QUALITY OF LIFE IN DIMAPUR AND ITS PERIPHERY

BY

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DECLARATION

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

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CHAPTER-I

QUALITY OF LIFE

A QUANTITATIVE MEASURE OF LEVELS OF WELFARE.

1.1 Introduction

It is customary to begin the study of a subject with its definition in which one makes a precise statement of its essential nature and scope. This provides the bounds within which we confine ourselves in analyzing the concept. However, in this study, we shall part with the convention and try to approach the subject by tracing the different stages of development that has taken place in the study of the concept thus far. This will enable us to have a bird's eye view of how the subject has evolved over certain period of time.

1.2 Definitions of QOL

A study on Quality of life is hardly a few decades old. Moreover, whatever little studies done are mostly from different approaches than economics. Hence, a wide scope exists for doing more research in the particular field.

Aristotle mentioned **good life** in his writings in the past, which in modern times may be termed as quality of life (QOL). Another writer termed it as the **state of well being** which is the product of interplay of Social, Health, Economic and Environmental conditions, which affect human and social development. The degree to which a person enjoys the important possibilities of his life, or how good life is, arises from variety of life conditions that work together in complex ways. All these factors directly or indirectly affect QOL of the people. Still another says that the study of QOL is an examination of factors that contribute to the goodness and meaning of life as well as people's happiness.

The use of the phrase **quality of life** dates back only to 1964, though no agreement yet exists as to what meaning it carries (**McCall**: 1975: p.229). Since the manifestation of life and the immanent life processes denote an indefinite field of concerns, QOL is treated as an all-inclusive notion (**Mukherjee**: 1989: p.23). Accordingly, many scholars from different Disciplines have tried to study and define QOL in their own perspectives, which resulted in multiplicity of definitions of QOL.

McCall opines that "quality of life" refers to "life in a certain society" or life in a certain region of the earth's surface (**McCall**: 1975:

p.232). **Arnold Michell** *et el.* define QOL as "an individual's overall perceived satisfaction of his needs over a period of time" (**McCall**: 1975: p.236). **Dalkey** *et al.* define the term QOL as "a person's sense of well-being, his satisfaction or dissatisfaction with life or his happiness or unhappiness" (**McCall**: 1975: p.236). **McDowell** and **Newell** (1987) suggest that QOL relates both to the adequacy of material circumstances and the people's feelings about these circumstances (**Raphael** *et al.*: 1996: p.66). **Coulter** (1990) defines QOL as "a sense of personal satisfaction with life that is more than just pleasure or happiness and yet something less than meaning or fulfillment" (*ibid*: p.66). Thus, QOL refers to life in general which is dependent on the living conditions prevailing in a community or region where one belongs. Hence, QOL refers to welfare enjoyed by the people and is determined by a host of things like, consumption of goods and services (both private and public) consumed by the residents. This includes consumption of goods and services that make up the standard of living of the consumers, the unpriced bounties of Nature like fresh air, open sky, water, sunshine, scenic beauty etc. and the individual's own perception about those conditions.

Since QOL refers to the overall well being which is not defined, the researchers are compelled to use their own common sense. As a result, the study of QOL is not thoroughly scientific (in the sense of being a positive investigation). The indicators, currently being employed in the studies of QOL, are normative rather than descriptive in nature e.g. satisfaction over job or family. Hence, there is a surge of interest for devising a new approach to studying QOL (**Bunge**: 1975:p.76-77).

Raising the quality of life, defined as the state of material well being of a community or an individual on account of availability of, access to and consumption of the requisites of generally aspired conditions of living, is ordinarily an important objective of almost all socio-economic and political endeavours. For determining the direction of such endeavours and stressing particular points or aspects pertaining to the same, one has to measure the extent of quality of life that a community has attained. Then one may also investigate into the nature and the determinants of quality of life attained by that community to choose the correct type of instruments for policy or planning purposes.

Yet, one must distinguish quality of life from standard of living. Standard of living is defined by the state of consumption activities

pertaining to the material requisites of well being that is commanded by the means at the disposal of the consumer and consumption of which goods and services is willful and optional (volitional). Quality of life is inclusive of the standard of living and something more. Beyond the standard of living, it includes the impacts and effects of a willful or compulsory consumption of the externalities in the surrounding, natural or man-made, appealing or obnoxious, that defines the consumer's state of living in its entirety.

Any economy at a particular instance has a fixed amount of material as well as oligarchic wealth (i.e. accessible only to a few, and in the sense of **Roy Harrod**) that it can offer to the consumers. Here *wealth* means "goods and services", not necessarily *commodities*, whether natural or man-made. Similarly, it also has a fixed amount of material and oligarchic nuisances, "bads and dis-services", whether natural or man-made, to offer to the consumers. The offer, optional or compulsory at the end of the supplier, might be priced or gratis and the acceptance of the offer may similarly be optional or compulsory at the end of the consumer. Some elements of these types of wealth as well as nuisance permit exclusion while some others do not. Either the supplier or the consumer or both may exercise exclusion. While the standard of living entails the consumption of

material wealth that permits exclusion at both ends (by the supplier as well as the consumer), the quality of life consists of the consumption of both types of wealth and nuisances (material as well as oligarchic) of both denominations (excludable as well as un-excludable). An example would suffice to make the point clearer. A car is a material wealth that is excludable at both ends. Its consumption is a measure of the standard of living. When many in number, the individuals using car would create a social scarcity for parking facilities (oligarchic wealth) as well as pollute the surrounding. One person's standard of living furthers nuisance (social scarcity and pollution) for another person that is neither excludable (at both sides) nor compensated for and strains the quality of latter's life, though it may not affect the latter's standard of living adversely. A rise in the standard of living of the many in the society would often degrade the quality of life, not the standard of living, of the most, including those who enjoy the higher standard of living. This is the paradox of affluence (**Hirsch**, pp.27-54). It does not mean, however, that poverty of individuals or that of the society as a whole begets higher quality of life. Enough supply of material wealth (both private and public) and the higher standard of

living of the many is a necessary and vital ingredient of quality of life at individual as well as community level.

As mentioned above, Quality of life refers to the extent of welfare enjoyed by the people. It is determined by the living conditions prevailing in a particular area, state or country. It comprises the whole gamut of consumption of goods and services of both private and public, consumed by the residents, including consumption of goods and services that make up the standard of living of the consumer and his family members on the one hand and un-priced bounties of nature, like fresh air, open sky, scenic beauty, sun shine etc. on the other. Thus, quality of life depends upon a host of factors that directly or indirectly affect the welfare of an individual (or the society).

1.3 **Towards Quantitative Measurement of Quality of Life**

All of us have an intuitive understanding, common sense and conventional wisdom, of what "Quality" means. It may be difficult to articulate but one may quote the following passage from the **Pirsig**'s book entitled *Zen and the Art of Motorcycle Maintenance.*

"QUALITY ... You know what it is, yet you do not know what it is. --- is self contradictory; -- some things are better than others, that is, they have

more quality. – when you try to say that the quality is, apart from the things that have it, it all goes poof! There is nothing to talk about. – if you cannot say what quality is, how do we know that it even exists? If no one knows what it is, then for all practical purposes it really does not exist at all. – for practical purposes it really does exist. What else are the grades based on? Why else would people pay fortunes for some things and throw others in the trash pile? Obviously some things are better than others.... – what is betterness? So round and round you go, spinning mental wheels and nowhere finding any place to get traction. What the hell is quality? What is it?" (Quoted in *Manual of Self Study* (vol 3), **National Assessment and Accreditation Council, Bangalore**, 1998, p. 2.).

To assert something on quality, therefore, one must express it quantitatively. One must use some scale of measurement. The first step in doing that is to identify at least two distinct real states (e.g. high quality and low quality) and associate these states with different points on the number line. Next, assuming a monotonic increase from low to high, graduation of the scale is done. This is how temperature is measured. Two distinct states of water (ice and vapour) are assigned two different points on the number line (zero and hundred in the Celsius scale or 32 and 212 on Fahrenheit

scale) and having assumed a monotonic increase of temperature of water from the state of ice to the state of vapour, the scale is graduated. The Beaufort scale of wind velocities used in meteorology ranging from calm (zero) to hurricane (twelve) is another example of quantification of quality. Measurement of hardness of substances (the Mohs' scale, based on scratching) and quantification and coding of colours in painting (for hue, value and chroma) are based on the similar logic. This logic should be applicable to measurement of quality of life as well. It is practicable to measure quality on an interval scale at least, though its measurement on the ratio scale might be inappropriate since it is difficult to define the absolute zero (**Kothari**: 1995: pp. 85-115) of quality of life.

Initially, attempts were made by various scholars in the past to measure quality of life in different parts of the world by employing per capita income as an index. The guiding logic behind such a choice has been two-fold; first, that income determines expenditure on quantity and quality of various goods and services that in turn determine the economic welfare of the consumer, and secondly, per capita income is also indicative of the level of development of an economy, which goes hand in hand with the level of economic welfare attained by the people participating in that

economy. However, per capita income as an index has been proved inadequate for any meaningful measurement of the concept of quality of life. Modern thinkers are of the view that quality of life depends upon various factors and not just per capita money income. So, in order to arrive at a meaningful assessment of quality of life, one needs to examine the whole gamut of consumption of goods and services of both private and public, consumed by the residents, along with the general condition of living that determine his welfare. A thorough investigation would be required in the following areas of life: Food, Shelter and Clothing; Housing, Radio, TV, Furniture etc. available to the people; public goods items like Roads, Electricity, Water supply, Drainage and Sewage systems, Education, Market, Health and Recreation facilities, Transportation, Literary facilities and above all, the general conditions of living. This would show the level of enjoyment of the fruits of civilization by the people. This would enable us to arrive at a meaningful assessment of Quality of Life in any particular area being studied.

1.4 The Gross National Product as a Measure of Quality of Life

Ever since economists began measuring the level of welfare and economic development, GNP and related measures have been used as an index. The guiding principle behind such a choice could be:

a) that income determines expenditure and quantity and quality of various goods and services that in turn determine the economic welfare of the consumer,

b) that GNP per capita is also indicative of the level of economic welfare attained by the people participating in that economy, and

c) that economic growth has a tendency to automatically trickle down to the poor and if it fails to do so, the government would take corrective measures (**Streeten** and **Hicks**: 1991: p.55),

Unfortunately, however, this does not go well. Instead, it is observed that despite increase in per capita GDP, level of living of the masses remained unchanged in many countries, because development in the level of living depends on to what extent per capita GDP is transformed into social development (**Mazumdar**: 1996: p.245). Further, growing attention to the social, political, economic and environmental health of the nation has led to

the quest for the other indicators, which will more adequately reflect the overall "health of the nation and its well being" (**Liu**: 1974: p.187).

"By 1950s it had already become clear that in spite of the widespread use, per capita GNP is insufficient measure of well being of citizens. Thus in 1954, an expert group within the UN suggested that we should not rely on monetary measures alone; the measurement of well being, should be based on several different components, together making up the level of living" (**Erickson**: 1999: p.67). One of the reasons for this frustration is simply because GNP cannot be relied upon as a good measure of the non-material basic needs which are not convertible into monetary terms.

Having confirmed the inadequacy of GNP for measuring human welfare and economic development, the search now began for an alternative approach or measure. The result was that the concept of **social indicators** was born. This new approach would enable the researchers to measure various concepts like development of health, nutrition, housing, income distribution, cultural and social development and other attributes of well being.

1.5 **Inadequacy of GNP as a Measure of QOL and the need for Social Indicators**

An indicator is a token or symptom of some condition as paleness may indicate bad health and high unemployment figure, a sick economy. Every indicator points to, or is a token of, something else as litmus paper colour is an acidity indicator (**Bunge**: 1975: p.66). As the indicator is meant to indicate to something, the role of Social indicator is to indicate the affairs of the society. Thus, **Carlisle** defines social indicators as "*the operational definition or part of the operational definition of any one of the concepts central to the generation of an information system descriptive of the social system*" (**Carlisle**: 1972: p.25).

1.6 **Uses of social indicators**

The above definition indicates the following uses of social indicators:

a) Social indicators are useful in providing comprehensive data on problems arising at any one time and demanding urgent attention like the immigrant problem, the problems of the aged and the poor, etc. and to devise ways and means to solve them.

b) Social indicators lead us to those social conditions considered desirable by policy makers towards which action is warranted. This will provide measures of the effectiveness of social policies aimed at their achievement.

c) Social indicators intend to describe the social system and changes taking place within it. These indicators are subject to regular production as time series data to make them relevant variables for social research.

d) Social indicators are also information indicators, which help the researchers to predict the future events that might take place in the society.

e) Social indicators also serve as a means to develop methods of monitoring the progress as well as effectiveness of social policies and programs.

1.7 **Types of social indicators**

Basing on the above listed uses, we can classify the social indicators into four categories as; 1) Informative indicators, 2) Predictive indicators, 3) Problem oriented indicators, and 4) Program evaluation indicators.

In short, social indicators are the means of assessing the social well being of individuals and groups. They are not merely economic but much broader in dimension. In fact, economic indicators are a part of social indicators. The term *social indicators* have been used loosely as to include a whole range of human, economic, social, cultural and political indicators.

1.8 **Objectives of social indicators**

The following are the objectives of social indicators:

1. To provide more complete and precise answers to many socially relevant questions: how healthy are we? how educated? how adequate is our housing? who are the poor and underprivileged? are those who need help from the welfare state those who get it? etc.
2. To monitor more adequately the effectiveness of social policy - policies are formulated for human beings but their effectiveness is often measured in the pecuniary units spent and in the manpower employed or services rendered. Social indicator aims at helping the assessment of such conditions.

3. To sound warning to emerging problems, e.g., pollution, racial tension, drug addiction and to redress the information gap once these problems have been recognized (**Carlisle**: 1972: p.23).

1.9 History of development of social indicators

In the pre-historic period, a type of social indicator was developed when following Joseph's interpretation of his dream, Pharaoh decreed measurement of all the lands of Egypt so that, the corn produced by one-fifth of the land could be stored in Joseph's "ever normal granary" for the impending seven years famine (**Bible**: **Genesis**: 41: 33-34 as quoted by **Bauer**: 1966: see preface-x). On another occasion, God instructed Moses to take census of all the people of Israel to ascertain the number of people who are able to go to war. Thus, preparation for war necessitated the census (*ibid*: **Numbers** 1: 1-3). This could be called social statistics or social indicator. The Romans were also in the habit of conducting census enumeration from time to time. Following one such decree from Caesar Augustus around 5 BC, Joseph and Mary went to Bethlehem for census enrolment and in that trip Jesus was born. (Ibid: **Luke** 2: 1-5). This exercise

was done apparently for better governance and effective administration of the empire.

During 1920s the idea began to take shape that society should produce a quantitative picture of itself and its changes. It resulted in appointment of Presidential Committee in 1929 in the US. It began its task and produced a massive report called "Recent Social Trends" 1933. This formed the forerunner for 'social indicators movement' in the latter years (**Judith**: 1975: p.40).

In the modern times, interest in social indicators has been firmly established. It all began when National Aeronautics and Space Administration (NASA) commissioned study of the impact of the space program on American society which resulted in a book that popularized the term "social indicator" (**Bauer**: 1966 as quoted by **Judith**: 1975:p.42).

Since then, a great deal of work has been undertaken by various agencies to compile a set of social indicators like 1954 **UN** Report on the "definition and measurement of standard and levels of living", **UN** (1975), **OECD** (1976), Agency for International Development (**AID** 1976), **UNESCO** (1977) to mention a few.

1.10 **Composite Indices**

Of late, development of social indicators has given way to emergence of "composite indices" which appears to be more efficient in measuring various aspects of life. Resultantly, a good amount of work has gone in with a view to replace GNP meaningfully by these sets of statistics (**Streeten**: 1991: p.61). **UNRISD** 1966 developed "the level of living index" and again in 1972 **McGranahan** *et al.* constructed "Development Index" basing on 18 core indicators. A study by the United Nations-**ECOSOC** (1975) sought to analyze development by ranking 140 countries by seven indicators other than **GNP**. Overseas Development Council (**ODC**), under the guidance of Morris D Morris constructed Physical Quality of Life Index (**PQLI**) which uses three simple indicators with equal weights to attempt to measure fulfillment of "minimum human needs, life expectancy at age one, infant mortality and literacy".

With the help of composite indices almost everything about society like health, nutrition, housing, income distribution, aspects of culture and social development, economic development, education, sanitation, water supply etc. can be measured somewhat accurately. These composite indices include not only social indicators but also all other types of indicators such

as political, economic, culture, level of living, welfare, development indicators as well as quality of life indicators.

1.11 **Quality of Life indicators**

Now the question arises as to what is QOL indicator and what role it plays in the study of the society. **Mario Bunge** defines QOL indicator as follows:

"Let S be a set of variable indicators of the state of the individual component of some human community C. Then x belongs to S, x is a QOL indicator if and only if x is an indicator of the physical, psychical, social, or cultural well-being of the individual members of C" (**Bunge**: 1975:p.74).

In other words, a QOL indicator is supposed to contribute to the assessment of this degree of well being. Hence, "the quality of air people breathe and the water they drink, the value and quantity of food they eat, the size and quality of their shelter, the satisfaction they derive from their family and their jobs, the degree of their participation in the affairs of their community, indices of work and street safety, the number of books read and theatrical performance attended – all these qualify in principle as QOL indicators" (ibid: p.74-75).

1.12 **Types of QOL Indicators**

According to the coverage and the scope, there are different kinds of QOL indicators, as shown below:

1. Physical - e.g.. Access to Natural resources and hygienic water
2. Biosocial - e.g. Health, Housing conditions and Sanitation
3. Psychological - e.g. Marriage and job satisfaction
4. Technical - e.g. Percent of skilled workers or number of people per washing machine
5. Economic - e.g. Income and wealth distribution
6. Social - e.g. Welfare services and public safety
7. Cultural - e.g Opportunities for intellectual and artistic creation and for continuing education
8. Political - e.g. Participation in community decision-making and strength of political coercion

The list is not exhaustive as newer and newer dimensions evolve day by day in the study of QOL as development of human society in general and development of the subject in particular takes place.

1.13 The Subjective and the Objective Measures of Quality of Life

On the criterion of perception, recording and measurement the indicators of QOL that we derive from different aspects of life can be classified into two broad categories, *viz.* a) Objective indicators, and b) Subjective indicators. These indicators are termed as "the new scientific approaches to measuring QOL" (**Diener** *et al*: 1977:p.191). While *objective* indicators refer to objectively observable conditions of social life without regard to people's perception and assessment of these facts, *subjective* indicators are based on people's perception and assessment of their lives under given circumstances. An example would simplify the concept; the number of persons per room is an objective indicator, while people's expressed satisfaction with their housing is a subjective indicator. In short, prevailing "conditions of life" form objective indicators while "experience of life" of the residents form subjective indicators. (**Oppong** *et al.* 1988:p.605-6). Objective indicators may be termed as indirect measures whereas subjective measures of QOL are direct measures (**Andrews**: 1974:p.280). Scholars have forwarded many arguments for and against these two measures; yet, they both have positive roles in the sense that they at least indicate the general conditions of people's lives. There is also a

contention that both of these are necessary in the sense that they are complementary, e.g. objective data about unemployment, hospitalization, crime rates etc. would be lifeless unless some implications about their human meaning could be drawn. Moreover, neither type can properly be interpreted in the absence of the other (**Rodgers** *et al* 1975:128). Hence, both objective and subjective indicators are necessary for studying QOL of any community.

It is needless to overemphasize that the wearer best knows where the shoe pinches. The quality of life of a person is what he perceives it to be: very good, good, satisfactory, bad or miserable. Assume the distribution to be a unimodal one. Then the modal perception might be a measure of the quality of life at the gross level. They say 'Vox populi vox dei'. The voice of the people is the voice of the Truth. Thus we define the subjective measure of quality of life. However, in the real life the opinion of each individual reflects his own position vis-à-vis his own ideals (**Galbraith**, pp. 196-197). Opinions might not be expressed sincerely. General opinion might lead only to a patent falsehood, not the truth.

So, the critics would not agree. Think of a positional economy. Think of a society whose members are divided into the predator and the prey; the

masters and the maids; the "MEN" and the "bungled and botched". Much of this is there at the philosophical level. May we construct QOL Index reflecting conditions of the underdog (**John Rawls**)!

A man is known not by what he says or opines, but by what is revealed through his action. What almost everybody aspires for, in action, is what improves an individual's quality of life, if achieved; what almost everybody is averse to, in action, is what erodes an individual's quality of life, if met with. This dictum might help in defining an objective measure of quality of life. This stand on measurement of quality of life is, nevertheless, subject to a similar criticism. One may invoke the paradox of affluence.

Both stands contain some truth. A purely subjective measure of QOL may be misleading in its contents as well as imports to policy guidelines. On the other hand, a purely objective measure might score no better. One must strike a balance and choose a judicious mix of the two. On certain issues, the objective realities are telling and opinions do not add much. Yet, on certain other issues there may be no clue other than seeking the opinion of the people to depend upon. Therefore, the methodology of constructing a measure (index) of QOL may vary from place to place as well as from purpose to purpose which such a measure would serve.

1.14 **Importance of QOL**

The ideological thrust of the study of QOL is to find out as to how our life is going and to make necessary adjustments that will in turn enable us to live quality life that is both meaningful and enjoyable. Although research in Quality of Life is hardly a few decades old, it has spread all over the world. The concept has become so popular that the politicians, who previously spoke of welfare of the society, now use the phrase "quality of life" of the people (**Mukherjee**: 1989:p.23).

In the words of **P. Kind**, the research on QOL is hardly two decades old; yet, this has become the latest catchphrase to decorate the Newspapers headlines and to enhance the political debates. Unfortunately, however, the meaning is usually left to the imagination of the reader or listener, since it is seldom defined. Resultantly, it is often exemplified in terms of the context in which it is used (**Kind**: 1990:p.63).

1.15 **Quality of Life in an Urban Area**

To narrow down and move closer to the study at hand, it would be pertinent to conceptualize the dimensions of Quality of life in an urban area and its periphery. Quality of Life in a town is a multifaceted phenomenon,

determined by the cumulative and interactive impacts of numerous and varied factors like housing condition, urban infrastructure, access to various urban amenities and facilities, income, standard of living, physical and social environment, etc. The "feel good" factor also is there. People strive to optimally choose residential location and the result of such choice is the variation in quality of life according to the location of residential units. Generally, Central Business District (CBD) and its immediate surrounding exhibit crowding and distant peripheries lack in amenities and facilities, affecting quality of life of the residents adversely. And with this concept of Quality of Life in an urban area, we shall now proceed to study the quality of life in **Dimapur and its periphery**. However, before doing so, we need to familiarize ourselves with the area under study, that we shall be doing in the next chapter.

CHAPTER-II

THE STUDY AREA: DIMAPUR AND ITS PERIPHERY.

From the previous chapter we have acquired some knowledge about the concept, methods of measurement, stages of development and importance of Quality of Life (QOL). What we need now is to use these methods to study the level of QOL enjoyed by a community or region, various factors that determine QOL, and variations in the QOL among different segments of the area under consideration. For this, it is essential to delineate the Study Area, i.e. Dimapur and its periphery.

2.1 The Present Study

This study is a modest attempt to assess the quality of life in Dimapur and its periphery. Dimapur town is the most important and cosmopolitan commercial centre of Nagaland, India, connected with railways, roadways and airways and hence often referred to as the gateway to Nagaland. Census 1991 reported a population of 57 thousand living in this town. The decennial growth rates of population during 1971-81 and 1981-91 were 165 and 73 percent respectively. We estimate that at present the population of

Dimapur is over one lakh. At a crow fly distance of about 8 kms (highway distance 16 kms) from the CBD of Dimapur, there is a small town, Chumukedima, with an estimated population of about 13 thousand. Our study covers this small township also.

Due to various geographical, political and economic reasons, Dimapur has neither grown radially nor linearly, but in the three quadrants barring the II (north-west) quadrant. We have conceptually divided the township, its suburb and the periphery into five sectors, (1) CBD and its immediate surrounding, the central sector, (2) first order ring around the central sector, (3) second order ring around the central sector, (4) third order ring or the terminal ring of the township, and (5) rural settlements in the vicinity of the township. It would be pertinent to note here that the word 'ring' may not be taken literally, in the sense of the Euclidean geometry of a two-dimensional space. It should rather be conceptualized as a zone embedding (or being embedded within) another zone of a distinct order of urban characteristics and civic activities. Thus, a *ring* is a geographical-cum-functional concept as being used in this study. Although the urban area of Chumukedima is away from Dimapur, it resembles the sites in the first order ring around the central sector. We have, therefore, included

Chumukedima in the second sector, though it is geographically far away from the core. Then twenty one sites have been chosen randomly from these sectors; four each from the first and the second sectors, five each from the third and the fourth sectors, and three from the fifth sector. The fifth sector works as the control sector. From each site, we have selected eleven households randomly to collect information on the scheduled variables. The researcher has personally visited all the sample households and collected information from them on a multitude of variables reflecting various aspects of quality of life (e.g. education, housing, utilities and amenities, accessibility, waste disposal and environment, income & expenditure, entertainment, health conditions, etc.). In total, we have surveyed two hundred thirty one (231) households. Eleven households hail from Chumukedima. In what follows, we shall describe the study area. However, Dimapur being only a small town in the state of Nagaland, it is pertinent to devote a few lines on the mother state (Nagaland) too.

2.2 **The state of Nagaland**

Formerly, Nagaland was known as *Naga Hills* (**Elwin**: 1961: pp.18-33) from the time it was designated as a district in 1866 (**Ramuny**: 1993:

pp. 8-9), under the Lieutenant Governorship with Samaguting as headquarter (**Sema**: 1986: pp. 79-97). Later on, it became a district in Assam with the same name. In 1957, it was re-named as *Naga Hills Tuensang Area* (NHTA) by including the erstwhile Unadministered Area of Tuensang district. Finally, the State of Nagaland Act 1962 gave the district a new name; **Nagaland**.

Thus Nagaland attained statehood on the 1st December 1963 with Kohima as its capital. Initially, it had only three districts: Kohima, Mokokchung and Tuensang. Five more districts have since been added; they are - Wokha, Zunheboto, Phek, Mon and Dimapur, thereby raising the total number of districts up to eight in all.

i. Physical Feature

Nagaland lies between $25^0 60'$ and $27^0 40'$ North Latitude and $93^0 20'$ and $95^0 15'$ East Longitude. It occupies an area of 16,579 Sq. Kms. It is bounded by Myanmar (Burma) and Arunachal Pradesh in the East, Assam in the North and West, and, Manipur in the South. The topography of the state is predominantly hilly with plenty of spurs and ridges (**Directorate of**

Economics and Statistics: Pp.2-4). The altitudes vary between 194 meters to 3840 meters. It receives annual rainfall of 2500 mm.

ii. Population

Nagaland has a population of 1,988,636 according to 2001 (Provisional)

Census, of which 1,041,686 are male and 946,950 are female. Density of population is 120 per sq. kilometer and the decadal growth rate of population is 64.41% in 1991-2001 as against 56.08% in 1981-91. The literacy rate stands at 67.11%. Nagaland's population consists of 0.19% of the total population of India, which stands at 10.27 million in 2001.

iii. The people

The population of Nagaland is almost entirely tribal except in the district of Dimapur. There are 15 recognized tribes in the state, *viz*, Angami, Ao, Chang, Chakesang, Khiamniungan, Kuki, Konyak, Lotha, Phom, Pochury, Rengma, Sumi, Sangtam, Yimchungru and Zeliang. There are also a few sub-tribes among these major tribes. All the tribes have their own distinct languages and thus developed certain amount of variations in their

cultures over time. Every tribe uses a common script, i.e. Roman Script, as none of the tribes have a script of their own. English is used as the official language and Nagamese (which does not have a script) is used as a second language for all practical purposes.

The sheer love of the open, and the peculiar history of *Head Hunting*; a game played by the Nagas to exhibit their gallantry, using the enemy's head as a trophy, compelled the people to build their villages on the peak of the hills, some as high as 2000 meters.

In Nagaland, Tribal and Village Councils regulate the social life. The Regulation of 1945 gives power to the Tribal Councils to try Criminal as well as civil cases and to administer justice. (**Directorate of Economic and Statistics:** pp.2-4). The *Customary Law* prevails over all other statutes of the country, and no other act of Indian Parliament can be enforced in Nagaland without the approval of the State Assembly.

iv. Livelihood pattern

Agriculture is the mainstay of the people. About 73.38% of the work force are dependent on it (**Directorate of Economic and Statistics:** pp.2-4). Majority of the people practice Shifting Cultivation, and only a few are

engaged in Settled Cultivation both in the plain as well as hill areas. During the off seasons, people engage themselves in Weaving, Black smithy, Carpentry, Handicraft and similar activities. There are also manufacturing activities, which engage a considerable amount of the population. Unfortunately, however, this sector has not developed satisfactorily.

2.3 **Dimapur and its periphery:**

i. Introduction

Among the towns of Nagaland, Dimapur enjoys a special status because of its unique location. It is the only town of the state, situated on the plain area having excellent road, rail and air links with various parts of the country. It was designated as a town for the first time by 1961 Census when its population recorded 5753 persons. It received impetus as Nagaland attained statehood in 1963 and the subsequent developmental plans accelerated its growth (**Directorate of Census operations**: p.12). The growth was so rapid that at one time, it acquired the name as the ***fastest developing town*** in the North-East India (**Ao**: 1993: p.145).

Dimapur lies between $25^0$54' 30" North Latitude and $93^0$44'15" East Longitude. It is located on the Western part of Nagaland bordering Assam's

Karbi-Anglong district. It occupies an area of 18.13 sq. kms. i.e.3.45 kms. from North to South and 6.30 kms. from East to West (**Nagaland Town Planning Organization**: p.5) The area of the town was only 0.41 sq.kms. in 1961, which increased to 15.90 sq.kms. in 1971, and 18.13 sq.kms. in 1981. It is expected to have increased much further by now according to its ever-expanding nature. This indicates the necessity of planning for the city. It is bounded by Lengirijan rivulet and Karbi-Anglong Hills on the North, and by Highlands on the South. On the East, the boundary throughout is formed by the river Dhansiri and on the West; the town area merges with the hills and the Reserved Forest.

ii. The Population

The Population of the town was 5753 according to 1961 Census. It rose to 12426 in 1971, 32878 in 1981, 57182 in 1991 and 107614 (provisional) in 2001. The decadal growth rate was 172.04% in 1961-71, 110.06% in 1971-81, 73.92% in 1981-91 and 88.19% in 1991-2001. This enormous increase in population took place in spite of the fact that birth rate

has been pushed down due to improvement in medical facilities, especially in the town area.

Household population also has been increasing at a phenomenal rate: 401 households only in 1947 that rose to 2430 in 1963. It went up to 4410 in 1971, which reached 12,581 in 1991, and 31,340 in 2001. This implies that the number of households increased by 506% between 1947-63, by 81% between 1963-71, by 185% between 1971-91 and by 149.11% between 1991 and 2001. This confirms the rapid growth of the town. The sudden spurt in the population of both people and households has attracted the inquisitive eyes of many demographers, sociologists, economists and researchers and, certainly, it is one of the reasons that prompted the author to undertake a study on this town.

iii. Topography of the town

The area covered by the town and surrounding villages is an undulating plain, characterized by an acutely broken topography. It is surrounded by hills and highlands on three sides. The eastern portion of the town is covered by the flood plain of the river Dhansiri, and the area, east of Golaghat road, is subject to flooding almost every year. The major portion

of the area between the road and Dhansiri river remains marshy and water logged, making it difficult to plan any developmental activities (**Directorate of Economics and Statistics**: pp.2-4). The town is generally gradient towards the east.

iv. Climate

Dimapur has practically two seasons: Dry Season (Oct.-May) and Wet Season (June-Sept). Dry season may be sub-divided into Hot and Cold weathers. Hot weather begins from March whereas Cold weather begins from November. May remains the hottest month where the mercury shoots up to 40^0C. South West Monsoon normally becomes active by the 2^{nd} week of June, while heaviest rainfall occurs during the months of July and August. There is no Meteorological office at Dimapur to report the latest samples of climatic changes, though we have a record of one year sample, collected by Agriculture Department, Government of Nagaland, Kohima, for the year 1976 that shows the following;

Rainfall	:	128.8cms
No rain days	:	91 days
Maximum Temperature	:	30.05^0C
Minimum Temperature	:	12.10^0C
Relative Humidity	:	73%

The above figures would gives us a rough idea about the climatic conditions of the region in which the study area is located.

v. Flora and Fauna

The main forest products of Dimapur are Bamboo, Timber, Thatch and, various species of Medicinal plants, which are rarely found in different parts of the country. Some important tress like Nahor, Sam, Poma, Khokan, Ajar, Amari, Gonsoroi, Sonari, etc. are found in plenty. The Forestry administration and its development have been placed under the charge of Forest Officer of the rank of Deputy Conservator of Forests with head quarters at Dimapur. The Forests are generally of Wet Evergreen type with a high density of flora, rich in a number of species. Timber of gigantic stature and remarkable height are grown especially in the foothill areas. The

town enjoys the advantage of having Rangapahar Reserved forest measuring 20.20 hectares in its vicinity.

Dimapur is a home to many animals and birds. Myna, Sparrow, Cuckoo, Sunbird, Parrot, Parakeet, Robin, Quail, Wood-pecker, Horn-bill, Swift Hawk, Crow, and other colourful wrens are available in the region. Varieties of animals like Snakes, Monkeys, Tigers, Deers, Porcupine, Squirrels, etc. are also found. A full-fledged Forest Division named as Wild Life Preservation Division has been established at Dimapur to protect these precious and rare species.

2.4 A History of the Growth of the Town

Dimapur has a long historical background tracing its origin to the Kacharis in whose language, *Dima* means a big river, as *di* is water or river and *ma* is big. This word was always used with special reference to the Dhansiri river on whose bank the town was and still is situated (**Gaite**: Pp.92-251). As all early human settlements took place on the banks of big rivers, and, at the same time, there is no other big river in the vicinity of the town, it is reasonable to assume the accuracy of the above version. Supporting this view the District Gazetteer of India, Nagaland, Kohima

district, states: Dimapur, originally a Kachari word *Dimasa* after the river which flow through it, was renowned headquarters of old Kachari kingdom, before it was shifted to Maibong (**Bareh**: p.215). Other historians argue that the name of the town *Dimapur* is believed to have derived from a character in the Mahabharata called *Hidimba*, which was later on, named as Dimapur (**Nagaland Town Planning Organization**: p.4). This version asserts that Dimapur is derived from the word *Hirimbapur* which in turn is derived from the word *Hirimba,* i.e. the name of the Kachari kingdom. There is an interesting story behind this; Bhima the son of Pandu, during the days of exile of the Pandavas, came to Assam and met Hirimba, the demoness. He married her and had a son called Gatotkacha who fought in the great battle at Kurukshetra on the side of the Pandavas. Since then, the Kacharis have been known as the decendents of Gatotkacha, and their kingdom was designated as *Hirimba* after the name of the mother of Gatotkacha. Their capital came to be known as *Hirimbapur* and the Kachari kings assumed the title of *Hirimbeswar* or the lord of Hirimba. Later on, *Hirimbapur* was transformed into *Dimapur* (**Dutta**: 1962: P.98). It is not unlikely that 'Hirimba' is a transformation of the composite Sanskrit word '*Sri Amba*', meaning 'the Venerable and Generous Mother', for the speech sound of 's'

is often a hard 'h' (similar to that in heavy, hope or heart) in the Assamese tongue in the similar manner as 'Sindhu = the river *Indus* as spoken by the Greek' was spoken as 'Hindu' by the Persians. Whatever might be the views of the historians or the conjecture of the phoneticians/philologists, it is clear that Dimapur was once the capital of Kachari kingdom that extended up to North Cachar and the river Dikhu in the east, and that development of Dimapur centered around the river Dhansiri till railways were introduced and the National Highways crisscrossing the town accelerated its growth.

As a result of the development of cultural relationship between the Angami Nagas and the Kacharis, the unrecorded history of Dimapur as well as the Kacharis began to unravel slowly. It became known that the Kacharis came from the Jaintia Hills as early as A.D 1375. On one occasion, a Kachari Rajah fled to the Naga Hills in the vicinity of Dimapur. Accompanied by several followers, he settled there permanently, making Dimapur as the capital of Kachari kingdom, which extended up to North Kachar.

In course of time, the relationship between the Kacharis and the Angamis became strained. As a result, the Kacharis began to defend

themselves from Angami raids by building fortresses, the remains of which are still lying scattered in Dimapur.

In the 14th century A.D, Dimapur became a flourishing city. Several industries like textiles, cotton ginning, pottery, etc. produced from Dimapur were sent to Golaghat and Rangpur; the capital of the Ahoms.

The Ahoms attacked the capital of Kachari kingdom in A.D 1490, but were repulsed successfully by the defenders. They made a second and successful attack in A.D 1536, when the Kachari king Det Singh was killed. Consequently, the city was ravaged completely by the invaders. Thus, the glory of Dimapur went down with the defeat of the Kacharis. Only the ruins of the palace gateway, public buildings, tanks and other artifacts that once symbolized the greatness of Dimapur remain.

In the modern times, Dimapur is developing so fast that it looks as if it is trying to regain its past glory. Just a village in 1951, with a population of 1839 in a few colonies like Railway station, Post office, Police station, Old Burma camp and a small vegetable market, it became a census town only in 1961 with a population of 5357. Since then, Dimapur has been growing at a lightning speed, reaching a population figure of 57,182 in 1991 and 1,07,614 in 2001. In 1981 there were only six Wards in Dimapur,

whereas there are 21 Wards at present. This confirms that the town has increased in physical terms also, so much so, that it really calls for an urgent and proper planning for a modern city.

