Chapter 4

Materials And Methods
Materials and Methods

This chapter deals with the methods and procedures used in connection with the study conducted and consists of four main points.

A. Sampling techniques.
B. Variables and their empirical measurements.
C. Techniques of field data collection, and
D. Statistical methods used.

A. SAMPLING TECHNIQUES

Considering the need for availability of data and usual limitation of a student research project, Jalpaiguri district and the Purulia district of West-Bengal were purposively selected for the present study. The observations will be limited to the purposively identified selected tribal communities in two different districts. Toto tribe from Jalpaiguri and Santal, Sabar, Lodha from Purulia district were considered for the preparation of sample population.

The area has been selected purposively for this study because:

1. Toto, is a diminished tribe who were concentrated in very few number in the Totopara of the Jalpaiguri district.

2. Santal, Sabar and Lodha all these three tribes were available in large number in the Purulia district.

3. The tribals of these regions were in below nutritional stage due to lack of knowledge, awareness and the poor socio-economic condition.

4. It had good transportation facilities, which helped to make the data collection easier.

Selection of sites:

There were 13 blocks in Jalpaiguri district and 20 blocks in Purulia district, in which the Totopara of the Madarihat block of Jalpaigui district and
Bandawan, Purulia-I, Baghmundi, Kashipur, Neturia, Para, Barabazar and Manbazar-II blocks of Purulia district were selected purposively according to the density of the schedule tribe population. These two districts were totally different in geographical and atmospheric nature. Jalpaiguri district was in Terai Belt and Purulia district was in Red Laterite zone.

Selection of respondents:

In Jalpaiguri, Toto and in Purulia Santal, Lodha and Sabar were considered for sample population. Total numbers of selected tribal communities were four under study. Each community was classified into two age groups and 40 samples were randomly selected from each age group of each community. In this way, total numbers of 320 (N=320) samples were considered to form the sample population under study. The total samples (N=320) were divided into two categories depending on age group as follows:

1) 20Years to 40 Years.

2) 40Years+ to 60Years.

The districts, agro-climate, tribal community and age group wise distribution of the respondents is given in the following table.

**TABLE: 5 POPULATION UNDER PROPOSED STUDY**

<table>
<thead>
<tr>
<th>Agro climate</th>
<th>District</th>
<th>Terai</th>
<th>Red laterite</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Toto</td>
<td>Santal</td>
<td>Sabar</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>Jalpaiguri</td>
<td>Purulia</td>
<td></td>
</tr>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20years to 40 years</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>40+years to 60 years</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td><strong>n</strong></td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>320</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
B. VARIABLES AND THEIR EMPIRICAL MEASUREMENTS

In the present study the “Health Status” was the dependent variable. The selected independent variables were 12 socio-economic, 3 socio-psychological, and 3 communication variables. The study was also conducted on clinical and anthropometrics examination along with diet survey.

TABLE: 6 SELECTION OF VARIABLES USED IN THE PRESENT STUDY

<table>
<thead>
<tr>
<th>DEPENDENT VARIABLE</th>
<th>MEASUREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>((Y_1)) Health Status</td>
<td>'Health Status Index' developed.</td>
</tr>
</tbody>
</table>
| \((Y_2)\) Anthropometrics Score | (i) BMI. (Body Mass Index)  
| | (ii) Waist hip ratio  
| | (i) Measuring Blood Pressure (Systolic & Diastolic)  
| | (ii) Measuring Pulse Rate |

**INDEPENDENT VARIABLES**

**SOCIO-ECONOMIC**

- \(X_1\) → Age  
  Schedule developed
- \(X_2\) → Sex  
  —do—
- \(X_3\) → Education  
  Socio- Economic Status Scale- Rural, Pareek & Trivedi, (1964)
- \(X_4\) → Family educational status  
  Index of Family Education Status, Roy, (1967)
- \(X_5\) → Occupation  
  Schedule developed.
- \(X_6\) → Land holding  
  Socio- Economic Status Scale- Rural, Pareek & Trivedi, (1964)
- \(X_7\) → Income  
  Schedule developed
- \(X_8\) → House type  
  Socio- Economic Status Scale- Rural, Pareek & Trivedi, (1964)
- \(X_9\) → Family size  
  —do—
- \(X_{10}\) → Family type  
  —do—
- \(X_{11}\) → Marital Status  
  Schedule developed

**SOCIO-PSYCHOLOGICAL**

- \(X_{12}\) → Attitude towards health status  
  Scale developed
INDEPENDENT VARIABLE | MEASUREMENTS
--- | ---
$X_{13}$ $\rightarrow$ Knowledge about health status | Scale developed
$X_{14}$ $\rightarrow$ Awareness of health hygiene | Schedule developed
$X_{15}$ $\rightarrow$ Innovation Proneness | Innovation Proneness Scale Moulik (1965)

COMMUNICATION
$X_{16}$ $\rightarrow$ Mass media communication | Bandhopadhay,(1986)
$X_{17}$ $\rightarrow$ Cosmopilite sources of information | -do-
$X_{18}$ $\rightarrow$ Personal localite sources of information | -do-

CLINICAL EXAMINATION
1. General appearance | Schedule developed from different literature
2. Hair | -do-
3. Face | -do-
4. Eyes | -do-
5. Lip | -do-
6. Tongue | -do-
7. Teeth | -do-
8. Gums | -do-
9. Glands | -do-
10. Skin | -do-
11. Nails | -do-
12. Odema | -do-
13. Pallor | -do-

DIET SURVEY | Modified schedule of the NIN schedule (1994), Hyderabad: 57.

DEPENDENT VARIABLES

Health status ($Y_2$):

What makes thinking about health equity difficult from the outset is that the concept of health itself is not easy to grasp. It should be noted that although general observations can be made with respect to the meaningfulness of different definitions of health, it is likely that the adequacy of concepts of health varies with the context in which we refer to it. This is a pragmatic argument in that it is based on the view that the adequate concepts of health
will emerge through solving actual problems. There are many indicators used refer to two dominant notions of health. They are, on the one hand, varieties of biomedical model, and on the other, the (WHO, 1976) of health quality of life approaches. According to the WHO definition, "health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". The notion of health, as well as the quality of life approaches are example of a positive definition of health – positive because health is described directly and not as the absence of disease. The biomedical model, according to which health pertains in the absence of disease, uses a negative definition. Boorse (1977) has spelled out the philosophical content of the biomedical model as follows, "Health as freedom from disease is ... statistical normality of function, i.e. the ability to perform all typical psychological functions with at least typical efficiency level." Broose claims that his bio-statistical model is value-free and is able to define health only with respect to empirical knowledge of the operation of the organism. Now that social epidemiologists Young et al. (2005) have established a broad range of correlations between measures of health and social variables, the question of how such factors affect the human body has become more pressing than ever. Strengthened host resistance and health practices are the two most plausible intervening processes for explaining the "sociobiological transition". A range of social determinants link to both of these to predict health.

A relatively new approach to measure 'health status index' was constructed by the researcher. This index is based on a radial and non-radial efficiency measure obtained from a parametric and non-parametric health characteristics frontier model. Creating scales, indexes, or any measurement/assessment instrument that might be called a test is part of the research process that is concerned with calibration. In many ways, calibration is a quick and easy way to achieve precision and accuracy, which are, of course, important goals of measurement. One can just as easily get by without creating a scale or index, but at some point, at least in estimating the reliability
and validity of the study, which is going to have to look at item and response patterns. There's a big difference between scaling and scoring a test, and since most readers are familiar with the typical multiple-choice tests found in education, that's where we'll start. It's not uncommon for social sciences to draw upon the field of Education Statistics.

In this research work 'health status index' was a dependent variable, which was developed by the researcher with the help and the guidance of the method of 'Equal-Appearing intervals' invented by 'Thurstone', who was one of the first and most productive scaling theorist.

Thurstone (faculty.ncwc.edu/toconnor/308/308lect05.htm), Lee, J. et.al. (1955), Young, (2005), (www.socialresearchmethods.net/kb/scalthur.htm),(www.rasch.org/rmt/rmt21a.htm) scales were developed in 1929 for measuring a core attitude when there was multiple dimensions or concerns around that attitude. A person might have one part of their attitude relating to self-defense; another part of their attitude relating to constitutional rights; and still another part of their attitude relating to child safety. How do we determine which part of the attitude goes to the core of the matter? In Thurstone scaling, the researcher would obtain a panel of judges (say 100 of them) and then dream up every conceivable question to ask about gun control (say 100 questions). By administering that questionnaire to the panel, the researcher can analyze inter-item agreement among the judges, and then even use the discrimination index to weed out what are called the non-homogenous items. Scaling is all about homogeneity, a term sometimes used as synonymous with being unidimensional.