A simple analysis of the population composition of Dimapur makes one to conclude that Dimapur is mainly composed of people who have migrated from various places both from within Nagaland and India as well as from abroad. Looking from the household population angle, it only confirms our earlier contention. Many reasons could be attributed to the phenomenal growth of the town in terms of both people and household population due to a) Influx of foreigners from Bangladesh and Nepal, b) Rural-urban and Urban-urban migration from within Nagaland, c) Seasonal migration from Labor rich states of India like Bihar, d) Business migration, and finally, e) Natural processes.

Due to various reasons discussed above, the population of Dimapur is becoming highly mixed in nature. The following ethnic communities live in Dimapur presently; Assamese, Bangladeshis, Bengalis, Biharis, Burmese, Kacharis, Manipuris, Malayalis, Nagas, Nepalis, Punjabis, Rajasthanis, Tamilians, etc. The Socio-economic survey of Dimapur town conducted by the government agency during the year 1970-71 shows that 17.37 percent

households are composed of either originally settled or migrated from different parts of Nagaland, 16.80 percent are migrated from Bangladesh as refugees and the rest are people from different parts of India and Nepal. Thus Dimapur is a multi-racial and multi-lingual town that makes it a cosmopolitan town.

2.5 **Special Characteristics:**

2.5 **A. Transport and Communication**

Dimapur occupies a position of central importance in the region of the NortheEast India. It is considered the gateway of both the states of Nagaland and Manipur. As mentioned above, it is well connected by Roadways, Railways and Airways with many important towns and cities of India. This aspect is elaborated in the following few paragraphs:

i. Roadways

The National Highway No.39 connecting Dimapur on the Northern Flank with National Highway No.37 at Numaligarh in turn connects it with the important towns of Assam like Jorhat (130 kms), Dibrugarh, Tinsukia, Sibsagar and other Oil and Tea towns of Upper Assam and Nowgong and

Gauhati in the Lower Assam so also Shillong (406 kms), the capital of Meghalaya on the western side. On the southern direction, the National Highway No. 39 connects Dimapur with Nagaland state capital Kohima (74 kms) and Imphal (214 kms), the capital of Manipur. National Highway No.39 is the most vital road link for Assam, Nagaland and Manipur. All types of traffic of the aforesaid states move by this road, which passes through the middle of the town.

Another road, Highway No.36, connects Dimapur with Nowgong town of Assam and Gauhati (292 kms) *via* Dabaka. The same Highway links up with Diphu and Lumding through different link roads.

ii. Railways

Dimapur has the distinction of being the only town having Railhead in Nagaland. Railway was introduced by the then colonial administration as early as 1899. It has since been modernized and upgraded to Broad Gauge. It connects Dimapur with many important towns of the North East like Tinsukia, Dibrugarh, Lumding, Nowgong, and Gauhati, etc. Regular Train services to various destinations of India are available from Dimapur.

Important Trains like Rajdhani Express, Brahmaputra Mail, and North East Express, etc. connect Dimapur directly with the national capital, Delhi.

iii. Airways

The town is also well connected by airways. In fact, it is the only town in Nagaland, which has an airport. Regular Flight Services are operated to and from Calcutta with a destination to Dimapur by Indian Airlines. The Airport has been given a facelift recently and now is equipped to handle Boeing Services too.

2.5 **B. Industry**

Industrially, Dimapur has not developed much, though certain industrial activities have been spotted in the recent times. Several small and medium scale industries are located here, although there is practically no large-scale industry not only in Dimapur but also anywhere in Nagaland. Certain industries like Sugar Mill (though dysfunctional now), Rice and Flour Mill, Aluminum and Bricks factories, Timber Sawing Mills, Candle making factories, Wire nail industry, Manufacturing of Beverages, Cold Storage, etc. are some of the industrial activities undertaken in the town.

The District Industrial Centre, Dimapur, has established an Industrial Estate in the vicinity of the town where working sheds have been built and are being rented out to the entrepreneurs. Dimapur has been selected as an Economic Growth Centre by the government and accordingly preparations are on to provide minimum required facilities for establishing many new industries in the area.

Various Financial Institutions like Banks, Insurance Companies, Mutual Funds, etc. of the Government and Semi-government as well as private organizations have established their offices at Dimapur and are providing finance to the industrial entrepreneurs. Thus Dimapur is fast assuming the character of a major manufacturing centre in the region.

2.5 C. Agriculture

As it is predominantly a plain area, Dimapur has a well-developed agriculture. People practice Settled Cultivation here unlike in the hill districts. A good portion of the population is dependent on agriculture for their livelihood. According to 1981 Census survey report, roughly about 13.86% of the total land has been occupied by agricultural activities (**Directorate of Census operations**: 1988: p. 4).

2.5 **D. Market**

Since Dimapur has a well-developed infrastructure with urban character and favorable geographical location, it occupies a central place for all economic activities in the region. Market is no exception to it, which is rapidly assuming a distributive character, a *Mandi* town, for agricultural as well as industrial goods, serving as the transit point for all kinds of goods and services for its vast and rapidly expanding hinterland.

Dimapur plays the vital role as a nodal point of transportation for the whole region. The road transportation activities of Nagaland and Manipur states originate and terminate at Dimapur, so much so, that it is regarded as the lifeline for the twin states. Dimapur also serves as the regional market for all sorts of labour.

2.5 **E. Land use pattern**

Dimapur is situated very favorably in terms of its location and dominance that makes itself specially felt in such central areas as Banking, Wholesale trade, Regional Collection and Distribution of goods and services, Transport and Communication as well as Education. However, due to lack of proper planning, the town did not develop in a balanced manner.

There is a mix of land use almost in every pocket. Consequently, there is no especially demarcated area for Administration, Commerce, Residential, etc. (**Directorate of Census operations**:1988: p.12). The following paragraphs show the land use pattern as prevalent in 1981.

i. Residential Areas

Residential areas occupy 14.40% of the total area of the town. However, even the areas primarily earmarked for residential purposes are slowly being filled up with commercial type of buildings anticipating trade activities in the near future. This attitude of the private developers have created obnoxious problems such as congestions; leaving no room for open space, disrupting drainage and sewerage systems as well as encroachments on public lands, etc.

ii. Commercial Areas

Though Dimapur is known as the commercial capital of Nagaland, there is no particular area exclusively reserved for trade and commerce. Commercial area occupies only 1.55% of the total land although it has unofficially invaded and completely subjugated the residential areas. There

is no organized Commercial area, which can be classified as Wholesale, Retail, Storage, Repairing and Servicing shop areas, etc. All these different lines of trade are mixed in every part of the town.

iii. Industrial Areas

Dimapur has a good number of Small Scale Industries, most of which are located in the heart of the town in the form of residential-cum-commercial establishments. The residents, anywhere in the town unrestricted, set up all sorts of industries. This creates several environmental problems in the town. As mentioned earlier, an Industrial Estate has been set up in the western side of the town, and, together with this, the entire industrial establishments of Dimapur occupy only 0.95% of the town area.

iv. Government Reserved Areas and Administrative Areas

A few government departments have reserved certain areas for their office and residential buildings. Forest, PWD, Veterinary, Police and Administration departments have their own departmental lands, although

many of these areas have been either encroached or claimed by the private occupants, leaving only the hollow structure of the demarcations.

Administration department has been located on the western flank of the town. However, since the up-gradation of Dimapur to a district recently, arrangements are on to shift the department to Chumukedima. Other departments are all scattered throughout the town.

v. Transport and Communication

The town is divided in two halves by the Railway track from one direction, and by the two Highways (Nos.36 and 39) from another direction. This leads to acute traffic congestions in the centre of the town. Since it is an unplanned town, unauthorized constructions also hamper the efforts of the authorities to widen the roads or expand the railway yards. This adds to the existing problems further. Transport and Communication together occupy about 4.19% of the total area of the town.

vi. Slum Areas

There are a few settlements in the town that are designated as areas of sub-standard living. These are Thakurbari, Muslim patti, Janata Hotel area,

Eros Cinema area, West Yard, Dhobinala, Burma Camp, Nisatuo colony and many other areas where Muslim refugees and daily wage earning families reside.

Apart from these, other necessities like public utilities, *viz*, Recreational facilities, Schools, Hospitals, etc. occupy 11.87%, Agricultural activities occupy 13.85% and Water logging low land tracts occupy 7.28% of the total area. About 45.91% of the town area is still not yet developed and remains as vacant land.

The Town Planning Organization, Nagaland, gives the following table showing the existing land use pattern in Dimapur town before the preparation and implementation of the Master Plan for Dimapur.

vii. Existing land use pattern of Dimapur town in 1981

The existing land use in Dimapur town has been recorded (The Master Plan for Dimapur, 1975, p. 27) as follows:

Existing land use	Total area in acres	% of total area of the town
1. Residential Area	645.20	14.40
2. Commercial Area	69.67	1.55
3. Industrial Area	42.75	0.95
4. Transport & communication	187.71	4.19
5. Public Utility and uses	531.36	11.87
6. Agriculture	620.67	13.85
7. Water logged lands	325.36	7.28
8. Undeveloped vacant land	2056.99	45.91
Total -	**4479.71**	**100.00**

After the preparation of the Master Plan, the Nagaland Town Planning Organization (The Master Plan for Dimapur (for 1991): 1975, p. 115) recommended the following distribution of land use in the town:

viii. Proposed Land use pattern for Dimapur effective from 1991*

Proposed Land use (Area)	Area in acre	% of total arrea
1.Residential Area	1453.6	32.45
2.Commercial Area	135.0	3.01
3.Industrial Area	170.8	3.81
4.Government Reserve	566.3	12.64
5.Recreational land	1212.6	27.07
6.Circulation (Transport, Parking, Distribution)	786.2	17.56
7.Public and Semi-public lands	155.2	3.46
Total -	**4479.7**	**100.00**

The above table shows a better form of land use than the previous one. Obviously, if this proposition is implemented in letter and spirit, the

problem of congestion that is being experienced presently in the town would be eased to a great extent.

2.6 **Local amenities**

Dimapur offers a good number of facilities to its citizens and visitors. Like any other developing town these amenities are not properly regulated and maintained in many cases. Nevertheless, efforts are on to upgrade and improve the provision as well as delivery of these basic amenities for modern living.

i. Water Supply

Water Supply in Dimapur started in 1964 from a source near Purana Bazar and at Chumukedima near Diphu River. As the town grew, however, it became inadequate though the water was distributed to the town through elevated storage reservoirs located in various places. The condition has been so worsened that nowadays tape water runs hardly once or twice in a week. Only 42.4 percent of the population receives tape water (**Nagaland Town Planning Organization**: p.101), which also is much below the Environmental Hygiene Committee's recommendation of at least 40 gallons

per day per person for a population between 50,000 to 2,00,000. Consequently, 57.6 percent of the population depends on Well, Tank, Ponds etc, for drinking and cooking purposes. None of the localities receive 24 hours water supply in a day.

A new water source has been located at Diphupani river (Chathe) in the upper ridges of New Chumukedima village, which is about 18 kms away from Dimapur. Accordingly, works have been started to tap this source under the project named ***Augmentation of Water Supply to Dimapur town and extended colonies***. Under this project, the department of Public Health Engineering hopes to derive 15 MLD (Million Litres per Day) in summer and at least 84 MLD during lean season. This effort targets a supply of 135 litres per person per day for a population of 110,000. Thus the chances seem bright for Dimapurians to get decent and adequate water supply in the foreseeable future. At present PHED (Public Health Engineering Department) looks after water supply in Dimapur. According to this department's information, at present, about 7.5 million litres only, per day is being supplied to the town due to lack of infrastructure.

ii. Electricity

Electricity is provided by the Department of Power, Government of Nagaland by purchasing from other agencies like NEEPCO (North Eastern Electric Power Corporation), Power Grid Corporation, Government of Assam and Manipur, etc. The department has partially computerized system through which supply of power and the billing systems are regulated. At present the department supplies to the town a restricted peak demand of 25 Megawatt per day.

iii. Hotels and Lodges

There are quite a good number of Hotels and Lodges in Dimapur. Some are privately owned whereas others are government owned. Generally, Hotel tariff is cheap, say, ranging from Rs.30/- to Rs.1000/- per room per night. Varieties of food centres like restaurants, canteens and wayside amenities have sprung up all over the town. There is a Circuit House, an Inspection Bungalow, a Youth Hostel and many other departmental Guest Houses in the town that cater to the accommodation needs of the tourists.

iv. Local Transport facilities

Apart from Airways and Railways connections, Dimapur is well connected by Roadways with the neighbouring towns and cities of the North East like Kohima, Imphal, Golaghat, Jorhat, Dibrugarh, Tinsukia, Diphu, Lumding, Nowgong, Gauhati, Shillong as well as other district headquarters of Nagaland. Moreover, the town had a total of 47 kms of *pucca* road as in 1981, which has increased approximately to 330 kms in 2001. Though there is no city bus, Auto rickshaws and Rickshaws are available throughout the town within reasonable rates that makes local conveyance easy and convenient.

v. Communication facilities

There is a well-developed and fully mechanized tele-communication system in Nagaland with its headquarter in Dimapur. This enables the residents to have an easy access to telephones, fax and Internet facilities from anywhere in the town. BSNL has its General Manager's office located at Dimapur. The P & T department has upgraded its facilities like Speed post letter delivery system, Telegraphic Money Order, Savings Bank and many other services of modern use. Apart from this government owned

institution, there are much faster and more efficient private courier services, which cater to the needs of the people of the town.

Entertainment items like Doordarshan, Cable T.V, Local Music Recording and Producing centres, Local Dailies and Periodicals of different dialects, etc. service the town.

vi. Educational facilities

Dimapur has a large number of educational institutions both for primary as well as secondary levels. A few colleges of undergraduate studies have also been established both by the government and private individuals. However, very few of these institutions offer science subjects. Some of the institutions are producing good results while the rest are just doing business. On the whole, the secondary level institutions are outperforming the degree level institutions in terms of result in various examinations.

vii. Medical facilities

Dimapur offers modest medical facilities to its citizens especially for those who can pay for it. Besides the 100-beded Government Civil

Hospital, there are also a number of private Nursing Homes, Clinics and Pharmacies in the town. Majority of those in medical services, are doing a brisk business with their profession. During 1985-86, some 37,612 out door patients and 9473 indoor patients received treatment from these facilities.

Besides Allopathic, there are other alternative medical clinics like Homeopathic, Ayurvedic, Acupunctural, Herbal medicinal and other Quakes-run clinics, etc. which provide medical assistance to the people. The state Medical and Public Health department has also taken up a number of centrally sponsored schemes like Malaria, TB and Polio eradication programmes, Leprosy control Programmes as well as Programmes for Prevention of blindness, etc. in the town.

viii. Shopping facilities

There are a number of markets and Shopping complexes spreading over the town area: New market, Old market, Hong Kong market, Super market and many other colony markets, each specializing in different nature of goods. Hong Kong market resembles one of international markets while New and Old markets specialize in ethnic Indian goods. Almost everything one needs - from a simple stitching needle to the most sophisticated

computer wares - are available in the town. Direct marketing networks like Amway, Avon and others have also come in a big way.

2.7 **Local Administration**

Like any other town, Dimapur too has a local administrative body known as ***Dimapur Town Committee***. Although Dimapur was declared a census town only in 1961, by the year 1958, a local body was formed to assist the administration. It functioned as Area Council with 9 members nominated community-wise. The chairman was elected and paid as well as graded as full time official.

Since the town became a statutory town in 1971, the town committee became a well-organized body headed by a chairman. The people elected the members directly and the members in turn elected the chairman. The body had a term of 5 years, however, under certain circumstances, the term could be extended or terminated according to the desire of the state government in power.

The town committee undertakes various functions; It issues and renews trade licenses, oversees the execution of welfare and development schemes, maintains sanitation of the town, provides safety and security to

the people and property as well as aid, advise and assist the Deputy Commissioner in maintenance of law and order.

The town committee receives income from various sources like government grants, local taxes, fees and fines, and from earnings of public property. Generally, it incurs expenses mostly on payment of wages and salaries.

Another local body, known as ***Naga Council***, has sprung up in the town. It is a body of representatives from all Naga tribes. Its main role is to maintain social harmony and provision of justice among the Naga tribes residing in Dimapur. It has no financial power and no right to administer justice officially, though, in reality, it wields enormous power under the customary law of the tribes. With this power, it helps the administration in maintenance of law and order in the town in general, and among the Nagas in particular.

2.8 **Dimapur in the modern times**

Dimapur has been growing not only physically and demographically but also in every aspect of life. Everything is changing so fast that at times, the residents are at a loss in adjusting themselves to these changes. Tall

buildings rise overnight as every affluent Naga dreams of investing in Dimapur, where the building cost is the least and the business prospect, highest. Thus, an occasional visitor in his second visit would find it difficult to recognize the neighbourhood he visited earlier, in view of the fast changing physical feature of the town due to its rapid development.

With urbanization come all sorts of influence on the town's folks, some good and others bad. As facilities improve, people in general, become more educated, better fed, healthier as well as wealthier. Owing to an enhancement of education, employment opportunities also increase, especially in the private and the tertiary sectors. This leads to increase in income, and that in turn, pushes up the standard of living as well as level of living of the people.

The town has a mixed culture as much as it has a mixed population. Except for a few non-tribal populations, the western culture has completely dominated all ethos of life. It is a commonplace that Dimapurians in general, prefer *Jeans & Chappal* rather than the *indigenous* dress. With westernization, the *hippie* culture has especially taken over the youth. Thus, according to recent government survey, Dimapur has the highest number of drug addicts in Nagaland. *Heroin, Brown Sugar, Marijuana, Ganja,* and

other banned drugs are amply available in Dimapur. In spite of the fact that the state is under "prohibition", IMFL (Indian Manufactured Foreign Liquor) flows unobstructed in the streets of Dimapur. An adjoining settlement in Assam, i.e. Lahorijan, acts as the transit point for supply of all these *maleficent* goods. Going by the Newspaper reports, Flesh trade is also a thriving business in the town (**The Telegraph**, July, 24, 2002, p.21).

Dimapur is a home to all types of smuggling goods. Since there is no restriction for entry, many criminals from various parts of the country and abroad, flock to Dimapur for shelter and for prospects; e.g. many cars are stolen almost everyday, and many stolen cars from various parts of the country find their way to Nagaland *via* Dimapur. The unemployment problem, especially among the educated lot, coupled with influx of foreign refugees and the increase of offspring of mixed marriages between Naga women and male Plain-Landers, and Naga adopted Plain Landers, seem to be the major cause of such law and order problems in the society, if reports of police arrests and criminal identification are any indication. Lawbreakers and ex-communicated criminals from various villages of Nagaland, who find their way to Dimapur, also contribute to the situation. Thus Dimapur

has become a symbol of corruption, but nobody seems to bother, as Dimapur is a no particular tribe's land.

Most trade is controlled and operated by outsiders like Marwaris, Bengalis, Punjabis, Bangladeshis, Tamilians, Malayalis, and Tibetans, etc. These traders franchise certain Naga tribes and use them as covers to run their business briskly from behind (**Maitra**: pp.50-51). Some of the businessmen even marry the tribals for their business convenience. Many individuals and groups are involved in collection of forced donations either in the name of Undergrounds or in the name of Non-Governmental Bodies like trade unions, churches, students' unions, etc. These donations are collected either in the form of a *request* or of *dadagiri* (the obnoxious activities of a dominant local gangster), but have to be paid anyway, or else, one is apt to face the consequences. The traders in turn, realize this amount from the customers. Consequently, prices are exorbitantly high and almost every item needs heavy bargaining to gauge at its reasonable price, before transaction is affected. Thus Dimapur is slowly moving towards a ***Mafiosi*** system.

Nightlife at Dimapur is not very safe - anything can happen at any moment in spite of the watchful presence of the Police Flying Squad. Auto

rickshaw hiring charges go up several times the normal rate during the night. Hardly anybody dares venture out after 9 PM as robbery, extortion, unauthorized tax collections and gang fights mar the nightlife in the town. Since it is the cream of the state in terms of revenue collection, all the factions of the undergrounds vie for this town. Consequently, factional clashes and street shootings are not uncommon happenings even during the broad daylight.

Election in Dimapur is quite an experience in the sense that everybody takes election very seriously. In the beginning residents refused to vote, but now, they vote so enthusiastically; even resorting to proxy voting for getting their candidates elected by all means. Both money and muscle power are employed in all kinds of elections in Dimapur.

It is regrettable to note that there is rapid erosion of social values especially among the Nagas. The people, who then, used bamboo sticks, only, to secure their houses and granaries, are now being exposed to all vices of urban life. As a result, the society is slowly becoming more commercialized, stratified and disintegrated as any urban society. This naturally takes place at the cost of social and moral values of the erstwhile simple and innocent tribal society.

2.9 Up-gradation of Dimapur

Having recognized the importance of the town, the government had been considering making Dimapur, the capital of Nagaland. This could not be implemented because of some reasons. An attempt was also made toupgrade Dimapur Sub-division to District status. Accordingly, in the early nineties, an order was issued and a Deputy Commissioner posted. But due to public outcry the order was cancelled subsequently. Finally, in the year 1997, the government successfully upgraded Dimapur Sub-division to a full-fledged district bifurcating itself from Kohima District. Thus Dimapur became the 8th district of Nagaland with its head quarter at Chumukedima.

Meanwhile Dimapur continues to grow rapidly both demographically and spatially; it is fast turning into a metropolitan city. The government has recognized this situation and has proposed to plan for a city by integrating all the adjoining areas to the existing town of Dimapur.

2.10 The Periphery of Dimapur

Dimapur is surrounded by more than hundred villages, which are scattered along the National Highway No.39 and the river Dhansiri. These villages are highly populous. Though they appear at far due to lack of

proper road communication, they lie within a radius of 20 kms from the centre of the town. Accordingly, once roads and bridges are constructed, these villages would form a part of the town. Of these, only 61 villages (56 recognized villages and 5 unrecognized villages) are included in the present study. They together, constitute a population of 82,239 and a household population of 17,155 according to 2001 census (provisional).

Expansion of the town is limited by Lengirijan rivulet that forms the boundary between Assam and Nagaland states. Hence, extension is possible only in the eastern side along the Highway No.39 extending up to Chumukedima gate, and on both sides of it. Accordingly, the process is on to bring together all the adjoining areas under one municipal administration of Greater Dimapur. This proposed city would include the existing 21 wards under the present Town Committee set up, the adjoining town of Chumukedima (1 ward) and 61 other villages around Dimapur that are located within Nagaland territory. The proposed city will have a population of 189,853 (107,614 from Dimapur town and 82,239 from the peripheral villages) and a household population of 48,495 (31,340 from Dimapur town and 17,155 from the peripheral villages) The present study shall consider all those areas that are included in the proposed city of Dimapur.

CHAPTER-III
THE SURVEY OF LITERATURE

In the last chapter, we described the Study Area, i.e. Dimapur and its periphery. As we have familiarized ourselves with it, we shall now proceed further to survey the works already done on the subject, i.e. **Quality of Life and related measure of Welfare**, by various scholars at different times and different countries as well as with different approaches. This would enable us to understand the development that has taken place on the subject in all its dimensions.

Research in Quality of Life (QOL) is hardly a few decades old, hence, only a few researchers have ventured into this field directly. Since the concept is somewhat new, scholars are still not agreeable on any particular approach for defining and measuring QOL of people or region. In addition to that, QOL being an all-inclusive notion, it is bound to have an interdisciplinary appeal. Consequently, many scholars have studied it from different perspectives, which compound the problem of multiplicity of approaches as well as of literature.

A good amount of available literature has been considered in the present study that is quite wide ranging as the nature and scope of QOL is

so intricate and vast. As mentioned earlier, various scholars have approached the concept from various angles, a few of which are direct, and many others indirect. As a result, research in this subject has not been developed evenly. This compels us to arrange the survey of literature concept-wise rather than in chronological order. This will give us an idea of how, and along which lines, the research on this topic has developed.

The literatures may be broadly divided into six categories as given below:

a) Economic approaches to QOL studies and their relation with politics and civic aspects,

b) Studies of QOL at Micro (local, covering a small area) and Macro (at national or international) levels,

c) Studies of QOL with regard to concept, measurement, choice of variables and methodology,

d) Partial - that are basically concentrate on a particular aspect of QOL,

e) Studies of QOL in correlation with other related subjects, and finally,

f) Those studies that are not directly related with QOL.

3.a) **Economic approaches to QOL studies and their relation with politics and civic aspects:**

In this group, six papers have been incorporated. These works are dedicated to measurement of QOL purely from economic point of view, using economic variables like GNP and other measures of social accountings. The socio-economic implications of political decisions and the resultant effects of civic conditions on the society are dealt with in this section.

1. A part of the book *Resources, Values and Development* by **Amartya Sen** [1985] is dedicated to investigate some important issues in welfare economics and their relevance to development policy and international ethics. The author analyzed the use of conventions and norms in the perception of deprivation and poverty, and in social behavior involving divisions within the family and sex bias in general. The book also presents an original view of the relationship between goods and well being. It examines the welfare basis of real income comparisons, the social roots of hunger, and the nature of economic development.

2. **Amartya Sen**, [1981] in his book, *Poverty and Famines: An Essay on Entitlement and Deprivation*, challenges the common view that "shortage of food" is the reason for famine, and asserts that food shortage alone cannot be blamed for occurrence of famine. According to him, famines do occur in the midst of plenty and those famine-stricken areas have often exported food to other regions. Therefore, it is not only food shortage but also a host of economic agents through which we produce, distribute, exchange and consume, are equally responsible for causing famine. Thus, in order to get rid of the problems of poverty and famine, we must have a multi-pronged approach, touching all aspects of life like, social, economic, political, cultural and environmental aspects of the society.

3. **Paul Streeten** [1972] in his book *The Frontiers of Development Studies*, which is a collection of essays on the problem of development in the world in which rich and poor countries co-exist, found that presence and the policies of the rich crucially affect the development efforts and prospects of the poor. Some of the essays indirectly touch upon the issue of quality of life in the poorer nations.

4. **Gunnar Myrdal** [1970] in his book, *A World Anti Poverty Programme in Outline*, exposes the true facts of under-development with a statement of logical polices to be followed by the developed and the under-developed countries alike. He points out that racial inferiority and idleness may not be the sole reason for under-development and draws our attention to the fact that productivity in under-developed countries may well be lessened by low living standards and climatic conditions. Traditional institutions, attitudes and wide spread corruption are other factors that must not be politely ignored if development is to be fostered in a meaningful way. In order to pursue "modernization ideals" to improve life and offset population growth, economists must go beyond purely economic considerations while planning for development. Myrdal also devoted a large section of the book to the responsibility of the developed countries for the enlistment of the poorer nations.

5. **Amartya Sen** [1999] in his book, *Development as Freedom*, explains how in a world of unprecedented increase in overall opulence, millions of people living in the rich and the poor countries are still un-free. Even if they are not technically slaves, they are denied elementary freedom

and remain imprisoned in one way or another by economic poverty, social deprivation, political tyranny or cultural authoritarianism. The main purpose of development is to spread freedom and its thousand charms to the un-free. He argues that freedom is the ultimate goal of social and economic arrangements, and the most efficient means of realizing general welfare. Social institutions like market, political parties, legislatures, the judiciary and the media, contribute to development by enhancing individual freedom, and are, in turn, sustained by social values. Institutions, development, values etc., are all closely related, and Sen links them together in an elegant analytical framework. He investigates the relation between our collective economic wealth and our individual ability to live, as we should like. And by incorporating individual freedom as a social commitment into analysis, Sen, allows economics, once again, as it did in times of Adam Smith, to address the social basis of individual well being and freedom. In this book, Sen weaves the most important strands of his recent thinking on economic development, social justice and human rights, into a coherent vision of a better world.

6. In their paper, *Economic Approach to Measuring Quality of Life: Conceptual Convenience or Methodological Straitjacket*? **Alan Shiell,**

Catherine Pettipher, Norma Raynes and **Ken Wright** (1990) propose that the economist has a role to play in the evaluation of welfare services. While assessing the effectiveness of programmes and policies of welfare provision, the concept of economic cost must be considered such that comparison of benefits of alternative course of action in allocation of resources must be done. The paper examines whether or not techniques such as cost-effectiveness and cost-benefit analysis can be applied meaningfully to the evaluation of welfare provision.

3.b) **Studies of QOL at Micro and Macro levels:**

In this category, eleven QOL studies on Micro and Macro levels are assembled, of which some undertake study of QOL of a particular area or community taking primary data, while others study QOL of a state, country or nations using secondary data. Most of these studies are empirical rather than theoretical in nature.

1.The book entitled *Emerging Asia Changes and Challenges* published by the **Asian Development Bank** [1997] describes how Asia is experiencing fast social and economic transformation; the people of the

continent becoming richer, healthier, better fed and more educated. This undoubtedly means a rapid increase in the quality of life in this continent. This book reports on the changes in the various aspects of life in Asia and the challenges that are to be met if the present pace of development is to be continued in the future. A full chapter in this book is devoted on the assessment of quality of life in Asia by looking into poverty, education, health, working environment as well as rural transformation problems prevailing in the continent.

2. **B.N. Ganguli** and **D.B. Gupta** [1976] in their book, *Levels of Living in India: An Inter-State Profile*, attempt to measure inter-state differentials in the levels of living in India. This would enable one to understand the problems of poverty and the disparity in the levels of living in different parts of India.

3. Four macro-social change theories **-modernization theory, dependency/World system theory, state theory** and **human ecology theory**, shed light on the question: "Does human well-being vary substantially across regions within China and, if so, what forces have

contributed to this variation"? **R. Scott Frey** and **Fengxiang Song** [1997] in their article, *Human well-being in Chinese cities*, pioneered to examine all four theories simultaneously, using data collected from China Urban Statistics 1988 of Statistical Bureau of People's Republic of China, 1990. Ordinary Least Square (OLS) Regression method was used to analyze the data.

The authors studied the effects of **industrialization**, **foreign penetration**, **state investment** and **population growth** on the urban variation of three alternative forms of human well-being during the late 1980s. The findings provide support for both state theory and human ecology theory significantly, whereas, both modernization theory and dependency/world systems theory received little or no support for the proposition.

4. Krishna Mazumdar [1996] in an article, *Level of Development of a country: A Possible New Approach*, argues that the standard measure of economic growth of a specific country, namely, Per Capita Gross Domestic Product (PCGDP), is not adequate in cross country study. Consequently, he introduces a modified concept; Per Capita Real Gross Domestic Product

(PCRGDP) which he claims, takes care of purchasing power parity problems, thus facilitating cross country comparisons of level of development.

The study considered data for 1960, 1970, 1980, and 1990 on 8 social indicators of 92 countries from different Issues of World Tables and World Development Reports. To choose the appropriate form of equations explaining the relationships between PCRGDP and each of the eight social indicators, OLS method is used to find the best-fit equation where each of the social indicators is the dependent variable and PCRGDP is the independent variable.

The study attempts to find income elasticities of eight social indicators of development with respect to Per Capita Real Gross Domestic Product (PCRGDP), adjusted for purchasing power parity and expressed in international dollars for the four points of time. The income elasticities of social indicators may be identified as Necessity, Luxury and Inferior, and based on the nature of the income elasticities of the social indicators of development, the level of development of the countries were measured.

5. The properties of objective and subjective variables are commonly examined with reference to a set of mutually distinct but analogous social groups structured at a time point. The procedure fails to examine what is happening across the structured groups and therefore, what is likely to be the role of the variables in differentiating or integrating the ordained set of social groups. A resolution of the issue is vital for the appraisal of a better QOL because by definition it is always an ongoing phenomenon. **Ramkrishna Mukherjee** [1988] in his article, *Structure and Process of a phenomenon: The context of Quality of Life in India,* examines this issue with reference to its methodological applications and with respect to QOL data on India. Taking a sample of 590 individuals from West Bengal and Delhi regions, during the period 1980-82, data were collected by interviewing the respondents to ascertain what they wanted to have and to get rid of, in order that they may have a better QOL. The respondents were divided into two broad groups, and variations of QOL due to various reasons like, a) proximity to political power, b) availability and utilization of capital and labour, c) gender difference, d) economic status, e) culture or social status, f) ethnicity, g) regional location, and, h) city-rural habitation, were examined.

6. **Krishna Mazumdar** [2001] in another article, *Multivariate Analysis of Quality of Life in Indian Cities*, attempts to throw light on the quality of life in the 22 One-Million plus Cities of India (OMPCI). Quality of life is a multi-dimensional phenomenon and each of these dimensions is measured in different units. Given the difficulties in analyzing the quality of life with respect to each of these dimensions, the researchers in general prefer to aggregate them into a composite index, to detect the overall quality of life of a place compared to other places. In order to reduce the dimensionality problem, many methods have been suggested in the literature of spatial analysis. The author chooses 26 variables in 5 broad groups namely, a) Urban economy -5, b) Physical infra-structure -7, c) Social infra-structure -9, d) Environment -3, and e) Political system -2, all of which are included in the quality of life benchmarking project of National University of Singapore 1998. The Study assumes that all the cities can be mapped on multi-dimensional space, and each city is a point in that space. In other words, each city is assumed to be represented by a vector X (x_1, x_2,.....x_n). Let the X matrix represent all the cities under consideration. Let the vector $X^* = (x^*_1, x^*_2,\ldots,x^*_n)$ represent the hypothetical city having the best quality of life in all respects. In other

words, vector X* comprises the maximum values for the indicators having positive impact on the quality of life of cities and minimum values of the indicators having negative impact on the quality of life of cities. With this artifact, the study measures the distance between a city and the hypothetical city by following equation;

$$D_j = \sum_{i=1}^{P} [(X_{ij} - X_i^*)^2]^{0.5} ; \quad (j = 1, 2, \ldots m, \text{ and } i = 1, 2, \ldots, p),$$

where; x_{ij} = i^{th} variable for the j^{th} city, p = number of variables D_j=Distance between j^{th} city and the hypothetical city.

7. **Kau Ah Keng and Wang Siew Hooi** [1995] in their outstanding work, *Assessing Quality of Life in Singapore: An Exploratory Study*, carried out a measurement of QOL in Singapore. It aimed at finding out how Singaporeans view the quality of their lives, the extent to which demographic characteristics affect their satisfaction, and, the level at which Singaporeans were satisfied with the various domains of life.

Primary data generated by the authors, by means of a questionnaire response from 329 individuals, residing in various areas of Singapore, were employed for analysis. The study found that there was no significant

relationship between satisfaction and demographic characteristics. Moreover, people in Singapore attach great importance to being healthy and having family life. The levels of satisfaction with various domains of life were also assessed. The study revealed that Singaporeans are very much satisfied in various domains of life, particularly with family life, and, life in Singapore as a whole.

8. **Virgil H. Adams** [1997] in the paper entitled, *A paradox in African American Quality of Life*, attempts to assess the QOL of African Americans between 1980 and 1992. The study examines panel data from National Survey of Black Americans. It is seen that objective measures from current population reports and census data such as health, education, income etc., indicate that the condition of Black Americans has either stagnated or declined during the period. Contrarily, it is found in the study, that African Americans report of increase in general life satisfaction. There was no response bias that could account for the observed changes in the well being. These paradoxes, drawn between the results and the existing measures of well being, warrant further research in this field.

9. **J R Oppong, R G Ironside**, and **L W Kennedy** [1988] carried out a Centre-Periphery study entitled *Perceived quality of life in a Centre-periphery framework.* It was based on Alberta province, Canada, where the Edmonton City Calgary Corridor represents the centre, while the rest of the province; especially the Northern Alberta characterizes the periphery. Centre-periphery relationships have generally been a characteristic of every level of development, regardless of the type of political economy. Normally, the centre is well developed, and has better facilities and infrastructure, while poorer infrastructure and lesser facilities plagued the periphery.

A number of issues were addressed using data from Edmonton Area Studies (EAS) and Fieldwork conducted in the High Prairie region of Northern Alberta between December 1985 and January 1986. The study area was divided into 3 sectors; *viz*, Centre, Periphery, and, periphery of periphery. The study found that people in the periphery evaluate their lives highly, whereas, people of both centre, and periphery of periphery, evaluate their lives not so highly. This opens a new problem for research.

10. In *Quality of Life in Kwara State, Nigeria: An Exploratory Geographical Study*, **J.O.Oyebanji** [1982] attempts to construct territorial social indicators for Kwara state, Nigeria, and to suggest how they might be used to map inequalities. Whatever studies have been done on welfare in the area under study, have hitherto centered on economic aspects, leaving aside the other aspects of well being, is the observation of Oyebanji. So, he developed 31 variables under five facets of social well-being namely, a) Prosperity, b) The Environment, c) Education, d) Health, and, e) Social disorder. Data were obtained from published sources of Colonial Development Plans 1946-60, National Development Plans 1962-74, etc. Standard Score Additive Model, otherwise known as Z score is used to analyze the data. The study found that there are spatial variations among the different regions in all aspects of well being in the study area.

11. **Fukruddin** [1991] in his book, *Quality of Urban Life*, tried to ascertain the quality of living in the city of Lucknow. He investigated the spatial patterns of inequalities in the basic amenities and other resources, and, found how these irregularities in the quality of living are related with the residential patterns. He selected 31 variables for determining the quality of life. These variables were grouped into 5 categories, namely, Material

and Housing conditions, Territorial Stress, Amenities and Infra-structure, and, Education and Recreation. The matrix of residential structure consisted of 28 variables grouped into 4 factors, namely, Socio-economic status, Family status, Housing status and Ethnic

status.The book, claimed to be first of its kind, gives a good insight into the qualitative aspect of urban life, and is expected to be useful tool for researchers in this field.

3.c) **Studies of QOL: concept, measurement, choice of variables and methodology:**

The literature concerned with conceptual framework, measurement, choice of variables and the techniques used to study QOL are arranged in this group. Scholars have defined QOL in different ways at different times and situations. For example, some have defined QOL from purely a Health point of view while others have defined it to encompass Social, Economic, and Psychological as well as Environmental aspects. Some studies used objective or subjective indicators only, while others used both objective and subjective indicators in their studies. The following works, twenty-one in total, deal with the semantics of Quality of Life and its measurement.

1. In his book *The Quality of Life Valuation in Social Research,* **Ramkrishna Mukherjee** [1989] talks about the former concept of welfare of the masses which in modern times is known as the 'Quality of Life' of the people. It is a critical commentary on the all-inclusive notion of the quality of life, what quality of life stands for and how best its objectives may be realized. Mukherjee examines the methods utilized by the two perspectives of quality of life research. They are: 'Social indicators research' which considers the elite's valuation of what the people need so as to attain better quality of life, and 'Conventional quality of life research' which is meant to ascertain what the people want in order to improve their quality of life. Finally, the author formulates a new methodology in an effort to synchronize these two perspectives and remove the constraints facing quality of life research.

2. **Paul Streeten** and **Norman Hicks** [1991] in their edited book *Recent Issues in World Development: A Collection of Survey Articles,* pointed out the problem of employing GNP as an indicator of development because both GNP and per capita income are heavily weighted by the income shares of the rich. They suggested a number of alternatives to GNP

like using calorie intake of the people side by side with GNP, employing social indicators over and above economic indicators, social accounting system, etc. Finally, they made a number of recommendations for future research work in this field, and indicated that Basic needs approach which considers nutrition, basic education, health, sanitation, water supply, housing, etc. as indicators of quality of life would give clearer picture to the extent of development.

3. In another book, *Choice, Welfare and Measurement*, **Amartya Sen** [1983] delved into the concepts of choice, welfare and measurements separately and devoted a substantial portion of the book on welfare and its measurement. An ordinal approach to the measurement of poverty was proposed. He remarked that the ordinal method of measuring poverty might also be used for the interpersonal comparisons of welfare enjoyed by the people.

4. **I Adelman** and **T Morris** [1984] in their book *Economic Growth and Social Equity in Developing Countries* made a quantitative investigation of the interactions among economic growth, political participation and the

distribution of income in the rightist nations. Statistical techniques were applied to qualitative measures of institutional characteristics of nations in order to generate hypotheses about the effects of economic growth and institutional changes upon social equity in under-developed countries. Additionally, this book made a pioneering contribution to the methods and quantitative techniques of index construction.

5. **Alex C Michalos** [1997] in the paper, *Combining Social, Economic and Environmental Indicators to measure sustainable Human Well-being*, made an attempt to illustrate some ways in which social, economic and environmental indicators can be combined to tell a coherent story about the sustainability of human well-being. Citing examples from the fields of Health, the Fishing industry and Energy, he argued that success at constructing a single comprehensive system of indicators of human well-being will always be limited by one's particular departure from social, economic and environmental indicators. Moreover, if that were the case, then it would be advisable for researchers to abandon attempts to construct single comprehensive utopian system in favour of agreed upon lists of

important goals, indicators and monitoring procedures that can be used to implement progressive social change.

6. *Measuring Quality of Life: Economic, Social and Subjective Indicators*, the paper presented by **Ed Diener** and **Eunkook Suh** [1997], begins with the note that the concept of **good life** and **the essential qualities of a good society**, have occupied the mind of the thinkers throughout history. It then reviewed the several alternative approaches of defining and measuring quality of life, advocated by various scientists from time to time, such as, *Economic indicators, Objective or Social indicators* and *Subjective or perceptual indicators.*

These indicators assess three philosophical approaches to well-being that are based on the ability to select goods and services that one desires, normative ideals, and subjective experiences. The strength and weaknesses of these approaches were also reviewed. It is argued that *social indicators* (objective measures) and *subjective well-being measures* are both necessary to evaluate a society; at the same time, they complement each other in doing so. Each of these approaches contain information that is not contained in the

other measures, so also, each does not individually and in isolation perform perfectly well at all the areas of measurement.

7. Social Indicator Research aims at developing a comprehensive measure of Quality of Life in nations analogous to GNP in Economic Indicator Research. For this purpose, several propositions have been made. One such indicator is the **Human Development Index**, which measures QOL by means of **Input**; the degree to which society provides conditions deemed beneficial (presumed QOL).

Ruut Veenhoven [1996] in his *Happy Life Expectancy: A Comprehensive Measure of Quality of Life in Nations*, tries an alternative method of measuring QOL (in nations) by **Output**; the degree to which citizens live long and happily, known as **Happy Life Expectancy** (HLE). The concept is operationalised by combining registration-based estimates of length of life, with survey data on subjective appreciation of life. Life expectancy in years, multiplied by average happiness on a 0-1 scale, gives us a product, i.e. (HLE) which forms the number of years the average citizen in a country lives happily at a certain time.

Based on this formula, 48 nations were examined in the early 1990's and it was found that Northwestern European nations have the highest HLE while African nations have the lowest. Further, nations that are most affluent, free, educated, and tolerant, have the highest HLE. They together explain 70% of the statistical variance in HLE. Yet, HLE is not significantly related to unemployment, state welfare and income equality nor to religiousness and trust in institutions, but is related with military dominance and population pressure. It concludes that HLE qualifies as the envisioned comprehensive social indicator, which has both substantive meaning and theoretical significance.

8. In *Quality of Life Indicators and Health: Current Status and Emerging Conceptions*, **Dennis Raphael**, **Rebecca Renwick**, **Ivan Brown** and **Irving Rootman** [1996] reviewed the different approaches to Quality of Life. They are: a) Health Related Quality of Life (HRQOL), b) Quality of Life as Social Diagnosis in health promotion, c) Quality of Life among persons with developmental disabilities, d) Quality of Life as Social Indicators, e) The Center for Health Promotion model, and, f) Lindstrom's Quality of Life model.

Each approach is considered as to its emphasis on objective or subjective indicators, individual or system level measurement, value-laden or value-neutral assumptions, and potential relationship to social policy and social change goals. The links among the social indicators, quality of life, and health promotion areas are also examined.

9. **Theresa M Beckie and Leslie A Hayduk** [1997] in their article, *Measuring Quality of Life,* argue that quality of life is a global, yet uni-dimensional, subjective assessment of one's satisfaction with life. This conceptualization sees QOL assessment as resulting from the interaction of multiple causal dimensions, and, does not agree with proposals to limit QOL to Health Related Quality of Life (HRQOL).

The paper attempted to test the uni-dimensional, yet, global conceptualization of QOL using data from Coronary Artery Bypass Graft (CABG) patients, 306 in number. Self-Anchoring Striving Scales (SASS) and four other indicators were employed for analysis. All functioned as indicators of a single concept (QOL) that was repeatedly drawn upon as the patients determined their responses to these indicators. It was found that

only about half the variance in each indicator was attributable to the common QOL source. Several structural equation models were used to assess whether the superior performance of life (how satisfied are you with life as a whole) indicators was an artifact of the repetition of an item with this indicator. The data convincingly indicated that the superior performance was not a memory artifact, and that even the repetition of an identically worded item prodded the patients into drawing yet again upon the same QOL that grounded all the other measures.

10. In *The Quality of Life: Starting from Aristotle*, **Christopher Megone,** [1990] draws on some ideas found in Aristotle so as to apply to the modern discussion on Quality of Life. It attempts to shed light on practical issues through introduction of a theoretical apparatus, and then makes two major claims; a) Any conception of QOL taken to be purely empirically grounded will face problem, and, b) Any adequate measure of QOL should take account of an Aristotelian approach.

The paper criticizes the QALY (Quality Adjusted Life Year) method which attempts to measure QOL from the point of view of Health Status, which is taken as determining the allocation of resources for health care.

Finally, it argues that Aristotle was concerned with the QOL at fairly general level, so, his remarks can be brought to bear on any such measure of QOL.

11. In *The Quality of Life: A contrast between Utilitarian and Existentialist Approaches*, **Joanna Hodge,** [1990] sets up a comparison between the two approaches in discussing and attempting to measure quality of life so as to identify the strengths and limitations of QOL measurements in allocating health resources. The contrast is being initiated to show that choice of values is being made in the choice of the frame of reference.

The Utilitarian *'Good'* emanated from Mill's *'pleasure'*, and is defined as summation of individuals' good minus individuals' harms. Hence, there are supposed to be a set of clear distinctives between pain and pleasure in classical utilitarianism, between cost and benefit in public finance considerations and between sickness and health in health care. All these distinctions are brought into question in existentialism. The paper concludes with the note that Utilitarian approach is much more useful at least for the purpose of resource allocation.

12. In the *Issues in the Design and Construction of Quality of Life Measure*, **P. Kind** [1990] attempt to describe some of the design issues involved in constructing Quality of Life measure. It is expected to help regularize the debate on QOL measurement by providing a framework for assessing the strengths and weaknesses of the instruments. In this study, he confined the scope of QOL in terms of those modified by the provision of Health Care.

He advocates *descriptive system* as a pre-requisite for measuring QOL for it makes the simplest form of measurement possible, that is to establish a relationship between a subject (patient) and some point or level on a QOL continuum. He then goes on to say that although simple forms of measurement are possible by use of descriptive system alone, it is far better if more sophisticated tools like *valuation* or *scoring* system, which quantifies different levels of QOL, is employed. *Scaling* is another tool that he suggests especially in the case of measuring non-physical stimuli comparable to health states, e.g. the seriousness of crime (**Sellin** and **Wolfgang,** 1964). Under these, three methods, namely, *magnitude estimation, category rating* and *paired comparison* have been examined.

Finally, he says that although different tools of measuring QOL have not yet reached the point where the relationship between scales is so readily explained, both descriptive and quantitative forms of QOL measurement are becoming increasingly acceptable. However, more vigorous research is still advocated in the field of design and construction of new QOL measure.

The study was based on DHSS funded project, which was designed to evaluate the cost and quality of residential services for adults with mental handicap. The paper aimed at examining the advantages and disadvantages of using an economic approach to evaluate the efficiency of the services designed to meet the needs of these specific client group.

In this paper, the economic approach is described, and the importance of measuring QOL emphasized. The shortcomings and the problems associated with the existing measures, which have already been enlisted, to evaluate services for people with learning difficulties are also discussed, and, consideration is given to the merits of generic QOL measures which have been used by economists in acute health care settings.

13. Attempts to construct an overall measure of quality of life of any entity are confronted by obstacles posed by absence of a common *numeraire*. The diverse elements that affect QOL of people are subject to some form of measurement. However, no satisfactory method has yet been devised whereby those different measurements could be reduced to a single metric. **Denis F Johnston** [1988] in his paper, *Toward Comprehensive Quality of Life Index*, develops a construct and tries to apply the same in measuring QOL in the United States. Taking data of U.S socio-economic indicators for the period 1965-85, twenty-one variables were selected to represent prevailing conditions in nine major areas of social concern. Indices were prepared and the index values for observed year-to-year percentage changes in socio-economic indicators were derived. It was found that areas of **health** and **education** contributed most favourably in the changes of overall quality of life during the period under study. **Family stability**, **public safety**, and **poverty**, received negative ratings that offset the positive impacts of the first two.

14. **G F R Ellis** [1985] in his article, *An overall framework for quality of life evaluation schemes with application to the Ciskei (South*

Africa), presents an overview of different quality of life components that can be measured. He provides a framework for developing particular measurement schemes and for comparing the coverage of different QOL estimation schemes. The study first explains the nature of the feed back system of measuring QOL with a model, and then applies it for constructing QOL indices for Ciskei, South Africa. The study admits that there is a need for more research in this field for verifying accuracy of this method.

15. In his paper, *Quality of Life Indicators: A preliminary Investigation,* **Ben Chieh Liu** [1974] attempts to develop a systematic methodology for assessing a group of Social, Economic, Political and Environmental Indicators to reflect overall health of the nation and its citizens' well- being. Nine indicators covering individual status, individual equality, living conditions, agriculture, technology, economic status, education, health and welfare, state and local governments, were compiled from more than 100 variables for 50 states and the District of Columbia. Basing primarily on 1970 data, quality of life index was prepared and the states ranked. A composite index of Quality of Life (QOL) known as Socio-Economic-Political-Environmental (SEPE) index was prepared and

regressed on the nine indicators. However, the coefficient of variation was found to be very low. The study concluded with the observation that for achieving minimum acceptable QOL, minimum economic wellbeing is required. Beyond this point, high quality of life does not necessarily require a higher personal income.

16. **Mario Bunge** [1975] in his paper, *What is Quality of Life*? exemplifies the concept of **Indicator, Social Indicator**, and, **Quality of Life Indicator**.He argues that an Indicator is characterized as an observable variable assumed to point to, or estimate some other (normally unobservable) variable. It is a symptom or a token of something else. The relationship between an indicator and indicated can be either functional or it can consist in statistical correlation. It is not an arbitrary definition but somewhat a hypothesis or proposition. Hence, it is best justified to have it incorporated into a theory, say a mathematical model.

A social indicator is an indicator belonging to some sociological context. It is a variable serving as an indicator for sociological variable. It is not a political, economic, physical or spiritual indicator. A quality of life indicator is one that helps us to assess the degree of well being of an

individual or society. Since quality of life is an all-inclusive concept, it requires indicators from all aspects of living to measure it.

Some of the problems posed by this definition are discussed which led to the conclusion that a better understanding and assessment of QOL calls for more intense theoretical and methodological work rather than increase in the amount of social and environmental statistics. For data without ideas are sterile and misleading.

17. **Frank M Andrews** [1975] produced a pioneering work, *Social Indicators of Perceived Life Quality*, in which he argued that modern societies in both developing and developed countries have real concerns for maintenance, enhancement and re-distribution of individual well-being. Indicators of Perceived Well-being provide a direct measure of well-being. They also permit cross sector comparison, which is not possible with objective indicators, the paper asserts.

However, some critics have charged that perceptual indicators suffer from methodological weaknesses associated with their validity, interpretability, completeness and utility. The author addresses each of these weaknesses in great detail. He refutes them both theoretically and

empirically with his own research findings based on adult American responses, and concludes that none of these presumed weaknesses is sufficient to invalidate the development and use of perceptual indicators. Various suggestions concerning methodological research, to support the development of indicators of perceived well-being, were made in conclusion.

18. Modern Industrial societies' failure in improving man's lot despite impressive gain in affluence, and the desire for an index of social well being analogous to GNP and other measures of economic well-being, prompted the recent discussions on quality of life. **Storrs McCall** [1975] in his article, *Quality of Life*, sought to define Quality of Life. Many authors before him have defined quality of life in terms of actual happiness or perceived satisfaction.

He says that quality of life consists in the satisfaction of the general happiness requirements. To the extent that general happiness requisites (GHR) are met in a given society or region, quality of life is high in that society or region; to the extent that they are not met, quality of life is low. He discusses other definitions of quality of life forwarded by various

authors and draws the distinctions between his and theirs. Finally, he tries to explain what the general happiness requirements are.

19. **Willard L. Rodgers** and **Philip E. Converse** [1975] in their paper, *Measures of the perceived overall quality of life*, tried to assess quality of life, using both objective and subjective indicators. It was based on a National Study of the perceived quality of life, and the data used were obtained through personal interview of 2164 American adults in 1971-72.

Respondents were asked to assess their level of satisfaction with each of a set of 15 domains of their lives. They were also asked to describe their lives as a whole, using differential types of scales. Canonical correlation analysis was used to find the domain-specific and global items with the highest correlation. The two indices derived from this analysis, namely, the index of well-being and the index of domain satisfactions, have been examined in relation to a variety of demographic and situational variables, such as, age, socio-economic indicator, employment status, size of community, etc. The relationships thus discovered provide evidence for validity of these indices. Reliability of the measures and their stability over

a period of 8 months were both reasonably high. Both these measures formed acceptable indicators of the perceived overall quality of life. The paper concludes with a cautious note that much work remains to be done before we are fully convinced about the true meaning of these measures.

20. **Leslie W Kennedy, Herbert C Northcott** and **Clifford Kinzel** [1978] in their work, *Subjective evaluation of well-being: problems and prospects*, discuss some of the substantive and methodological pitfalls that arise in the subjective and methodological evaluation of well-being. Since the objective method is plagued with problems, the movement toward assessing social well being by using subjective evaluation evolved. It developed from a desire on the part of the researcher for a realistic assessment of individual life experience.

The discussion highlights illustrative references to the empirical findings of the 1977 Edmonton Area Study. Various issues like, a) Specific, domain and global measures, b) Objective states and subjective perceptions, c) Micro/ Macro unit of analysis, and, d) The problem of cultural relativism, were included in the discussion. Apart from subjective and objective

indicators of well being, two new indicators, namely, **demographic** and **experiential** variables were also discussed.

It is admitted that it is not yet possible to delineate a simple set of social indicators for use by policy makers and planers. Accurate assessment of social well-being currently requires the study of demographic and objective states together with cognitive and evaluational responses, and also requires not only at the global general satisfaction level, but also, at more specific levels of analysis.

21. In *Developing Measures of Perceived Life Quality: Results from several National Surveys,* **Frank M.Andrews** and **Stephen B.Withey** [1973] presented the current status of a series of studies directed towards the assessment of perceived life quality. They proposed that a person's overall sense of quality of life is nurtured by his affective responses to various life domains, which are of two types - **role situation** and **values**.

More than 100 items were used to measure a wide variety of domains and 28 items assessing perceived overall life quality were presented. The paper formed part of the on going study for developing measures of

perceived life quality, based on National Sample Surveys of American adults for May & November, 1972.

3.d) **Those papers that are basically a partial study of QOL:**

In this group, those works that might be called a partial study of quality of life are included. These articles, twelve in number, deal with subjects like development, measurement of development, indicators of development and human well being, measuring conditions of the poor, level of living of different communities, etc. The following are the works done by various scholars in this line.

1. **Morris David Morris** and **Michelle B McAlpin** [1982] in their book *Measuring the Conditions of India's Poor: The Physical Quality of Life Index* presented a simply constructed Index with which we can measure and monitor the impact of development programmes on mass welfare, particularly in terms of longevity, infant mortality and literacy. GNP had failed to determine how and in what measure, economic development affects the life of common folks. The physical quality of life index (PQLI) furnishes a desperately needed supplement to the GNP. Extensive use of PQLI has

enabled international, inter-state, inter-regional, male-female, rural-urban comparisons in terms of enjoyment of the fruits of civilization.

2. **S C Dube** [1983] not being satisfied with the traditional technique of measuring development by means of GNP, suggests an alternative tool in his book, *Development Perspective for the 1980s (*Chapter IV – Basic Needs and Quality of Life). He does so by emphasizing on the use of quality of life to measure development. Accordingly, he picks up poverty, population, food and other problems to measure the success of development strategies. This means that planning must insure mobilization of human resources, participation of the masses and proper implementation of the plans if it is to achieve the desired levels of development and higher quality of life.

3. In his edited book, *Basic Needs Approach to Development: Some Issues regarding Concepts and Methodology,* **D P Ghai** [1977] gives the general introduction to the Basic Needs approach to development, surveys the shifts in development strategies and places the evolution of basic needs strategy in the approach to development. This study was based on the UN Report on the "International Definition and Measurement of Standard of

Levels of Living" (1974), which elaborately discussed the fundamental problems of methodology facing researchers in Quality of Life. In the same book, **D P Ghai** and **T Alftan** jointly attempted to synthesize some of the main issues connected with Basic Needs strategy and tried to map out the main lines of conceptual and empirical work that will be required to make the strategy operational. **E L H Lee** and **A R Khan** tried to enlighten the readers about some Normative Aspects of a Basic Needs Strategy. They posed some of the main normative issues surrounding the adoption of basic needs strategy and developed a general methodology for identifying and quantifying 'basic needs' targets and applied it in the case of Bangladesh.

All these writers presented their own views and were not quite unanimous on all points. Nevertheless, their varied points of views make a good reading and throws some insights on the research issues relating to basic needs approach to improvement in quality of life.

4. **Gabriel Lipshitz** [1993] in his paper, *The Main Approaches to Measuring Regional Development and Welfare*, initiated a debate between various schools of thoughts over the definition and measurement of regional welfare and development. Three approaches were discussed: Objective,

Subjective and Radical. A perusal of numerous empirical studies in the Western, Third World, and, former Communist Bloc reveals that "objective school" prevailed upon the rest. Most of the studies used variables, such as, income per capita, unemployment rate, employment structure, and net migration rate, etc. which require lengthy time period data. Hence, subjective approach, which assesses the problems on a point of time, is likely to be handier. The study concluded with the note that the subjective and radical approaches are still in the stage of theoretical development and, hence, empirical research is somewhat lacking.

5. In another article, **The concept of well being**, in *Essays on Economic Progress and Welfare*, edited by **S.Guhan** and **Manu Shroff**, **Amartya Sen** [1986] tries to establish the idea of well-being as the foundation of Welfare Economics. He shows the inadequacy of the two approaches to this question as one approach identifies well being with utility and the other sees well being as some idea of opulence. He then directs his attention to two different but related notions; a) Functioning of a person; what he can achieve, which can be converted to numerical index, b) Freedom; what a person can do, that indicates his capabilities.

Positive freedom - what a person can do, can achieve, can experience - has strong claims to being the right approach to a person's overall advantage. He also discusses the problem of nutrition and the public policy issues related to this, and, the issues concerning the basic ability to live, as part of standard welfare analysis.

6. **Gunnar Myrdal** [1972] in his celebrated book, *Asian Drama: An Enquiry into the Poverty of Nations*, devotes a whole chapter on **the Level of Living and Inequality**. He begins the chapter by defining Levels of Living as the amount of goods and services regularly consumed by average person in the country. Hence, it is more meaningful to measure average level of living in terms of goods and services actually consumed, rather than by a single figure that is used in developed countries. It is especially so in Asian context where the chunk of one's income is spent on food alone. He went on to describe the poor living conditions prevalent in Asia, viz, Housing, Sanitation, Clothing, Food habit, Basic Amenities, Transportation, Income, Inequality, etc. that pulls down the level of living in the region.

7. Considerable amount of philosophical works has been done on a relatively new field called Medical Ethics. **Dan Brock** [1999] in his paper, *Quality of Life Measures in Health Care and Medical Ethics*, attempts to explore what illumination these works might offer, to our understanding of quality of life. He says that we can extract from the Literature on Medical Ethics, the main outlines of a general account of a good life. He believes that Medicine and Health Care can provide some of the most persuasive instances for both objective and subjective components of good life.

Brock divides theories of good life into three categories: a) Hedonist, b) Preference satisfaction or desire fulfillment, c) Ideal, each of which must be assigned an independent place. It can also be seen as a *vector view* in the line that Amartya Sen atomized in his article *Plural Utility*. The paper closes highlighting the need for more complex accounts of QOL than are often employed in programmes designed to improve quality of life of people.

8. **Townsend** [1979] defined poverty in terms of relative deprivation and controversially illustrated how such concept could be made operational, by developing a *deprivation index*. In the paper, *Testing Townsend:*

Exploring living standards using secondary data analysis, **Sandra Hutton** [1990] attempts to begin an empirical work to follow up and replicate Townsend's ideas.

The study employs information from the Family Expenditure Survey (FES), and the General Households Survey (GHS), to develop a measure of the standard of living. The study also looks into different facets of life, like poverty, employment, leisure and health, and, ascertains how they behave with varying income levels.

9. **Vijay Nayak** and **Shailaja Prasad** [1984] in their paper, *On Levels of Living of Scheduled Castes and Scheduled Tribes*, examined the levels of living of the SC/ST with respect to non-SC/ST in the state of Karnataka. The study was done during the period 1973-74 and 1977-78, basing on the ungrouped NSS data of the 28th and 32nd round. It briefly examined inequality in the level of living between SC/ST with that of non-SC/ST people, and the disparities in the level of education and occupational structures of the households. Comparison of size distribution of consumer expenditure (on the lines of Iyengar & Bhattacharya, 1961) and

consumption distribution of the SC/ST with that of non-SC/ST both for rural and for urban separately, was also carried out. The authors further estimated the percentage of households below the poverty line as also the level of absolute poverty among the SC/ST in both the areas. The study found that in both rural and urban sectors, the mean consumption of SC/ST was both below poverty line and that 79.9% of the rural and 63.6% of the urban SC/ST population lived below poverty line as against 54.8% of the rural and 50.4% of the urban non SC/ST population lived in poverty.

10. In **Nancy Baster** [1972] edited book, *Measuring Development; The Role and Adequacy of Development Indicators*, **Jan Drewnowski**, in his paper, **Social Indicators and Welfare Measurement: Remarks on Methodology**, argues that it is impossible to measure social conditions unless quantitative approach is used. At the same time, economic accountings cannot legitimately be used for measuring improvements in social conditions. Only three distinct aspects of social conditions, namely, a) Demography, b) Social relations and c) Welfare, can be considered conceptually measurable. Each of them must be measured in its own way.

The paper also dwelled on devising a methodology of measuring welfare by means of different indicators and indices, based on observable and unobservable facts. Welfare indices are supposed to serve not only for assessing the results of development but also as targets for development plans.

11. **Dudley Seers** [1972] in his paper, **What are we trying to measure?** in *Measuring Development; The Role and Adequacy of Development Indicators*, edited **by Nancy Baster**, says that development means creating the conditions for the realization of human personality. Its valuations must therefore, take into account three linked economic criteria: a) Poverty, b) Unemployment and c) Inequality. GNP can grow rapidly without any improvements on these criteria; so, development must be measured more directly rather than depending wholly on economic aggregates like GNP. The conceptual and practical problems of a number of indicators are discussed. The paper closes with a discourse on implications for planning for national and international development.

12. **Nancy Baster** [1972] in **Development Indicators: An Introduction**, in the book, *Measuring Development: The Role and*

Adequacy of Development Indicators, opines that Development is understood as multi-dimensional entity, involving changes in structure and institutions and their capacities of output. Three different but overlapping approaches to the definition of indicators are distinguished; a) The definition of indicators in the context of theoretical models of development, socio-political as well as economic, b) The use of Indicators in the empirical study of interrelations between economic and non-economic factors, c) The development of indicators for policy and planning. The integration of economic, social and political variables and the identification of systematic relations between them depend on progress along each of these three dimensions.

3.e) **Studies of QOL in correlation with other related subjects**:

In this section, quality of life studies in correlation with other aspects of life are taken into account. Studies on development, welfare and living conditions occupy major space in this group. Other topics covered include Basic Needs and quality of life, Human Development and quality of life, Health and quality of life indicators, etc., figure in these studies. The following five works are dedicated to these aspects.

1. **Elwil Beukes** and **Anna Van Der Colf** [1997] explored the use of Quality of life studies for the analysis of development potential from a human development perspective in their article, *Aspects of the Quality of Life in Black Townships in a south African city: Implications for Human Development.* In this connection, an empirical assessment of quality of life was carried out in the black community in Bloemfontein, a medium-sized South African City. Three hundred forty eight households were selected using stratified random sampling method, from poorer people, living in the areas formerly demarcated for black people by the apartheid policies of the previous government. The findings of the study were systematized in such a way that conclusions could be drawn about the potential for human development in these communities. It was further indicated that QOL studies might be used as an analytic base for development policy-making from human development perspective. However, this kind of application still needs further experimentation and more research, before it can be actually put to use.

2. **Merlin B Brinkerhoff, Kelly A Fredell** and **James S Frideres** [1997] presented a paper, *Basic Minimum Needs, Quality of Life and*

Selected Correlates: Explorations in villages in Northern India, in which they examined several issues arising from the linkages between development efforts and Quality of Life. Using empirical data, which were gathered to evaluate a Community Development Project in the Garhwal region of Northern India, several issues, germane to both social indicators and development, were investigated. This includes, a) The relationship between Basic Minimum Needs (BMNs) and Quality of Life (QOL), b) Some methodological innovations for measuring both BMNs and QOL, and, c) Selected correlates of BMNs and Social indicatiors of QOL for Garhwali villages. The study provides strong support that BMNs are not universal, but are time and site specific, in the sense that two similar villages may not have same BMNs. Correlation between BMNs and Social Indicators were very weak, but other similar items, like, "children needing food", and "going to bed hungry," had correlation with social indicators. This points to the fact that Needs should be assessed to guide development works, and that the use of social indicators for monitoring effectiveness of the change attempts, may be re-considered.

3. In their paper, *Population Dynamics and Quality of Life in North-East India*, **NM Panda** and **B Misra** [2001] attempt to define quality of life and describe how it is influenced by population dynamics. They assert that among different factors that affect quality of life, population dynamics is the most important one, because both objective and subjective dimensions of quality of life are the functions of this factor. Moreover, population dynamics causes chain reaction in the society, which, if left unchecked, would adversely affect quality of life of the community. Taking 25 indicators of quality of life, the study was done on seven Northeast states, basing on NEC data of population dynamics for the period 1971 to 1991. The study reveals a lower standard of living as well as lower quality of life in the North East states as compared with other regions of India.

4. **Ronald Mears** [1997] in his paper, *Improving Quality of Life in greater Soweto*, examines ways and means that could be employed to improve employment and quality of life in Greater Soweto. He begins with defining the Growth Centered, State Centered, and Human Centered views of development. He uses unpublished data of Chief Directorate Population

Development, 1996 and other research sources. It is found that the quality of life in Greater Soweto is still very low. Consequently, the study suggests a number of steps to be initiated by both Central and local governments, and calls upon the local community to involve themselves in their development.

5. **S K Mishra** and **S B Gaikwad** [1979] in their work, *Impacts of economic development on welfare and living condition of the people of M.P: An inter-district case study*, carried out an empirical study of association of social welfare and living conditions of the people with economic development in the state of Madhya Pradesh. They endeavoured to evaluate the role of agriculture, industrial, and infra-structural levels of development in shaping up some of the socio economic aspects of living. Data from various sources (including district level data for the period 1970-71) pertaining to economic development and living conditions were analyzed in the study. Employing 17 indicators of economic development, three sectoral indices were constructed by using Principal Component Method, to measure development levels of different districts in the associated sectors. Another 24 indicators were also employed for representing social welfare and living conditions of the people in general

and regressed on the development indices, to study the impact of the latter on the former ones. It was found that agricultural development has been highly partial in catering its benefits to different sections of the people, thus giving rise to many problems, which adversely affects welfare and living conditions. It was also found that agricultural development is more prominent, followed by industrial development and infra-structural development. The study concluded by suggesting initiation of land reforms and rapid industrial development so as to absorb the surplus labour force spilled over from agricultural sector.

3.f) **Those studies that are not directly related with Quality of life**

In this category, various works done on varied subjects by numerous luminaries that have indirect relationship with quality of life are included. Studies on the nature and scope of Social reporting, Social Indicators Movement, the use of Social Indicators in socio-economic studies, the history and the future direction of Social Indicator Research, Measurement and politics of poverty, etc. are discussed in this section. The cluster contains nineteen works as given below.

1. **Ramakrishna Mukherjee** [1975] in his book, *Social Indicators,* shows what Social Indicators can indicate and goes further to distinguish "Social Indicators" from "good social statistics". He also formulates a way to determine social indicators on the one hand, and distinguishes "change" which is value free, from "development", which is value loaded, on the other hand. Mukherjee further discusses how both qualitative and quantitative social indicators can be constructed efficiently at the current state of knowledge for effective social research.

2. **A.M. Khusro** [1967] in his book *A Survey of Living and Working Conditions of Students of the University of Delhi,* inquired into the living and working conditions of the students of Delhi University. In this effort, the author adopted a basic methodology through which relevant data were collected and analyzed. Two sets of questionnaires had been developed through which a detailed study on family particulars, monthly receipts, monthly expenditures, housing and accommodations, health, additional financial requirements, food and nutrition, transport, study habits, library and text books facilities, hobbies and recreational as well as newspapers and journal facilities, etc. of the students were investigated. Using all these data,

level of living conditions of the students were ascertained. This book provides an insight into various indicators through which level of living can be ascertained by a researcher.

3. **Alison G C Mallard, Charles E Lance** and **Alex C Michalos** [1997] produced a paper, *Culture as a Moderator of overall Life Satisfaction: Life Facet Satisfaction Relationships*, in which they proposed to provide additional competitive tests between three models of relationship between Life Facet Satisfaction (LFS), and Overall Life Satisfaction (OLS), and, to explore whether culture moderates these relationships.

Data reported in this study were collected as part of Michalos' (1991) global study of student well being. Students from 42 countries were made to fill a 10 page Satisfaction and Happiness Survey and the data collected therefrom.

The result of the additional competitive tests carried out between Bottom Up (BU), Top Down (TD) and Bi-Directional (BD) models overwhelmingly supported the BD model. It was also found that culture does not moderate the OLS – LFS relationship.

4. **Joachim Vogel** [1997] in his paper, *The Future Direction of Social Indicator Research*, presented at the World Conference on Quality of Life, Prince George, Canada, recalls the original purpose and goals of the Social Indicator Movement, which are: strong commitment to social monitoring and general enlightenment, exposing social costs of technology, economic growth, and, modernization. Lately, however, the movement has changed its direction because of diversification and specialization, in the sense that, it focuses more on promoting general enlightenment, rather than on "monitoring roles". The paper concludes with attempt to chart the future direction of social indicator research, keeping in mind, the original commitments of general enlightenment, contribution to the formation of public opinion, reconstruction of social indicators forming new alliances, supporting integrated national survey systems and comparative research, all of which relate to the unique task of the researchers, that is to provide empirical information for inclusion in the political agenda.

5. The paper, *Development Indicators and Development Models*, presented by **Donald McGranahan** [1972] deals with the semantics of Indicators, and the concept of Development. Various indicators, problems

associated with each of them and the procedures of their selection as well as validation are discussed. It is argued that the nature and scope of indicators, and the nature of the quantitative analysis of relations between them, will depend on the conception and definition of development. The system model, which underlies the UNRISD measurement of development, is contrasted with other approaches. Importance of indicator as useful tool for development analysis, and general evaluation of progress, is re-emphasised as a concluding remark.

6. In the *Strategies for reducing information overload in Social Reports*, **Alex C Michalos** [1974] introduces certain clarifying remarks on the concepts of **Social Indicators** and the **Social Report**. He designates social indicator as social statistics that have significance for the quality of life and social report as a systematic collection of social indicators.

He describes some different kinds of consumers of Social Reports such as **Ordinary Citizens**, who need the informations, so as to be well informed electorate, **Public Archivists**, whose primary function is to produce and keep reliable records of stock and flow of National Resources

and happenings, and, **Public Officials**, who are responsible for proposing, analyzing, preparing and evaluating public policies and programmes.

He also defines **Information Overload** as problems of having so much information that much of it becomes not only useless but also self-defeating. Finally, he devotes a major portion of the paper on devising 17 strategies for reducing information overload in social reports

7. In his project, *Disparity in income and levels of living among teachers in Delhi*, **S M Kansal** [1990] tried to ascertain the differences in income and levels of living among teachers having same qualification and skill but employed in different institutions of Delhi. Two hundred twenty four teachers were interviewed from different universities, colleges and schools, and, from each institution, only four respondents were selected. The study found that having the same level of educational qualification, experience, skill, etc, the teachers get different levels of income depending upon the institutions they work in. For example, a Post Graduate teacher working in a private Middle School draws a salary less than one-fifth of a University lecturer. Like ways is the salary between Government School teacher and a private school teacher with the same credentials. Moreover,

income being the chief determinant of the level of living, those teachers who are employed in the lower level or private institutions are forced to lowly living unlike their counterparts in the higher and government institutions. Thus, lack of equal opportunities after studies lead to income disparities later in lives. This could be due to the quality of education one receives as well as the system of marking in the examinations, apart from various possible reasons. The study also considered other forms of income like family income as a determinant of levels of living.

8. **Amitabh Kundu** [1993] in his book, *In the name of the Urban poor: Access to Basic Amenities*, analyses the access of the urban poor to six basic amenities, *viz*; Housing, Water Supply, Sanitation, Sewerage, Health care, and, Public Distribution Systems. He provides an overview of the existing organizational structure providing these services, and examines its sensitivities to the needs and affordability of the poor. He observes that the system has not been designed to meet the minimum needs of the poor people and is vulnerable to manipulations by vested interests. Thus, the poor have been able to access to only a small share of these amenities, while the non- poor getting the larger share. At the same time, the poor has

the accessibility to the lower order of amenities while the non-poor has the command over the better quality and higher order services. The book is useful for those involved in Town Planning, Housing and Urban Development, Urban economics students, and, Development scholars. Kundu used published data from population census and the National Sample Survey, unpublished data of government departments as well as primary data from field survey to draw his conclusions.

9. **Shafiqullah** and **Farasat Ali Siddiqui** [2001] in their paper, *Work force and level of socio-economic development in Uttar Pradesh*, examined the work force, socio-economic development and their relationship over the districts of Uttar Pradesh. The Study is essentially based on the secondary data of published sources, namely, Census of India, Statistical abstracts of Uttar Pradesh, district wise indicators of level of development for the year 1991. Fifteen variables were considered for the study. The Study found that work force is characterized by gradual increase from North to South, while the level of economic development is found to be high in the North Western regions; it declines towards the Central and Eastern regions of the state. The analysis reveals that the majority of the

districts, which record high level of work force, with high level of socio-economic development, are located in the Himalayan zone. Medium level of work force vis-à-vis high level of socio-economic development is mainly observed in the Northwestern and Central Plain districts. The districts of low level of work force with low and medium level socio-economic development are concentrated in the eastern regions of the state.