Characteristics of this scale:

1. This is unidimensional-scaling method.

2. We assume that the concept we are trying to scale is reasonably thought of as one-dimensional.
3. The description of this concept should be as clear as possible so that the person(s) who are going to create the statements have a clear idea of what are trying to measure.

4. Everyone who is generating statements has some idea of what are after in this focus command.

The researcher specially wants to be sure that technical language; acronyms are spelled out and understood.

Collection of statements:

As the first step, the items were collected on the basis of relevant literature, field extension personnel, subject specialists in the Extension Education, Home-Science and Food And Nutrition and researcher’s own experience. A total of 190 statements were constructed considering about the health habits, physical health, mental health, child-care, pregnancy management, family planning, immunization care, nutritional requirement, general treatment of diseases and health education.

Judges’ rating of statements:

All the 190 statements of health status index were mailed to 110 judges in all over India. The judges selected, to rate the items, were subject matter specialists, extension specialists from Agricultural Universities, nutritionist, dietitian, doctors, sociologists, psychologists, and public health specialists. The judges were requested to group into 11 groups on the basis of the degree of favourableness where group 1 stands for Least Favourable to the concept and accordingly group 11 stands for most favourable to the concept. It may be noted that each group may not be having same number of statements. Out of 110 judges, 40 judges returned the statements after duly recording their judgments.
Computing scale score values for each item:

The next step is to analyze the rating data. For each statement, the median and interquartile range was computed. The median is the value above and below which 50% of the rating fall. The first quartile (Q1) is the value below which 25% of the cases and above which 75% of the cases fall—in other words, the 25th percentile. The median is the 50th percentile. The third quartile, (Q3) is the 75th percentile. The interquartile range (Q) is the difference between third and first quartile or Q3-Q1. To facilitate the final selection of items the median and interquartile range were arranged according to the ascending order by mean and, within that, in descending order by interquartile range. The median or scale value and interquartile range of the statements were calculated according to the above-mentioned procedure with the help of Microsoft Excel 2000 and have been shown in (Annexure No. VI).

Selecting the final scale item:

This is the step for selecting the final items, which are at equal intervals across the range of medians. One statement for each of the eleven median values was selected. Within each value, the statements were selected that had the smallest interquartile range. This was the statement with the least amount of validity across judges. The candidate’s (judge’s) statements were looked over at each level and selected the statement that made the most sense. If it has been noticed that best statistical choice is a confusing statement, then next best choice has selected. 22 items were finally selected within 190 items marked as (*) in (Annexure No. VII).

Administering the scale:

Now the selected 22 items (Table: 7) were given to 30 participants and were asked to agree cr disagree with each statement. To get the person’s total score, the average value of the scale scores of all items that person’s agreed with, had been calculated. For instance, let’s see a respondent completed the scale as follows:
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>STATEMENTS</th>
<th>Agree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regular intake of balanced diet is necessary for maintaining health status.</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The habits of tobacco chewing is highly associated with detoration in health status.</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Use of tobacco is a cause of many severe diseases, and is the pre-requisite of bad health status.</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Use of tobacco affects the health status of a pregnant woman and foetus.</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>To maintain the good health drinking water should be clean, pure, and disinfected</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Chalky white or brownish teeth are symptom of malnutrition, which affects the health status.</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Muscular dystrophy is a malnutritious symptom, which affect the health status.</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Less sleeping habit is predisposed the immune system of the body.</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Colostrum is the first immunization for the baby for maintaining the good health</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Exclusive breast-feeding up to 6 months helps to keep a baby healthy.</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Mixed food items enhanced the health status.</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Too early (teenager) pregnancy affects the health status of the woman.</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Too close pregnancies affect the health status of the children.</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Self-controlled process is more hygienic than using pills or other medical measures to keep the health fit.</td>
<td>•</td>
<td></td>
</tr>
</tbody>
</table>
Repeated abortion due to son preference affect the health status of the female.  

Polio vaccination in schedule time (birth to 5 years) is good for maintaining health status.

Breast milk fulfils the nutritional requirement of the baby up to 6 month to keep the good health status.

After 1 year normal balanced diet is the sufficient for maintaining the health status.

Anemia is not good for health during pregnancy.

Administration of iron, folic acid is important during pregnancy for better health status.

Prophylactic measures like vaccination, deworming, etc may improve health status.

Safe food, clean drinking water and hygienic environment may result good health status.

In this example the respondent checked nineteen items as Agree. The average scale value of the nineteen items were taken, and the final value for the respondent had obtained.

**Reliability and validity test:**

The reliability of the health status index constructed for the present study was tested by split half method and test-retest method.

**Split-half method** – The reliability of the index was tested by split-half method. The selected statements of the index were arranged randomly and were then divided into equal halves, with all even number statements in one half and odd number statements in the other half. These two forms of statements were administered to 30 respondents separately. The coefficient of correlation between two sets of scores were computed and found to be .93, which was significant 1 percent level of significance. The reliability coefficient thus
obtained indicated that the internal consistency of the health status index constructed for the study was quite high.

**Test-retest method** – The same selected statements were administered to the same 30 respondents twice at an interval of 15 days. Thus, two sets of scores were obtained for each of the 30 respondents. The coefficient of correlation between two sets of scores was obtained. The coefficient of correlation calculated for the index developed was found to be .93, which was significant at 1 percent level of significance. Hence, this was highly stable and dependable for measurement of health status.

In the present study, the validity of the test was tested as follows:

**Content validity (Lee et al. 1955)** - This was established by showing that the test items were a sample of a universe in which the investigator was interested. Content validity was ordinarily to be established deductively, by defining a universe of items and sampling systematically within this universe to establish the test. In content validation, acceptance of the universe of content as defining the variable to be measured is essential.

The contents of the index of the present study derived from relevant literature, expert’s opinions and feelings as a measure of checks. This is ensured in the collection and selection of statements for this index. Care was taken to include all the statements, which represent the universe of content of health status index, were being developed.

**Anthropometrics Score ($X_2$):**

Medical or non-medical personnel can collect Anthropometrics data. In the former case, they can be included as part of the clinical nutritional examination. However, it is often simpler and faster if a reliable person other than the medical examiner records the height and weight during a survey.

**Weight**—The weight of a person is the most important single anthropometrics measurement that can be taken. Weight should be measured with the subject
nude or wearing the minimum of clothing (shorts only for males, light dress for females). Footwear should be removed. In this survey UNICEF SECA electronic scale has been used for taking the weight. The accuracy of the scale is 100gm. The weighing scale looks like a common bathroom scale. The scale has put on the level ground. It has a switch window just beside display window. When the switch window is covered up for a short time the scale is switched on. Initially when it is switched on the display has a “Baby in arm’s symbol and 188.8”. In about 5 seconds, the scale will adjust itself to zero (0.0). The scale is now ready to weigh the subject. The subject is now asked to stand on the platform. The weight of the subject displays in the display window. It has been noted that if the scale continues to show 1-1, it means the subject is moving around so much that the scale cannot decide on a weight. Stand still for a few moments, and the subject's weight will show in the display window.

**Height**- Height is also a very important measurement in the assessment of nutritional status. Height should be measured with the subject barefoot. Though many different types of equipment are available, height can be fairly accurately measured with a tape measure or a ruler. The tape is used in the present survey. A vertical wall rising from a truly horizontal floor is located. Then, using sticking plaster, sticky tape or a drawing-pin, secure the bottom of a 1-m length of tape-measure to correspond with the line. Similarly fasten the top, which will now be 2 m from the floor. The person being measured stands against the wall facing outward. The standard heights and weight chart are given in *(Annexure XVI)*.

**Waist circumference**- It is the most practical tool a researcher can use to evaluate a subject’s abdominal fat before and during weight loss treatment. In the present study the measuring tape has been used. High risk waist circumference: Men: >40inches (>102cm) Women: >35inches (>88cm).

**Waist-Hip ratio**- The predominant of fat in an obese person, whether in the upper part or the lower part of the body, may determine the disease pattern.
The normal ratio = Waist / Hip = 0.7

But with upper body obesity the ratio is 0.85 in women and greater than 1.0 in males. Abdominal obesity does not always go hand in hand with overweight and obesity.