10. In the paper, *The Conceptual Structure of Social Indicators*, **Elaine Carlisle** [1972] deals with the concepts and definitions involved in the development of Social Indicators. While highlighting the role of social indicators, the author suggests that Social Statistics should be made with three aims; a) to provide complete and precise answers to many socially relevant questions, like, how healthy we are? how educated? how adequate are hour Housing? etc. b) to facilitate effective monitoring of social policies, and, c) to signal warning of emerging problems, e.g. pollution, racial tension, drug addiction, and to fill the information gap once these problems have been recognized.

11. **Bernard Cazes** [1972] in the book, *Social Indicators and Social Policy* (chapter-1-**The Development of Social Indicators: A Survey**) traces the history of development of Social Indicators. In this book, he says that the sudden surge of interest in social indicators in recent times, is due to two reasons; a) the desire to have a scientific knowledge of the society, and, b) proper social planning. He then goes on to explain the typology of social indicators, saying that social indicator is a measurement, a measure of normative character, and, is integrated in a system.

12. **Ralph B D'Agostino** [1974] in his paper, *Social Indicators: A Statistician's View*, considers the problem areas of Social Indicator Research that are of concern to the statistician and in which he can prove helpful. Among these are the purposes of social indicators, what social variables should be considered as conceivable variables related to quality of life, what data should be collected taking into account the difficulty of not being able to directly measure variables of interest, how does one collect data guarding against multi-co-linearity, and how should the collected data be handled and analyzed. The paper also discusses as to why in social indicator research the secular trends, cyclical movements, seasonal

variations and irregular fluctuations must be taken into account. Techniques for relating lead indicators in one period, to co-incident indicators in another period are also discussed. Finally, the paper presents a select bibliography in canonical correlation, forecasting, indicators and index numbers, path analysis, regression analysis, simulation techniques, time series analysis and other areas useful in analyzing social indicator data.

13. **Judith I D N** [1975] in the book, *Social Indicators and Public Policy: Interactive Process of Design and Application* (Chapter-4-**The Social Indicator Movement**), narrates the history of the Social Indicator Movement, and describes the new types of instruments, methods and approaches in the use of social indicators decision making process.

14. The **UNESCO** published book, *The use of Socio-economic Indicators in Development Planning*, **Stephen H K Yeh** [1979] contributed a paper entitled **The use of Social Indicators in Development Planning**, in which he dwelled on the potential use of social indicators in planning for the removal of disparities. The paper raises three issues for discussion: a) the need to define what is to be measured, b) the purpose of measurement,

and, c) the use of measurement. With special reference to planning in developing countries, the paper suggests that greater attention be paid to the formulation of indicators not merely as an exercise in isolation, but in the context of the overall planning process.

15. **Mahar Mangahas** [1983] in his article, *Measurement of Poverty and Equity: Some ASEAN Social Indicators Experience*, advocates improvement in measurement of poverty and equity in ASEAN countries. He begins with describing the social indicator movement that had an essential spirit of putting its thrust towards quantification of the conditions previously neglected, but admittedly of important social concerns. Unfortunately, however, paucity of data in the study area seriously hampers the effort in this direction. The paper briefly discusses certain innovations in measurement of poverty and equity and then winds up with a set of recommendations.

16. In *Measuring the levels of development – A Taxonomic Approach*, **Sudama Singh** [1984] reviews various methods advocated by different scholars, for measuring the levels of development. Each of these,

he argues, suffers from many shortcomings. Principal Component Analysis is no exception. The most serious weakness of this technique being its dependence on the unit of measurement. Hence, as a substitute to this method, he suggested the use of an alternative method known as Taxonomic Method that is very simple and lucid, and does not require the knowledge of high level of Mathematics and Statistics. By this method, one can develop a single coefficient of composite index of development even for a Block or a village, provided, data are available, he claims.

17. **Nancy Baster** [1985] in the book, *Social Development in the third World*, edited by **J G M Hillhorst** et al. (**Chapter 2- Social Indicator Research: Some Issues and Debates**), presents a very general view on social indicators. She then discuses a few particular issues, including the debate on different approaches to the measurement of levels of living or quality of life, the question of an appropriate framework, for integrating social indicators with economic and other aspects of development, and problems of distribution and disaggregation.

18. In Chapter 3 (**Development Indicators: Some Relativities of Subjectivity and Objectivity**) of **J G M Hillhorst** et al. edited book *Social Development in the Third World,* **Raymond Apthorpe** [1985] presents an essay with the aim that could be described as looking into some discursive aspects of research method politics to take a broader view of "tools" than is customary. This view is discussed on the basis of debate that has been going on in the literature of social indicators. Some Relativities and Binarities are identified as worth examining in the future works to look into the research status of selected substantive areas of development policy, and then reviewed actual policies accordingly.

19. In *The use of social indicators in planning context,* **Stephen H K Yeh,** [1986] deliberated on new directions for action-oriented research that would enhance the nation's capacity to integrate socio-cultural with economic dimensions more effectively in development planning. Focusing on the general theme of applicability or operational relevance, the paper first reviews some general issues regarding the use of social indicators in policy context, followed by a review of selected experiences in the US, Philippines, China and Malaysia. A few suggestions are made in conclusion, which call for further discussion in this context.

CHAPTER – IV
THE METHODOLOGY: DATA COLLECTION AND CONSTRUCTION OF QUALITY OF LIFE INDEX

In the previous chapter, we have seen how various scholars have attempted to study QOL in different times and contexts. This enabled us to have a feel of how and in what direction the development of the subject has progressed. It also tells us of what methodologies have been adopted so far, in dealing with the subject. In the ensuing section, we shall attempt to describe the methodologies that have been used in the present study.

4.1 Broad Objectives, Scope and Limitations of the Present Investigation

Before proceeding further, it would be pertinent to state the broad objectives, the scope and the limitations of the investigation at hand clearly and categorically. In the earlier chapter, it has been shown how different researchers have visualized, defined and studied quality of life at different places and in different contexts. Quality of life involves numerous aspects; physical, environmental, economic, social, political, psychological, medical and so on to mention only a few. Then, studies may be conducted at the

macro level taking nations or large regions as units as well as at the micro level covering the people living in a small area, *viz.* a township. Further, one may use subjective or experiential indicators to assess quality of life as perceived by the people concerned, or alternatively, objective indicators of quality of life may be used. A judicious mix of objective as well subjective indicators may also be employed. In view of all these considerations all-inclusive assessment of quality of life may only be an ideal goal, but practically any particular study may only be partial. Therefore, it is required that one must clearly state the scope and the limitations of the study at hand.

The objective of this study is to assess (mainly the economic aspect of) the quality of life in the township of Dimapur (Nagaland) and its periphery, search for the factors that determine it, investigate into its distribution over space (different sectors of the city) and to correlate it with some important socio-economic variables such as employment, ethnicity and the like. Over and above these objectives we aim at (a) creating awareness to the general public, the social and health workers and the Authorities about the prevailing conditions of life, and (b) suggesting to the Authorities to make proper planning as well as implementation of those

plans so as to augment QOL in the study area. The latter two objectives are mainly *normative and Prescriptive* in nature.

Since this study is concerned with the assessment of quality of life in a township and its periphery, it may be classified into a *micro level study* of quality of life. Further, it is mainly concerned with the *economic aspect* of quality of life. It may touch upon some social, physical, environmental and a few other aspects of quality of life and in doing so may employ some indicators pertaining to those aspects, but only as much as the need to reinforce the economic aspect of quality of life warrants. Thirdly, it would primarily use the *objective indicators* of quality of life, though in certain situations, experiential, perceived or subjective indicators may also be employed. Lastly, an attempt will be made to quantify or devise a *quantitative measure of quality of life*, using statistical/mathematical methods. **This study, therefore, is a micro level quantitative investigation of mainly economic aspect of quality of life assessed primarily by objective indicators**. However, one does not intend to mean that the aspects of quality of life other than 'economic' are less important or subsidiary to the latter. Nor one undermines the worth and validity of

'subjective' indicators. One does not claim the superiority of quantitative approach to assessment of quality of life either.

4.2 **Hypotheses**

The objectives, scope and limitations of the investigation at hand broadly streamline the hypotheses to be tested empirically. We visualize that the quality of life is a resultant of two major factors, first the availability of the provisions (the goods, services, and other items including utilities and facilities, man-made and natural), which contributes to welfare of the people, and second, the number of claimants sharing the provisions. Larger the overall share of an individual in the provisions, better the quality of life that he enjoys. Further, quality of life is modified by the 'bads' or dis-utilities, both natural and man-made. With this background, this study aims at testing the following hypotheses:

1. The QOL in the CBD is relatively lower, but, as we move towards the periphery, first, the QOL increases, and then moving farther away, it decreases.
2. The quality of life is determined by the nature, the source and characteristics of livelihood.

3. The nature of factors that determines quality of life is such as to make a package or cluster, which leads to a skewed distribution of (the quantified measure of) quality of life over population and location.

The first hypothesis is based on our day-to-day experience of overcrowding in the CBD and lack of urban amenities and facilities in the peripheries. It is a commonplace experience that CBD has a very large daytime population (floating population) in comparison to its residential population. Therefore, urban amenities and facilities are over-used. It also has its negative spillover that ultimately affect the quality of life of the resident population adversely. The second hypothesis stems from the observed impacts of livelihood on one's attitude to the style of living. As a matter of fact, education, income, consumption pattern, family size, nature of employment and standard of living are closely interwoven that ultimately shape the factors affecting the quality of life. Our third hypothesis is based on the occurrence of complementarity and internal economies observed among various urban amenities and facilities as much as the observed pattern of consumption determined by the income of the urban dwellers.

4.3 The nature and sources of data

Since it is an empirical study, only primary data have been used for quantitative analysis. The data were collected by the researcher through personal interview with the respondents spanning over more than one hour with each of them. The respondents were asked questions on various aspects of living like Housing, Sanitation, Pollution, Environment, Economic conditions, Employment, Market, Road and Communication facilities, Recreational facilities, Basic amenities like Water supply and Electricity and Educational facilities, etc. The response was recorded on an Interview Schedule, prepared before hand. These data were fed into the computer for quantitative treatment and analysis by using a number of statistical methods.

Certain secondary data were used especially in the chapter on the study area. The main sources of these data were the Office of the Deputy Commissioner, Dimapur, the Dimapur Town Committee office, Town Planning office, Dimapur, Directorate of Census Operations, Kohima, Directorate of Informations and Public Relations, Nagaland: Kohima, Directorate of Economics and Statistics, Nagaland: Kohima, etc.

4.4 The methodology of data collection

Dimapur and its periphery, as the name suggests, forms the universe of the study. It consists of the towns of Dimapur and Chumukedima and the 61 villages surrounding it. However, not all, but only those villages on the eastern side of Dimapur that lie within the territory of Nagaland, are included in the study area. To be precise, only those areas that are included in the proposed city of Dimapur have been considered in the study. In order to facilitate study of the QOL over different locations, the study area has been divided into 5 categories as:

a) Main Business Area	-Central Business District (CBD)	-sector-1
b) Urban or City Area	-First order ring around the CBD	-sector-2
c) Suburban Area	-Second order ring around CBD	-sector-3
d) Forward Rural Area	-Third order ring around CBD	-sector-4
e) Backward Rural Area	-Fourth order ring around CBD	-sector-5

In the classification presented above, the word '*ring*' should not be taken in a literal or an ordinary geometric sense but in a *functional sense* reflected in the intensity of urban attributes since Dimapur is not a radial township.

The population of the study consists of all the registered households

within the demarcated area of the proposed Dimapur city. There are a total of 48,495 households in the area according to 2001 (provisional) census. From these households only 231 households have been picked up for closer examination using stratified random sampling method.

The population of the study area being quite large, it was not possible on the part of the researcher to have a complete survey due to time and resources constraints. Hence, sampling method was adopted; the area was first divided into Towns (Urban) and Villages (Rural). Of the 22 town wards (21 in Dimapur and 1 in Chumukedima), only 9 units were randomly selected and of the 61 villages, only 12 were randomly selected. From each of the 21 units (wards and villages) only 11 households each were interviewed. While selecting the households, care has been taken to see that the selected households were random and, additionally, not concentrated over a particular area only. As a result, households were scattered over various geographical locations of the unit such that they do represent the whole village or ward. Except in a few extremely difficult situations, no two consecutive households were selected for the interview. In such cases, the researcher used his own judgments for arriving at reasonable decisions free

from biases. However, human error too is not ruled out and hence, no perfection is claimed whatsoever.

4.5 Denomination of Indicator Variables of Quality of Life

It has already been mentioned that overall 231 households were selected for collection of data pertaining to quality of life of the households. In all, data on 135 indicator variables have been collected. The list of these indicators of QOL is given in the table below (with the mnemonics for easy reference in discussion that follows in the subsequent chapters).

Table 4.1: Indicators of Quality of Life in Dimapur

Sl. No.	Mnemonics	Name of the Variable
001	KITCHEN	No. of Kitchen rooms per capita
002	LIVROOM	" " Living Rooms " "
003	STDYROOM	" " Study Rooms " "
004	BEDROOM	" " Bed Rooms " "
005	O_ROOM	" " Other Rooms " "
006	STOROOM	" " Store Rooms " "
007	TOTROOM	" " Total Rooms " "
008	HHMEMB	No. of Household Members
009	OWNER	Ownership of Dwelling
010	BLDSTRUC	Building Structure
011	PLOTSIZE	Plot Size
012	FLOORARE	Floor Area
013	IBDIST	Inter-Building Distance
014	RUNWAT	Availability of running Water
015	WATSUPS	Water Supply System

016	WSUPMETH	Water Supply Method
017	ELECTRIC	Type of Power Connection
018	PWRFAIL	Freq. of Power Failure
019	USEFAN	Whether Uses Fans
020	NUMBFAN	No. of Fans in the House
021	RADIO	Has any Radio
022	LPG	Use of LPG for Cooking
023	FRIDGE	Use of Fridge
024	TV	Whether has a TV
025	TVTYPE	Type of TV
026	TELEPHON	Telephone Connection
027	FURNITUR	Has Furniture
028	FURNSPEC	Furniture Specification
029	VENTILAT	Ventilation adequacy
030	SUNSHINE	Sunshine availability
031	CMPNDRAT	Rating of the Compound
032	WTDSPMTH	Waste Disposal Method
033	DPDSINK	Distance from Public Sink
034	WATERLOG	Does suffer water Logging
035	WLOGSPAN	Duration of Water Logging
036	FALLOWLN	Fallow Land in the Vicinity
037	PUBDRAIN	Public Drainage
038	XCRETDSP	How excreta are disposed off
039	NOISE	Noise Level
040	SMOKDUST	Smoke and Dust in Air
041	FOULSMEL	Foul Smell in Air
042	WATPOLN	Water Pollution
043	NWATPOLN	Nature of Water Pollution
044	SATSANIT	Satisfied with Sanitary Condition?
045	PARK	Any Park Near by?
046	PARKDIST	Distance of Park if any
047	PRKNGSPC	Is there Parking Space Near by
048	PRKSPSIZ	Size of Parking Space
049	D_HIWAY	Distance from Highway
050	D_MNROAD	Distance from Main Road
051	MNRDREP	Has Main Road been repaired?

052	ROADTYPE	Type of Approach Road
053	SIDDRAIN	Side Drainage
054	SDRAINWR	Is Side Drainage Working?
055	POTHOLES	Potholes in the approach Road
056	VEHCLACC	Accessibility by Vehicle
057	RDMAKER	Who constructed the Approach Road?
058	SATROADC	Satisfied with Road Condition?
059	EMPLOYD	Whether Employed?
060	NATEMPL	Nature of Employment
061	INCOME	Monthly Income Range
062	BNKSACC	Has Bank Savings A/c
063	INSURANC	Has Insurance
064	FOODEXP	Expenditure on food Per Capita/month
065	HOUSRENT	House rent Per Capita/month
066	EDUCEXP	Expenses on Education Per Capita/month
067	TOILETEX	Exp. On Toiletries Per Capita/month
068	NEWSPEX	Expenses on News Paper Per Capita/month
069	ENTRTNEX	Exp on Entertainment Per Capita/month
070	ADDICTEX	Expenses on Addiction Per Capita/month
071	CLOTHEXP	Expenses on clothing Per Capita/month
072	DONATEX	Expenses on Donation Per Capita/month
073	TOTALEXP	Total Expenditure Per Capita/month
074	VEGETARN	Is Vegetarian?
075	NVEGFRQ	Frequency of Non-Veg. Consumption
076	MEALOUT	Does eat meals outside home?
077	TEASNACK	Tea/snacks outside Home?
078	SMOKCHEW	Smoking/Chewing?
079	FRESHMLK	Consumption of Fresh Milk per month
080	PWDRMLK	Consumption of Powder Milk per month
081	FRUITS	Expenses on food per month
082	EGGS	Consumption of eggs/month
083	MEATFISH	Meat/Fish consumption/month
084	VEGEXPND	Expenses on Vegetables/month
085	NEWSREGL	Regular Readership of Newspaper
086	TYPNEWSP	Type of Newspaper subscribed
087	NWSCOL	Which news columns are read

088	TVWATCH	Watches TV regularly
089	TVHOUR	TV watching for how Many hours
090	LIBRARY	Does go to Library
091	NOLIBWHY	Does not go to Library? Why?
092	D_LBRARY	Distance of Library
093	LIBADQT	Is Library facility adequate?
094	HOBBY	Has any Hobbies?
095	HOBBYTYP	Which types of hobbies?
096	HOBBYFAC	Have the facilities for hobbies?
097	HOBYHIND	Hindrances in pursuing Hobbies
098	HBHINDTY	What type of hindrances in Pursuing the hobbies
099	MOVIE	Does go to movies
100	MOVIEFRQ	Frequency of movie-going
101	PICNIC	Goes to picnic
102	DRAMA	Goes to drama
103	DRMAFAC	Are there facilities for Drama
104	ED_GPA	Education of Grand Father
105	EDFATHER	Education of father
106	EDMOTHER	Education of mother
107	EDRESPON	Education of the Respondent
108	CHLDSTDY	No. of children in schools, etc
109	CHLDPSCL	Children in Pre-School
110	CHLDSCHL	Children in School
111	CHLDCOLG	Children in college
112	DPSCHOOL	Distance of Pre-school
113	DSCHOOL	Distance of school
114	DCOLLEGE	Distance of College
115	STDEDINS	Standard of Educational Institutions around
116	FMSICK	Is a family member sick
117	IDMEMBER	Sick member's relationship with the respondent
118	DISEASE	Which disease?
119	DURSICK	Duration of Sickness
120	DISABILI	Any family member is suffering From disability?
121	XRAY	Has taken x-ray
122	XRAYFRQ	Frequency of X-ray taken
123	EYESIGHT	Is eye sight normal

124	EYEGLASS	Does wear specs
125	FAMDOCTO	Has a family Doctor
126	EXERCISE	Does exercise
127	NOEXRWHY	If no exercise, then reason
128	DMARKET	Distance of Market place
129	MODEMRKT	Mode used to go to Market
130	MRKTFRQ	Frequency of going to Market
131	DWRKPLC	Distance of Work Place
132	MODEWRK	Mode used to go to Work Place
133	TIMEWRK	Travel Time needed to go to the work Place
134	TRVLCOST	Travel Cost to Work Place
135	MODEQLTY	Quality of Mode used to go to the Work Place

4.6 **Methodology of Data Analysis**

In analyzing the data to draw relevant conclusions, three types of statistical method have been used: (a) The Principal Component Analysis – for construction of a composite index of Quality of Life, (b) Factor Analysis – for identification of the structure underneath the empirically obtained indicators of Quality of life and identification of indicators thereof, and (c) Regression, Canonical correlation and ordinary (Carl Pearson's) bi-variate correlation – for measurement of the degree of association as well as the response of a variable (or a set of variables) to other variables. It would not be unavailing to give an introductory idea of these statistical methods before we use them in the analysis at hand.

i. Correlation and Regression Analysis

The coefficient of product moment correlation, which measures the degree of association between two variables, is the cosine of the angle between two vectors, best fit in the sense of least squares, that pass through the swarm of observed points in the two-dimensional plane (X,Y), intersecting each other at the mean values of X and Y. On the other hand, if one holds that a variable Y has two parts, one regular and the other random, while the regular part is a function of X such that $Y = f(X, \alpha)$, where α is the vector of parameters, and the random (stochastic) part is ξ, then α may be estimated such that $\xi' \xi = \Sigma(\xi_i)^2$ is minimum. The enterprise of estimating α is called regression analysis. If $f(X, \alpha)$ is linear (e.g. $Y = \alpha_1 X_1 + \alpha_2 X_2 + \ldots + \alpha_m X_m + \xi$), it is called a linear regression analysis, else it is called a non-linear regression analysis. In linear regression, a particular parameter, α_j, may be interpreted as the partial derivative of Y with respect to the explanatory variable X_j or geometrically as the tangent or slope of the line in the (X,Y) plane. However, in case of non-linear regression a parameter is interpreted in accordance with its position vis-à-vis the explanatory variables and its appearance in the model specification. Regression analysis

is used for structural analysis as well as prediction. While the estimation of parameters in a linear regression model under standard Gauss-Markov conditions being satisfied by the stochastic ξ is simple and straightforward, violation of Gauss-Markov conditions may necessitate application of a suitable econometric method (**Intriligator**, pp. 78-144). Estimation of parameters in a non-linear regression model requires application of a method such as Gauss-Newton, Marquadt, Powell or any other suitable search method (**Kuester** and **Mize**, pp. 205-251).

ii. The Principal Component Analysis

The Principal Component Analysis (**Kendall** and **Stuart**, pp. 285-299) is primarily concerned with data reduction, i.e. how to best represent a multitude of (often highly correlated) variables by a few derived variables (that are linear combination of the original variables). Hence, it has been a popular method to construct composite indices that are (weighted) linear combination of a large set of indicators ($I_j = Xw_j$, where I represents the composite index, X is the matrix of standardized indicator variables and w is the weight vector). Standardization of X is done in the manner such that each standardized indicator variable has a zero mean and a unit standard

deviation. The composite index I_j explains certain percentage of the total variance in the original indicator variables X, which is optimal in the sense that no other linear combination of X can explain larger percentage of *variance* in X than what I_j does.

The Principal Component analysis starts with the product moment inter-correlation matrix [R] among the original variables (indicators). However, if indicators are measured in the same unit and standardization is not necessary, it is possible to start with the variance-covariance matrix [V] as well, though such cases are only rare. Next, eigenvalues and eigen vectors of R are obtained. Very often, each eigen vector (say, ε_j) is normalized such that the (Euclidean) norm of the normalized vector (say, w_j) is equal to the eigenvalue (λ_j) associated with the vector. This procedure has an advantage over other methods of normalization. When $I_j = Xw_j$, the coefficient of correlation between I_j and the k^{th} indicator (X_k) is equal to the k^{th} element of w_j, that is $r(I_j , X_k) = w_{kj}$. In this sense, I_j is the composite index that maximizes the sum of squared correlation coefficients between itself (I_j) and the indicators (X_k) over k. This property of I_j makes it an ideal index of X.

Very often, one chooses to represent X only by a single composite index (I_1). In that case only the largest eigenvalue and the associated eigen vector are used. In case X is a set of highly correlated indicators, a single composite index suffices to represent it. However, when the original indicator variables are poorly correlated or structured such that they indicate to blocks of indicators highly correlated within the block but poorly correlated across the blocks (a block-diagonal structure), it is preferable to attempt at Cluster Analysis and Factor Analysis first, resolve the structure and then proceed to making composite indices.

iii. Factor Analysis

Factor Analysis is a multi-variate statistical method with a major objective of data reduction. It assumes that a few latent, fundamental and essential forces work in the hind side and manifest themselves into the empirically observed multivariate data on a complex of variables. These essential, but latent or unobservable forces are "factors". Thus, the relationship between these latent factors and the observed data on the variables is that of "the essence" and "the manifestations". Nevertheless, each individual variable that constitutes of the complex of empirical data has 'noise', specificity or

errors of its own. Using suitable statistical and mathematical methods it is possible to extract these essential factors and in turn, they can be given a conceptual and theoretical meaning. Thus, Factor Analysis is a statistical method to extract the common, essential and latent variables that reflect themselves into a complex of empirically observed variables. These essential factors are very often much fewer in number than are their manifest variables. In this sense, factor analysis is a statistical method of reducing the dimensionality of data.

The method of Factor Analysis may take a number of different forms based on the following assumptions and techniques used. These different approaches to Factor analysis may conveniently be classified according to the following criteria.

1. Assumption regarding the relationship between the universe of variables and the sample variables drawn from the said universe: Latent factors may manifest themselves into innumerably many measurable variables, but in any particular empirical study, only a subset of the said universe of variables can be included in the analysis. That is to say that the sample over the variables is always a proper subset of the universe of variables.

2. Assumption regarding the relationship between the universe of individuals and the sample individuals drawn from the said universe: Empirical data on various variables (manifestations) are collected for a sample of individuals to whom the schedules are administered.
3. Assumption regarding the composition of variables in terms of its explicability by other variables (complimentary set) in the sample: It may be assumed that every variable included in the analysis can be (partly) explained by the complementary set of variables included in the analysis.
4. Inter-relationship among the latent factors: It may be assumed that the latent factors (essence) are orthogonal among themselves or, alternatively, they are inter-correlated.
5. Optimization criterion: Factor Analysis has to depend on some optimization criterion, whether in terms of the minimization of some type of distance between the empirical data points and the inferred (estimated) points corresponding to them or maximization of the probability of occurrence of the data points. In measuring the distance different criteria might be used.

6. Identifiability of factors and Reproducibility of the empirical inter-correlation matrix: *On the one hand, identifiability demands that the* number of factors be as small as possible (parsimony) and such that each factor can be given some conceptual or theoretical meaning. On the other hand it is also required that the original empirical inter-correlation matrix among the variables is reproducible in terms of the factor loadings. These two requirements often compete with each other.

iiii.A) Methods to extract Initial Factors from the Observed Correlation Matrix

The complex of the criteria mentioned above gives rise to several strategies of factor analysis to extract initial factors from the observed correlation matrix [**Kim** and **Mueller**, 1978]. The general method of extraction may be expressed symbolically as the solution of the eigen-equation (characteristic equation) in which $Det(R_x - \lambda I) = 0$ is solved for λ *and from* $R_xV = \lambda V$ *the vector* V *is obtained. Then* V *is used to obtain* initial factor loadings. Here R is the inter-correlation matrix obtained from the variables included in the analysis. The real difference in the methods of

extraction is in obtaining R_x from R. Obtaining R_x from R depends on two major ideas, first, the communality, generality, image or similar to these and the second the individuality, anti-image, uniqueness, residual or the like. The correlation matrix is decomposed into two parts, the common part and the uncommon part. The real issue is as to how one does the decomposition. Accordingly, we will see how R_x is defined differently in different methods of extraction.

1) Alpha Factoring

In this method it is assumed that the variables included in the analysis are only the samples from a universe of innumerable variables that the latent factors may manifest themselves into. Accordingly, the initial factors are extracted and later necessary rotations are applied to them. In Alpha factoring, the key emphasis is not on the statistical inference but its objective is to draw inference for an understanding of the underlying essence that give rise to the manifestation as empirically observed. In Alpha factoring $R_x = H^{-1}(R-U^2)H^{-1}$, where U is the diagonal matrix made up of the elements that are square root of the unique component for each

variable (unexplained by other variables and so uncommon or unique to the variable) and H is the matrix of the square root of communalities.

2) Image factoring

Image analysis decomposes the variations in the variables into two parts, (i) image, and (ii) anti-image. That part of the variation of a variable which is predictable by a linear combination of all the other variables in the set (complimentary set) is called the image of the variable. It is the common part. On the other hand, the anti-image of the variable is the residual, which is the unique part of the variable. Here $R_x = (R\text{-}S^2)R^{-1}(R\text{-}S^2)$, where S is the diagonal matrix whose elements are the standard deviation of the residuals of each variable that could not be explained by other variables. This S is the matrix of anti-image standard deviations or $s_j = (\Sigma(e_{ij})^2/n)^{0.5}$ for variable j.

3) Principal Axis factoring

This is one of the oldest methods of factor analysis to extract initial factors. An attempt is made to find out as many mutually orthogonal principal axes as needed. Each principal axis is obtained in such a

manner that it minimizes the sum of distance between the observed points and the estimated points on the principal axis (distance measured by the length of the line *normal* to the principal axis and joining the observed point away from the principal axis and the expected point on the principal axis). This method uses the decomposition strategies of the Principal Components analysis as applied to the adjusted correlation matrix whose diagonal elements are replaced by corresponding estimates of communalities. These communalities are usually estimated by the highest absolute correlation in the corresponding row of a correlation matrix. In our general system here R_x = R-h, where h is a diagonal matrix of communalities. This method is gradually being replaced by the **Least Squares factoring**. In the Least Squares factoring, an attempt is made to minimize the residual correlation after extracting a given number of factors, and to assess the degree of fit between the reproduced correlation under the model and the observed correlations. Since the squared differences are minimized, the name follows. In the LS factoring the communalities are estimated at each iteration (not once for all as in the Principal Axis method) and a new R_x is found until the results are stable.

4) Maximum Likelihood procedure for initial factoring

It is assumed that the observed data comprise a sample from a population where a k-common factor model exactly applies, and where the distribution of variables and the factors is a multivariate normal. The exact loadings on each variable are unknown and to be estimated. The objective of ML method is to find the underlying population parameters that would have the greatest likelihood of producing the observed correlation matrix. In our general framework, here $R_x = U^{-1}(R-U^2)U^{-1}$, where U is the square root of the unique variance estimated at each stage of iteration. The initial iteration begins with the principal component analysis. In contrast with the Least Squares method where the sum of squared discrepancies (between initial and reproduced correlations) is minimized, in case of maximum likelihood method the likelihood of reproducing the observed (that is, initial) correlations by the estimated loadings is maximized. Further, in the LS method, assumption of normality of distribution is not necessary.

5) Principal Component analysis for initial extraction of factors

In terms of eigenvalues and eigenvectors, an observed or initial

correlation matrix, R, can always be decomposed as $R = R_1 + R_2 + \ldots + R_m$, where R_i is a cross-product of the i^{th} eigenvector (standardized) multiplied by the i^{th} eigenvalue. Conventionally eigenvalues are ordered according to magnitude and the first eigenvalue is the largest while the last is the smallest. Accordingly, R_1 reproduces larger part of R than do the subsequent R_s and that also in the order. Here we have $R_x = R$. Interestingly, the Principal Component method does not try to modify the matrix of inter-correlations in view of communalities, uniqueness, image, etc. In this sense, this method of initial factorization is quite different from others. However, due to its great power in decomposition of R matrix into orthogonal component matrices and finding out eigenvalues, it is often used at the initial level of many methods of extraction. As a matter of fact, the famous theorem of Cayley-Hamilton (that every continuous function of a matrix is a function of its eigenvalues and eigenvectors) makes the Principal Component method so powerful.

The initial factoring step usually determines the minimum number of factors that can adequately account for the observed correlations, and provides the estimates of the communalities for each variable. With these

factors (say m in number) and estimated communalities, it is possible to carry out some transformation over the factors (by rotation performed on them in the m-plane) so that simpler and more easily interpretable factors can be obtained. The output of such an attempt is the rotated factors.

iii.B) Rotation of Factors for better interpretation

To proceed for rotation, one must, first assert whether the factors would be correlated (non-orthogonal or oblique) or they are orthogonal (spherical) among themselves. If one visualizes that the factors need not be orthogonal, one may proceed to oblique rotation (OBLIMIN or PROMAX). In cases when there is a good reason to hold that factors are orthogonal, one may try with methods like VARIMAX, QUARTIMAX or EQUAMAX rotation. It is fair not to impose orthogonality on the factors from the very beginning and look into the pattern obtained after carrying out the oblique rotation. If the factors are orthogonal, such evidence will be available in the results of the oblique rotation. Alternatively, rotation can be carried out to obtain a pattern that is close to a given (target) matrix.

It is clear that an oblique solution is more general than an orthogonal rotation because it does not impose the restriction of orthogonality on the

factors. Its supremacy over the orthogonal rotation methods lies in the fact that after carrying out the oblique rotation one may get the feel whether imposition of orthogonality relations on the factors from the very beginning could have been appropriate or not.

1. The Quartimax Rotation

Let us define $\mathbf{q}_i = [\Sigma_j (b_{ij})^4 - \{\Sigma_j (b_{ij})^2\}^2]/(m^2)$; where j =1, m ; i = 1, n. Further, let **q** be defined as the sum of $\mathbf{q}_i$. That is $\mathbf{q} = \Sigma_i (q_i)$; i = 1,n. Here m is the number of initial factors and n is the number of observations in the data set. Since communalities $(h_i)^2 = \Sigma_j (b_{ij})^2$ are already fixed and m^2 = constant, **q** varies directly with $\Sigma_i\Sigma_j (b_{ij})^4$. Now axes are rotated in such a way that **q** is maximized and in that process old (initial) factor loadings are replaced by new factor loadings. This is called the Quartimax rotation. An application of quartimax criterion usually results in emphasizing the simplicity of interpretation of the variables at the expense of simplicity of interpretation of factors. In general, fewer common factors add to simplicity in interpretation of variables while fewer variables with large loadings on each factor facilitate the interpretation of the factors and their identification. The

Rotated factors obtained by this method are orthogonal among themselves.

2. The Varimax Rotation

Let us define $\mathbf{v}_j = [n\Sigma_i (b_{ij})^4 - \{\Sigma_i (b_{ij})^2\}^2]/(n^2)$; where j =1, m ; i = 1, n. Further, let **v** be defined as the sum of $\mathbf{v}_j$. That is $\mathbf{v} = \Sigma_j (q_j)$; j = 1,m. Here m is the number of initial factors and n is the number of observations in the data set. Now, unlike in case of quartimax rotation, $\Sigma_j (b_{ij})^2$ are no longer fixed but they are variable due to summation being carried out over n individuals, the maximization of V is called the Varimax method of rotation. This method of rotation concentrates on simplifying the interpretation of factors rather than the variables, as it was the case with the quartimax rotation method. The Rotated factors obtained by Varimax method are orthogonal among themselves.

3. The Equimax and the Biquartimax Rotation

A hybridization of quartimax and varimax rotation methods yields these methods. If one maximizes $\zeta = \alpha\mathbf{q} + \beta\mathbf{v}$, the compromise solution is obtained. Defining $\gamma = \beta/(\alpha+\beta)$, in special or limiting cases $\gamma = 0$ yields

quartimax solution and $\gamma = 1$ yields varimax solution. In particular, maximization for $\gamma = m/2$ is called the Equimax solution and that for $\gamma = 0.5$ is called the biquartimax solution. The Rotated factors obtained by this method are orthogonal among themselves.

4. Indirect Oblimin Rotation

This method of rotation tries to simplify loadings on *Reference Axes*. The indirect Oblimin criterion is given by:

$B = \Sigma_j [\Sigma_k \{n\Sigma_i a_{ij}^2 a_{ik}^2 - \gamma(\Sigma_i a_{ij}^2 \Sigma_i a_{ik}^2)\}]$; $k = 2, m$; $j = 1, k$.

Iteratively, B is minimized. In the expression above, $\mathbf{a_{ij}}$ are projections of i^{th} factor on j^{th} reference axis usually normalized by h_i^2 (communality) and γ refers to the degree of obliqueness, which can be altered to obtain more or less oblique solution. For $\gamma = 0$ this rotation is called **Quartimin** solution, while for $\gamma = 1$ it is called **Covarimin** solution. For $\gamma = 0.5$ it is called **Biquartimin** solution.

5. Direct Oblimin Rotation

This method of rotation tries to simplify loadings on *primary factors*.

The direct Oblimin criterion is given by:

$$D = \Sigma_j [\Sigma_k \{\Sigma_i b_{ij}^2 b_{ik}^2 - \delta(\Sigma_i b_{ij}^2 \Sigma_i b_{ik}^2)/n\}]; j,k = 1, m.$$

Iteratively, D is minimized. In the expression above, $\mathbf{b}_{ij}$ are factor loadings in a pattern matrix and δ refers to the degree of obliqueness, which can be altered to obtain more or less oblique solution. For a unifactoral factor pattern, $\delta = 0$ identifies the correct pattern.

6. Promax Rotation

Promax rotation is a variant of Target matrix rotation, though in this case such a matrix is derived from the data itself and the analyst is not needed to supply any target matrix. The rationale behind the promax rotation is the observed fact that in practice the orthogonal solutions are not much different from oblique solutions. Therefore, if small loadings are reduced to near-zero loadings (that might be ignored), it is possible to construct a fairly good target matrix with much simpler structure. Having done that, one rotates the factors to be close to such an artificial target matrix.

iii.C) The Choice of method

In practice, it is not at all easy to choose among the various methods of extraction of factors or rotation of factors. The first difficulty is regarding the decision as to how many factors are to be extracted. It is usually suggested that one should extract as many factors as the number of eigenvalues of the inter-correlation matrix exceeding unity. But when the number of variables included in the analysis is large (say over 100) and these variables are not strongly correlated with each other, this criterion may suggest extraction of too many factors to be explicable or meaningful. The Principle of Parsimony of Factors is seriously violated in such a case. It is to be noted that the data origination from a relatively less developed population has only a poor communality. In case of such data the said criterion is utterly disappointing. Nevertheless, the irony is that extraction of factors and thereafter their rotation and identification (interpretation) depends greatly on the choice of the number of factors to be extracted.

Cattell, R B [1965] suggested *Scree Test.* It is a diagrammatical presentation of eigenvalues (of inter-correlation matrix) with the magnitude of the eigenvalue on the vertical axis and the serial number of the eigenvalue (integers of the index set) on the horizontal axis. This curve is

usually (not always) very steep in the beginning but quickly tapers off. It clearly has an 'elbow' before which the slope is steep (negative) and after which it is poorly falling. It is a good heuristic to extract as many factors as suggested by this elbow projected on the horizontal axis. Nevertheless, one must not forget that factors so extracted have also to be interpreted and given some reasonable meaning within the available theoretical structure. One must make a number of trials and errors. Different methods of extraction and rotation must be experimented with.

Having decided tentatively as to how many factors are to be extracted, one has to choose the method of extraction. The most intriguing fact is that in most cases there is not much difference between the results obtained by one method of extraction and the others. It is more so when the number of individuals as well as number of variables in the data is large. In applying different methods of extraction of factors, one observes that factor loadings exhibit some alteration and their order is changed. The factors so extracted sometimes change their order (what is the first factor in one method of extraction turns out to be the second or the third factor in another method of extraction). New factors, however, do not emerge very often. In an explorative research, there is no much reason to hold as to the order of

importance or strength of the underlying factors. When one method suggests one order and another method suggests another order, the researcher is faced with a real instance of indecision. Nevertheless, an attempt to derive a fixed (say, m) number of factors by different methods of extraction is always rewarding. It is true that in one method the list of variables loading on a particular factor is not exactly the same as in case of another method of extraction. Nevertheless, it is a general observation that these lists contain quite many common variables. Only a few are uncommon. Usually, they suggest adequately for proceeding to an attempt to giving some name (identification) and theoretical justification (interpretation) to those clusters of variables.

The next step is to go in for rotation. It is fair not to impose orthogonality on the factors in the very beginning. So, one may start with the "Direct Oblimin" or "Promax" solution. If factors are correlated, the solution would suggest that. In case there are no such symptoms observed, one may impose orthogonality conditions on the factors and try with such methods as "Quartimax", "Varimax" or "Equamax". Alpha factoring may go well with "Quartimax" and "Equamax" solutions. Principal Component and Max Likelihood methods may go well with "Varimax" rotation.

Finally, nothing can supersede judgment, interpretability and theoretical justifiability. To suppress small loadings and carefully deal with the bi-polar factors may be helpful in clear conceptualization.

iv) Canonical Correlation

Canonical Correlation is a generalization of the ordinary (bi-variate product moment) coefficient of correlation. If we have two sets of variables, say [X] and [Y], either X or Y (or both) could be either a singleton or a multi-member set. When X and Y both are singletons, the cosine of the angle of two vectors passing through the swarm of points in X-Y plane is named as the (bi-variate) coefficient of correlation. If either X or Y (but not both) is singleton, we obtain the so-called 'coefficient of multiple correlation'. The multi-membered set (say, X) of variables is transformed into a single variable by an appropriate (often least squares) method such that the angle between the composite variable (say, $Y = Xa$) and its counterpart (i.e. Y) is as small as possible (so that the cosine of the angle or the coefficient of multiple correlation is the largest possible). However, if X and Y both are multi-membered sets, Y is transformed into X and X is

transformed into Y such that the cosine of the angle between X and Y is the maximum. This is the *coefficient of canonical correlation.* Algebraically,

Coeff. of Canonical Correlation = **Eigenvalue** $\{(X'X)^{-1}X'Y\,(Y'Y)^{-1}Y'X\}$

The matrix within the curly brackets in the relationship stated above has the number of eigenvalues equal to the rank of the said matrix [**Kendall** and **Stuart**, pp. 299-306]. Hence, there are as many coefficients of canonical correlation as the number of eigenvalues. Among them, the one associated with the largest eigenvalue is often used to measure the association between X and Y.

CHAPTER-V

ANALYSIS OF DATA: FINDINGS AND INTERPRETATIONS

5.1 Facets of Quality of Life and Construction of QOL Indices

We have visualized QOL as a multifaceted unobservable attribute, which is instrumentally measurable in each dimension by means of an index. Perhaps, it does not have a natural zero and the natural scale to facilitate the construction of an absolute measure that may claim a universal use. It requires an arbitrary base to define its zero (**Georgescu-Roegen**, pp. 17-46).

We visualize that QOL has four dimensions or facets: (a) Housing conditions, (b) Economic aspects like income, expenditure on necessities like food, clothing, rent, education, etc, (c) High Consumption, which includes consumption of mass media like newspaper, TV, library services, indulgence in hobbies, movies, picnic, drama shows, concerts, and educational services, health status and consumption of health services, etc. and (d) Accessibility to market and work place including the mode of transport. Among these aspects of QOL, the aspect of high consumption deserves a special attention. While food, clothing, housing and movement

are rather necessities and relate to the bodily needs, the consumption of mass media products, hobbies, entertainment, etc. emanate from the mind and characterize the cultural needs of the better off in the society. One might ask a very pertinent question here. Whose life is 'the life' and whose values determine what type of life is loftier? **Veblen** (1899) said long back that the values of the Leisure Class determine the values of the society. This class defines what is life and what one means by quality of life. The loftier quality of life is the quality of life that the Leisure Class lives. The Labour Class only imitates them. More leisure, more wasteful and conspicuous consumption, more indulgence in unproductive labour and idle curiosity are the sine qua non of a high quality of life. "I like work; it fascinates me. I can sit and look at it for hours", wrote **Jerome K. Jerome** (sarcastically, of course). In a similar sense, we have used the term "high consumption". Be what the high quality of life is, high consumption defines that. We must clarify one more thing. We have visualized "Economic aspect" as one of the facets of QOL. One may ask: is housing or high consumption extra-economic? The answer is, obviously, an emphatic no. Yet, we do not want to indulge in this discussion now. Our categorization is only to facilitate the

work at hand with no ado to logical or conceptual neatness in the categories used here.

We have grouped the variables into four categories as noted above and for each category a facet index of QOL has been constructed. In doing so, Principal Component Analysis has been used. It might be reported here that in spite of being aware of the optimal and desirable properties of the Principal Component Analysis in constructing indices by linear combination of object variables (**Kendall** and **Stuart**, pp. 250-299), we have tried with a few other methods of constructing composite indices. Relative Frequency method (assign weights proportional to the frequency of occurrence), Inverse Relative Frequency method (assign weights inversely proportional to the frequency of occurrence), Dispersion Weight method (assign weights proportional to the standard deviation of the variables), Inverse Dispersion Weight method, and Angular Weights method (assign weights proportional to the cosine of the average of the arc-cosine of the coefficient of correlation between a given variable and other variables in the object set, that is: $W_i = \cos((\Sigma\cos^{-1}(r_{ij}))/m)$) and so on. Except the Angular Weight Method, all others perform miserably. However, *Principal Component Analysis* does perform the best. This is being reported here only

in passing that the alternative methods used by us in transit and unsuccessfully were devised on the basis of some thought given to them but they did not perform. We hold that this note on failure is important. It tells a more complete story of investigation.

A. Facet Indices of QOL

At the first instance QOL indices have been constructed for four major facets, namely, (1) Housing, (2) Economic, (3) High Consumption and (4) Accessibility. The findings regarding them are reported here.

i. Housing

To represent this facet as large as 58 (number of) variables have been used. These variables include plot size, floor area, distance of the dwelling house from other buildings, number of various rooms (per capita) in the house used for different purposes (like living, bed, kitchen, store, study, etc.), structure and ownership status, water and power supply, use of fans, radio, TV, Fuel gas, fridge, telephone, furniture, attributes pertaining to ventilation, sun shine, sanitation, waste disposal, drainage and water

logging, pollution of air and water, noise and dust, parking facilities, connectivity, road condition and so on.

Table 5.1: Loadings for Facet-Index of Housing
(58 variables)

0.411	0.554	0.378	0.596	0.538	0.555	**0.729**	-0.015	0.008
0.655	0.207	**0.743**	-0.089	0.528	-0.230	0.513	0.448	0.032
0.410	**0.760**	0.188	0.617	0.629	0.573	0.666	**0.705**	0.268
0.739	0.558	-0.014	0.212	0.346	-0.028	-0.095	0.065	-0.267
-0.077	0.023	-0.120	-0.166	-0.286	-0.247	-0.005	0.278	0.090
-0.013	0.097	0.123	0.316	0.140	0.412	0.113	0.215	0.084
-0.164	0.144	0.158	0.260					

EIGEN VALUE = 8.75913; VARIATION EXPLAINED = 15.10 PERCENT

The first five dominant positive variables (Table 5.1) with loadings larger than 0.70 are: (#7) no. of rooms in the house (per capita), (#12) floor area (per capita), (#20) no. of fans used, (#26) telephone connection, and (#28) modern furniture like sofa set, dining table and the like. On the other hand the most dominant negative (loadings less then -0.10) variables - that affect quality of life adversely – are the presence of: (#36) fallow land in the vicinity, (#39) disturbing noise, (#40) dust in the air, (#41) foul smell in the air, and (#42) water pollution. Additionally, two other variables that obtain negative loadings are (#15) source of water supply and (#57) approach road construction agency. They indicate to a poor level of public contribution to water supply and maintenance of the approach road. The contribution of

first five dominant positive variables to the variation in the QOL index is a little over 30 percent. The contribution of all negative variables together is below 5 percent. About a dozen of variables are too poorly loaded to contribute significantly to the index and one may possibly drop them out. The index is reliable even though it explains only 15.10 percent of the total variation in the host of 58 variables.

ii. Economic Status

This facet is made up of 26 variables that include employment, income, savings, insurance, per capita expenditure on food, clothing, housing, education, entertainment and addictions, and a host of variables that indicate to the quality of food intake by the members of the family.

Table 5.2:Loadings for Facet-Index of Economic Aspects
(26 variables)

0.061	0.136	0.676	0.488	0.438	**0.706**	0.164	0.624	**0.718**
0.770	0.618	0.236	**0.823**	**0.715**	**0.910**	-0.105	0.508	0.570
0.192	-0.080	0.333	0.164	**0.714**	0.421	0.434	0.548	

EIGEN VALUE = 7.34257; VARIATION EXPLAINED = 28.24 PERCENT

The first six dominant positive variables (Table 5.2) with loadings larger than 0.70 are: per capita expenditure on particulars; (#6) food items,

(#9) toiletries, (#10) newspaper, (#13) clothes, (#14) donations, (#23) fruits and (#15) gross per capita expenditure, which is loaded the most. Only two variables obtain negative loadings: (#16) status of being a vegetarian and (#20) addiction to smoking, chewing etc. However, they are only poorly loaded. Dominant positive variables together contribute a little over 56 percent to the index assuring reliability of the latter in measuring the quality of life of the sample households.

iii. High Consumption

This facet is made up of 43 variables concerning consumption of mass media like newspaper, TV, library services, indulgence in hobbies, movies, picnic, drama shows and concerts as well as status of education, health and related services.

Table 5.3:Loadings for Facet-Index of High Cons
(43 variables)

0.675	0.706	0.638	0.476	0.272	0.253	-0.162	0.304	-0.190
0.635	0.677	0.409	0.484	0.395	-0.089	-0.081	0.479	0.416
0.438	0.456	0.526	0.557	0.646	-0.069	-0.138	-0.153	0.144
0.066	0.041	0.226	-0.367	0.003	-0.018	-0.004	0.125	-0.005
0.209	0.222	-0.045	0.217	0.394	0.258	-0.193		

EIGEN VALUE = 5.79747; VARIATION EXPLAINED = 13.48 PERCENT

The first six dominant positive variables (Table 5.3) with loadings larger than 0.60) are: (#1) regular readership of newspaper, (#2) readership of national and widely circulated newspapers, (#3) readership of editorials, feature articles, national and international news etc., (#10) indulgence in hobbies, (#11) hobbies of varied types, and (#23) the educational level of the respondent. On the other hand, variable #31 (opinion regarding the standard of educational institutions around) is negatively (and rather strongly) loaded. Two other negatively loaded variables referring to (#9) adequacy of library facilities, and (#43) adequacy of facilities of and participation in physical exercises deserve a mention. Consumption of health facilities (variable # 37 through #42 except #39 which is regarding the normal eyesight) obtains moderate positive loadings. Some ten variables obtain poor loadings and contribute very little to the index. Overall, the power of the index of quality of life representing this facet is relatively lower than those for housing and economic aspects. It is rather expected. In less developed regions consumption for satisfaction of physical wants (food, clothing and shelter) is usually dominant and more prominent than consumption for the satisfaction of non-physical wants. For many such non-physical wants either do not exist or they are nowhere in the priority list.

The Principles of Hierarchy, Subordination, Satiability and Growth of Wants formulated by Banfield, Gossen, Jevons and Menger deserve a reference (**Georgescu-Roegen**, pp. 193-204). In Veblen's vein, high consumption is the indulgence of the Leisure Class.

iv. Accessibility

This facet is made up of eight variables regarding the distance, mode of transportation and frequency of visiting the market place, as well as the distance, mode and quality of conveyance, time cost, and money cost of going to one's place of work.

Table 5.4: Loadings for Facet-Index of Accessibility
(8 variables)

0.423	-0.367	0.226	**0.856**	0.210	**0.831**	-0.117	**0.774**

EIGEN VALUE = 2.44383; VARIATION EXPLAINED = 30.54 PERCENT

Among those variables, (#4) distance from home to work, (#6) time taken in commuting between home and the work place and (#8) quality of service provided by the conveyance to the work place and back obtain high positive loadings (Table 5.4). Negative loadings are obtained by (#2) mode of transport to visit the market and (#7) monthly cost of conveyance. The index is satisfactorily representative.

B. The Composite Index of Quality of Life

Having constructed indices measuring the four facets of quality of life in the study area, an attempt may now be made to construct a composite index of quality of life. This index is a weighted linear combination of the facet-wise indices. Once again, the technique of Principal Components has been used to obtain such an index.

Table 5.5: Loadings for Composite Index of QOL
(4 Facet Indices)

0.90114	0.91229	0.86129	-0.16330

EIGEN VALUE = 2.41281; VARIATION EXPLAINED = 60.32 PERCENT

One finds (Table 5.5) that while housing, economic and high consumption indices obtain very large loadings, accessibility obtains a very small (but negative) loading. That is to say that accessibility, though not much important, affects quality of life adversely. One may note that while accessibility enhances quality of life on the one hand, it is also, on the other hand, associated with high noise level, dust and foul smell in the air and other polluting agents that adversely affect the quality of life of the people. It may also be noted that Dimapur is not a large township where commuting takes much time or cost. Work places and market places are as ubiquitous as the residential sites. Rickshaws (both hand driven and autos) are

available in plenty and cheap. This fact is reflected in the small loading obtained by the index measuring accessibility.

5.2 Distribution of Households according to QOL

The frequency distribution of sample households according to the value of the Composite Index of QOL is presented in Table 5.6. The values of mean, median, standard deviation and Pearsonian coefficient of skewness (based on ungrouped data) are 0.00, -0.24, 2.41 and 0.30 respectively.

Table 5.6: Frequency Distribution of Sample Households according to the Composite Index of Quality of Life in Dimapur

Class	(-6 , -4)	(-4, -2)	(-2, 0)	(0, 2)	(2, 4)	(4, 6)	(6, 8)	(8, 10)
Freq.	1	55	75	58	26	11	3	2

5.3 Proximity to Bliss or Hell Point

From the viewpoint of appeal there may be four types of variable: (a) ***nice***, the more of which is monotonically preferred to the less; (b) ***nasty***, the less of which is monotonically preferred to the more; (c) ***neutra***l, ambivalent or having no preference related to changes in either direction; and (d) ***naïve/ primitive***, on which preference relations are altered once a

point, called a saturation or satiation point (either in one or both directions) is reached. A naïve variable might be appealing (repugnant) within a range but further beyond a limit any change is nauseating (likable). Within limits, naive variables behave either like a nice variable or like a nasty variable. It is a commonplace experience that almost all primitive (bodily) wants are satiable and the law of variable proportions as well as the Weber-Fechner law works on them. Due to this fact, almost all variables related to the satisfaction of primitive (bodily) wants are naïve. The matters may be different in case of cultural, spiritual, psychic or paranormal wants.

Now, suppose, we have two sets, X and Y, of the two types of variable; X consisting of nice variables and Y consisting of nasty variables. An index, $\zeta = (\zeta_1, \zeta_2)$, is to be constructed such that each of the two elements of the index is a weighted sum (linear combination) of the variables, X and Y individually. Define $\zeta = (\zeta_1, \zeta_2) = (Xw, Yv)$, where w and v are weights. Note that ζ is a point in a two-dimensional space. If we define $B(\zeta) = \{Max(X)w, Min(Y)v\}$ and analogously, $H(\zeta) = \{Min(X)w, Max(Y)v\}$, then $B(\zeta)$ is the Bliss Point and $H(\zeta)$ is the Hell Point. Note that $B(\zeta)$ and $H(\zeta)$ are the two points in a two-dimensional space. It is assumed

that Min(X), Min(Y), Max(X) and Max(Y) are some finite numbers, which in case of an empirical investigation are always (empirically) obtainable. Knowledge of Bliss and Hell points may help in interpretation as well as assessment of ζ so obtained. It also leads us immediately to design a measure that might be of a great use. The ratio, $\rho = (d(H)/d(B))$, where d(H) and d(B) are the norms with the Hell and the Bliss points as references, may indicate whether people are closer to the Hell or the Bliss point. One may define a norm in any particular manner (**Krishnamurthy** and **Sen**, pp. xxviii-xxix; **Froberg**, pp.62-63).

In the context of the present study, three of the four facet-indices are nice variables while accessibility exhibits the characters of a naive variable, acting rather nastily. The Hell and the Bliss points are (–32.00, -0.64) and (74.62, 1.05) respectively. The ratio of absolute norms is 0.431 while the ratio of Euclidean norms is 0.476. Both of them indicate to a relative proximity to the Hell point than to the Bliss point.

5.4 **Quality of Life and the Relative Location of Residential Sites**

It is generally accepted view that people normally try to avoid residing in the Central Business District (CBD) basically for two reasons;

on one hand, the price of land in the CBD is so exorbitant that very few can afford and those who already have, are also tempted to sell them away, on the other, due to the location of predominantly economic activities like market place, the Central Business District (CBD) of a town is overcrowded and tumultuous. People seldom choose CBD for residential purposes unless compelled to do so. On the other hand, people generally do not want to reside far away from the CBD due to the need of the services offered by the CBD. In less developed economies where many cannot afford to own a vehicle and therefore must move either on foot or avail themselves of the public transport services, residential sectors are located only at a moderate distance from the CBD. Further, in such economies rural areas surrounding the urban settlements often lack in amenities and facilities that keep people away from choosing their residential sites in the outskirts of the town. All these forces determine the quality of life of the urban dwellers at different sites. It is usual to observe that the quality of life improves as one moves away from the CBD, attains a peak somewhere at the median distance, and thereafter it starts decreasing as we move farther away.

If we identify a household by its residence in one of these five sectors, we may use dummy variables to represent it. Let X(n,m) be a

matrix of such information, where n=231 (number of households in the sample) and m=4 (number of sectors less one). If the i^{th} household resides in the j^{th} sector, then X(i,j) = 1, else X(i,j) = 0. Let Y(i) be the numerical value of QOL of the i^{th} household. We may formulate a linear regression model in which the quality of life (Y) is determined by the residential location (X). Thus,

$$\mathbf{Y = a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + b + e.}$$

In the model specified above, $\mathbf{a_i}$, **b** and **e** are the regression coefficient, regression constant and the error terms respectively. The specification of the model restricts that the residents of the control sector (the fifth sector or the villages in the rural area) do not partake of the benefits enjoyed by the urban dwellers in sectors 1 through 4. We do acknowledge the properties of the Generalized Least Squares (GLS) method of estimation, but, in the present context, Ordinary Least Squares (OLS) method has a natural and interpretive appeal. The OLS coefficients are linear functions of sector wise averages of QOL (= $\mathbf{a_j}$+ **b** for sectors j =1 through 4, and **b** for sector 5). The findings of OLS estimation are given in Tables #5.7 and #5.8.

Table 5.7: Regression Coefficients of Facet Indices of QOL on Sector/Location

Variables	X1	X2	X3	X4	Constant	R^2
Housing:						
Coefficient	11.204	12.982	14.990	7.391	-9.936	0.31
't' Value	6.616	7.665	9.256	4.564	7.761	
Economic Status:						
Coefficient	3.479	7.946	9.047	2.448	-4.913	0.21
't' Values	2.284	5.216	6.212	1.681*	4.267	
High Consumption:						
Coefficient	3.034	6.309	6.751	2.313	-3.938	0.18
't' Values	2.479	5.153	5.767	1.976*	4.255	
Accessibility:						
Coefficient	1.406	0.342	-0.525	-1.020	0.035	0.12
't' Values	2.632	0.640**	1.031**	1.997*	0.087**	

Note : (** = Insignificant / ; * = Significant) at 5% p level. No asterisk = Significant at 1% p level.

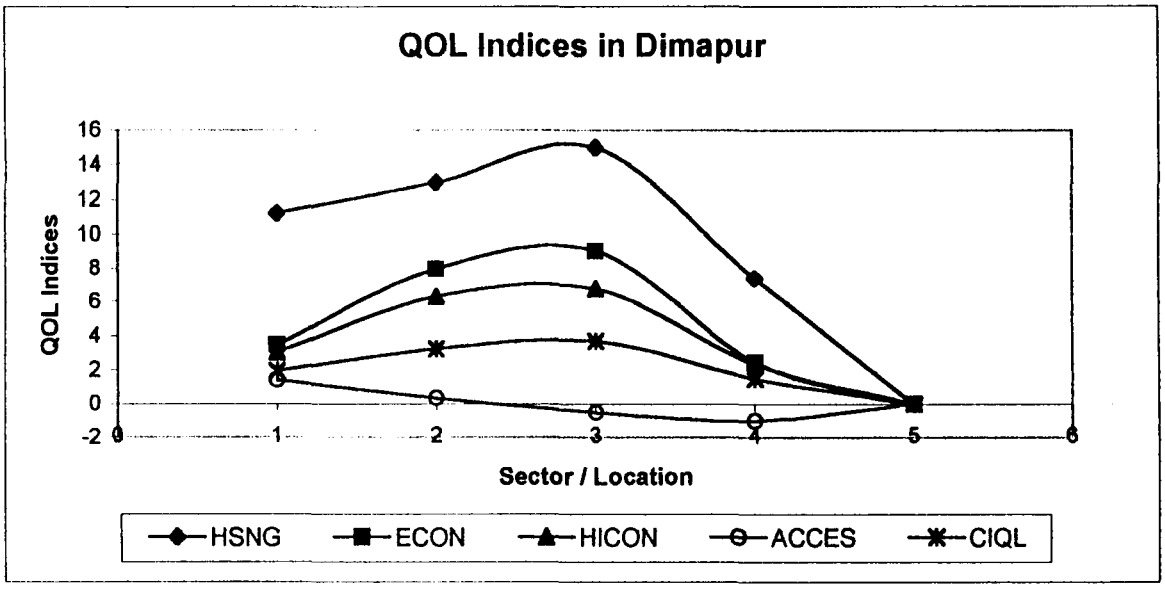
Table 5.8: Regression Coefficients of Composite Index of QOL on Sector/Location

Variables	X1	X2	X3	X4	Constant	R^2
Coefficient	1.942	3.237	3.704	1.476	-2.220	0.27
't' Values	4.045	6.745	8.072	3.217	5.119	

For 4 and 226 (numerator's and denominator's degrees of freedom) the table values of F at 5 and 1 percent probability levels are 2.4 and 3.4 respectively. For R^2 = 0.12 (the minimal value of R^2 obtained by the estimated regression equations) F value is 7.70. Thus, all regression

equations are statistically significant. For 226 degrees of freedom (when 't' assumes a normal distribution) and probability levels at 5 and 1 percent, the table values of 't' are 1.65 and 2.33 respectively. In the tables #5.7 and #5.8 above, '**' denotes insignificance at 5 percent probability level and "*" denotes insignificance at 1 percent probability level. The coefficients significant at 1 percent level have no asterisks.

Figure –5.1: QUALITY OF LIFE IN DIMAPUR



While location of residence has statistically significant role to determine the quality of life in Dimapur, accessibility facet is insignificant at sectors 2 and 3. Sectors 1 and 4 obtain opposite coefficients for determining QOL due to accessibility.

An inspection of the magnitudes of the regression coefficients reveals that in general (except in case of accessibility) the values of the coefficients increase as we move from X_1 to X_2, attains a peak at X_3 and decrease as we move to X_4. Since all values of X are zero or unity, values of the coefficients indicate that at X_3 (sector 3) QOL attains its peak. Our findings corroborate to the general observation that as we move away from the core towards the periphery, quality of life first improves, attains its peak at or around the median area and then tapers off.

5.5 **Sector-wise Distribution of Over-all Quality of Life**

We have noticed as to how the values of Composite Index of QOL cluster and vary over the sectors. It might be informative and perhaps prescriptive to observe how the values of the index are distributed in the five sectors. The table # 5.9 gives an idea of the same.

Due to the nature of measurement, it is not possible to work out Gini Coefficient for the Composite Index of QOL over the whole range (because the mean is zero). Perhaps it would be misleading to use Gini coefficients at the sector level also, though they could be numerically computable (Table 5.9). We warn, nonetheless, that they may mislead. However, measures of

skewness in different sectors suggest that it is the least in sector 3 followed by sector 4 while it is largest in sector 5 followed by sectors 2 and 1.

Table 5.9: Sector-wise Distribution of Composite Index Of QOL

Sectors/ Measures	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Overall
Mean	-0.278	1.017	1.484	-0.744	-2.220	0.000
Median	-0.683	0.547	1.233	-0.999	-2.566	-0.243
Skewness	0.545	0.600	0.329	0.427	0.809	0.302
Gini Coeff	-8.75	2.42	1.77	-2.54	-0.62	Cannot be Computed

5.6 Community-wise QOL

Among the sample households (231 in number) 178 belong to the various Naga tribes while the rest belong to varied non-Naga communities. Their location cum community wise cross distribution is given in Table 5.10.

Table 5.10: Location cum Community wise Distribution of Sample Households

Site/Community	Sector I	Sector 2	Sector 3	Sector 4	Sector 5	Total
Ao	4	5	14	23	0	**46**
Angami	2	4	5	1	0	**12**
Lotha	7	15	12	9	11	**54**
Sema	0	4	12	1	0	**17**
Sangtam	0	1	1	0	11	**13**
Zeliang	7	0	1	0	0	**8**
Chakesang	0	1	0	0	11	**12**
Kuki	0	0	0	11	0	**11**
Other Nagas	0	1	4	0	0	**5**
Non-Nagas	*24*	*13*	*6*	*10*	*0*	*53*
Total	**44**	**44**	**55**	**55**	**33**	**231**

If QOL index is regressed on the dummy variables representing membership of a particular community, regression coefficients indicate the mean QOL of the communities. The coefficients of regression thus obtained are presented in Table 5.11.

Table 5.11: Community-wise Regression coefficients of Quality of Life in Dimapur

Community	Ao	Angami	Lotha	Sema	Other Nagas	Constant
Coefficient	1.053	1.657	1.185	2.042	-0.917	-0.528
"t" Value	2.325	2.305	2.725	3.259	2.058	1.711
Number	46	12	54	17	49	

While the Semas and the Angamis (their average QOL being statistically indistinguishable) have appreciably high quality of life, the Lothas and the Aos (whose average QOL are statistically indistinguishable) are only in the above average class. Other Nagas, most of them dwelling in the semi-urban or rural settlements, cluster significantly below the median value of QOL. The Non-Nagas are a little better on an average. Barring a few, most of the Non-Nagas, who are urban dwellers, belong to Bengali, Bihari, Kachari, Keralite, Manipuri, Marwari or Nepali communities. Some of them are in business or service while others belong to the wage-earner class.

5.7 A Canonical Correlation Analysis

We have two sets of variable, Y (Facet indices of QOL) and X (location/Sector codes and Community codes). We have observed how they are related. However, in each case we have assumed a single equation model in which a particular facet of QOL is explained by location codes or the overall (composite) index of QOL is explained by community codes. However, if we attempt at finding out how location and community codes together correlate with all facet indices of QOL, we may go in for Canonical Correlation Analysis (**Kendall** and **Stuart**, pp. 299-306). Here we have used detailed community description of Nagas. Canonical correlation coefficient is equal to 0.612 and the weights obtained by location, community and the facet indices are presented in the Table 5.12.

Table 5.12: Regression Coefficients of QOL on Location and Community Variables

Location:	1	2	3	4
Coefficient:	0.29917	0.29926	0.35731	0.18356

Community	Ao	Angmi	Lotha	Sema	Sngtm	Zlng	Chksng	Kuki	O. Nagas
--Coefficient	0.08	0.07	0.13	0.06	0.02	0.02	0.05	0.01	–0.01

-Facet Index of QOL	Housing	Economic	Hi Cons	Access
Coefficient	0.60939	0.02052	0.00153	0.08249

Our findings with regard to the weights obtained by location remain essentially unchanged. Location #3 obtains the largest weight once again and similar tendency of the movement of QOL over the locations is observed. Among the tribes, now Lothas obtain the largest weight. Note that these weights are net of the effects of location, unlike in the regression analysis above where the effects of location were inclusive. Unlike Aos, Angamis and Semas, many among the Lothas in the sample reside in sector 5. While location effects were inclusive, the average QOL of the Lothas was under-estimated.

On the other hand, the coefficient associated with the 'Housing Facet' is overwhelmingly large compared to other facets. This is so due to the high degree of association among the facets of housing, economic status and high consumptions, which a single index might be sufficient to capture. Indeed the inter-correlation matrix among them reveals the said high degree of association (Table 5.13). The facet-index of QOL in housing has extracted communality from other facet indices.

Table 5.13: Inter-Correlation matrix of Facet-Indices of QOL

Facet Index of QOL	Housing	Economic	HiCon	Access
Housing	1.000	0.759	0.661	-0.072
Economic		1.000	0.675	-0.148
HiCon			1.000	-0.036
Access				1.000

5.8 An Alternative Approach to Construction of QOL Indices

In the earlier sections of this work we have visualized object variables in each facet independent across the facets. In other words, we have assumed a block-diagonal structure. The object variables in housing (58 in number) are assumed to be uncorrelated with the object variables in "economic aspect", "high consumption" and "accessibility" and so on.

Table 5.14: Loadings of Object Variables in the Pooled Set (135 variables)

0.379	0.524	0.394	0.519	0.504	0.567	**0.680**	0.043	0.014
0.549	0.204	**0.692**	-0.034	0.472	-0.212	0.461	0.447	-0.004
0.367	**0.768**	0.207	0.572	0.656	0.558	**0.683**	**0.701**	0.238
0.760	0.470	0.036	0.196	0.249	-0.043	-0.072	0.020	-0.194
-0.017	0.005	-0.115	-0.095	-0.218	-0.176	-0.018	0.204	0.070
0.047	0.064	0.136	0.204	0.068	0.313	0.020	0.154	0.087
-0.076	0.097	0.078	0.185	0.082	0.203	**0.679**	0.554	0.403
0.637	0.187	0.518	0.620	**0.722**	0.633	0.154	**0.760**	0.615
0.796	-0.043	0.446	0.524	0.129	-0.113	0.305	0.149	0.657
0.398	0.366	0.472	0.631	0.569	0.531	0.513	0.318	0.140
-0.067	0.208	0.181	0.417	0.518	0.279	0.268	0.173	-0.123
-0.115	0.457	0.392	0.297	0.307	0.457	0.433	0.645	-0.178
-0.266	-0.204	0.168	0.003	0.037	0.247	-0.324	-0.080	-0.098
-0.105	0.112	-0.058	0.214	0.238	-0.003	0.212	0.320	0.234
-0.150	-0.135	0.409	0.215	-0.219	0.313	-0.059	0.364	0.089

Nevertheless, this assumption might not be correct at all. Economic status depends on the type and the source of livelihood correlated with the material resources and the skill of the members of a household. This in turn determines housing condition and high consumption. In assuming otherwise we part with the reality, and statistically we use only the information that

constitute the blocks in the diagonal of the full inter-correlation matrix (135 x 135) while the off-diagonal blocks are ignored. That amounts to a use of only a one-third, 32.16 percent = $[\Sigma_j\{m_j\ (m_j\ -1)\}/\{m(m-1)\}]x\ 100$, of the total information contained in the full inter-correlation matrix. Here m_j is the number of object variables included in the j^{th} facet (j = 1, 2, 3, 4) and m = Σm_j. Now we propose that instead of working with them in a compartmentalized manner, take all of them together and carry out Principal Components Analysis on the pooled set of the object variables.

In the pooled set, the number of object variables (Z) is 135 in total (58 of housing, 26 of economic aspect, 43 of high consumption and 8 of accessibility pooled together). The inter-correlation matrix of these variables has an order of 135 x 135. The largest latent root of the inter-correlation matrix is 18.481, which explains 13.69 percent of the total variation in the object variables, Z. The loadings obtained by the (standardized) object variables are presented in Table #5.14. We define,

$$I_{HS} = \sum_{1}^{58}(Z_jW_j);\quad I_{EC} = \sum_{59}^{84}(Z_jW_j);\quad I_{HC} = \sum_{85}^{127}(Z_jW_j);\quad I_{AC} = \sum_{128}^{135}(Z_jW_j);\quad I_{QL} = \sum_{1}^{135}(Z_jW_j)$$

Here I_{HS} , I_{EC} , I_{HC} , and I_{AC} are facet indices (defined in the current

approach) of housing, economic aspect, high consumption and accessibility respectively, and I_{QL} is the composite index of quality of life. The Z is the set of object variables (standardized) and W is the vector of the loadings. Defining the indices in this manner has three properties; first that it has no longer been assumed that different facets are uncorrelated with each other, second that the loadings are comparable within as well as across the facets as they are obtained from the same eigenvector, and finally, that $I_{QL} = I_{HS} + I_{EC} + I_{HC} + I_{AC}$. We recall that we selected the sample households (11 each) from 21 sites. Site wise QOL averages are presented in Table 5.17.

Table 5.15: Regression Coefficients of QOL Indices on Sector Dummies

Variables	X_1	X_2	X_3	X_4	Constant	R^2
IHS/Coeff	8.786	11.286	13.288	6.375	-8.505	0.28
IHS/t value	5.470	7.026	8.651	4.150	7.004	
IEC/Coeff	3.298	7.345	8.418	2.259	-4.569	0.21
IEC/t value	2.378	5.296	6.348	1.703*	4.358	
IHC/Coeff	3.087	5.755	6.201	2.555	-3.769	0.20
IHC/t value	3.054	5.693	6.415	2.643	4.932	
IAC/Coeff	0.193	0.769	1.303	1.004	-0.733	0.23
IAC/t value	0.960**	3.817	6.765	5.214	4.811	
IQL/Coeff	15.367	25.155	29.210	12.193	-17.576	0.28
IQL/t value	4.205	6.883	8.359	3.489	6.362	

Note : (** = Insignificant / ; * = Significant) at 5% p level. No asterisk = Significant at 1% p level.

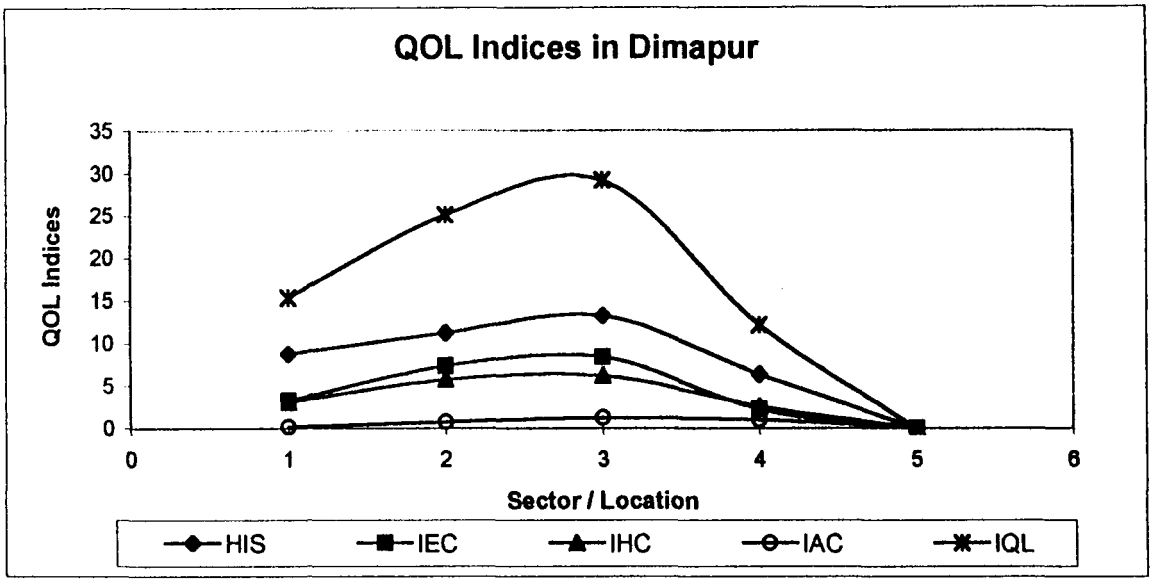
It would be interesting to inquire if redefining facet indices and composite indices has altered the relationship between sectors and the QOL

indices. As before, we regress the indices (obtained in an alternative way) on sector dummies. The results are tabulated in Table 5.15. We find that except in the case of accessibility facet, our findings are essentially unaltered. In case of accessibility, the relationship that was weak and faltering earlier has now become strong enough to suggest that IAC facet also exhibits the same relationship with sectors/location as other facet indices do. We have also compared the properties of the residuals of regression equations across the earlier and the latter indices of QOL. We simply report that the residuals of the latter QOL indices conform more closely to the standard Gauss-Markov assumptions (**Henri Theil**, pp. 119-124) regarding suitability of OLS. We do not want to overload our discourse with those details at present. Nor have we ventured to use Zellner's SURE method (**J. Johnston**, pp. 337-341).