**Blood Pressure** - It is the pressure exerted by the blood at right angles to the walls of the blood vessels. Unless indicated otherwise, blood pressure refers to systemic arterial blood pressure, i.e., the pressure in the large arteries delivering blood to body parts other than the lungs, such as the brachial artery (in the arm). The pressure of the blood in other vessels is lower than the arterial pressure. Blood pressure values are universally stated in millimetres of mercury (mmHg). The systolic pressure is defined as the peak pressure in the arteries during the cardiac cycle; the diastolic pressure is the lowest pressure (at the resting phase of the cardiac cycle). The mean arterial pressure and pulse pressure are other important quantities. Typical values for a resting, healthy adult human are approximately 120 mmHg systolic and 80 mmHg diastolic (written as 120/80 mmHg), with large individual variations. These measures of blood pressure are not static, but undergo natural variations from one heartbeat to another or throughout the day (in a circadian rhythm); they also change in response to stress, nutritional factors, drugs, or disease. Pagoda sphygmomanometer 300 used in measuring the blood pressure in the present study.

**Pulse rate** - Pulse measurement is performed to determine heart rate and rhythm. Our pulse is caused by our heart beating. As heart beats and forces blood through body, a feeling of a throbbing sensation (the pulse) by putting fingers over one of arteries at any point where the artery comes close to the surface of skin, such as wrist, neck, or upper arm. Counting pulse rate is a simple way to estimate how fast heart is beating. Pulse rate measurements are often done by a health professional as part of a physical examination or in an emergency, but it is very easy to learn to measure our own pulse rate as well.
A pulse is usually described in terms of its rate, which is the number of beats per minute (bpm). However, the rhythm and strength of the heartbeat can also be noted, as well as whether the blood vessel feels hard or soft. An irregular rhythm, a weak pulse, or a hard blood vessel may indicate a medical condition that needs further evaluation.

The pulse rate is measured by counting the beats in a set period of time (at least 15 to 20 seconds) and multiplying that number to get the number of beats per minute. During exercise, fever, or are under stress, heart rate usually speeds up to meet body's increased need for oxygen and nutrients carried in the blood. As a result, pulse rate normally varies from minute to minute. Unless pulse rate is being measured to check the fitness level or in an emergency situation, it is usually measured after have a rest for 10 minutes or more. This measurement is called a resting pulse rate. It is an accurate and simple assessment of the health of the heart and circulatory system. For adult men and women the pulse rate varies from 60-100 bpm.

**Body Mass Index (BMI)**- It is the most commonly used criterion to diagnose obesity. It was described by Quetelet and is also called Quetelet Index. It is calculated as:

\[
\text{Body Mass Index (BMI)} = \frac{\text{Weight (Kg)}}{\text{Height (metre)}^2}
\]

On the basis of BMI, obesity is graded as follows:

<table>
<thead>
<tr>
<th>TABLE: 8 BMI IN ADULT MEN AND WOMEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kg/m²</td>
</tr>
<tr>
<td>Normal</td>
</tr>
<tr>
<td>Obesity</td>
</tr>
<tr>
<td>Grade I</td>
</tr>
<tr>
<td>Grade II</td>
</tr>
<tr>
<td>Grade III</td>
</tr>
</tbody>
</table>

Review of literature, Extension and Home-science and Nutrition specialists helped in idea of the variables relevant to the study.

From amongs: the large number of variables, which may have, theoretical relationship with health of the human beings and those are helpful in measuring the health status of an individual, have been selected for present study.

**INDEPENDENT VARIABLES**

**Socio-economic:**

**Age (X₁):**

Age refers to the number of years the respondent lived since birth at the time of interview and was rounded to the nearest whole number. In the present study, the number of years rounded to the nearest whole number the respondent lived since birth at the time of interview was taken as a measure of age. In the present study, each community was classified into two age groups and 40 samples were randomly selected from each age-group of each community. Age group of the respondents in the present study are:

1. 20Years to 40 Years,
2. 40Years+ to 60Years.

**Sex (X₂):**

The members of many species of living things are divided into two or more categories called sexes (or loosely speaking, genders). These refer to complementary groups that combine genetic material in order to reproduce. This process is called sexual reproduction. Typically, a species will have two sexes: male and female.
Education ($X_3$):

Health status of an individual influenced by his or her education level. The world map of illiteracy closely coincides with the maps of poverty, malnutrition, ill health, high infant and child mortality rates. Studies indicate that education, to some extent, compensates the effects of poverty on health, irrespective of the availability of health facilities.

To quantify the educational status of the respondents, the scoring system followed by Pareek and Trivedi, (1964) in their Socio-Economic Status Scale Rural was used. The scoring was as follows:

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>0</td>
</tr>
<tr>
<td>Can read only</td>
<td>1</td>
</tr>
<tr>
<td>Can read and write</td>
<td>2</td>
</tr>
<tr>
<td>Primary</td>
<td>3</td>
</tr>
<tr>
<td>Middle school</td>
<td>4</td>
</tr>
<tr>
<td>High school</td>
<td>5</td>
</tr>
<tr>
<td>Graduate</td>
<td>6</td>
</tr>
</tbody>
</table>

Family educational status ($X_4$):

The method followed by Ray (1967) in computing the family educational status was followed in the present one. In this method, the educational achievement of each member of the family was noted and scored as suggested by Pareek and Trivedi (1964) in the item education of the Socio-Economic Status Scale-Rural. The total score of a family on education was then divided by the “effective family size” to get the educational status of the family. The “effective family size” was obtained by subtracting the numbers up to 4 years of age from the total number of members in the family. The procedure adopted with an actual computation.
Computation of family educational status

Name of the respondent : Dadura Toto

Village : Totopara

Total members in the family : 8

Members up to 4 years of age : 5

Effective family size : 3

TABLE NO: 9 EXAMPLE OF THE EDUCATIONAL SCORE OF THE FAMILY MEMBER

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Scale score</th>
<th>Frequency</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle school</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Primary school</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Can read &amp; write</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can read only</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

Index of family educational status = \[ \frac{\text{Total educational score}}{\text{Effective family size}} \]

= \[ \frac{7}{3} \]

= 2.3

**Occupation (X₃):**

The occupation of a person is an important indicator to determine the economic status of that person in a society. The scores for different categories of occupation were as follows:

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Score</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Business</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Cultivation</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
Land holding (X6):

The amount of land is an important economic parameter to assess the economic standing of that person in the society. The procedure for scoring was as follows.

No land = 0
Up to one hectare = 1
Up to two hectares = 2
Above two hectares = 3

Income (X7):

Income strongly correlated to health status and access to health care. Greater wealth allows a household to maintain its standard of living when income falls due to job loss or health problems (Council of Economic Advisers for the President’s Initiative on Race, 1998). The ability to obtain health insurance coverage is directly related to income and wealth. Income is also related to the amount of preventive care received, which is associated with health outcomes.

In the present study, the procedure of collecting information on income of the respondent or respondent’s family in per month was followed:

High Income : (More than 2000/-)
Middle income : (Rs: 1001/- - 2000/-)
Low Income : (Upto Rs. 1000/-)

House type (X8):

The possession of a house and the nature of the house are important indicators of socio-economic status. These were measured as follows Pareek and Trivedi, (1964).
No house = 0  Hut = 1  Katcha house = 2
Mixed house = 3  Pucca house = 4  Mansion = 6

**Family size (X9):**

It refers to the members present in individual respondent's family. Generally, families consisting of one to five members are being regarded as small size families while large size families consist of more than five members. Large size family, which requires proper distribution of foods within all members, is very essential to maintain the proper nutritional status in all. Here also the scoring system followed by Pareek and Trivedi, (1964) in their Socio-Economic Status Scale-Rural was followed.

- Up to five members = 1
- Above five members = 2

**Family type (X10):**

In the present study, it refers to whether there is single or joint family system in the respondent's family. A family was considered as single when it consisted of husband, wife, and unmarried children. A joint family consisted of other blood relations also.

The scoring system developed by Pareek and Trivedi, (1964) in their Socio-Economic Status Scale Rural was followed to quantify the family type of the respondents.

- Single = 1
- Joint = 2

**Marital Status (X11):**

The concept of marital status applies to the conjugal arrangements of a person. It includes persons who are living together as husband and wife,
regardless of whether they are legally married or in a common-law relationship. Persons living in a conjugal relationship are identified as spouses. Spouses may be legally married spouses or common-law partners.

In the present study, the procedure of collecting information on marital status of the respondent or respondent’s family was followed:

- Married :
- Unmarried :
- Widow/widower :
- No of children : a) Male b) Female

Socio-psychological

Attitude towards health status (X12):

It is proposed that an “attitude is a mental ------state of readiness” (Allport, 1935). It is lean predisposition towards aspects of our environment. They may be positively or negatively directed towards aspects of the health related matters. Attitude was defined by ‘Thurston’ as the degree of positive or negative affect associated with some psychological objects.

Procedure followed for developing attitude scale:

Among the techniques commonly used in this study for construction the ‘attitude scale’, was followed by ‘Likert’.

Likert scales were developed in 1932 as the familiar five-point bipolar response format most people are familiar with today. These scales always ask people to indicate how much they agree or disagree, approve or disapprove, believe to be true or false. There's really no wrong way to do a Likert scale, the most important thing being to at least have six response categories like strongly favourable, favourable, moderately favourable, neutral, unfavourable, strongly unfavourable. The "don't know" statement is optional, and some people prefer not to use it since it's an odd response category.
Collection of statements:

As the first step, the items were collected on the basis of relevant literature, field extension personnel, subject specialists in the Extension Education, Home-Science and Food And Nutrition and researcher's own experience. The questions were designed to test the attitude towards health status of the target samples of the present study. In all, 67 statements were initially prepared for the study.

Editing of the items:

All the items were edited by applying the following criteria and guidelines suggested by Thurstone and Chave, (1927), and Edwards and Kilpatrik (1984).

1. Avoiding statements that referred to the past rather than to present.

2. Avoiding statements that were factual or capable of being interpreted as factual.

3. Avoiding statements that might be interpreted in more than one way.

4. Avoiding statements that were irrelevant to the psychological object under consideration.

5. Avoiding statements that were likely to be endorsed by almost everyone or by almost none.

6. Selecting statements that were believed to cover the entire range of the affective scale of interest.

7. Keeping the language of the statements simple, clear and direct.

8. Statements were short, rarely exceeding 20 words.

9. Each statement contained only one complete thought.
10. Statements containing universals such as 'all', 'always', 'none', and 'never' often introduce ambiguity and was avoided.

11. Words such as 'only', 'just', 'merely' and others of similar nature of connotation were with care and moderation in writing statements.

12. Whenever possible, statements were in the form of simple sentences rather in the form of compound and complex sentences.

13. Avoiding the use of words, which may not be understood by those who are to be given the completed scale.

14. Avoiding the use of double negatives.

Judges' rating of statements:

All the 67 statements (Annexure No: II) of attitude towards health status with continuum, namely 'strongly favorable', 'favorable', 'moderately favorable', 'unfavorable', and 'strongly unfavorable' against each of the statements were mailed to 110 judges in all over India. The judges selected, to rate the items, were subject matter specialists, extension specialists from Agricultural Universities, nutritionist, dietitian, doctors/physicians, sociologists, psychologists, and public health specialists. The judges were requested to rate all the statements for each on the 7-point continuum. Out of 110 judges, 52 judges returned the statements after recording their judgments. The responses of 52 judges have been critically screened through and found that the responses of 12 judges were not duly recorded as per procedure. Thus, finally the responses of 40 judges were considered for calculation of scale and Q values of the attitude statements.

Calculation of scale values:

40 judges had judged the derivation of scale values for the 67 attitude statements of health status and each were obtained by computing the median values for each of the statements.
The procedure followed in obtaining judgment in respect of statement No. 1 and 2 of attitude towards health status is shown in (Annexure VIII).

The data obtained from the judges were arranged in three rows. In the first row the frequency (F) of the statement in each of the seven categories have been given. In the second row, the proportions of frequencies (P) have been calculated. The proportions were obtained by dividing each frequency by N, that is the total number of judges (40). In the third row the cumulative proportions (CP), i.e., the proportion of judgments in a given category plus the sum of all the proportions below that category has been shown.

Since the median of the distribution of judgments for each statement was taken as the scale value of the statement, the scale value was calculated from the data arranged in the above manner by means of the following formula of Edward, (1969).

\[
S = 1 + \frac{(0.50 - pb)}{pw}
\]

Where,

- \( S \) = the median or scale value of the statement.
- \( l \) = the lower limit of the interval in which the median falls.
- \( pb \) = the sum of the proportions below the interval in which median falls.
- \( pw \) = the proportion within the interval in which the median falls.
- \( i \) = the width of the interval and is assumed to be equal to 1.00.

Values of first statement (attitude towards health status) in the above formula.
Similarly, the scale value of the second statement was calculated.

\[
S = 1.5 + \frac{(0.50 - 0.5)}{0.25} \times 1.00 \\
= (1.5 + 0) \times 1.00 \\
= 1.5
\]

Calculation of Q values:

The semi-interquartile range (Q) was computed as an index of statements on the scales of the goal to have smaller number of statements rather evenly placed on the continuum. The Q values indicated the ambiguity or uncertainty of meaning of the statements. The statements with large Q values were omitted.

The inter-quartile range (Q) contains the middle 50 percent of the judgments. To determine the value of Q other two point measures, the 75th centile (C\textsubscript{75}) and 25th centile (C\textsubscript{25}), are needed. The Q values (C\textsubscript{75} and C\textsubscript{25}) were calculated using the following formula of Edwards, (1969).

\[
C_{75} = 1 + \frac{(0.75 - pb)}{pw} \times 1.00
\]

Where,

\[
C_{75} = \text{the } 75^\text{th} \text{ centile.}
\]
l = the lower limit of the interval in which the median falls.
pb = the sum of the proportions below the interval in which the 75th centile falls.
pw = the proportion within the interval in the 75th centile falls.
i = the width of the interval and is assumed to be equal to 1.00.

The 25th centile obtained by the following formula:

\[
C_{25} = l + \frac{(0.25 - pb)}{pw} \times 1.00
\]

Where,

\[
C_{25} = \text{the 25th centile.}
l = \text{the lower limit of the interval in which the median falls.}
pb = \text{the sum of the proportions below the interval in which the 25th centile falls.}
pw = \text{the proportion within the interval in the 25th centile falls.}
i = \text{the width of the interval and is assumed to be equal to 1.00.}
\]

For the first statement attitude towards health status in table 1, Q values were calculated as follows:

\[
C_{75} = 2.5 + \frac{(0.75 - 0.75)}{2.5} \times 1.00
\]

\[
= (2.5 + 0) \times 1.00
\]

\[
= 2.5
\]

\[
C_{25} = 0.5 + \frac{(0.25 - 0)}{0.5} \times 1.00
\]

\[
= (0.5 + 1.0) \times 1.00
\]

\[
= 1.5
\]

The interquartile range (Q) is calculated by taking the difference between \( C_{75} \) and \( C_{25} \).
Thus, \[ Q = C_{75} - C_{25} \]
\[ = 2.5 - 1.5 \]
\[ = 1 \]

Similarly, Q value was calculated for statement No. 2 as follows:

\[
\begin{align*}
C_{75} &= 1.5 + \frac{(0.75 - 0.43)}{1.5} \times 1.00 \\
&= 1.7 \\

C_{25} &= 0.5 + \frac{(0.25 - 0)}{0.5} \times 1.00 \\
&= 1.5 
\end{align*}
\]

The interquartile range (Q) is calculated by taking the difference between \( C_{75} \) and \( C_{25} \).

Thus, \[ Q = C_{75} - C_{25} \]
\[ = 1.7 - 1.5 \]
\[ = 0.2 \]

The scale and Q values of all statements were calculated according to the above-mentioned example with the help of Microsoft Excel 2000 and have been shown in (Annexure No. IX).

**Final selection of attitude statements:**

Based on the median and Q values, the statements (items) were selected to constitute scale taking into account the following criteria:

i. The median values of the statements should be fairly distributed throughout the continuum.

ii. The statements should have smaller Q values as far as possible.

iii. The statements selected should represent the universe of opinions or content with respect to the related area.

iv. There should be an equal number of statements indicating favorable and unfavorable attitudes.
Based on these criteria, 18 statements of the attitude towards health status (*Annexure No. X*) were finally selected. Statements with median values above 1.60 and their Q values below 1.60 were selected.

**Final format of the scale and scoring procedure:**

The attitude statements finally selected were randomly arranged in the final format. The scale had an equal number of favorable and unfavorable statements. In the final format of the scale, there were three columns representing a three-point continuum of agreement to disagreement to the statements as suggested by **Likert (1932)**. The three points on the continuum were: agree, undecided, and disagree with weights of 3, 2, and 1 respectively for favorable statements and 1, 2 and 3 for unfavorable statements respectively.