Table 5.16: Correlation Matrix (Between & Across) Earlier and Alternative QOL Indices

	IHS	IEC	IHC	IAC	IQL	hsng	econ	hicon	acces	comp
HIS	1.000									
IEC	0.786	1.000								
IHC	0.720	0.713	1.000							
IAC	0.408	0.454	0.495	1.000						
IQL	0.936	0.920	0.864	0.528	1.000					
HSNG	**0.996**	0.768	0.711	0.384	0.924	1.000				
ECON	0.777	**0.999**	0.705	0.452	0.913	0.759	1.000			
HICON	0.670	0.682	**0.990**	0.475	0.827	0.661	0.675	1.000		
ACCES	-.098	-.142	-.048	**-.306**	-.124	-.072	-.148	-.036	1.000	
COMP	0.912	0.918	0.889	0.505	**0.994**	0.901	0.912	0.861	-.163	1.000

Figure-5.2:QOL INDICES IN DIMAPUR



Thus, the new approach has only reinforced our earlier findings with an added accent. Now there is a simple additive relationship between I_{QL} and facet indices. The contributions of I_{HS} , I_{EC} , I_{HC} and I_{AC} to I_{QL} are 41.11, 33.41, 22.66 and 2.82 percent respectively. The inter-correlation matrix of new (alternative) indices and earlier indices suggests (see bold underlined entries in Table 5.16) that except IAC (new) and ACCES (old) facet indices (that are negatively correlated, r = -0.306), other new and old indices are extremely highly correlated (coefficient of correlation, r, at least equal to 0.99). This degree of correlation, when the number of observations in the sample is as large as 231, is extremely high and indicative of perfect correlation.

The variables that load larger than **0.60** in the new QOL index are, namely, (#7) Total rooms (per capita), (#12) Floor area (per capita), (#20) No. of fans, (#23) Fridge, (#25) TV type, (#26) Telephone, (#28) Furniture, (#61) Monthly income, (#64) Food Expenditure, (#67) Expenses on toiletries, (#68) Expenses on newspaper, (#69) Expenses on entertainment, (#71) Expenses on clothes, (#72) Expenses on donations, (#73) Total Expenditure, (#81) Expenses on fruits, and lastly, (#107) the education level of the respondent. They add to the quality of life if they have larger values. On the other hand, variables that load *negative* and smaller than **–0.10** (and therefore adversely affect the quality of life if they assume larger values) are, namely, (#15) Water supply source, (#36) Fallow land in the vicinity, (#39) Noise, (#41) Foul smell in the air, (#42) Water pollution, (#78) Smoking and chewing, (#99 and #100) Movie going and its frequency, (#108) Number of Children studying in school, (#109) No. of Children in pre-school, (#110) No. of Children in school, (#115) Standard of educational institutions, (#118) Disease, (#127) Reason for not doing physical exercise, (#128) Distance of market from the residence, and (#131) Distance of work place from the residence.

Table 5.17: AVERAGE QOL INDICES AT DIFFERENT SAMPLE SITES, DIMAPUR

Site No.	SECTOR CODE	SITE NAME	--- FACET-INDICES OF QUALITY OF LIFE--- HIS	IEC	IHC	IAC	OVERALL IQL
1	1	DIMAPUR_TOWN	2.039	1.511	0.017	-0.009	3.558
2	1	DIMAPUR_TOWN	-0.806	-3.299	-1.829	-0.112	-6.047
3	2	DIMAPUR_TOWN	4.089	5.263	4.011	0.657	14.023
4	3	DUNCAN	6.173	2.073	3.565	0.557	12.369
5	3	RESIDENCE/KYONG_COLONY	4.120	2.829	2.528	0.177	9.655
6	1	DHOBINALA	-1.415	-2.690	-1.851	-1.217	-7.175
7	1	NEW_MARKET	1.312	-0.605	0.936	-0.817	0.825
8	2	CIRCULAR_RD/KHERMAHAL/ NOTON_BASTI	6.611	4.090	3.919	0.277	14.898
9	2	CHUMUKEDIMA	1.593	0.400	-0.393	-0.812	0.788
10	3	LINGIRIJAN	5.662	4.951	0.347	0.352	11.314
11	3	THAHEKHU	4.929	2.921	1.662	1.224	10.737
12	3	NAGARJAN	3.028	6.466	4.057	0.538	14.091
13	5	SENJUM	-5.483	-2.087	-0.746	0.394	-7.923
14	4	AOYIMKUM	-2.419	-1.302	-1.990	0.309	-5.402
15	2	PURANA_BAZAR	-1.170	1.348	0.406	0.022	0.608
16	4	KUSHIABIL	0.537	-0.213	0.533	0.507	1.365
17	4	AOYIMTI	-3.281	-2.339	-1.127	0.388	-6.360
18	4	PHAIPIJANG	-3.453	-3.690	-1.676	0.713	-8.107
19	4	DIPHUPAR	-2.035	-4.006	-1.809	-0.561	-8.412
20	5	TSSITHRONGSE	-10.160	-6.234	-5.379	-1.096	-22.871
21	5	BADE	-9.871	-5.387	-5.181	-1.495	-21.935

5.9 Statistical Distribution of the Overall QOL Index

If we look into the statistical properties (J N Kapur and H C Saxena, p. 53 and pp. 196-300) of the Overall (Composite) Index of QOL, we find that it follows Type I Distribution of Karl Pearson. We obtain the determinantal equation $F(x) = b_0 + b_1x + b_2x^2 = 0$, for which $b_0 = 428.2117$, $b_1 = 9.96722$, and $b_2 = -0.0846$. The two roots of the equation are –33.4596 and 151.2759. The Pearsonian betas are: $\beta_1 = 0.6595$ and $\beta_2 = 3.5597$. The Pearsonian gammas are: $\gamma_1 = 0.8059$ and $\gamma_2 = 0.5596$. However, these details are only of a statistical interest.

5.10 Sector-wise Distribution of Households as per QOL Index

It is important to know as to how the households living in different sectors are distributed according to the General (Composite) Index of QOL. The QOL Index is distributed with mean = 0 and standard deviation = 18.481. The cumulative distribution classified according to mean+Fd is presented in Table 5.18. Here F is a factor like 2, 1.5,..., -1.0, -1.5 and so on and the abbreviation **>2d** means the QOL class that includes the households that obtain QOL point greater than mean+2SD. In each of the sectors 1, 2 and 3 there is one household whose QOL index is below the level of mean -1.5d while in sector 5 such three households are there. Earlier we have seen that the distribution of QOL over the sectors follows a particular pattern. It increases as we move away from the core, attains a peak in sector 3 and then dwindles down sharply as we move to sectors 4 and 5.

Table 5.18: Sector-wise Distribution of Households According to QOL Index

Sector/Class	>2d	>1.5d	>1d	>0.5d	>Mean	> -0.5d	> -1.0d	> -1.5d
Sector1	2	3	5	10	**16**	27	37	43
Sector2	2	4	8	17	**30**	39	42	43
Sector3	4	9	19	26	**41**	51	53	54
Sector4	1	3	4	6	**13**	41	48	55
Sector5	0	0	0	1	**3**	5	14	30
Total	9	19	36	60	**103**	153	194	225

However, that finding was based on the sector-wise arithmetic mean (or regression coefficients) of QOL obtained by the households living in those sectors. It is a commonplace knowledge that the arithmetic mean is very sensitive to the extreme values of its components. Now we look into the number of households in different sectors and QOL classes rather than (local) averages of QOL in different sectors. The table #5.18 presented above is indicative, nay confirmatory, of the tendency observed earlier in table #5.17. The said tendency starts revealing itself from the third column onwards in the table #5.18 (class >1.5d and the classes to the right thereof). It becomes prominent in the fourth column there.

5.11 **The Destitute Households**

Let us inquire of the number of destitute households in different sectors. Much would depend on how we define destitution because at present, in the context of our discourse, there is no measure to decide on the same. Possibly, one may hold that those who score less that mean-1.0d of QOL Index are destitute households. Normally, no more than 16 percent of the individuals in a sample are below this level unless their distribution has a significantly positive skewness. From Table 5.18 we find that the sectors

1 through 5 have the number of destitute households 7, 2, 2, 7 and 19 in that order, summing up to 37 in number (about 16 percent of the total households in the sample). The number of destitute households in sector 5 is as many as the sectors 1 through 4 have together, while sectors 2 and 3 are much better off. Once again, it vindicates our earlier findings.

5.12 **Supra-Destitute Households and the QOL Index**

Here by '*supra-destitute*' households, we mean the collection of households having QOL above the destitute households. The term purports to connote the complementariness and not the contrariness to destitute households. We do not wish to use any antonym of destitute (rich, well-to-do, affluent, etc.) as it might mean contrariness than contradictoriness of terms. Logically, 'supra-destitute' means 'not-destitute'. We contemplated earlier for a moment (in the section 13 of chapter 1) on the possibility of constructing a QOL index reflecting the conditions of the underdog among the households. Such an index of QOL may be proportional to the ratio of supra-destitute households residing in a particular sector to the total number of destitute households living in that sector weighted by the proportion of the total number of households (in the sample) residing in that sector. On

this consideration now let us measure the quality of life in a sector. Viewed in the manner proposed above, we define the measure of QOL_j in sector j as:

$$QOL_j = 100[\{(n_j - D_j)/D_j\}.(n_j/n)].$$

In the expression above, n_j is the number of households in sector j, n is the total number of households ($=\Sigma n_j$) and D_j is the number of destitute households in sector j. It is pertinent to note that the measure proposed above is extremely sensitive to the number (if very small) of the destitute households in the sample. However, if the number of destitute households is not very small and the sample is a good representative of the population, such an index may indicate to the quality of life of the population. The Table #5.19 presents the values of the index for different sectors while we measure the quality of life in the said manner.

Table 5.19: QOL Measured in terms of the Relative Number of Destitute Households

Sector	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5
QOL	100.68	400.00	630.95	163.27	10.53

We observe that our earlier conclusion remains largely unaffected except that the core sector (#1) slides below the sector 4. Owing to the small numbers, one may expect large standard errors of estimate in such a

situation. Nevertheless, if the sample size is large, definitive conclusions may be drawn.

Let us contemplate on a regression model that may describe QOL in table 5.19 above in terms of a polynomial of the sector codes. Let QOL_j be the value of the index of quality of life and $L_j = j$, the serial number of sector j. Thus, $L_1 = 1$; $L_2 = 2,\ldots,L_5 = 5$. We specify our model as $QOL = EXP(\Sigma a_k L^k + e)$, where k=1, 0, -1 and -2. In words, a factor of QOL varies proportionately with the sector code (k=1), while another factor varies inversely with it (k = -1 and –2). It also has a constant factor (k=0). The exponential specification (or its semi-log-linear transformation) has some justification in terms of increase and decay. One may also note that the serial number of sectors is not a nominal number, but, it has some meaning in terms of accessibility, availability of urban facilities, congestion, etc. at least in an ordinal sense. In the same vein, the first factor may tentatively represent "room for expansion or surplus carrying capacity" while the second factor may be "availability or flow of urban utilities and facilities". The surplus carrying capacity of the core might be very little and the flow of urban amenities there might be quite large. In the outer zones of the

town, the case might be reverse. We have estimated the coefficients of the regression equation as follows:

$$QOL = Exp\{-4.7346\ L^{1} + 36.0000\ L^{0} - 55.5606\ L^{-1} + 28.9082\ L^{-2} + e\};\quad R^2 = 0.9996$$
$$\qquad\qquad (30.18) \qquad (29.44) \qquad\quad (20.36) \qquad (17.21)$$

The figures in the parentheses are 't' values. All regression coefficients are significantly different from zero at 1 d.f. and 5 percent level of significance (table values of 't' for 1 and 5 percent levels of significance are 31.82 and 12.71 respectively). However, we would not attach much value to this finding unless empirical evidences further support it.

5.13 **A Summary**

In this exercise we have touched upon several issues relating to an investigation into conceptualization, definition, measurement, spatial and community-wise distribution, asymmetry, inequality and a few other related aspects of quality of life in a commercial township of a developing tribal-abundant state located in a less developed, hilly and frontier region of India. Unlike many studies on the assessment of quality of life at a macro level wherein certain gross indicators (mortality rates, per capita income, literacy rate, felt and expressed satisfaction from the prevailing political or

administrative system, functionality or otherwise of the prevailing social systems, institutions and mores, etc. at the national, the sub-national or regional level) have conventionally been used to measure QOL, we have measured QOL in this investigation by means of micro-level indicators. This distinction is important because the object and the level of an investigation determine the choice of variables as well as the methodology to be entertained. Indicators of quality of life relevant to a macro-level study might be inappropriate or unavailing to a study at micro-level and vice versa. The same is true with the appropriateness of methodology as well. The methodology of assessing the quality of life engendered in this study is statistical in nature, which presupposes variations in observed values of the indicators employed in the analysis. Macro-level variables do not vary at micro levels. That is not to say that lack of variation in the value of a variable makes it irrelevant or such a variable is not a factor determining the quality of life. The variable may be relevant, but lack of variations in its values over the recorded observations makes it statistically ineffective. For example, the performance of a political system in determining the quality of life of the citizenry is relevant beyond doubts. However, at a micro level, where all citizens are under the identical political

system, one cannot determine the effectiveness of the said political system unless some observations obtained from a different political system are included in the analysis. In a given region (or spatial unit of investigation), time series data encompassing different political systems in vogue may be appropriate for this purpose, but such a study will be using secondary data that might not cover the aspects one wants to study.

We reiterate that quality of life is an all-invasive concept that draws heavily upon many disciplines. It is also a dialectical concept that does not easily yield to quantitative analysis. It is a commonplace to be skeptical on the possibilities of measuring (quantitative treatment) of 'quality'. However, in the quantitative treatment of quality we have been inspired by the scholars like **George Fisher** (Measuring the Unmeasurable, *World*, 2, 1990) and **John von Neumann** and **Oscar Morgenstern** (*Theory of Games and Economic Behaviour*, 1947) who go a long way with elaborate arguments as to how quality can be dealt with quantitatively. Accordingly, we tried to measure it. Whether such an attempt is an instance of 'misplaced concreteness' or fanatical 'arithmomorphism' (**Georgecu-Roegen,** pp. 21-22) is an open question. Numbers can do much and much is there that numbers cannot do. We perceive the limitations of classical statistics. Yet,

we have tried to deal with the issue with the help of classical statistical tools. We believe that our attempt has possibly not gone in vain. Although a vindication of some generally held view by an empirical finding is not a proof of the mettle either of the said view or the said empirical finding, but such a correspondence, nevertheless, provides some confidence to the researcher. With this sense of self-restraint and discretion, we present the summary of our findings as follows:

1. Economic and Accessibility aspects of QOL constitute relatively more cohesive sets of indicators/variables than the Housing and the High Consumption aspects.

2. Of the four facet indices of QOL, those related to housing, economic aspects and high consumption are singularly dominant and positive. They together contribute over 97 percent to the Composite Index of QOL. The fourth facet relates to accessibility. It contributes but only a little to the Index.

3. The distribution of sample households according to the value of the Composite Index of QOL is asymmetric around the mean value. Overall, the sample households are closer to the Hell point and farther from

the Bliss point. Asymmetry is the least in sector 3 followed by sector 4, and the most in sector 5 followed by the sectors 2 and 1.

4. Average Quality of Life improves as one moves away from the core sector 1), attains it peak at sector 3 and sharply declines afterwards.

5. Average Quality of Life of the "advance" Nagas (Ao, Angami, Lotha and Sema Nagas) is much higher than "Other Nagas" and the non-Nagas. The Lothas in the urban area (sectors 1 to 4) are perhaps better off. The non-Nagas are all urban dwellers and, on an average, the quality of their life is a little better than "Other Nagas".

6. Construction of the facet indices as well as the composite index based on full matrix of inter-correlation among the indicators of QOL yields better results than if the indices are constructed by using block-diagonal partial information. This finding is natural and expected. We always pay for ignoring the relevant information. The weak and faltering performance of the facet index of accessibility based on partial information has followed the suit after the incorporation of full information. This finding has some prescriptive value for the future research.

7. A perusal of the table containing loadings of pooled (135) object variables (indicators) suggests that about one-fourth of the loadings

(absolute value) are less than 0.10. Exclusion of such variables from the object set would not affect the composite index of QOL adversely, but only add to the parsimony. However, retaining them does not have any undesirable affect. We have avoided, therefore, an exercise in pruning them out. An advice to exclude such 'weaklings' from the set of object variables in order to enhance the explanatory power of the index is rather usual. We hold that such an advice is naive and its practice illusive. An inference based on partial information can never outperform the inference based on full information. Nature never speaks a lie; she has left it to us to interpret her words.

8. There are a number of destitute households in the sample. Most of them are in the rural outskirts of Dimapur, but scarcely a few in the sectors 2 and 3, where average quality of life is better. Perhaps, a residence in sector 2 or 3 is economically inaccessible to them. An index of QOL based on the consideration of destitute households vindicates the conclusions drawn earlier.

Table 5.20: Quality of Life Indices (Facet and Overall) in Dimapur, Nagaland

Household Number	QOL Index (HOUSING)	QOL Index (ECON)	QOL Index (HI_CONS)	QOL Index (ACCESS)	QOL Index (GRAND)
1	10.27	11.07	8.06	1.3	30.7
2	2.45	-3.45	4.22	-0.7	2.53
3	9.85	7.98	2.93	0.83	21.59
4	-6.98	-7.8	-3.24	-0.2	-18.23
5	3.11	-1.97	-5.41	-0.88	-5.15
6	-14.72	-5.57	-8.25	0.11	-28.43
7	-2.65	2.89	1.89	-0.88	1.25
8	-7.23	-5.64	-6.25	-0.08	-19.2
9	18.95	15.98	6.88	0.66	42.46
10	3.09	-2.21	-2.7	-0.56	-2.39
11	6.3	5.34	2.07	0.3	14
12	-2.21	-2.03	0.24	-0.56	-4.56
13	-3.86	-5.69	-7.93	-1.46	-18.94
14	-1.77	-2.52	-1.06	1.5	-3.86
15	7.74	-4.04	-2.08	-0.97	0.65
16	-7.73	-7.02	-2.65	-0.17	-17.57
17	0.83	-3.39	-2.5	-0.28	-5.34
18	-1.04	-2.4	-4.31	0.13	-7.62
19	4.7	-4.63	0.79	-0.42	0.44
20	-8.26	-2.92	-2.16	0.15	-13.19
21	-7.84	-6.48	-5.48	0.4	-19.41
22	10.57	4.83	7.02	0.45	22.88
23	5.25	5.12	2.1	0.06	12.52
24	0.47	2.08	-2.7	0.36	0.21
25	2.09	-0.99	2.9	-0.56	3.44
26	1.5	2.33	2	0.27	6.1
27	3.66	1.77	7.79	1.27	14.49
28	2.22	6.49	4.36	1.4	14.48
29	5.68	8.1	10.48	1.61	25.87
30	21.04	32.09	14.34	2.04	69.51
31	0.3	2.86	-2.86	-1.28	-0.98
32	6.74	0.88	2.01	0.38	10
33	-3.96	-2.82	3.68	1.69	-1.4
34	23.08	3.38	9.15	0.92	36.52
35	6.96	9.28	6.22	1.37	23.83
36	9.42	2.47	1.17	1.59	14.65
37	3.48	-0.35	3.56	1.03	7.72

38	4.53	1.07	6.31	0.48	12.4
39	1.81	-1.49	0.48	-0.42	0.37
40	4.19	15.42	13.94	0.6	34.15
41	7.09	1.28	0.45	0.3	9.12
42	3.6	-4.74	-6.28	-0.02	-7.43
43	-1.08	-4.83	0.93	0.57	-4.41
44	4.83	1.31	3.29	-0.28	9.16
45	-5.21	-1.53	-0.97	-0.84	-8.56
46	22.18	10.98	14.3	0.77	48.24
47	0.8	-0.02	0.29	-0.74	0.32
48	-2.43	1.65	-2.6	-0.56	-3.95
49	8.2	13.13	3.89	-0.6	24.62
50	5.44	-1.34	1.7	0.67	6.47
51	-0.2	0.84	7.3	1.12	9.06
52	0.62	-0.5	-3.53	0.93	-2.49
53	13.92	8.38	2.37	0.04	24.71
54	-0.21	-2.35	1.69	-0.37	-1.23
55	2.21	1.88	3.37	1.55	9.01
56	-1.75	-2.33	-0.88	-1.55	-6.51
57	-9.08	-5.62	-6.29	-1.23	-22.22
58	8.36	-0.72	3.42	-1.55	9.51
59	-9.27	-5.58	-5.86	-0.97	-21.68
60	-3.99	-5.96	-4.77	-1.6	-16.32
61	-5.57	-7.25	-5.81	-0.29	-18.92
62	2.98	4.27	0.98	-1.28	6.94
63	-0.55	-2.89	-3.64	-1.6	-8.68
64	-3.02	-3.17	-3.86	-1.28	-11.33
65	1.48	-2.73	-1.09	-0.45	-2.78
66	4.83	2.38	7.45	-1.6	13.06
67	1.13	0.37	2.33	-0.97	2.87
68	-3.1	-4.85	-5.89	-0.56	-14.41
69	6.6	6.56	-0.44	-0.97	11.75
70	-9.06	-5.41	1.88	-0.14	-12.74
71	22.05	25.2	6.2	-0.65	52.8
72	2.03	-0.1	8.98	-0.97	9.93
73	0.16	-5.23	1.66	-0.97	-4.37
74	-2.23	-7.47	-4.16	-1.28	-15.15
75	-2.61	-5.17	-1.96	-0.85	-10.6
76	4.47	-3.15	-1.04	-0.71	-0.42
77	-4.99	-7.41	2.75	-0.92	-10.57
78	0.93	-0.42	-1.78	-0.88	-2.15
79	7.56	1.55	1.11	-0.28	9.94

80	15.5	6.76	10.94	0.32	33.51
81	6.94	0.7	4.47	1.24	13.36
82	-2.07	-3.78	4.48	1.32	-0.05
83	4.14	0.49	0.2	0.47	5.3
84	16.89	28.1	10.95	0.04	55.98
85	-2.39	-1.83	1.2	0.04	-2.98
86	19.09	10.89	0.18	0.4	30.56
87	-0.94	-2.24	3.86	0.56	1.24
88	7.08	4.76	7.49	-0.16	19.17
89	-1.26	-2.76	0.87	-0.45	-3.59
90	5.06	0.9	-3.16	-1.28	1.51
91	6.03	4.4	-0.89	-0.65	8.88
92	8.11	3.33	0.53	-0.97	11.01
93	7.62	7.37	7.59	1.79	24.37
94	1.58	0.83	1.11	-1.6	1.92
95	4.55	-3.04	-0.67	-1.37	-0.53
96	3.09	4.59	-1.66	-1.18	4.84
97	-12.88	-3.89	-1.52	-1.28	-19.58
98	0.67	-1.83	-5.08	-0.97	-7.2
99	-5.05	-5.49	-1.44	-0.97	-12.95
100	-3.56	-1.05	-1.89	1.36	-5.13
101	0.65	0.27	2.25	0.2	3.37
102	2.06	0.9	-0.95	-0.28	1.74
103	19.32	17.89	0.21	0.4	37.82
104	5.17	5.02	0.6	-0.01	10.78
105	18.24	22.16	5.02	0.09	45.5
106	10.46	3.33	3.03	0.08	16.91
107	16.95	10.18	1.32	1.46	29.91
108	-17.23	-7.72	-8.04	-0.39	-33.38
109	2.02	-4.75	-4.51	-0.07	-7.31
110	8.19	8.24	6.78	1.04	24.25
111	5.53	8.35	2.88	1.24	18
112	14.43	5.86	9.99	1.64	31.92
113	1.48	-0.05	1.92	1.37	4.71
114	0.41	2.51	1.54	1.4	5.86
115	3.82	1.54	-1.56	0.87	4.66
116	2.45	-0.16	-3.18	0.54	-0.35
117	-2.26	-0.78	3.18	0.84	0.97
118	4.01	-5.2	-0.93	0.2	-1.92
119	1.07	5.62	-3.97	0.6	3.33
120	9.47	8.5	3.84	2.98	24.8
121	13.82	5.96	4.57	1.78	26.13

122	15.47	18.52	9.95	0.08	44.01
123	8.31	5.67	2.96	1.05	17.99
124	-9.98	-2.72	-3.89	0.41	-16.18
125	3.42	14.93	5.84	0.3	24.48
126	7.42	5.83	8.25	1.04	22.54
127	12.98	11.75	6.95	1.12	32.8
128	8.05	10.71	6.42	1.23	26.41
129	4.34	8.67	3.23	1.29	17.54
130	3.83	6.21	14.92	0.8	25.76
131	-11.65	-6.59	-6.87	-0.56	-25.68
132	-8.88	-1.84	-3.11	-0.84	-14.67
133	-7.56	-6.68	-3.49	-0.2	-17.93
134	-6.21	-4.15	-0.41	0.36	-10.42
135	-10.92	-3.52	-1.18	0.04	-15.57
136	-3.1	-2.48	-2.13	0.04	-7.68
137	3.53	3.04	1.49	0.6	8.66
138	4.41	5.63	1.77	0.48	12.29
139	-5.6	-0.64	3.01	0.69	-2.53
140	-10.47	-6.07	-1.54	0.23	-17.86
141	0.31	-1.25	1.33	0.5	0.89
142	-11.37	-2.44	-3.72	1.02	-16.51
143	-13.34	-4.4	-3.33	0.58	-20.49
144	8.98	5.06	1.22	0.9	16.16
145	1.95	-4.55	-4.34	-0.28	-7.22
146	-10.08	-4.29	-7.41	-0.43	-22.21
147	-0.63	1.48	-0.41	-0.29	0.14
148	-1.55	-1.21	3.07	0.52	0.83
149	1.1	-3.26	-3.77	-0.6	-6.52
150	-2.23	-2.94	-2.18	0.04	-7.32
151	-7.28	-4.77	-4.5	0.34	-16.2
152	-10.95	2.62	-1	1.5	-7.84
153	-3.65	-2.17	-0.97	0.18	-6.62
154	-2.25	-0.3	-1.6	1.54	-2.61
155	-7.75	-6.1	-2.04	-0.42	-16.31
156	2.09	-0.21	0.76	-0.03	2.6
157	7.49	-1.29	5.82	-1.04	10.98
158	6.67	17.35	0.17	2.17	26.36
159	0.38	3.51	2.28	-0.97	5.21
160	2.32	4.4	1.04	1.32	9.08
161	4.8	7.32	3.74	0.53	16.39
162	-3.84	4.31	1.45	-0.02	1.9
163	-1.65	-0.71	-0.66	0.71	-2.31

164	-16.87	-7.77	-3.97	-1.49	-30.09
165	-6.52	-5.97	-4.12	-0.52	-17.13
166	2.65	-4.22	-1.74	-0.28	-3.59
167	-12.28	-4.88	-4.24	-0.6	-22
168	14.75	1.9	3.84	1.78	22.28
169	15.79	15	8.52	2.7	42
170	-7.27	-8.04	-2.88	-0.35	-18.54
171	3.69	-2.06	-1.89	-0.68	-0.95
172	-7.05	-5.29	-0.76	0.33	-12.77
173	-12.49	-7.97	-4.96	-0.29	-25.72
174	8.35	14.14	9.44	1.7	33.62
175	-0.3	-1.95	1.5	0.45	-0.3
176	0.09	1	-0.95	0.82	0.96
177	0.93	-3.65	-1.83	0.17	-4.38
178	8.87	3.56	17.76	1.83	32.02
179	-5.51	-4.25	-4.79	0.6	-13.94
180	-6.41	-3.66	-4.04	-0.03	-14.15
181	-1.43	-3.6	-4.11	0.69	-8.44
182	-8.83	-3	-2.61	-0.18	-14.61
183	-8.02	-4.29	-4.82	0.72	-16.41
184	-5.9	-0.43	-0.13	0.56	-5.9
185	1.33	1.03	-0.75	0.78	2.38
186	-2.7	-2.86	-3.26	-0.28	-9.11
187	-8.42	-4.58	-3.81	-0.6	-17.41
188	0.72	-2.56	-3.58	-0.56	-5.99
189	3.94	2.92	2.37	1.64	10.88
190	-1.4	-7.46	-2.57	1.02	-10.41
191	-9.06	-3.73	-2.11	1.33	-13.57
192	-3.6	-5.72	-3.54	1.72	-11.15
193	2.2	-1.87	6.99	0.43	7.74
194	-5.38	-4.03	-4.49	0.42	-13.48
195	-5.31	-3.55	-3.45	-0.28	-12.58
196	-2.71	-2.15	-0.43	1.32	-3.97
197	-11.34	-7.23	-4.37	0.24	-22.7
198	-6.05	-5.22	-3.25	0.57	-13.95
199	-8.66	-6.7	-3.9	-0.24	-19.49
200	1.87	-3.04	2.05	-1.6	-0.72
201	8.17	-3.49	1.33	-0.8	5.2
202	4.99	1.6	0.71	0.61	7.9
203	-8.72	-5	-4.34	-0.63	-18.69
204	-8.8	-4.54	-3.94	-0.54	-17.82
205	5.56	-5.46	-3.13	-0.36	-3.39

206	-3.23	-4.66	-3.57	-0.56	-12.02
207	-6.45	-6.55	-3.23	-0.92	-17.16
208	-7	-5.09	-3.41	-0.25	-15.76
209	-0.11	-1.13	1.54	-0.88	-0.58
210	-6.77	-4.76	-6.62	-1.11	-19.26
211	-7.7	-6.38	-6.61	-0.9	-21.59
212	-11.59	-4.04	-0.7	-1.32	-17.65
213	-10.54	-6.15	-4.27	-1.07	-22.03
214	-10.54	-5.66	-6.06	-0.9	-23.15
215	-10.92	-7.29	-7.23	-0.98	-26.42
216	-6.74	-6.88	-4.13	-1.32	-19.07
217	-11.04	-6.37	-5.5	-1.4	-24.31
218	-10.88	-6.33	-3.41	-1.19	-21.81
219	-12.78	-6.75	-7.29	-0.98	-27.81
220	-12.26	-7.96	-7.36	-0.9	-28.48
221	-6.05	-2.94	-5.22	-1.69	-15.89
222	-7.93	-7.25	-6.43	-1.48	-23.08
223	-12.75	-6.64	-4.89	-1.69	-25.97
224	-8.86	-5.48	-4.78	-1.69	-20.8
225	-13.94	-7.72	-7.62	-1.14	-30.41
226	-8.16	-5.34	-1.58	-1.48	-16.56
227	-10.36	-5.56	-7.12	-1.69	-24.72
228	-8.43	-2.97	-5.95	-1.69	-19.03
229	-12.14	-5.47	-5.7	-1.3	-24.61
230	-10.81	-6.76	-5.69	-1.21	-24.47
231	-9.17	-3.12	-2.01	-1.42	-15.73

CHAPTER- VI
DETERMINANTS OF QUALITY OF LIFE IN DIMAPUR
A FACTOR ANALYTIC APPROACH

6.1 **Introduction**

In the earlier chapter we were concerned with the construction of an index of quality of life in our study area that may reliably measure (in a relative sense) the (mean level of) quality of life in different sectors of the township of Dimapur. We used the method of Principal Components Analysis to that end and constructed Facet indices as well as the Overall Index of Quality of Life in Dimapur. We observed how the mean levels of various indices varied over the sectors as well as the communities.

We did not, however, venture into answering a more fundamental question as to what might be the factors that determine (variations in) the quality of life in our study area. Theoretically but rather vaguely we mentioned that one of the components of quality of life is the standard of living that depends on the consumption of personalized (private) goods and services having two properties (i) excludability and (ii) rivalry or competition among the consumers. This component of quality of life is primarily based on income level of the consumers. Nevertheless, we also

mentioned that the quality of life is something more than merely the standard of living. The second component of quality of life depends on the consumption of public goods that characterize non-rivalry (many consumers can share the public goods) as well as non-excludability. When a public good is provided for some, it is provided for all irrespective of the fact whether the latter ones pay for it or not. This leads to over-use of public goods. This leads to crowding. Not only that, there are certain external diseconomies that emanate from their use and they are non-excludable 'negative spill-over'. Consumption of these common goods and 'bads' make up a significant part of quality of life.

The objective of this chapter is to investigate into the determinants of quality of life. We visualize that there are a few essential and ordinarily unobservable variables that reflect themselves into the indicator variables constituting one or the other aspect of quality life. The quality of life is an abstract concept. It is a concept that has large many dimensions. An indicator in each dimension might be measurable, but together they make the concept fuzzy and only a qualitative statement may be made about the whole. Yet we believe that some leading factors determining quality of life

are discernible. With this background we make an attempt in this chapter to extract factors of quality of life in our study area.

6.2 Factors behind the Variation of Quality of Life in Dimapur

As it has been said earlier, data on 135 variables pertaining to various aspects related to quality of life were collected from 231 households residing in different sectors of the township of Dimapur and the surrounding villages in the periphery. The objective of this chapter is to apply factor analysis on the complex of variables so as to extract some meaningful 'Factors' that determine the quality of life in the study area.

It would be useful to list the variables that would be used for factor analysis. The table below provides such a list. On many occasions, these variables will be addressed to by their mnemonics or the short name to facilitate remembering and addressing.

Table 6.1: Indicators of Quality of Life in Dimapur

Sl. No.	Mnemonics	Name of the Variable
001	KITCHEN	No. of Kitchen rooms per capita
002	LIVROOM	" " Living Rooms " "
003	STDYROOM	" " Study Rooms " "
004	BEDROOM	" " Bed Rooms " "
005	O_ROOM	" " Other Rooms " "
006	STOROOM	" " Store Rooms " "
~~007~~	~~TOTROOM~~	~~" " Total Rooms " "~~
~~008~~	~~HHMEMB~~	~~No. of Household Members~~
~~009~~	~~OWNER~~	~~Ownership of Dwelling~~

010	BLDSTRUC	Building Structure
011	PLOTSIZE	Plot Size
012	FLOORARE	Floor Area
013	IBDIST	Inter-Building Distance
~~014~~	~~RUNWAT~~	~~Availability of running Water~~
015	WATSUPS	Water Supply System
016	WSUPMETH	Water Supply Method
017	ELECTRIC	Type of Power Connection
018	PWRFAIL	Freq. of Power Failure
~~019~~	~~USEFAN~~	~~Whether Uses Fans~~
020	NUMBFAN	No. of Fans in the House
~~021~~	~~RADIO~~	~~Has any Radio~~
022	LPG	Use of LPG for Cooking
023	FRIDGE	Use of Fridge
~~024~~	~~TV~~	~~Whether has a TV~~
025	TVTYPE	Type of TV
026	TELEPHON	Telephone Connection
~~027~~	~~FURNITUR~~	~~Has Furniture~~
028	FURNSPEC	Furniture Specification
029	VENTILAT	Ventilation adequacy
030	SUNSHINE	Sunshine availability
031	CMPNDRAT	Rating of the Compound
032	WTDSPMTH	Waste Disposal Method
033	DPDSINK	Distance from Public Sink
~~034~~	~~WATERLOG~~	~~Does suffer water Logging~~
035	WLOGSPAN	Duration of Water Logging
036	FALLOWLN	Fallow Land in the Vicinity
037	PUBDRAIN	Public Drainage
038	XCRETDSP	How excreta are disposed off
039	NOISE	Noise Level
040	SMOKDUST	Smoke and Dust in Air
041	FOULSMEL	Foul Smell in Air
~~042~~	~~WATPOLN~~	~~Water Pollution~~
043	NWATPOLN	Nature of Water Pollution
044	SATSANIT	Satisfied with Sanitary Condition?
~~045~~	~~PARK~~	~~Any Park Near by?~~
046	PARKDIST	Distance of Park if any
~~047~~	~~PRKNGSPC~~	~~Is there Parking Space Near by~~
048	PRKSPSIZ	Size of Parking Space
049	D_HIWAY	Distance from Highway
050	D_MNROAD	Distance from Main Road
051	MNRDREP	Has Main Road been repaired?
052	ROADTYPE	Type of Approach Road
053	SIDDRAIN	Side Drainage
054	SDRAINWR	Is Side Drainage Working?

055	POTHOLES	Potholes in the approach Road
056	VEHCLACC	Accessibility by Vehicle
057	RDMAKER	Who constructed the Approach Road?
058	SATROADC	Satisfied with Road Condition?
~~059~~	~~EMPLOYD~~	~~Whether Employed?~~
~~060~~	~~NATEMPL~~	~~Nature of Employment~~
~~061~~	~~INCOME~~	~~Monthly Income Range~~
062	BNKSACC	Has Bank Savings A/c
063	INSURANC	Has Insurance
064	FOODEXP	Expenditure on food PC/month
065	HOUSRENT	House rent Per Capita/month
066	EDUCEXP	Expenses on Education PC/m
067	TOILETEX	Exp. On Toiletries, PC/m
068	NEWSPEX	Expenses on News Paper PC/m
069	ENTRTNEX	Exp on Entertainment PC/m
070	ADDICTEX	Expenses on Addiction, PC/m
071	CLOTHEXP	Expenses on clothing, PC/m
072	DONATEX	Expenses on Donation, PC/m
~~073~~	~~TOTALEXP~~	~~Total Expenditure PC/Month~~
~~074~~	~~VEGETARN~~	~~Is Vegetarian?~~
075	NVEGFRQ	Frequency of Non-Veg, Consumption
076	MEALOUT	Does eat meals outside home?
077	TEASNACK	Tea/snacks outside Home?
078	SMOKCHEW	Smoking/Chewing?
079	FRESHMLK	Consumption of Fresh Milk/m
080	PWDRMLK	Consumption of Powder Milk/m
081	FRUITS	Expenses on food per month
082	EGGS	Consumption of eggs/month
083	MEATFISH	Meat/Fish consumption
084	VEGEXPND	Expenses on Vegetables/m
085	NEWSREGL	Regular Readership of newspaper
086	TYPNEWSP	Type of Newspaper subscribed
087	NWSCOL	Which news columns are read
~~088~~	~~TVWATCH~~	~~Watches TV regularly~~
089	TVHOUR	TV watching for how Many hours
090	LIBRARY	Does go to Library
091	NOLIBWHY	Does not go to Library? Why?
092	D_LBRARY	Distance of Library
093	LIBADQT	Is Library facility adequate?
~~094~~	~~HOBBY~~	~~Has any Hobbies?~~
095	HOBBYTYP	Which types of hobbies?
096	HOBBYFAC	Have the facilities for hobbies?

097	HOBYHIND	Hindrances in pursuing Hobbies
098	HBHINDTY	What type of hindrances in Pursuing the hobbies
~~099~~	~~MOVIE~~	~~Does go to movies~~
100	MOVIEFRQ	Frequency of movie-going
101	PICNIC	Goes to picnic
102	DRAMA	Goes to drama
103	DRMAFAC	Are there facilities for Drama
104	ED_GPA	Education of Grand Father
105	EDFATHER	Education of father
106	EDMOTHER	Education of mother
107	EDRESPON	Education of the Respondent
~~108~~	~~CHLDSTDY~~	~~No. of children in schools, etc~~
109	CHLDPSCL	Children in Pre-School
110	CHLDSCHL	Children in School
111	CHLDCOLG	Children in college
112	DPSCHOOL	Distance of Pre-school
113	DSCHOOL	Distance of school
114	DCOLLEGE	Distance of Clollege
115	STDEDINS	Standard of Educational Institutions around
116	FMSICK	Is a family member sick
117	IDMEMBER	Sick member's relationship with the respondent
118	DISEASE	Which disease?
119	DURSICK	Duration of Sickness
120	DISABILI	Any family member is suffering From disability?
~~121~~	~~XRAY~~	~~Has taken x-ray~~
122	XRAYFRQ	Frequency of X-ray taken
123	EYESIGHT	Is eye sight normal
124	EYEGLASS	Does wear specs
125	FAMDOCTO	Has a family Doctor
126	EXERCISE	Does exercise
127	NOEXRWHY	If no exercise, then reason
128	DMARKET	Distance of Market place
129	MODEMRKT	Mode used to go to Market
130	MRKTFRQ	Frequency of going to Market
131	DWRKPLC	Distance of Work Place
132	MODEWRK	Mode used to go to Work Place
133	TIMEWRK	Travel Time needed to go to the work Place
134	TRVLCOST	Travel Cost to Work Place
135	MODEQLTY	Quality of Mode used to go to the Work Place

Note: Variable with double strike were included in constructing the Overall QOL index in the earlier chapter, but they are dropped out in factor analysis in this chapter.

The eigenvalues of the inter-correlation matrix (135 x 135) constructed from the indicators provide the Scree Plot. The elbow of the Scree Plot suggests five factors to be extracted. Alternatively, one may extract as many factors as the number of eigenvalues exceeding unity in magnitude. However, in that case 38 factors have to be extracted. It is singularly difficult to assign any meaning to such a large number of factors. So, it has been decided to extract only five factors and identify them with some meaningful concept.

Fig. 6.1: Scree Plot of Eigenvalues of Inter-correlation Matrix Among the Indicators of Quality of Life, Dimapur

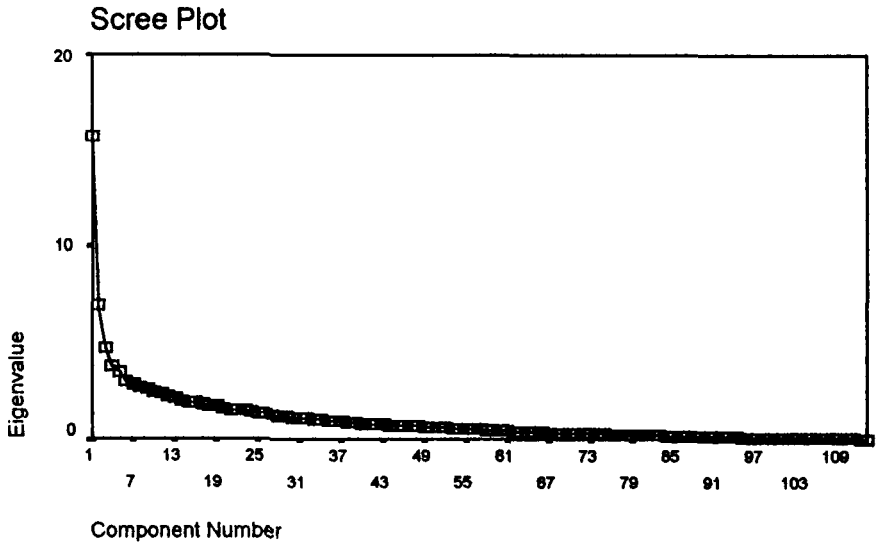


Table 6.2: Rotated Factor Loadings Matrix*

(Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization).

Factor	1	2	3	4	5
NUMBFAN	.759	.308			
FURNSPEC	.744	.314			
TVTYPE	.675	.223			
TELEPHON	.659	.305			
NEWSREGL	.634			.340	
LPG	.617		.253		
FRIDGE	.611	.247			
BLDSTRUC	.566	.229	.275		
DCOLLEGE	.517			-.261	
CHLDCOLG	.517	-.239		-.221	
VENTILAT	.497		.239		
WSUPMETH	.493				
BNKSACC	.487	.248			
EDRESPON	.479	.346		.270	
FRUITS	.476	.343		.403	
TYPNEWSP	.463	.209	.208	.390	
VEGEXPND	.463			.278	
NWSCOL	.444		.250	.390	
ELECTRIC	.442	.203			
TVHOUR	.441				-.208
EGGS	.432				
EDUCEXP	.401	.353			
EYEGLASS	.399				.284
MODEMRKT	.394			.264	
TRVLCOST	.382			.267	
NVEGFRQ	.354	.272			
MEATFISH	.322				
CHLDPSCL	-.319			.304	
WATSUPS	-.294				
FOULSMEL	-.286				
SMOKCHEW	-.251				
PWDRMLK	.226				
FRESHMLK	.219			.200	
EXERCISE					
NOEXRWHY					
KITCHEN		.794			
LIVROOM		.774			
NEWSPEX	.259	.747		.213	

FLOORARE	.393	.678			
O_ROOM		.664			
ENTRTNEX	.242	.662	.206		
CLOTHEXP	.511	.600			
FOODEXP	.349	.588			
BEDROOM	.286	.569		-.244	
DONATEX	.337	.523			
TOILETEX	.362	.522			
STDYROOM		.517			
STOROOM	.333	.499			
MEALOUT	.214	.471		.315	
EDFATHER		.445		.237	
CHLDSCHL		-.431			
DRAMA		.400		.215	
INSURANC		.372			
PLOTSIZE		.353	-.260		
EDMOTHER	.205	.346		.274	
ADDICTEX		.344			
PICNIC	.236	.323		.290	
ED_GPA		.297			
NWATPOLN	.238	-.246			
STDEDINS		-.233			
PRKSPSIZ		.202			
WTDSPMTH			.712		
SMOKDUST			-.687		
PARKDIST			-.621		
FALLOWLN			-.619		
D_HIWAY			.590		
NOISE			-.582		
PUBDRAIN			-.571		
MNRDREP	.332		.560		
RDMAKER			.533		
HOUSRENT		.343	.495		
SIDDRAIN			.493		
IBDIST			-.485		
DWRKPLC	-.266		.431		
DMARKET			.418	-.312	
D_MNROAD			.408		
MRKTFRQ			.395		
CMPNDRAT	.331		-.389		
SATSANIT			.362		
POTHOLES			-.349		

SUNSHINE			-.325		
DPDSINK			.316		
MODEQLTY			.293	.283	
MOVIEFRQ			.264		
SATROADC	.225		.239		
SDRAINWR					
WLOGSPAN					
XCRETDSP					
MODEWRK	.287			.519	
HOBYHIND				.449	.414
HOBBYTYP	.270	.343		.438	.302
TIMEWRK			.249	.420	
D_LBRARY				.419	
LIBRARY				.412	
DRMAFAC		.241		.356	
ROADTYPE			.258	-.311	
DPSCHOOL				.272	
HOBBYFAC		.224		.265	
NOLIBWHY				-.257	
FAMDOCTO	.218			.222	
TEASNACK				.222	
IDMEMBER					.776
DISEASE					.763
FMSICK					.742
HBHINDTY				.375	.458
DISABILI					.379
EYESIGHT					-.378
PWRFAIL				-.205	-.374
DURSICK		.202		-.204	.326
XRAYFRQ					.322
LIBADQT					-.207
DSCHOOL					
VEHCLACC					

**Note: Loadings with a magnitude less than 0.20 have been suppressed.*

6.3 **Identification of Factors**

Having extracted five 'factors', the next problem is to identify them. The loadings obtained by various indicators suggest the following categorization. However, it must be borne in mind that no mechanical method to identification is available. A caution and judgment regarding identification of factors is of the utmost importance.

Factor 1 - High End Consumption

In this category one may include the personalized flow of utility emanating from various objects that have four distinctive characteristics. First, that they have excludability, at the end of the supplier as well as the consumer, and, therefore, the consumer has the freedom of choice with regard to their consumption at the qualitative level (to consume or not) as well as the quantitative level (how much to consume). Secondly, they are the means to comfort and luxury and their income as well as price elasticity is larger in magnitude. Thirdly, high income and standard of living support their consumption. Lastly, most of them relate to durable consumer goods. In our case, indicators pertaining to this type of consumption are:

TVTYPE, NUMBFAN, FURNSPEC, TELEPHON, NEWSREGL, TVHOUR, FRIDGE, LPG, BLDSTRUC, EDRESPON, FRUITS, TYPNEWSP, BNKSACC, VEGEXPND, NWSCOL, WSUPMETH, EGGS, CHLDCOLG, DCOLLEGE, MODEMRKT, ELECTRIC, EDUCEXP, NVEGFRQ, TRVLCOST, MEATFISH, and EYEGLASS and so on.

Factor 2 - Low End Consumption

"Rice, Raiment and Roof" including the consumption of personalized space are the major items of low-end consumption. They are necessities. Their income and price elasticities are smaller in magnitude. In our analysis, variables that make up the second factor are: KITCHEN, LIVROOM, FLOORARE, NEWSPEX, BEDROOM, O_ROOM, ENTRTNEX, CLOTHEXP, FOODEXP, STOROOM, STDYROOM, DONATEX, CHLDSCHL, TOILETEX, MEALOUT, PLOTSIZE, EDFATHER, EDMOTHER, ADDICTEX , INSURANC , PICNIC and so on.

Factor 3 - Consumption of Public Goods, Commons and Negative Spillovers

Consumption of this category characterizes non-excludability and non-rivalry. Due to free riding, these goods are often over-used and subject to over-crowding. In our analysis, the variables entering this category are: SMOKDUST, WTDSPMTH, PARKDIST, FALLOWLN, NOISE, D_HIWAY, PUBDRAIN, HOUSRENT, MNRDREP, RDMAKER, IBDIST, SIDDRAIN, CMPNDRAT, DWRKPLC, MRKTFRQ, D_MNROAD, DMARKET, SATSANIT, POTHOLES, MOVIEFRQ, SUNSHINE, DPDSINK, MODEQLTY, SATROADC, etc are the important ones.

Factor 4 - Supplementary Consumption

These are miscellaneous type of consumption supplementing standard of living. In our analysis they constitute the fourth factor. They are: HOBBYTYP, HOBYHIND, MODEWRK, HOBBYFAC, DRMAFAC, LIBRARY, ROADTYPE, D_LBRARY, TIMEWRK etc are important.

Factor 5 - Health-related Attributes

The fifth factor is made up of the health related variables in main. These are: IDMEMBER, DISEASE, FMSICK, XRAYFRQ, EYESIGHT, DISABILI and DURSICK are some prominent ones to mention. It is a negative type of factor. Its larger value indicates poorer health conditions and abatement of quality of life.

6.4 Distribution of Mean Factor Scores over the Sectors of the Township

A regression analysis carried out to study the spatial distribution of mean factor scores over the sectors of the township of Dimapur reveals that factor#3 monotonically decreases as we move away from the CBD to the periphery. It is in conformity with our expectation. The CBD is more crowded and polluted. It caters to the largest floating population who over-use the public facilities there. Factor #5 (related with poor health conditions) scores higher in the CBD and as we move away to sectors #3 and #4, a decline is observed. It is likely that health conditions are poorer in the CBD and better in sectors #3 and #4. But due to poor conditions of living, health in the rural areas scores poorer.

Factors #1, #2, and #4 are closely related with standard of living. Mean scores of these factors are lower in the CBD and rise as we move away to sectors #2 and #3. They attain their peak in sector #3 and after that the experience a decline as we move away further to sectors #4 and #5.

Table 6.3: Regression Coefficients of Bartlett Factors on Sectors

(Factor Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization).

Factor	Statistic	Sector1	Sector2	Sector3	Sector4	Sector5	R^2	F value
Factor1	Coeff	0..854	1.289	1.582	0.876	-0.993	.248	18.6
	t value	4.240	6.400	8.211	4.546	6.523		
Factor2	Coeff	0.198	0.516	0.482	0.151	-0.287	.037	2.17*
	t value	0.868	2.265	2.212	0.691	-1.664		
Factor3	Coeff	2.546	1.364	1.120	0.520	-1.135	.666	112.6
	t value	18.959	10.155	8.723	4.051	11.183		
Factor4	Coeff	-0.649	-0.188	0.121	-0.499	0.250	.088	5.45
	t value	2.927	0.849	0.570	2.354	1.489		
Factor5	Coeff	-0.193	-0.110	-0.292	-0.451	0.234	.023	1.34**
	t value	0.839	0.477	1.329	2.053	1.350		

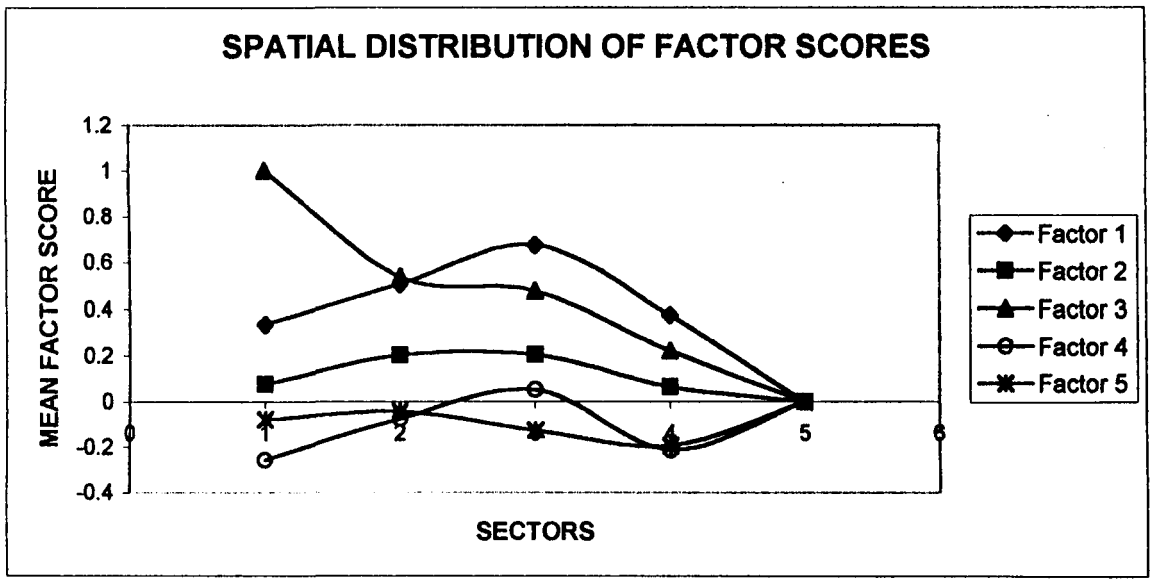
Note: * Significant at 5*; ** not significant

Table 6.4: Beta Regression Coefficients of Factors on Sectors

(Factor Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization).

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Sector 1	0.336	0.078	1.002	-0.256	-0.076
Sector 2	0.507	0.203	0.537	-0.074	-0.043
Sector 3	0.675	0.206	0.478	0.052	-0.125
Sector 4	0.374	0.064	0.222	-0.213	-0.192
Sector 5	0	0	0	0	0

Fig. 6.2: SPATIAL DISTRIBUTION OF FACTOR SCORES
(Factor Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser
Normalization).



A perusal of the list of variables making up different factors suggests that the first, the second and the fourth factors might have a significant correlation among them. All of them are closely relate to personalized (private) consumption of goods and services that define standard of living. But the rest two factors, the third identified with the consumption of public goods and negative spill-over and the fifth related with health conditions may be only poorly correlated or orthogonal to the others. With this idea in mind, we venture to carry out an oblique rotation.

6.5 **Oblique Rotation**

To follow the suggestion noted above, we make an attempt to oblique rotation of factors using "Promax" rotation method. The rotated factors are presented in the table. We find that the factors are indeed correlated as shown in the table of inter-correlation matrix of Factors.

Table 6.5: Factor (Pattern) Matrix*

(Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalization).

Variables	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
NUMBFAN	.759				
FURNSPEC	.737				
TVTYPE	.683				
CHLDCOLG	.669	-.376		-.277	
LPG	.653		.243		
TELEPHON	.644				
DCOLLEGE	.633			-.324	
NEWSREGL	.631			.280	
FRIDGE	.596				
BLDSTRUC	.593		.279	-.205	
VENTILAT	.523		.240		
WSUPMETH	.514				
TVHOUR	.505				-.230
EYEGLASS	.482				.272
BNKSACC	.458				
VEGEXPND	.453			.238	
EGGS	.444				
ELECTRIC	.434				
TYPNEWSP	.412			.347	
EDRESPON	.411	.218		.217	
NWSCOL	.404		.220	.349	
FRUITS	.390	.203		.358	
MODEMRKT	.377			.234	
TRVLCOST	.373			.243	

CHLDPSCL	-.360			.357	
EDUCEXP	.355	.278			
NWATPOLN	.337	-.326			
WATSUPS	-.333				
FOULSMEL	-.333				
SMOKCHEW	-.307	.210			
NVEGFRQ	.302		-.205		
MEATFISH	.295				
SATROADC	.259		.246		
PWDRMLK	.258				
EXERCISE					
DSCHOOL					
NOEXRWHY					
KITCHEN	-.359	.928			
LIVROOM		.845			
NEWSPEX		.728			
O_ROOM		.707			
FLOORARE	.278	.653			
ENTRTNEX		.651			
BEDROOM	.208	.579		-.304	
FOODEXP	.239	.552			
STDYROOM		.545			
CLOTHEXP	.411	.515			
CHLDSCHL	.202	-.499			
DONATEX	.220	.464			
TOILETEX	.248	.460			
STOROOM	.237	.453			
MEALOUT		.424		.289	
EDFATHER		.416		.213	
ADDICTEX	-.265	.401			
PLOTSIZE		.387	-.264		
DRAMA		.380			
INSURANC		.346			
EDMOTHER		.291		.250	
ED_GPA		.272			
PRKSPSIZ		.221			
STDEDINS					
WTDSPMTH			.701		
SMOKDUST			-.686		
PARKDIST			-.626		
FALLOWLN			-.609		
D_HIWAY			.598	-.219	

NOISE			-.586		
MNRDREP	.367		.568		
PUBDRAIN			-.567		
RDMAKER			.532		
SIDDRAIN			.491		
HOUSRENT		.402	.490		
IBDIST			-.483		
DMARKET			.439	-.322	
DWRKPLC	-.268		.430		
D_MNROAD			.418		
MRKTFRQ			.396		
CMPNDRAT	.378		-.385		
POTHOLES			-.359		
SATSANIT			.352		
SUNSHINE			-.338		
DPDSINK			.311		
MOVIEFRQ	-.209		.268		
SDRAINWR					
WLOGSPAN					
XCRETDSP					
MODEWRK	.262			.515	
TIMEWRK	-.225		.232	.457	
HOBYHIND				.452	.408
D_LBRARY				.431	
LIBRARY				.428	
HOBBYTYP		.259		.415	.295
DRMAFAC				.354	
ROADTYPE			.283	-.335	
DPSCHOOL				.295	
MODEQLTY			.285	.287	
PICNIC		.257		.264	
NOLIBWHY		.216		-.262	
HOBBYFAC				.260	
TEASNACK				.227	
FAMDOCTO				.203	
FRESHMLK					
IDMEMBER					.779
DISEASE					.767
FMSICK					.744
HBHINDTY				.380	.452
DISABILI					.376
EYESIGHT	-.245	.213			-.374

PWRFAIL				-.215	-.370
DURSICK		.241		-.230	.331
XRAYFRQ					.315
LIBADQT					-.209
VEHCLACC					

**Note: Loadings with a magnitude less than 0.20 have been suppressed.*

Table 6.6: Factor Correlation Matrix
(Extraction: Principal Components. Rotation: Promax)

Factor	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	1.000	.469	0.034	0.283	0.045
Factor 2		1.000	0.062	0.226	-0.009
Factor 3			1.000	0.096	0.084
Factor 4				1.000	0.041
Factor 5					1.000

Table 6.7: Regression Coefficients of Bartlett Factors on Sectors

(Factor Extraction Method: Principal Component Analysis.
Rotation Method: Promax with Kaiser Normalization).

Factor	Statistic	Sector1	Sector2	Sector3	Sector4	Sector5	R^2	F value
Factor1	Coeff	0.835	1.366	1.662	0.821	-1.010	0.287	22.7
	T value	4.253	6.962	8.856	4.374	6.810		
Factor2	Coeff	0.443	0.836	0.882	0.343	-0.535	0.098	6.11
	T value	2.008	3.790	4.179	1.626	3.208		
Factor3	Coeff	2.530	1.377	1.137	0.501	-1.134	0.665	112.0
	T value	18.808	10.236	8.839	3.894	11.153		
Factor4	Coeff	-0.318	0.167	0.488	-0.312	-0.013	0.105	6.61
	T value	1.145	0.759	2.323	1.482	0.080		
Factor5	Coeff	-0.076	-0.036	-0.222	-0.425	0.175	.025	1.47**
	T value	0.329	0.159	1.011	1.936	1.010		

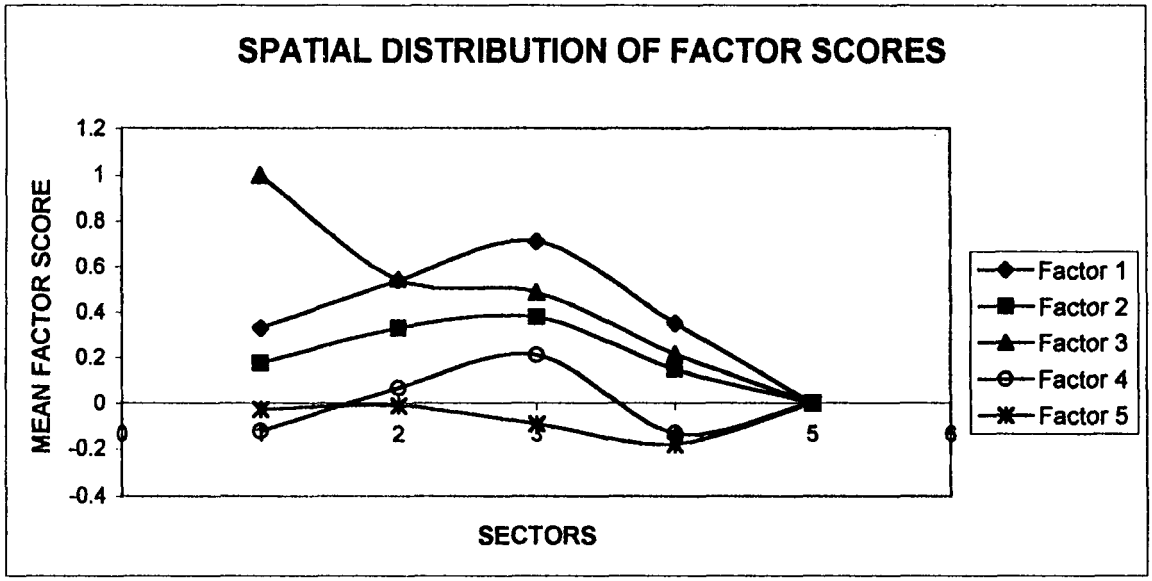
Note : ** Not significant

Table 6.8: Beta Regression Coefficients of Factors on Sectors

(Factor Extraction Method: Principal Component Analysis.
Rotation Method: Promax with Kaiser Normalization).

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Sector 1	0.328	0.174	0.996	-0.125	-0.03
Sector 2	0.538	0.329	0.543	0.066	-0.014
Sector 3	0.709	0.376	0.485	0.208	-0.095
Sector 4	0.35	0.146	0.214	-0.133	-0.181
Sector 5	0	0	0	0	0

Fig. 6.3: SPATIAL DISTRIBUTION OF FACTOR SCORES
**(Factor Extraction Method: Principal Component Analysis.
Rotation Method: Promax with Kaiser Normalization).**



A comparative study of the results obtained by the orthogonal and the oblique rotations reveals that that our conclusions are essentially unaltered. The first factor (that relates to High End Consumption) attains its peak in sector 3. The second factor (that relates to basic consumption of food,

clothing, housing, etc.) as well as Factor #4 behaves in the same manner. These factors are related to the 'standard of living' of the households. However, the third factor (pertaining to consumption of public or common goods and non-excludable negative spill-over) scores highest in sector 1 and it has the monotonically declining trend as one moves away from the CBD. Lastly, Factor #5 (health conditions) improves as we move away fro CBD to sector #4, but beyond that it deteriorates. We observed similar tendencies when we analyzed the spatial distribution of mean factor scores obtained by orthogonal rotation.

6.6 A Change in the Method of Factor Extraction

It would be interesting to investigate if the method of extraction (of factors) has any significant effect on our findings or our conclusions are rather immune to changes in the method of extraction. In what has been presented above, Principal Component Analysis was the method of extraction of factors. Now we use the "Principal Axis" and the "Image" factoring methods of extraction. The results are presented in the tables below.

Table 6.9: Factor (Pattern) Matrix*

(Factor Extraction Method: Image Factoring.

Rotation Method: Promax with Kaiser Normalization).

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
NUMBFAN	.800				
FURNSPEC	.786				
NEWSREGL	.756				
TVTYPE	.696				
TELEPHON	.682				
FRIDGE	.650				
LPG	.616		.216		
CHLDCOLG	.603	-.406		-.235	
TYPNEWSP	.597		.210	.214	
DCOLLEGE	.583	-.238		-.258	
NWSCOL	.562		.241	.212	
BLDSTRUC	.543		.262		
FRUITS	.540			.237	
VEGEXPND	.516				
EDRESPON	.499				
CLOTHEXP	.499	.442			
WSUPMETH	.491				
BNKSACC	.482				
ELECTRIC	.471				
VENTILAT	.459		.218		
TVHOUR	.455				
EDUCEXP	.450				
MODEMRKT	.447				
TRVLCOST	.446				
EGGS	.439				
EYEGLASS	.391				
NVEGFRQ	.382				
TOILETEX	.371	.359			
MEATFISH	.364				
CMPNDRAT	.333		-.325		
FAMDOCTO	.291				
EDMOTHER	.288				
FRESHMLK	.285				
WATSUPS	-.255				
PICNIC	.241			.212	
SMOKCHEW	-.240				
FOULSMEL	-.236				

PWDRMLK	.224				
STDEDINS					
EXERCISE					
ED_GPA					
DSCHOOL					
NOEXRWHY					
VEHCLACC					
KITCHEN	-.361	.970			
LIVROOM		.884			
O_ROOM		.672			
NEWSPEX	.216	.630			
FLOORARE	.318	.615			
ENTRTNEX		.606			
BEDROOM		.596		-.238	
FOODEXP	.277	.524			
STDYROO		.517			
CHILDSCHL		-.452			
DONATEX	.332	.388			
STOROOM	.307	.379			
ADDICTEX		.337			
PLOTSIZE		.326	-.228		
INSURANC		.304			
MEALOUT	.237	.301		.210	
EDFATHER	.205	.281			
DRAMA		.270			
WATPOLN	.236	-.257			
NOLIBWHY					
PRKSPSIZ					
WTDSPMTH			.721		
SMOKDUST			-.644		
FALLOWLN			-.628		
PARKDIST			-.589		
D_HIWAY			.563		
MNRDREP	.322		.561		
PUBDRAIN			-.553		
SIDDRAIN			.544		
NOISE			-.535		
RDMAKER			.522		
HOUSRENT		.376	.466		
IBDIST			-.432		
DWRKPLC	-.321		.416		
DMARKET	-.204		.390	-.263	

D_MNROAD			.378		
SATSANIT			.361		
MRKTFRQ			.349		
DPDSINK			.316		
SUNSHINE			-.302		
POTHOLES			-.301		
MODEQLTY			.262		
SDRAINWR			.243		
SATROADC	.201		.240		
MOVIEFRQ			.235		
WLOGSPAN					
XCRETDSP					
HOBYHIND				.706	
HBHINDTY				.644	.215
HOBBYTYP	.268			.549	
D_LBRARY				.422	
LIBRARY				.393	
MODEWRK	.347			.356	
TIMEWRK			.239	.342	
ROADTYPE			.279	-.299	
CHLDPSCL	-.265			.283	
HOBBYFAC				.281	
PWRFAIL				-.270	
DRMAFAC				.232	
DPSCHOOL				.205	
LIBADQT					
TEASNACK					
IDMEMBER					.905
DISEASE					.900
FMSICK					.856
DURSICK		.208			.295
XRAYFRQ					.264
EYESIGHT					-.263
DISABILI					.214

**Note: Loadings with a magnitude less than 0.20 have been suppressed.*

Table 6.10: Factor Correlation Matrix
(Extraction: Image Factoring. Rotation: Promax)

Factor	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	1.000	.484	0.071	0.212	-0.078
Factor 2		1.000	0.071	0.154	-0.131
Factor 3			1.000	0.149	0.108
Factor 4				1.000	-0.054
Factor 5					1.000

Table 6.11: Regression Coefficients of Bartlett Factor Scores on Sectors

(Factor Extraction Method: Image Factoring.
Rotation Method: Promax with Kaiser Normalization).

Factor	Statistic	Sector1	Sector2	Sector3	Sector4	Sector5	R^2	F value
Factor1	Coeff	0.757	1.342	1.631	0.735	-0.963	0.276	21.56
	t value	3.756	6.655	8.456	3.813	6.318		
Factor2	Coeff	0.410	0.739	0.866	0.278	-0.491	.087	5.37
	t value	1.794	3.229	3.962	0.115	2.841		
Factor3	Coeff	2.592	1.388	1.160	0.450	-1.141	0.659	109.38
	t value	18.353	9.828	8.592	3.332	10.691		
Factor4	Coeff	-0.508	-0.043	0.163	-0.565	0.201	.082	5.07
	t value	2.160	0.183	0.724	2.511	1.128		
Factor5	Coeff	0.267	0.105	-0.053	-0.011	-0.056	.012	0.70**
	t value	1.107	0.436	0.230	0.046	0.306		

Note : ** not significant

Table 6.12: Beta Regression Coefficients of Factors on Sectors

(Factor Extraction Method: Image Factoring.
Rotation Method: Promax with Kaiser Normalization).

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Sector 1	0.292	0.157	0.979	-0.189	0.101
Sector 2	0.518	0.282	0.524	-0.016	0.04
Sector 3	0.682	0.359	0.475	0.066	-0.022
Sector 4	0.308	0.112	0.184	-0.228	-0.004
Sector 5	0	0	0	0	0

Fig. 6.4: SPATIAL DISTRIBUTION OF FACTOR SORES
(Factor Extraction Method: Image Factoring.
Rotation Method: Promax with Kaiser Normalization).

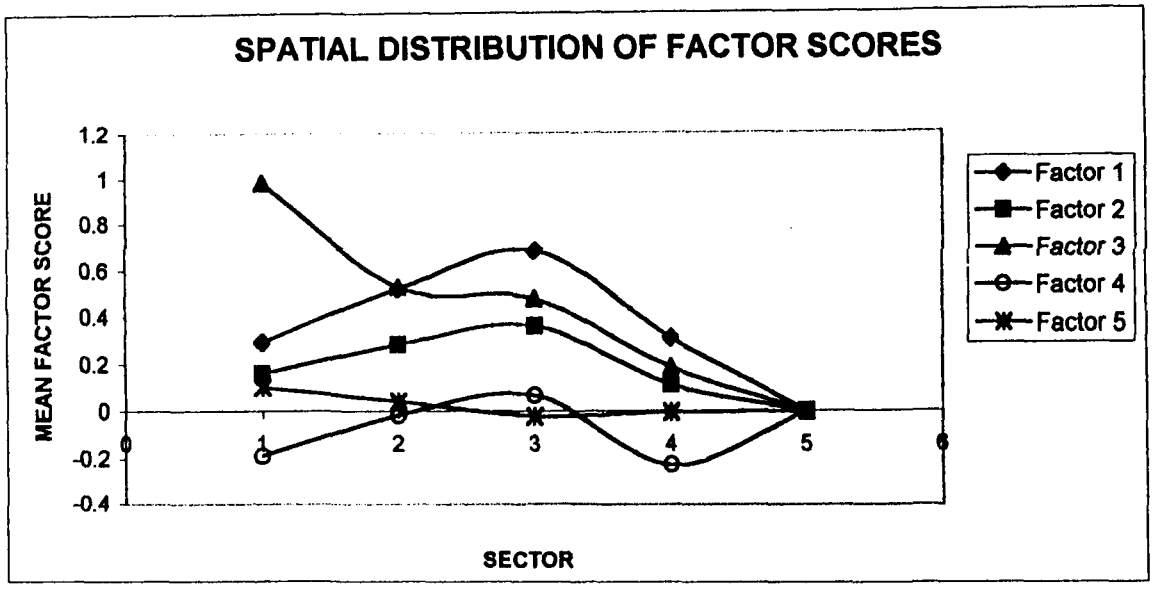


Table 6.13: Factor (Pattern) Matrix*

(Factor Extraction Method: Unweighted Least Squares Factoring.
Rotation Method: Promax with Kaiser Normalization).

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
NUMBFAN	.757				
FURNSPEC	.733				
CHLDCOLG	.679	-.352		-.248	
TVTYPE	.660				
DCOLLEGE	.651			-.274	
LPG	.638		.232		
TELEPHON	.630				
BLDSTRUC	.597		.269		
NEWSREGL	.585			.302	
FRIDGE	.572				
VENTILAT	.502		.225		
WSUPMETH	.487				
EYEGLASS	.467				.223
TVHOUR	.461				
BNKSACC	.422				
ELECTRIC	.403				

VEGEXPND	.402			.234	
EGGS	.399				
CMPNDRAT	.374		-.363		
CHLDPSCL	-.366			.316	
EDRESPON	.366			.245	
EDUCEXP	.335	.254			
MODEMRKT	.334			.249	
TRVLCOST	.319			.227	
FOULSMEL	-.314				
NWATPOLN	.312	-.283			
WATSUPS	-.306				
NVEGFRQ	.274				
MEATFISH	.269				
SMOKCHEW	-.262				
SATROADC	.249		.226		
PWDRMLK	.229				
EXERCISE					
DSCHOOL					
NOEXRWHY					
VEHCLACC					
KITCHEN	-.380	.961			
LIVROOM		.854			
NEWSPEX		.710		.225	
O_ROOM		.687			
FLOORARE	.282	.653			
ENTRTNEX		.630			
BEDROOM	.228	.580		-.281	
FOODEXP	.222	.539			
STDYROOM		.511			
CLOTHEXP	.390	.501			
CHLDSCHL		-.459			
DONATEX		.436			
STOROOM	.218	.428			
TOILETEX	.217	.427			
MEALOUT		.380		.315	
EDFATHER		.371		.222	
PLOTSIZE		.361	-.251		
ADDICTEX	-.244	.352			
DRAMA		.337			
INSURANC		.316			
ED_GPA		.232			
PRKSPSIZ					

STDEDINS					
WTDSPMTH			.696		
SMOKDUST			-.669		
PARKDIST			-.607		
FALLOWLN			-.596		
D_HIWAY			.573	-.212	
NOISE			-.558		
PUBDRAIN			-.550		
MNRDREP	.363		.545		
RDMAKER			.505		
HOUSRENT		.383	.466		
SIDDRAIN			.460		
IBDIST			-.454		
DMARKET			.406	-.318	
DWRKPLC	-.267		.400		
D_MNROAD			.387		
MRKTFRQ			.368		
SATSANIT			.335		
POTHOLES			-.328		
SUNSHINE			-.310		
DPDSINK			.285		
MODEQLTY			.257	.226	
MOVIEFRQ	-.211		.253		
SDRAINWR					
WLOGSPAN					
XCRETDSP					
HOBYHIND				.502	.285
HOBBYTYP		.216		.486	.203
MODEWRK				.481	
HBHINDTY				.425	.323
FRUITS	.333			.394	
TIMEWRK	-.264		.216	.388	
D_LBRARY				.370	
LIBRARY				.370	
TYPNEWSP	.354			.369	
NWSCOL	.347		.214	.367	
DRMAFAC				.332	
ROADTYPE			.254	-.321	
DPSCHOOL				.278	
PICNIC		.226		.276	
HOBBYFAC				.275	
EDMOTHER		.246		.256	

TEASNACK				.223	
NOLIBWHY				-.220	
FAMDOCTO				.206	
FRESHMLK					
IDMEMBER					.834
DISEASE					.816
FMSICK					.784
EYESIGHT	-.244				-.300
DURSICK		.225			.291
DISABILI					.285
XRAYFRQ					.274
PWRFAIL				-.238	-.258
LIBADQT					

**Note: Loadings with a magnitude less than 0.20 have been suppressed.*

Table 6.14: Factor Correlation Matrix

(Extraction: Unweighted Least Squares. Rotation: Promax)

Factor	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	1.000	0.506	0.061	0.407	-0.046
Factor 2		1.000	0.083	0.308	-0.093
Factor 3			1.000	0.126	0.113
Factor 4				1.000	-0.049
Factor 5					1.000

Table 6.15: Regression Coefficients of Bartlett Factor Scores on Sectors

(Factor Extraction Method: Unweighted Least Squares Factoring.
Rotation Method: Promax with Kaiser Normalization).