While administering the scale, the respondents were asked to respond to each statement in terms of their degree of agreement and disagreement by putting a tick mark (\(\checkmark\)) in the appropriate column against each statement. The score for each individual respondent was obtained by summation. The range of scores for the selected statements was 18 to 54 (18 x 3 = 54).

**Reliability:**

The reliability of the attitude scale constructed for the present study was tested by split half method and test-retest method.

**Split-half method** – The reliability of the scale was tested by split-half method. The attitude statements of the scale were arranged randomly and were then divided into equal halves, with all even number statements in one half and odd number statements in the other half. These two forms of statements were administered to 30 respondents separately. The coefficient of correlation between two sets of scores in the scale was computed and found to be 0.90 which was significant at 1 percent level of significance. The reliability coefficient thus obtained indicated that the internal consistency of the attitude scale constructed for the study was quite high.
**Test-retest method** – The attitude scale was administered to the 30 respondents twice at an interval of 15 days. Thus, two sets of attitude scores were obtained for each of the 30 respondents. The coefficient of correlation between two sets of scores was obtained. The coefficient of correlation calculated for the scale developed was found to be 0.87, which was significant at 1 percent level of significance. Hence, attitude scale was highly stable and dependable for measurement of attitude towards health status.

**Validity:**

In the present study, the validity of the scale was tested as follows.

**Content validity** - This is a kind of validity by assumption of Guilford (1954). The main criterion of the content validity is how well the content of the scale sample the subject matter that is important for the study. The contents of attitude scale were derived from relevant literature, experts, and opinions. This was ensured in the collection and selection of statements of the scale.

The co-efficient of correlation values calculated for the scale developed were found to be highly significant at 1 percent level of significance.

The attitude scale towards health status constructed was highly stable and dependable for measurement.

**Knowledge about health status (X₁₃):**

The quality and the quantity of food are the basic attributes of health condition of living beings. The health status of a population is therefore primarily dependent upon the dietary intake along with some other measures. But the knowledge about health including proper hygienic practices is the way to improve the health status of an individual or a community. Knowledge was defined in this study included those behaviors and test situations which emphasized the remembering either by recognition or recall of ideas, material or phenomenon (Bloom et al. 1956). The knowledge about health status is related to different health habits, physical and mental health, child care,
pregnancy management, family planning, nutritional requirements, health education etc.

**Item Collection:**

The content of knowledge test was composed of questions called items. Items for the test were compiled from different sources, such as literature, field extension personnel, subject matter specialists in Extension Education, Home-Science and Food and Nutrition and researcher’s own experiences. The questions were designed for administering to the target samples to know the knowledge level about their health status.

**Initial Selection of Items:**

The selection of items was done on the basis of the following criteria:

i. It should promote thinking rather than rote-memorization, and

ii. It should differentiate the well-known target people from the poorly known ones and should have a certain difficulty value.

Based on these two criteria 215 items (*Annexure No: V*) were initially constructed for administering to the samples for item analysis and screened out further items.

All the 215 items collected for construction of the knowledge test in objective form and were dichotomous or multiple-choice format

**Item Analysis:**

The item analysis of a test yielded two kinds of information; item difficulty and item discrimination. The index of the item difficulty revealed how difficult an item was where as the index of discrimination indicated the extent to which an item discriminated to well inform individuals from the poorly informed ones.
The items were checked and modified on the basis of pre testing and administered to randomly select 90 samples of three different zones - Municipality (30), Corporation (30), and Panchyta (30) area for item analysis. Each one of the 90 respondents, to whom the test was administered was given score 1 or 0 for each item according to whether the answer was right or wrong. The total numbers of the correct answers given by a sample out of 215 items were the knowledge score secured by him/her. After calculating the scores obtained by 90 samples, the scores were arranged in a descending order.

These 90 samples were then divided into six equal groups, each having 15 samples. Samples in each group were arranged in descending order according to the total score obtained by each one of them. These groups were named as G₁, G₂, G₃, G₄, G₅, G₆, respectively. For item analysis the middle two groups (G₃, G₄) were rejected. The first two groups (G₁, G₂) and last two groups (G₅, G₆) were considered for computation of item difficulty and item discrimination indices.

The range of the scores obtained by the four groups of the respondents were as follows:

\[ G₁ = 188 - 122 \]
\[ G₂ = 121 - 98 \]
\[ G₅ = 61 - 47 \]
\[ G₆ = 46 - 31 \]

The maximum score was obviously 215, which could be scored when all the 215 items were answered correctly. The data pertaining to the correct responses from the items in respect of these four groups were tabulated.
**Item Difficulty Index:**

The difficulty index of an item was defined as the proportions of correct answer given by the samples to that particular item. This was calculated by the formula:

\[ P_i = \frac{n_i}{N_i} \times 100 \]

Where,

- \( P_i \) = Difficulty index in percentage of \( i^{th} \) item.
- \( n_i \) = Number of respondents giving correct answer to \( i^{th} \) item.
- \( N_i \) = Total number of samples to whom \( i^{th} \) item was administered.

The difficulty indices of all items were calculated.

**Item Discrimination Index:**

The discrimination index was obtained by calculating the Phi-Coefficient as formulated by Perry and Michael (1951). However, Mehta (1958) in using \( E^{1/3} \) method to find out item discrimination emphasized that this method was analogous to, and hence, a convenient substitute for the Phi-Coefficient. The method suggested by Mehta (1958) was adopted for the present study. The formula by which the item discrimination index was calculated is given below:

\[ E^{1/3} = \frac{(S_1 + S_2) - (S_5 + S_6)}{N/3} \]

Where, \( S_1, S_2, S_5 \) and \( S_6 \) were the frequencies of correct answers in \( G_1, G_2, G_5, \) \( G_6 \) groups respectively, and

\( N \) = Total number of respondents in the sample of item analysis.
Selection of items for test:

Two criteria viz item difficulty index and item discrimination index were considered for selection of items in the final format of the knowledge test.

The underlying assumption in the statistics of item difficulty was that the difficulty was linearly related to the level of individual’s knowledge about health status. When a respondent passed an item, it was assumed, as Coombs (1950) described, that the items were less difficult than his ability to cope with it. In the present study, items with difficulty index ranging from 30 to 80 and discrimination index ranging from 0.30 to 0.55 were included in the final format of the knowledge test (Annexure No:XI, Annexure No:XII). The knowledge test had all total 47 items which fulfilled both the criteria were selected for the final format of knowledge test (Annexure No XIII).

Scoring Method:

The summation of scores for correct replies over all the items of a particular respondent indicated his/her level of knowledge about health status. The range of scores was, therefore, from 0 to 47.

Reliability of knowledge test:

The reliability of the knowledge test developed was tested in two ways.

i. Split-half method:

All the 47 items of the knowledge test were first arranged randomly (simple random sampling) and then divided into two parts. In these two sets, one set having 23 items with odd numbers and other set having 24 items with even numbers were administered to 50 respondents separately. The coefficient of correlation between two sets of scores was computed and the value 0.896 was found to be significant at 1% level. The reliability co-efficient, thus obtained, indicated that the “internal consistency” of the knowledge test developed for the study was quite high.
ii. Test-Retest method:

The knowledge test with 47 items was administered to 30 respondents, twice at an interval of 15 days. The co-efficient of correlation value was 0.899, which was found to be significant at 1% level. Hence, the knowledge test constructed was highly stable and dependable for measurement of this variable.

Content Validity of Knowledge Test:

In the final selection of items, care was taken to include items covering the entire universe of relevant behavioural aspects of the respondents with respect to knowledge about health status. Items were collected through various sources including specialists and hence it was assumed that the scores obtained by administering this test-measured knowledge of the respondents as intended.

Awareness towards health hygiene ($X_{14}$):

Awareness is the fact or state of being aware, or conscious, especially of matters that are particularly relevant. Dourish and Belloti (1992) have given one of the best-known definitions for awareness: “awareness is an understanding of the activities of others, which provides a context for your own activity”.

20 items (Annexure No XIV) of Awareness towards health hygiene were compiled from different sources, such as literature, field extension personnel, subject matter specialists in Extension Education, Home-Science and Food And Nutrition and researcher’s own experiences. The questions were designed for administering to the target samples to know the awareness level about their health status. It was scored on the basis of response either ‘Yes’ or ‘No’ by 1 or 0 respectively.