Factor	Statistic	Sector1	Sector2	Sector3	Sector4	Sector5	R^2	F value
Factor1	Coeff	0.885	1.406	1.687	0.854	-1.041	0.276	21.52
	t value	4.338	6.889	8.648	4.375	6.751		
Factor2	Coeff	0.469	0.858	0.979	0.357	-0.571	0.107	6.79
	t value	2.061	3.771	4.499	1.641	3.318		
Factor3	Coeff	2.648	1.453	1.190	0.484	-1.180	0.670	114.95
	t value	18.871	10.358	8.869	3.607	11.123		
Factor4	Coeff	-0.266	0.313	0.657	-0.269	-0.101	0.122	7.87
	t value	1.133	1.331	2.924	1.197	0.570		
Factor5	Coeff	0.127	0.020	-0.149	-0.195	0.054	.013	0.72**
	t value	0.509	0.080	0.623	0.819	0.286		

Note : ** not significant

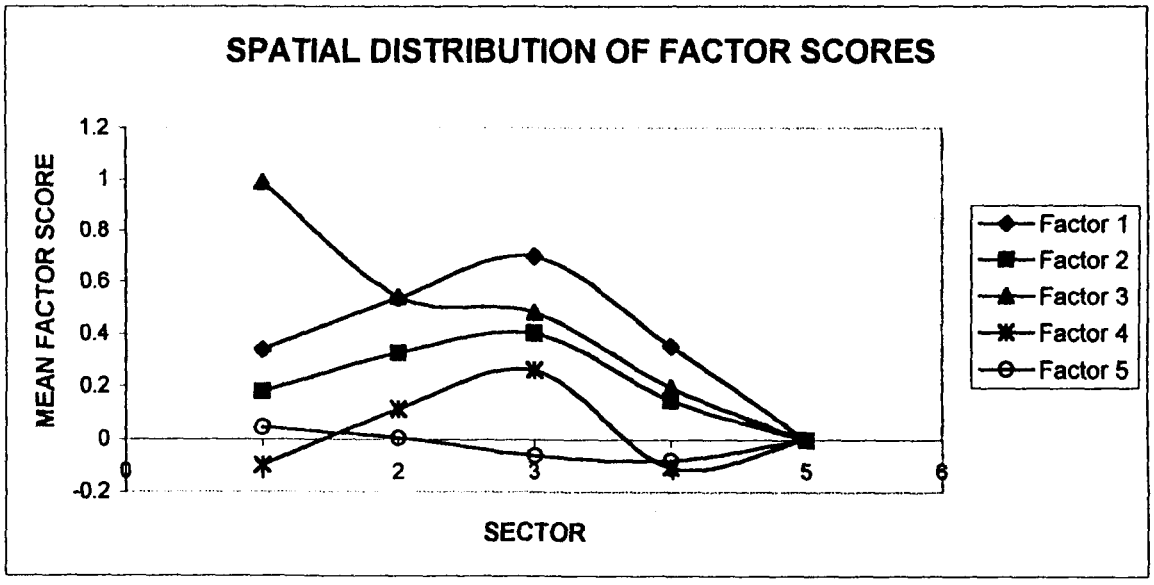
Table 6.16: Beta Regression Coefficients of Factors on Sectors

(Factor Extraction Method: Unweighted Least Squares Factoring.
Rotation Method: Promax with Kaiser Normalization).

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Sector 1	0.338	0.178	0.990	-0.097	0.046
Sector 2	0.536	0.326	0.544	0.114	0.007
Sector 3	0.698	0.403	0.483	0.260	-0.059
Sector 4	0.353	0.147	0.196	-0.106	-0.077
Sector 5	0	0	0	0	0

Fig. 6.5: Spatial Distribution of Factor Scores

(Factor Extraction Method: Unweighted Leat Squares.
Rotation Method: Promax with Kaiser Normalization).



The factor identified with the consumption of commons, public goods and non-excludable negative spill-over score highest in the CBD and with a movement towards the periphery it declines monotonically. On the other hand, factors identified with the standard of living score lower in the CBD, attain a peak in Sector #3 and onwards they decline as we move to

sector #4 and the peripheral rural settlements. Evidently, our conclusions are grossly immune to the alterations in the method of extraction (as well as rotation). Such stability confirms to some extent that the identification of factors has been reliable.

6.7 Relationship between Income Group and the Factors of Quality of Life

We have seen that irrespective of the method of extraction and rotation, three important factors relate to 'standard of living' determined by high-end consumption, low-end consumption and supplementary consumption. Two factors, however, are different in essence. One of them has been identified with the consumption of public goods and negative spillover and the other with the poor health conditions.

How do these factors relate to the income groups to which the households belong? It is natural to think that the factors identified with the 'standard of living' would correlate positively with income and there too, the factor identified with 'high-end' consumption would correlate more strongly with income than the factors identified with the 'low-end' and supplementary consumption. On the other hand, the factor identified with

public consumption and negative spillover would have either a poor correlation with income or it will correlate negatively with income. The reasons for a negative correlation of this factor lies in the fact that the high income group may choose residential sites that have lesser extent of negative spillover and crowding of public goods. Lastly, the factor identified with health conditions (which is a negative indicator of quality of life) would either have no correlation with income or it will vary inversely with the level of income.

We have classified households in three income groups: (i) Low income group (with Rs. 5000 or less per month), (ii) Middle income group (with Rs. between 5000 to15000 per month) and (iii) High income group (above Rs. 15000 per month). Our hypotheses are supported by the findings when five factors are extracted by unweighted Least Squares method, Promax rotation, Bartlett's method of factor scores, while income group identifier alone is the regressor and the factor scores are the regressands. The hypotheses are supported by the models where factors are conceived as functions of income group identifier as well as the residential location of households (sectors). We have experimented with other methods also, but our conclusions remain unaltered.

Table 6.17: Regression Coefficients of Bartlett Factor Scores on ncome
(Factor Extraction Method: Unweighted Least Squares Factoring.
Rotation Method: Promax with Kaiser Normalization).

Regressor →	Statistic	Constant	Income Group	R^2	F value
Factor1	Coefficient	-2.123	1.069	0.471	203.56
	T value	13.538	14.267		
Factor2	Coefficient	-1.241	0.624	0.159	43.32
	T value	6.245	6.587		
Factor3	Coefficient	-0.137	0.069	0.002	0.43**
	T value	0.624	0.658		
Factor4	Coefficient	-1.081	0.544	0.334	28.74
	T value	5.087	5.361		
Factor5	Coefficient	-0.040	0.020	0.000	0.035**
	T value	0.178	0.187		

Note: ** not significant

Table 6.18: Regression Coefficients of Bartlett Factor Scores on Income and Sectors
(Factor Extraction Method: Unweighted Least Squares Factoring.
Rotation Method: Promax with Kaiser Normalization).

Regressor →	Stati-Stic	Constant	Income Group	Sector1	Sector2	Sector3	Sector4	R^2	F
Factor1	Coeff	-2.415	0.889	0.542	0.860	1.008	0.595	0.554	55.84
	t value	14.383	11.837	3.320	5.149	6.153	3.837		
Factor2	Coeff	-1.348	0.503	0.275	0.550	0.596	0.211	0.195	10.91
	t value	5.947	4.958	1.249	2.440	2.693	1.008		
Factor3	Coeff	-0.916	-0.170	2.713	1.558	1.320	0.533	0.680	95.75
	t value	6.325	2.629	19.280	10.811	9.336	3.988		
Factor4	Coeff	-0.784	0.442	-0.437	0.042	0.320	-0.398	0.185	10.21
	t value	3.303	4.161	1.895	0.177	1.379	1.814		
Factor5	Coeff	-0.004	0.037	0.113	-0.003	-0.177	-0.206	0.013	0.59**
	t value	0.014	0.319	0.443	0.011	0.694	0.854		

Note: ** not significant

Table 6.19: Regression Coefficients of Bartlett Factor Scores* on ownership/Rural Residence

Regre Ssor →	Stati-Stic	QOL Factor as a Function of Ownership of Dwelling			QOL Factor as a Function of Rural Dwelling (Sector 5)		
		Constant	**Ownership**	**R^2/ F**	**Constant**	**Rural Res**	**R^2/ F**
Factor1	Coeff	-0.360	0.114	0.020/ 4.58	0.174	-1.215	0.170/ 47.0
	t value	1.987	2.141		2.592	6.858	
Factor2	Coeff	0.098	-0.031	0.001/ 0.33**	0.095	-0.666	0.051/ 12.2
	t value	0.532	0.574		1.323	3.499	
Factor3	Coeff	1.479	-0.467	0.319/107. 2	0.197	-1.376	0.210/ 61.05
	t value	9.610	10.353		2.953	7.813	
Factor4	Coeff	0.188	-0.059	0.005/ 1.12**	0.017	-0.118	0.001/ 0.34**
	t value	0.983	1.059		0.220	0.581	
Factor5	Coeff	0.253	-0.080	0.009/ 2.04**	-0.009	0.068	0.000/ 0.10**
	T value	1.325	1.427		0.117	0.309	

*Extraction by Un-weighted LS; Rotation by Promax with Kaiser Normalization. ** not Signific.

6.8 Ownership of Urban Dwelling and the Factors of QOL

We observe that ownership of urban dwelling is associated with higher standard of living (significant positive coefficient for Factor 1) and favourable consumption of public goods (significant negative coefficient for Factor 3). In case of other Factors, the coefficients are statistically insignificant. On the other hand, rural dwelling (residence in Sector 5) is

associated with lower standards of living (significant negative coefficients for Factors 1 and 2), but a favourable Factor 3 (possibly due to lesser extent of negative spillovers). These findings are quite in conformity with expectations and common experience.

6.9 **Factors of Quality of Life and the Nature of Employment**

Our sample households derive income from employment as well as property. Among those who derive income from employment, some are government employee, some others are employed in the private sector while yet others are self-employed. We have investigated the relationship of the factors of quality of life with the nature of employment of the respondent. We find that there is only a weak relationship between the first three factors (#1, #2 and #3) and the nature of employment (table 6.20). Factors #4 and #5 exhibit no dependence on nature of employment. The overall index of quality of life has some degree of dependence on the nature of employment, though not very strong.

Table 6.20: Regression Coefficients of Factor Scores on Nature of Employment

Regressor →	Stati-stic	Constant	Govt. Employment	Private Employment	Self Employment	R^2	F
Factor1	Coeff	-0.138	-0.109	**0.403***	0.132	0.052	4.158
	t value	0.752	0.513	1.929	0.508		
Factor2	Coeff	-0.145	0.025	0.165	**0.583****	0.031	2.447
	t value	0.791	0.117	0.784	2.222		
Factor3	Coeff	-0.006	0.009	-0.171	**0.589****	0.054	4.311
	t value	0.034	0.041	0.821	2.269		
Factor4	Coeff	-0.046	-0.116	0.194	0.079	0.019	1.428
	t value	0.248	0.537	0.916	0.297		
Factor5	Coeff	-0.075	-0.036	0.117	0.243	0.007	0.538
	t value	0.402	0.017	0.549	0.914		
Overall QOLI	Coeff	-3.619	-1.206	**7.517***	**8.688***	0.056	4.476
	t value	1.076	0.308	1.949	1.810		

Note: ** = significant at 5% and * = significant at 10% level of significance.

6.10 **Factors of QOL and the Ethnicity of Households**

An investigation of the association of the factors of QOL with ethnicity reveals that in case of Factor1 (Standard of living on account of high end consumption) the Semas are better off followed by the Angamis, the Lothas and the Aos, while at the other end the Kukis and the Zeliangs are in the unfavourable state (see table # 6.21). On account of Factor3 (Consumption of public goods and negative spillovers) the Zeliangs and the

Kukis, (followed by Other Nagas and the Semas) are better off while the Angamis and the Lothas at the other end are relatively worse off. This is so mostly due to the fact that a large majority of the Zeliangs and the Kukis (in the sample) are residing in the rural settlements (Sector 5) surrounding the township of Dimapur. We have already seen that rural residents have better score on Factor 3. The Semas, the Zeliangs and the Aos score favourably on Factor 5 (health conditions). In matters of Factor 4, the Lothas score favourably. In case of other coefficients one may reserve one's comments as these coefficients (different Factors and different tribes) are statistically infirm. The conclusions follow that the advance Nagas (The Semas, the Angamis, the Aos and the Lothas) score favourably on the Factors of QOL relating to the standard of living, but they also share the negative spillovers of urban living more in proportion. The Zeliangs and the Kukis score unfavourably on the standard of living but they share the urban externalities and negative spillover of urban living lesser in proportion. The constant terms in the regression equations relate to the non-Naga households. In case of factor 1 the non-Nagas are better than the Kukis and the Zeliang while in case of Factors 3 and 5 they score worst.

Table 6.21: Regression Coefficients of Factor Scores[$] on Naga Sub-ethnicity

F/E		CNST	Angm	Ao	Chak	Kuki	Lotha	O_Naga	Sema	Sngt	Zing	R^2	F
F1	C	-0.372	0.825	0.605	0.410	-0.755	0.646	0.267	1.243	0.723	-0.658	.241	7.79
	T	*2.953*	*2.812*	*3.273*	*1.178*	*2.573*	*3.642*	*0.877*	*4.862*	*1.684*	*2.319*		
F2	C	-0.082	0.454	0.257	-0.236	-0.184	0.192	-0.487	0.399	0.073	-0.498	.062	1.62**
	t	*0.580*	*1.385*	*1.243*	*0.608*	*0.562*	*0.968*	*1.428*	*1.396*	*0.152*	*1.572*		
F3	C	0.817	-0.496	-1.064	0.489	-1.765	-0.863	-1.580	-1.413	-1.093	-1.785	.350	13.20
	t	*6.875*	*1.791*	*6.100*	*1.490*	*6.379*	*5.154*	*5.510*	*5.859*	*2.700*	*6.664*		
F4	C	-0.200	0.483	0.279	-0.320	-0.387	0.494	-0.286	0.666	0.557	-0.223	.088	2.37*
	t	*1.382*	*1.436*	*1.315*	*0.801*	*1.152*	*2.428*	*0.820*	*2.270*	*1.132*	*0.684*		
F5	C	0.337	-0.552	-0.556	-0.461	-0.155	-0.090	-0.369	-1.235	0.425	-0.942	.127	3.56
	t	*2.381*	*1.677*	*2.680*	*1.180*	*0.470*	*0.454*	*1.081*	*4.304*	*0.883*	*2.956*		

$ Extraction: Un-weighted LS; Rotation: Promax/ Kaiser Normalization. * Signif at 5%; ** Not signif.

6.11 Relationship of Overall QOL Index with the Factors of QOL

Earlier we constructed an overall index of QOL by using the first principal component. Having carried out the Factor Analysis and identified the factors of QOL, it is natural to ask as to how these factors explain the overall index of QOL. In the case when these factors explain the overall QOL index well, we may conclude that it is a fair representative of these factors and does indeed measure the quality of life in the study area. With

this objective in mind, we have regressed the Overall QOL index on the (five) factors of QOL. The tables 43 through 46 contain the results. We have used different methods of extraction of factors (as well as rotation). However, in our choice of the method of rotation as well as the method of constructing the indices of factor scores, we are guided by an important requirement of regression analysis. It is that the explanatory variables may as far as possible be uncorrelated across themselves (lest the problem of co-linearity induce independent variables to share and blur the coefficients obtained by regression analysis). In doing so, first, we have avoided oblique rotation (except in one case, only to see if oblique rotation really alter the findings) and secondly, we have constructed indices of factor scores by Anderson-Rubin method (which ensures orthogonality among the indices of factor scores).

Our findings are extremely encouraging. The overall QOL index is explained by the factors of QOL with the coefficient of determination (R^2) at least as large as 0.991. The different methods of extraction do not affect the coefficient of determination in any significant sense. Further, except for factor #5 (Health conditions), the coefficients associated with other factors are stable in the magnitude, sign as well as statistical significance (the case

of Alpha factoring with Promax rotation is rather different). The logic of alpha factoring is very different from other methods of factoring. In alpha factoring we consider the variables included in the analysis as a sample over the universe of variables. At that, the Promax rotation assumes non-orthogonality among the factors. These properties of alpha factoring with promax rotation may have drastic effects on the behaviour of factor score indices in explaining the overall QOL index. Yet, the first three factors remain stable in relation to the overall QOL index.

Table 6.22: Regression Coefficients of Overall QOL Index on Factors of QOL
(Unweighted Least Squares, Varimax rotation; Anderson Rubin Score)

Dependent Variable	Statistic	Consatnt	Factor1	Factor2	Factor3	Factor4	Factor5	R^2	F
Overall	Coefficient	**0.000087**	**13.074**	**11.488**	**1.877**	**5.801**	**-0.053**	**.992**	**5255**
QOL Index	T value	**0.001**	**114.923**	**100.982**	**16.502**	**50.987**	**0.469**		

Table 6.23: Regression Coefficients of Overall QOL Index on Factors of QOL
(Image Factoring, Varimax rotation; Anderson Rubin Score)

Dependent Variable	Statistic	Consatnt	Factor1	Factor2	Factor3	Factor4	Factor5	R^2	F
Overall	Coefficient	***0.000087***	***15.403***	***9.592***	***1.832***	***2.711***	***-0.125***	***.991***	***5042***
QOL Index	T value	**0.001**	**132.646**	**82.601**	**15.776**	**23.434**	**1.080**		

Table 6.24: Regression Coefficients of Overall QOL Index on Factors of QOL

(Principal Components Factoring, Varimax rotation; Anderson Rubin Score)

Dependent Variable	Statistic	Consatnt	Factor1	Factor2	Factor3	Factor4	Factor5	R^2	F
Overall	Coefficient	**0.000087**	**13.455**	**11.771**	**1.737**	**4.241**	**0.404**	**.994**	**7373**
QOL Index	t value	**0.001**	**139.911**	**122.408**	**18.580**	**44.103**	**4.205**		

Table 6.25: Regression Coefficients of Overall QOL Index on Factors of QOL

(Alpha Factoring, Promax rotation; Anderson Rubin Score)

Dependent Variable	Statistic	Consatnt	Factor1	Factor3	Factor2	Factor4*	Factor5*	R^2	F
Overall	Coeff	**0.000087**	**17.934**	**3.253**	**0.768**	**2.660**	**0.622**	**.992**	**5547**
QOL Index	t value	**0.001**	**161.924**	**29.376**	**6.937**	**24.015**	**5.620**		

* Note: Factors # 4 and # 5 obtained by Alpha Factoring are not comparable with those obtained by other methods of Factoring. Further, Alpha Factoring (with Promax Rotation) reorders the Factors obtained by other methods reported in tables above.

Table 6.26 : Inter-Correlation Matrix of Factors of QOL with Facet and Overall Indices of QOL

	F1	F2	F3	F4	F5	Acc	Econ	Hicon	Hous	QOLI
F1	1.000									
F2	.469	1.000								
F3	.034	.062	1.000							
F4	.283	.226	.096	1.000						
F5	.045	-.009	.084	.041	1.000					
	.569	**.250**	**-.153***	**.479**	-.080**	1.000				
Econ	**.758**	**.811**	.033**	**.421**	-.002**	.454	1.000			
Hicon	**.767**	**.617**	**.168***	**.625**	.105**	.496	.713	1.000		
Hous	**.857**	**.752**	**.177**	**.193**	.031**	.409	.786	.720	1.000	
QOLI	**.883**	**.800**	.125**	**.427**	.036**	.528	.920	.864	.936	1.000

Factor Extraction - Principal Components; Rotation - Promax; Score – Bartlett. * sig at 5%; ** Not Signif.

Let us look at the problem a little differently, neither from the viewpoint of consistency of the factors that we identify, nor from the viewpoint of the order in which they emerge. Alpha factoring with Promax

rotation has extracted the fourth and the fifth factors that are different from those extracted by other methods of factoring and also changed the order in which the factors emerge. However, their relationship with the Overall QOL index is very satisfactory ($R^2 = 0.992$). It suggests that even though there might be some other factors responsible for determining the QOL, our overall QOL index represents them well. If the variables included in the analysis are a sample over the variables that indicate to QOL, our overall QOL index adequately represents them. This is a very interesting and significant finding. It has a great confirmatory power to justify our Overall QOL Index. We recall that in constructing an index of overall quality of life, our purpose has been to obtain an index that measures quality of life fairly well and reliably too. No one can deny that we have included in our analysis only a subset of variables from the set of innumerably many variables that indicate to the quality of life in the study area. Any study can do no better than to use a subset of variables, larger or smaller simply because it is not possible to include all variables that relate to quality of life. From this point of view, assuming (as most of the methods of extracting factors do) that the variables included in an empirical study constitute the universe is overenthusiastic. Therefore, Alpha factoring might be a more appropriate method of factor extraction. We conclude therefore that our overall Index of Quality of life is a reliable measure of the quality of life in

the study area. Irrespective of the method of extraction and rotation (as well as the primacy of factors emerging from these methods), it is a stable and representative index. The coefficients of correlation (Table 6.26) across the factors of QOL and indices of QOL indicate that factor #5 does not have significant correlation with any index. Factor # 3 has no significant correlation with economic facet index as well as overall QOLI. Except those mentioned above, all other coefficients of correlation are statistically significant, most at 1 percent level. Keeping in mind the limitations of bi-variate coefficient of correlation in indicating the strength of relationship between two variables in a multivariate milieu, the table #6.26 suggests that our facet indices also are good measures of the concerned aspects of the quality of life in the study area.

6.12 **Clustering and Group formation by the Indictors of Quality of Life**

It would be interesting to investigate how the indicators of quality of life cluster and make groups among themselves. The identification of these groups is based on the inter-correlation matrix of the set of 135 indicators of QOL.

i. Major (Core) Group

The following variables (indicators) form the major group. One may depend on these indicators (and drop other indicators without much loss) since the indicators forming this group make the most cohesive or the core cluster.

[WTDSPMTH — TVTYPE — BNKSACC — EDMOTHER — MODEWRK — FURNITUR — RADIO — PRKNGSPC - CLOTHEXP — VENTILAT — ENTRTNEX — TYPNEWSP — TOILETEX —WSUPMETH — DRAMA — HOBYHIND — SMOKDUST — TVWATCH — NVEGFRQ —MNRDREP — TELEPHON — STOROOM — EDFATHER — STDEDINS — DWRKPLC — D_HIWAY — FURNSPEC — BEDROOM — MODEMRKT — ED_GPA — CMPNDRAT — TOTALEXP — EDUCEXP — KITCHEN — DRMAFAC — OWNER — INCOME — BLDSTRUC — NEWSPEX — NWSCOL — TOTROOM — HOBBYTYP — USEFAN — CHLDSTDY — DMARKET — NOISE — NUMBFAN — LIVROOM — HOBBY — DCOLLEGE — XRAYFRQ — HHMEMB — RDMAKER — TVHOUR — CHLDCOLG — PARKDIST — TV — PICNIC — FRESHMLK — HOUSRENT — FRIDGE — DONATEX — ELECTRIC — TRVLCOST]. **Order#4**

ii. Small Groups

There are two small groups formed by the following indicators. Inclusion of these variables may be useful to further analysis.

[SATSANIT — DPDSINK — LIBADQT — D_LBRARY — HBHINDTY — D_MNROAD — EDRESPON — O_ROOM — STDYROOM — HOBBYFAC — MRKTFRQ — FOODEXP —RUNWAT —EGGS — PLOTSIZE] **Order#2**

[FALLOWLN — WATPOLN — VEGETARN — WATSUPS — SATROADC — CHLDSCHL —PUBDRAIN — FOULSMEL — EYEGLASS — SIDDRAIN — LPG — FRUITS — MEALOUT —INSURANC — FAMDOCTO]. **Order#3.**

iii. Isolated Packets

There are two isolated packets formed by the following indicators. Inclusion of these indictors may add some new factors to the analysis.

[IBDIST – NEWSREGL – FLOORARE – VEGEXPND -- MEATFISH – CHLDPSCL – XRAY] **# 5**

[VEHCLACC – IDMEMBER – DISEASE – FMSICK – DISABILI – EYESIGHT] **#17**

iv. Isolated Triads

Three isolated triads are identified dropped out of further analysis.. These indicators may safely be

[MOVIEFRQ – NATNEMPL – MOVIE] **#7,** [MODEQLTY – ROADTYPE – TIMEWRK] **#8,**

[PRKSPSIZ – SMOKCHEW – PWDRMLK] **#11.**

v. Isolated Couplets

There are five isolated couplets. They may be dropped from further analysis.

[PARK – WATERLOG] **#1,** [LIBRARY – DPSCHOOL] **#14,** [SDRAINWR – NOLIBWHY] **#18,**
[WLOGSPAN – DSCHOOL] **#19,** [NWATPOLN – ADDICTEX] **#9.**

vi. Isolated Points

Finally, there are nine isolated points: They may be dropped from further analysis.

[PWRFAIL], [SUNSHINE], [XCRETDSP], [POTHOLES], [EMPLOYD], [TEASNACK], [DURSICK], [EXERCISE], [NOEXRWHY]. Of the rest orders.

6.13 Algorithm for identification of Groups of Variables

1. Let there be m number of variables each in n observations, denoted by X(n,m). From these variables construct a correlation matrix R(m,m).

2. Choose a variable (say #k from among X to begin the iteration. Find variable #j that has the largest (in magnitude) correlation with variable #k, that is, abs(r(k, j)) = maximum. Then the couplet of variables (k, j) make the starting core. Construct the vector v_i = {abs(r(k,i)) + abs(r(j,i))}/2 for i =1,m, but i not equal to k and j. Find max(v_i) and the variable, say, q,

that is associated with max(v_i). This variable, q, is added to the set (k,j) to make (k,j,q).

3. Find the vector v_i = {abs(r(k,i)) + abs(r(j,i)) + abs(r(q,i))}/3 for i =1,m, but i not equal to k, j and q. Find max(v_i) and the variable, say, p, that is associated with max(v_i). This variable, p, is added to the set (k,j,q) to make (k,j,q,p).

4. Find the vector v_i = {abs(r(k,i)) + abs(r(j,i)) + abs(r(q,i)) + abs(r(p,i))}/4 for i =1,m, but i not equal to k, j, q and p. Find max(v_i) and the variable, say, s, that is associated with max(v_i). This variable, s, is added to the set (k,j,q,p) to make (k,j,q,p,s).

5 And so on until all variables are exhausted. Now, the last variable added to the set be, say, #g.

6. Taking #g as the starting variable as in step 1 repeat the process outlined in steps 1 through 5 above. At the end, suppose the last variable to join is #h. With #h as a starting variable, repeat the steps 1 through 6.

7. After three or four iterations the results will stabilize and afterwards the results repeat themselves in the couplets of identical vectors.

8. Terminate further iterations. The last two vectors are to be used for further steps in 9.

9. Suppose that the last vector obtained is denoted by L_2. Then L_1 is the vector just preceding L_2. Choose the first element of L_1, that is $L_1(1)$ and watch at the corresponding element of L_2, that is $L_2(1)$. If $L_1(1) = L_2(1)$, then the variable is an isolated point. It will not have any link with other variables in the set. However, usually this is not the case. $L_1(1)$ would be different from $L_2(1)$. In this case, search L_1(all values) for occurrence of $L_2(1)$ in it. Suppose that is found at location t in L_1 that is, $L_1(t) = L_2(1)$. Then watch at $L_2(t)$. If $L_1(1) = L_2(t)$, the group of $L_1(1)$ and $L_1(t)$ make a couplet. However, if $L_1(1)$ is not equal to $L_2(t)$, find the occurrence of $L_2(t)$ in L_1. Proceed in this seesaw scheme. Lastly, $L_2(t)$ will be identical to $L_1(1)$. This occurrence terminates the process.

10. Choose the next virgin (not yet touched) element in L_1 and proceed as in 9. This will give the second group and so on, until no virgin element is left in L_1.

11. The group identification is over. Stop. End.

CHAPTER-VII

OBSERVATIONS AND PRESCRIPTIONS

7.1 An Overview of the study of QOL in Dimapur

The study of QOL in Dimapur indicates that Income is a strong determinant of QOL and that there is a direct relationship between income and QOL. Thus, keeping other factors constant, higher the income, higher shall be the mean level of QOL and *vice versa.* And if so, in order to raise QOL, people's income must be raised. The onus of this attempt lies with both the individuals concerned and the government. On the one hand, the individual must be sincere and hard working to earn more, on the other, the government as well as the private employers must create more employment opportunities so as to boost the income of the people in general. This will directly or indirectly augment their income and that in turn, will improve the quality of their living.

Housing is another strong determinant of QOL. It includes factors like Sunshine, clean air, enough open space, hygienic drinking water, hygienic toilet and good surrounding, etc., which help increase QOL and the lack of these lead to deterioration of the same. The residents can have

them only if they can afford them or the Authority must provide them. This calls for increase in the income of the people on the one hand, and proper planning and implementation as well as maintenance of public utilities like Road and communications system, water supply, electricity supply, drainage and sewerage systems, waste disposals, etc. on the part of the Authority.

It is found that QOL is relatively low in the CBD which includes Nyamo Lotha Road, G.S Road, Old Market, New Market, etc. These areas are generally crowded so that both human and vehicular congestion is inevitable. Secondly, CBD is mostly inhabited by floating population like travelers, office goers, businessmen, school children, etc., who come to the CBD from the peripheries to work during the day and retreat at the end of the day. Since it is heavily populated, especially during the day, the public goods tend to be overused; at the same time, more pollutants are emitted thereby contaminating the environment of the area. Hence, pollution is more in these areas. Moreover, majority of the CBD inhabitants are poor, e.g. pavement dwellers, Railway platform dwellers, slum dwellers, street corner and shop dwellers and beggars, etc. Therefore, QOL in these areas is bound to be lower. As the lowly people cannot afford good amenities, the

Authority must provide them. Accordingly, the roads must be widened, toilet facilities, water supply, electricity provision must be ensured. Building regulations must be implemented strictly, and waste disposal must be done timely. In short, the Authority must ensure clean environment to improve QOL in the CBD of the town. This can be done through proper planning and implementation as wee as proper maintenance of the available facilities.

The QOL in the peripheral areas is very low. The reason is that the facilities that are available in the urban areas are not available in the rural periphery. Accordingly, facilities like Roads, Transport, Electricity, Water supply, drainage and sewerage systems, Library facilities, etc. must be extended to these villages also so that QOL in these areas may also be improved.

7.2 **Prescriptive Remarks**

After having empirically substantiated his impressions and observations on the area under study that he has had over a few years' period, the researcher has identified certain problems prevailing in the region the solution of which lies both with the Authority as well as the

residents. Hence, basing on these findings, the following recommendations are being forwarded with a view to alleviate the problems faced by the residents in their day-to-day life.

1. At least two new bridges over river Dhansiri at certain locations like from Ward No.3 connecting Darogajan and Kushiabil villages and another at Rangapahar Railway crossing connecting Murise and Tssithrongse villages must be built. This would ease the transport bottleneck in the peripheries whose residents, presently travel even upto 20 kilometers to reach Dimapur. A small bridge would bring them nearer by 10-15 kms.

2. At least two new Flyovers across the Railway track, one at New Field Check Gate, and another at the Indian Oil Depot (on the Halflong road), connecting Nagarjan village, are urgently required to ease the traffic congestions in the town.

3. Attempts may be made to divert the vehicular movements along Highway No.36 which goes through the middle of the town, thereby

creating undesirable traffic jams, should be diverted. For this, it is suggested that the road from Sub-jail, near Rangapahar Army Cantonment that connects with Kohima road at 3rd Mile Dimapur (via Signal basti and Nagarjan village) must be upgraded, and all Kohima bound commercial vehicles that come from Diphu side, may be diverted to this route.

4. Attempts also must be made to divert traffic in Highway No. 39, especially the vehicles that are not bound for Dimapur. This will be possible when the proposed second Flyover at the New Field Check Gate is completed.

5. There are a few schools in the middle of the town, which is disrupting traffic. Hence, effort must be made to shift those institutions to the periphery. In this connection, the government must make certain allowances to encourage them to take the step. However, if this is not feasible, the School Authorities must be made to open multiple gates from all directions, from where the students

and parents can access the schools. This would ease the traffic congestions at the main entrance of the schools during school hours.

6. Dimapur receives water supply with a capacity of 15 million liters per day (MLD) but due to lack of proper infra-structure, the department of Public Health Engineering (PHED) is able to supply only 7.5 MLD. Hence, the department must make efforts to repair or replace the old pipelines as well lay new ones to ensure clean and adequate water supply to all areas of the town. It is reported that very few Dimapurians depend on government water supply. They solely depend on ground water from the ring wells dug by themselves. However, such qualities of water pause health risk as it contain a very high percentage of iron. Therefore, the Authority must arrange ways and means for treatment of such waters before the residents are allowed to use them.

7. Health care is another area where the Authority must direct its attention urgently. The government, many years ago, sanctioned several crores of rupees for a Referral Hospital at Dimapur. This

must be completed and dedicated to the people as soon as possible. This is expected to lessen the number of patients going out of the town for treatment of various diseases. The area being under Malaria Zone, programs for eradication of malaria must be undertaken frequently. This must include both educating the people on prevention and treatment of malaria as well as provision of medicines and implements for the same. Since Malaria is indicative of the presence of water logging, the Authority must make effort to reduce the incidence of these problem.

8. Tuberculosis is another killer disease prevailing in the area. Since its treatment is quite expensive the poor can hardly afford. Hence, the government must make arrangements for opening a center for diagnosis and treatment of T.B in Dimapur area. And till this is implemented, the poor patients must be provided with free medicines and other material help.

9. Drainage system of the town being so inadequate, a few hours of rain is enough to submerge all low lying areas of the town. More over,

many areas, which were not flooded earlier, are being flooded lately. This indicates that the drainage condition of the town is worsening day-by-day. It is therefore, recommended that the drainage system be completely overhauled and repaired, so also, fresh works be carried out on a war footing.

10. Waste disposal system is another area that requires urgent attention of the Authority. Recently, a few mobile waste containers have been installed in certain locations of the town area. However, collections of refuse is not done regularly in many locations, at the same time, the residents still throw waste materials hither and thither in the town. There is no such facilities provided in the periphery of the town. The Authority must ensure regular and timely pick up of the refuse and also educate the residents of the proper use of those public disposals.

11. Fresh locations of educational institutions in the middle of the town must be discouraged henceforth. This would go a long way to ease traffic as well as human congestions in the town

12. Commercialization of the Residential areas must be prevented to the extent possible. Buildings of unauthorized structures must be regulated and the offenders punished accordingly.

13. Those factories and automobile garages that give out waste products thereby affecting the environment of the town must be shifted towards the outskirts of the town.

14. There is a Master Plan for Dimapur dating back to 1975 that was prepared with a recommendation to implement it with effect from 1991. However, this was not implemented due to some reason. The Authority must examine this Master Plan and try to comply with at least some provisions of it that may be reasonable and profitable in the long run.

15. The incidence of electricity failure is quite high in Dimapur. It is customary that Dimapurians experience at least 3 hours of electricity failure everyday. As a result, of the 231 households interviewed, 100% of them complained about this problem. Most of such

electricity cuts happens unannounced, which infuriates the residents. The concerned Authority needs a genuine introspection to improve their service, if not, the government must take steps to privatize the distribution of electricity in the town in particular and the state in general.

16. The road condition in Dimapur is just horrible. The roads, whatever grade they are constructed, are generally seasonal in nature for they hardly last for 5 months i.e. during the dry seasons. There is no such road as an "all weather road" in Nagaland. This problem must be looked into urgently, and if possible, the government must enlist the help of the Non-government organizations to solve this problem.

17. The present town could not implement the Master Plan for its development for which the residents are paying dearly. This mistake must not be repeated in the future. To avoid this problem, the planners of the proposed city must plan thoroughly and far in advance. The concerned inhabitants must also be consulted and they be made to participate in the process of planning as well as

implementation of the plan. The Master Plan must be prepared elaborately and implemented in letter and spirit. This will automatically solve most of the problems that are being faced by the present town of Dimapur.

18. Sewerage system is non-existent in Dimapur in spite of the fact that it is an ancient town. This renders the town most polluted especially in the areas where there is no river in the vicinity. The Authority must plan for a separate arrangement for sewerage system that is completely different from the drainage system.

19. Public places like Gardens, Green spaces are very rare in Dimapur. Even those few are not maintained properly. In the proposed city, the planners must include such facilities also.

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