Innovation Proneness ($X_{15}$):

It is operationally defined as behaviour pattern of an individual who has desires to seek changes in health habits and practices and to introduce such
changes into his daily life system, which will improve the health status. 

P. Brief et al. (1976) noticed that Innovation proneness refers to the degree to which various characteristics of the elite facilitate the acceptance of change-size, differentiation, integration, formalization, security, accountability, resources, and perceived innovativeness.

Self-rating innovation proneness scale of Moulik (1965) was used to measure the innovation proneness of the respondents of the present study. This scale consists of three sets of statements with weights of 3, 2 and 1, indicating level of proneness. The forced choice method was followed to overcome the familiar problems of personal bias and lack of objectivity in self-evaluation. This method forced the respondents to choose from a group of three sort statements describing particular personality characteristic, the one, which most accurately describes the respondent herself, and also the one, which least accurately portrays the respondent herself.

After obtaining the respondent’s “most-least” chances for each of the three sets of statements, the scoring was done by summing up the ratios of the weight of “Most-Like” statement to the weight of “least-like” statement. The three ratios for three sets were the respondent’s self-rating scale for innovation proneness.

Respondents were categorized according to their degree of proneness to various innovations as High (Mean ± SD), Medium (Mean ± SD), and Low (Mean – SD).

Communication:

Mass Media Communication (X_{16}):

Rogers and Svenning (1996) pointed out that attendance to mass media is a broadener to horizons, an informer and persuader for change.
To measure the degree of mass media communication sources, each respondent was asked to indicate on a 4 points continuum as to how often he/she got information about informed about maintaining the good health status from each of the sources. The scoring procedure for the responses was most often – 3, often – 2, some times – 1, and never – 0. The score of an individual respondent was obtained by adding the scores over different sources of Bandopadhyay (1986). The range of scores was from 0 to 24.

The mass media communication sources of information considered for the present study were radio, television, educational film, newspaper, health and nutritional publication, poster, demonstration, exhibition/swastha mela. These were relevant for the area and were finalized after discussion with the extension personnel and pretesting the schedule.

**Personal Cosmopolite (X17):**

Cosmopoliteness is the degree to which individuals are oriented to the external world, beyond their immediate social system. The geographical mobility obviously varies according to the availability of roads and means of transportation, nearness to cities and other factors.

The personal cosmopolite sources of information considered for the present study were doctors, health workers of Govt, NGO, UNICEF personnel, panchayet members, ICDS personnel, FAO personnel, KVK personnel.

To measure the degree of personal-cosmopolite sources of information, each respondent was asked to indicate on a 4-point continuum as to how often he/she got information about maintaining the good health status from each of the sources. The scoring procedure for the responses was most often – 3, often – 2, some times – 1, and never – 0. The score of an individual respondent was obtained by adding the scores over different sources of Bandopadhyay (1986). The range of scores was from 0 to 24.
Personal Localite ($X_{18}$):

Neighbours, relatives, friends and village leaders pay an important role to maintain the good health status (Singh and Jha 1965). In our country personal localite sources information (Neighbours, relatives, friends, other family members, resident of the same village but other than neighbours and quack) play an important role to maintain the good health status.

The scoring procedure for the responses was most often – 3, often – 2, some times – 1, and never – 0. The score of an individual respondent was obtained by adding the scores over different sources of Bandopadhyay (1986). The score for individual respondent was obtained by adding the scores over different sources.

CLINICAL EXAMINATION:

Countries like India clinical examination have a vital role for assessing the malnutritious symptoms in the community. The nutritional status of a community is the sum of the nutritional status of the individuals who form that community. The specific signs, and their presence or absence were recorded on a standardized form in the present study. Under the clinical examination the general appearance of the subject and the condition of hair, face, eyes, lip, tongue, teeth gums, glands, skin, nails were observed along with this it was recorded that whether the subject was suffering in edema and pallor.

1. General appearance: it is the researcher's naked eye impression about the subject when he or she first looks at, whether the subject is normal built, or thin built, or sickly.

2. Hair:

*Normal Hair*: the hair will be black in colour and healthy.

*Lack of luster*: the hair discoloured and appears dry.
**Dyspigmented** - the color of hair depends on pigment granules in the cortex of the hair. Due to malnutrition the colour of hair become dull and fade.

**Thin and sparse hair** - the hair becomes thin and easily breakable.

**Easily pluckability of hair** - hair can easily be plucked, without much resistance or causing pain to the subject.

**Flag sign** - dyspigmentation of the hair, which occurs as a light band in darker regular hair. The sequence of the colour of band sometime coppery red, black, white.

3. **Face**:

**Diffuse pigmentation** - scatter patches all over the face.

**Naso-labial dyssebacea** - inflamed and oily nasal folds (http://www.hxhiles.com/search2.php)

**Moon face** - face looks rounded appearance with prominent cheeks.

4. **Eyes**:

**Conjunctiva** - the normal conjunctiva is colourless, moist and bright.

**Bitot spot** - these are dirty white or silvery gray foamy patches or spots, raised from surface seen on the conjunctiva, usually on the outer side of the cornea. They are formed due to accumulation of denuded conjunctival epithelial cells. It may appear as a single spot or as multiple spots, which may later unite to form a large triangular patch with base towards cornea. Bitot spot may be stained black by using ‘kajal’. The bitot spots may present in only one eye or both the eyes and are usually seen along with conjunctival xerosis (conjunctival xerosis is recognized by dryness of the conjunctiva, the transparent layer on the white part on the eye) (Assessment Of Nutritional Status Of <5 Year Children- Government of India- UNICEF programme of cooperation:2003-2007. Operational Manual).
Angular conjunctivitis- It is a bony infection of the conjunctiva, which is the protective membrane that lines the eyelids and covers exposed areas of the sclera (also called the white of the eye).

Pale conjunctiva- it is a very little or no evidence of red colour on the anterior rim, which matched the fleshy colour of the posterior aspect of the palpebral conjunctiva (Sheth et.al. 1997).

Cornea- the normal cornea, which is the clear surface at the front of the eye, is the mail-focusing element of the eye.

Dryness- the moist part of the cornea becomes dry.

Hazy or opaque- the transparent and smooth part of the cornea becomes rough and hazy.
Night blindness- it is an inability to see in dim light. It is due to impairment in dark adaption.

5. Lip- normal lip is soft, and smooth and normal in skin colour. Angular stomatitis- angels of mouth will have ulcers. There may be fissures, which may extend into the oral cavity and also on to the skin outside. Milder lesions are identified easily with the mouth half open (Assessment of Nutritional Status of <5 Year Children- Government of India- UNICEF programme of cooperation: 2003-2007. Operational Manual).

Cheilosis- cracking of the lower lips is usually seen, but it can be differentiated from winter cracking of the lips.

6. Tongue- normal tongue is smooth, moist, clean and reddish in colour. Pale and flabby- it is very little or no evidence of reddish colour on the surface of the tongue and it becomes flaccid.

Red and raw- tongue appears bright red or magenta red in colour and it becomes dry.

Fissured- grooves are observed on the upper surface of the tongue. Geographic tongue- it is a scattered ulceration observed on the layer of the tongue. The surface of tongue becomes rough and irregular. Sometimes bleeding is also occurring from the ulcer. The condition is often painful.


Attrition- it is flattening of biting surface. Enamel worn away, exposing underlying dentin. Dentin may be yellow or brown stained.

8. Gum-

Spongy and bleeding gum- gums are swollen (spongy) and bled with even slightest touch. There may be associated petechial hemorrhages, and painful enlargement of epiphysis of long bones (Assessment Of Nutritional Status Of <5 Year Children- Government of India- UNICEF programme of cooperation:2003-2007. Operational Manual).

9. Gland-

Thyroid enlargement- palpation of thyroid gland is necessary, only when it is not visible. The technique of examination is to stand in front of the subject and with the help of both thumbs simultaneously the lateral lobe and isthmus (band connecting the two lobes) are examined. It is better to ask the subject to relax the neck muscles by throwing the head slightly downwards. The thyroid swelling moves up and down when the subject swallows. If the thyroid gland is palpable, the subject is asked to fully extend the neck and ascertains whether the gland is visible in that position. In the grade I palpable the thyroid gland is palpable but not visible, with neck in normal position. In grade II palpable thyroid gland is visible, with neck in normal position, and palpation is not required. The grade I and grade II palpation totally known as goiter.
**Fig No: 8.** This picture depicts the typical appearance of a goiter in a middle aged woman. Her entire neck looks swollen because of the large thyroid.

[Source: http://www.endocrineweb.com/goiter.html Thyroid Goiter. Enlargement of thyroid.]

*Parotid enlargement*- Palpation of the parotids to test for enlargement is a vital component of the clinical examination. The patient is asked to clench his teeth so that the masseter muscle is palpable. The parotid is best felt behind the masseter muscle and in front of the ear. The parotid gland is a salivary gland. It may appear once in a while or as chronic persistent enlargement. Parotid gland enlargement may present on one side only (unilateral) but usually affects both parotid glands (bilateral) (http://www.thedoctorwillseeyounow.com/articles/arthritis/sjogren_10/).

10. **Skin**-

*Normal skin*- Normal skin has an even tone, soft and a smooth texture, no visible pores or blemishes, and no greasy patches or flaky areas. This type of skin has a clear, fine-textured, supple and smooth surface, which is neither greasy nor dry. It glows with an inner health, which stems from good blood circulation and excellent health. There may be occasional pimples in women just before menstruation due to increased hormonal activity, which makes the sebaceous glands overactive. Acne is, however, not a problem for people with normal skin. It is beautiful, but it needs care if it is to last. Neglect can lead to signs of aging and
Dry and Scaly skin- Dry skin has a low level of sebum and can be prone to sensitivity. The skin has a parched look caused by its inability to retain moisture. It usually feels "tight" and uncomfortable after washing. Chapping and cracking are the sign of the dehydrated skin. Dryness is exacerbated by wind, extremes of temperature and air-conditioning, all of which cause the skin to flake, chap and feel tight. This type of skin is tightly drawn over bones. It looks dull, especially on the cheeks and around the eyes. There may be tiny expression lines on these spots and at the corners of the mouth.

Scaly skin is a skin disorder characterized by sudden or gradual development of reddened, thick, itchy patches of silvery scales (raised layers of dead skin flakes) usually in the elbows, knees, scalp, hands, trunk and nails. This type of skin disease is known as Psoriasis. The skin may blister (raised and bubble like) or have pustules (small, raised, and pus-filled). The nails may show pitting (pin-sized punched-out areas) the joints may be painful (arthritis), itching, and patches and itching may involve the scalp.

Follicular hyperkeratosis- Follicular hyperkeratosis was observed in a patient with multiple myeloma. This keratosis is considered to be a cutaneous manifestation of multiple myeloma, since similar cases have been observed before. In addition, the patient had cutaneous, ocular, and articular signs and symptoms of cryocrystalglobulinemia, ie, cutaneous vasculitis, blurring, and joint swellings, (Lukitsch et al. 1985).
**Petechial skin** - Petechiae are pinpoint-sized hemorrhages of small capillaries in the skin or mucous membranes. Petechiae is the term given to the individual small red or red-blue spots about 1-5mm in diameter which make up the rash. They are caused by a small local amount of bleeding within the skin. Deeper bleeding beneath the skin may be seen as bruises (ecchymoses). Petechiae appear as round, pinpoint-sized dots that are not raised. The color varies from red to blue or purple as they age and gradually disappear. Petechiae commonly appear on the lower legs, but may be distributed all over the body. Petechiae are red because they contain red blood that has leaked from the capillaries into the skin. Petechiae do not blanch when pressed upon (http://skin-care.health-cares.net/petechiae-purpura.php).

**Pellagrous dermatitis** - developed itching, burning sensation, scaliness and brownish pigmentation over face, hands and dorsal aspect of forearms are observed and also rashes appear on the skin exposed to the sun. Examination at this stage revealed typical pellagrous dermatitis Janak. R. et al. (1987).

**Flaky paint dermatitis** - the skin becomes dry and peeling (http://en.wikipedia.org/wiki/Pallor).

11. **Nail** -


12. **Odema** - Presence of abnormal amounts of fluids in intercellular space, resulting in swelling.
13. **Pallor**—it is an abnormal loss of skin or mucous membrane color. It can develop suddenly or gradually, depending on the cause. It needs to be properly distinguished from other symptoms such as whitening of the skin or hypopigmentation (loss of skin pigment). Several severe illnesses lead to general pallor of the body. Unless it happens accompanied by pale lips, tongue, palms, mouth and other regions of mucous membrane, (that is, a general pallor) it is probably not clinically significant and does not require any treatment. Pallor is more evident on the face and palms. It is also important to notice that pale skin doesn't necessarily indicate disease—lack of sunlight or inherited paleness may be the reason (Jan et. al. 2004).

**DIET SURVEY (RECALL METHOD)**

Accurate assessment of the dietary intake of a community takes much longer than getting a picture of the community's nutritional status by clinical or anthropometrics examination. There are two main types of dietary survey. One relies on direct observation of a sample of the population, with their food measured and weighed over a given period of time. The other relies on inquiry, with a larger group of people questioned about their diet. Each type has a disadvantage: the former is very time consuming, and the latter depends on the memory, integrity and intelligence of the subjects questioned. Neither method takes account of past consumption or of uncertainties of food composition. Such involved methods are rarely justified or practical. It is often better to use cruder, simpler methods that provide data that reveal the causes of malnutrition and suggest corrective measures.

The most common method is to ask the subject to recall what was consumed during the previous 24-hour period. This is termed the 24-hour recall method. It is useful to have available local measures (bowls, cups, spoons) so that the respondent can indicate the approximate amount eaten. In the present study 24-hour recall method was followed.
The standard Household Measures are given to the (Annexure XVI).

First ask the wife of the head of household to show what food she intends to cook for the family that day. This food is then accurately weighed and all the records are noted.

However, the respondent may have no idea of how much food she is going to use that day, or she may exaggerate the amount. This type of survey takes no account of food loss or wastage and gives no indication of what individual members of the family consume. Additionally, the day in question may not be representative of normal intake for a variety of reasons. To overcome this, a number of 24-hour recalls can be done at random.

C. TECHNIQUES OF FIELD DATA COLLECTION:

Before construction of data collection instrument pilot study was undertaken only in Toto Para of Jalpaiguri District for Toto Tribe.

Construction of schedule:

The draft schedule of data, incorporating the tools and techniques of measurement of different variables, was pretested. The final format of the interview schedule is placed in (Annexure XIV).

Field data collection:

The data were collected during November 2005, June-July 2006 and November 2006 with the help of the structured schedule constructed for the study. In each village, before starting the interview, few days were devoted to develop the rapport with the respondents.

The schedule was administered to the respondents and the responses were recorded. The interview was done by researcher herself.
D. STATISTICAL METHODS USED:

The statistical methods used in the study include percentage analysis, co-efficient of correlation, path analysis, and principal component analysis by the help of SPSS 10.0 for windows software.

Similar statistical techniques were used for each tribal community. The steps and methods of statistical tools are described bellow-

All categorical or qualitative variables were measured for their category wise frequency and from such frequencies, percentage were calculated. Such study was repeated for clinical measurement variables. Anthropometrics score was calculated on the basis of five variables namely BMI, waist hip ratio, systolic pressure, diastolic pressure and pulse rate. On five point scale where BMI range of 19-24 were given score 1, otherwise 0. Waist hip ratio were scored on the basis of sex where female 0.85 as the limiting point below what score will be 1, otherwise 0. Similarly for male 1.0 as the limiting point, below what score will be 1, otherwise 0. Systolic blood pressure was having 139 as a limiting point. Above 139 and below 120 was scored as 0 and otherwise 1. Diastolic blood pressure was having 89 as a limiting point. Above 89 and below 80 was scored as 0 and otherwise 1. Pulse rate was having 60-90 as a limiting point above and below that score was marked as 0 and otherwise 1.

Mean and Standard Error of all these dependent variables were calculated with respect to each level of the independent variables. These calculated means were further tested by the nonparametric techniques like Mann-Whitney U and Kruskal-Wallis ($\chi^2$) test respectively for independent variables with level 2 and above level 2 significantly.

Again, all above-mentioned dependent variables except communication score and its subset variables were calculated for their mean due to Mass Media, Personal Cosmopolite, and Personal Localite. These means were also
tested by either above-mentioned Mann-Whitney U and Kruskal-Wallis ($\chi^2$) nonparametric techniques.

Pearson's Co-relation Co-efficient and Spareman's Rank Correlation Co-efficient were calculated among all variables and will be presented in matrix form, where each co-efficient is tested for its significance by t-test.

Pearson’s Co-relation Coefficient Matrix is further helps us to establish the causal effect relationship (Linear Structured Relationship) by Path Analysis where health status index and anthropometric score will be treated as effect variables in two separate Path Analysis for a set of common causal variables as all socio-economic parameters, communication scores, attitude towards health status, awareness about health status, knowledge about health status, innovation proneness, and nutrient (Protein, Fat, Carbohydrate) deviations all important direct and indirect effect will be discussed further.

Comparison between zone and among tribal community:

All variables under study were calculated for their mean value along with standard error due to two zones under study namely Red Laterite Zone and Terrai Zone. Similarly mean and standard error were calculated for four tribal communities (Toto, Santal, Sabar, Lodha) under study. All above means were compared by Mann-Whitney U test for zone comparison and Kruskal-Wallis ($\chi^2$) test for tribal communities comparison.

All variables which have resulted significant, mean differences for different zone for all community will be further analysed by Principal Component Analysis (PCA) to find out independent factors with Eigenvalues more than 1 explaining larger share of accounted for variance of the study. All factor loading under each factor were further looked into for identifying variables clustering with either health status index or over all health status score in similar fashion. All contrast within factor will be explained.
Indexing:

Linear and weighted linear indices were established on the basis of Minimum Data Set (MDS) and based upon previous PCA results where the highest loaded variables within factor will represent that factor, in variation with other highly loaded variables. Such techniques was used for both zone and tribal community comparison and resultant indices will be displayed in the form of Stacked column Diagram, where length difference of each stacked can give clear idea about the importance of that MDS parameter of the overall study.

The Mann-Whitney U test (http://www2chass.ncsu.edu/garson/pa765/path.htm) is a non-parametric test that can be used in place of an unpaired t-test. It is used to test the null hypothesis that two samples come from the same population (i.e. have the same median) or, alternatively, whether observations in one sample tend to be larger than observations in the other. Although it is a non-parametric test it does assume that the two distributions are similar in shape.

In the present study SPSS 10.0 software (http://www2chass.ncsu.edu/garson/pa765/path.htm) was used for statistical calculation.

Kruskal-Wallis \((\chi^2)\) Test (http://www.texasoft.com/winkkrus.html) is a non-parametric test (distribution-free) used to compare three or more independent groups of sampled data. Unlike the parametric independent group ANOVA (one way ANOVA), this non-parametric test makes no assumptions about the distribution of the data (e.g., normality). This test is an alternative to the independent group ANOVA, when the assumption of normality or equality of variance is not met. This, like many non-parametric tests, uses the ranks of the data rather than their raw values to calculate the statistic. Since this test does not make a distributional assumption, it is not as powerful as the ANOVA.
Pearson's Co-relation Co-efficient (http://www-micro.msb.le.ac.uk/index.html) is the relationship between two variables, is closely related to prediction.

There are numerous methods for calculating correlation, e.g:

- The parametric Pearson, or "r value", correlation
- The nonparametric Spearman correlation
- Many others

Pearson correlation calculations are based on the assumption that both X and Y values are sampled from populations that follow a normal distribution, at least approximately, although with large samples, this assumption is not too important. Alternatively, the nonparametric Spearman correlation is based on ranking the two variables, and so makes no assumption about the distribution of the values.

To get the Pearson correlation coefficient, r, we used r SPSS 10.0 software (http://www.esub.edu/ssric-trd/SPSS11-7/11-7htm). Same way Spearman correlation is calculated with the help of SPSS 10.0 software (http://www.esub.edu/ssric-trd/SPSS11-7/11-7htm).

Path analysis is an extension of the regression model, used to test the fit of the correlation matrix against two or more causal models, which are being compared by the researcher. The model is usually depicted in a circle-and-arrow figure in which single arrows indicate causation. A regression is done for each variable in the model as a dependent on others which the model indicates are causes. The regression weights predicted by the model are compared with the observed correlation matrix for the variables, and a goodness-of-fit statistic is calculated. The best fitting of two or more models is selected by the researcher as the best model for advancement of theory. Path analysis requires the usual assumptions of regression. It is particularly sensitive to model specification because failure to include relevant causal variables or inclusion of
extraneous variables often substantially affects the path coefficients, which are used to assess the relative importance of various direct and indirect causal paths to the dependent variable.

**Key concepts of Path: (Wright, S. 1934)**

- **Path model.** A path model is a diagram relating independent, intermediary, and dependent variables. Single arrows indicate causation between exogenous or intermediary variables and the dependent(s). Arrows also connect the error terms with their respective endogenous variables. Double arrows indicate correlation between pairs of exogenous variables. Sometimes the width of the arrows in the path model are drawn in a width which is proportional to the absolute magnitude of the corresponding path coefficients (see below).

- **Causal paths** to a given variable include (1) the direct paths from arrows leading to it, and (2) correlated paths from endogenous variables correlated with others which have arrows leading to the given variable. Consider this model:

  ![Path Diagram](image)

  This model has correlated exogenous variables A, B, and C, and endogenous variables D and E. Error terms are not shown. The causal paths relevant to variable D are the paths from A to D, from B to D, and the paths reflecting common anteceding causes -- the paths from B to A to D, from C to A to D, and from C to B to D. Paths involving two correlations (C to B to A to D) are not relevant. Likewise, paths that go backward (E to B to D, or E to B to A to D) reflect common effects and are not relevant.
**Exogenous and endogenous variables.** Exogenous variables in a path model are those with no explicit causes (no arrows going to them, other than the measurement error term). If exogenous variables are correlated, this is indicated by a double-headed arrow connecting them. Endogenous variables, then, are those, which do have incoming arrows. Endogenous variables include intervening causal variables and dependents. Intervening endogenous variables have both incoming and outgoing causal arrows in the path diagram. The dependent variable(s) have only incoming arrows.

**Path coefficient/path weight.** A path coefficient is a standardized regression coefficient (beta) showing the direct effect of an independent variable on a dependent variable in the path model. Thus when the model has two or more causal variables, path coefficients are partial regression coefficients which measure the extent of effect of one variable on another in the path model controlling for other prior variables, using standardized data or a correlation matrix as input. Recall that for bivariate regression, the beta weight (the b coefficient for standardized data) is the same as the correlation coefficient, so for the case of a path model with a variable as a dependent of a single exogenous variable (and an error residual term), the path coefficient in this special case is a zero-order correlation coefficient.

**Principal Component Analysis (PCA)** is a mathematical procedure that transforms a number of (possibly) correlated variables into a (smaller) number of uncorrelated variables called principal components. The objective of principal component analysis is to reduce the dimensionality (number of variables) of the dataset but retain most of the original variability in the data. The first principal component accounts for as much of the variability in the data as possible, and each succeeding component accounts for as much of the remaining variability as possible.
Why use Principal Components?

It is trivial to replace two variables by their two principal components of variability. There does not seem to be any point in changing two observed variables into two other variables, which are simple linear combinations of the original variables. But there are two reasons why we might need to do this:

(1) Normally, there will be more than two variables to deal with and the hope would be that we would find it satisfactory to use principal components of variability which are fewer in number than the number of observed variables under consideration yet account for a major part of their variances.

(2) Principal components have a general usage in making best use of the observed variability in multivariate situations. We can find principal components analysis behind the scenes in MANOVA (multivariate analysis of variance) and in various other analyses.

In the present study the raw data of PCA was analysed with the help of SPSS syntax window (www.cas.lancs.ac.uk/short_courses/countdown.php?url=notes/struct_eq/session2.pdf).

Minimum Data Set (MDS)

Minimum data set (MDS) (www.ncpc.org.uk/policy_unit/mds/data_manual.htm) is a predefined set of data items collected for a particular purpose. The use of minimum data sets supports a common approach to information while not prescribing particular data collection methods or computer systems. To ensure that the data are always collected in the same way, detailed definitions, instructions and lists of possible values (options) are agreed. This means that all users of the data know what items to expect and share an understanding of what they mean. The
The use of minimum data sets has become well established in the NHS since the Körner reforms of information management of *Steering Group on Health Services Information*, (1982). The MDS is now an essential part of communication between purchasers and providers. Over the past decade, problems with the implementation of Körner information systems and a perceived 'top down' approach which was out of tune with local needs have engendered understandable resistance to further developments in information management and technology, especially in NHS community services. The voluntary and non-prescriptive nature of this project is intended to take account of local variation and to impose the minimum burden on participating services.