CHAPTER IV

METHODOLOGY

1. Operational Definitions of Main Concepts
2. Sample
3. Design and Hypothesis
4. Tools Used
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CHAPTER IV

METHODOLOGY:

(A) OPERATIONAL DEFINITIONS:

Before embarking upon the methodological details, some operational definitions used herein are stated.

Nutritional Status:

Due to great socio-economic differences between Western and Indian population, milestones of physical and mental development in children of these countries also differ dramatically. In a comparative study upon height and weight of lower and upper class children of Gujarat, in reference to western norms, Rajlakshmi (1969) has clearly shown differences in (height and weight) which were consistent with food intake or nutritional level. Due to these differences the western standards of height and weight could not be applied to Indian child population, and therefore the 50th percentile of Harvard standard (western norms) was taken as 100th percentile for an Indian child's weight. This was on the similar line of the classification proposed by Jelliffe (1966).

The child's weight for age is a reliable and recommended procedure adopted by Government and Research workers to assess state of health (I.C.D.S. Manual 1984). Hence this criteria has been used in the present study to form the various nutritional groups of sample. Taking this criteria as the Indian
Standards of growth, following nutritional grades were decided upon, to denote the extent of malnutrition.

Normal Grade: A child who weighs above 80% of Indian Standards is considered to be in the normal grade of nutrition.

First Grade: A child who weighs between 70 to 80% of Indian Standards, is considered to be in the first grade of malnutrition.

Second Grade: A child who weighs between 60 to 70% of Indian Standards, is considered to be in the second grade of malnutrition.

Third Grade: A child who weighs between 50 to 60% of Indian standards, is considered to be in third grade of malnutrition.

Children weighing less than 50% of Indian Standard are highly at risk children classified in fourth grade of malnutrition. This grade could not been included in this study since very few cases were encountered while sample selection.

Level of Intelligence:

IQ is measured using the formula \( \frac{CA}{MA} \times 100 \) in BKIS which calculates IQ on the basis of correct answers given in regard to age distribution. Higher IQ on this scale indicates higher level of intelligence and vice-versa.

Emotional Maladjustment:

The total score on Child Behaviour Check-List is the summation of the number of items a parent has marked as "yes"
or "sometimes", wherein Yes = 2 and Sometimes = 1. Higher score is indicative of emotional maladjustment.

(B) Sample:

Data for this study was collected from Jamnagar city in Gujarat State. The investigator tends to study children belonging to predominantly backward socio-economic strata of urban background. It was decided that a total sample of 300 be selected which include children with different nutritional status, sex difference and educational status, belonging to the age group of six to twelve years.

Within this framework the sample was incidental and approached through a house to house visit. On analysis of the personal data gathered from the subjects, the sample was classified into certain groups. These classified groups are described in the table below.

Table - IV.1
Description of the Sample

<table>
<thead>
<tr>
<th>Groups</th>
<th>Sub-Group</th>
<th>Number</th>
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<tbody>
<tr>
<td>1. Nutritional Status</td>
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<td>77</td>
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<tr>
<td></td>
<td>First grade</td>
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<td>Third grade</td>
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<td></td>
<td><strong>Total</strong></td>
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<td>2. Sex Difference</td>
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<td></td>
<td>Female</td>
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<td></td>
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3. Educational Status

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<tr>
<td>Status</td>
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<td>School going</td>
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</tr>
<tr>
<td>Non school</td>
<td>Non school</td>
<td>125</td>
</tr>
<tr>
<td>going</td>
<td>going</td>
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</tr>
<tr>
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4. Interactional Groups

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5. Total

<table>
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Nutritional Status:

Besides external factors like residential environment, financial status, parent and sibling interrelationship, education etc; there are many internal i.e. physiological factors also which play a vital role in a child's development. Hebb (1958) has classified these factors as heredity, prenatal and postnatal chemical environment of the nervous system and sensory experience wherein prenatal and postnatal chemical
environment of the nervous system is directly influenced by nutrition. The realization of hereditary potentialities is also subject to good nutrition, for instance a child of tall parents cannot be expected to reach his full height if his diet is inadequate in protein, calories etc. Other factors like sensory experience of the individual depends not only on the presence of sensory stimuli but also on the responsiveness of the brain to the stimuli. This responsiveness depends again on the chemical environment of the nervous system which as previously stated is influenced by nutritional intake. The apathy of undernourished is also well known. An intellectual feast is not as palatable to a hungry man, as to a well fed man.

Many observations have been made regarding the association of PEM with psychological changes such as impairment in emotional and intellectual fields, mental apathy, loss of drive and incentive, and irreversible mental retardation. Stoch et al., 1963; Rajlakshmi and Ramakrishnan 1967; Izard, 1971; Dasen et al., 1977; Galler et al., 1984; and Mc Gregor, 1987). All these above mentioned studies have shown a correlation between the child's nutritional status and the psychological development. Nutritional status - levels has been taken as the main variable in the present study.

Sex Difference :

In our country, society has always been a male dominated one. Although with time, trends are changing to some extent in favour of female population, still one has not been able to
demolish the general preference for male children. In the backward socio-economic strata wherein traditional myths and beliefs still exist, birth of a male child becomes a matter of pride whereas female arrival does not evoke any happiness or contentment.

Also due to general market inflation and increasing cost of living, more and more percentage of women specially residing in urban slums have started going out for working to support their family. In such cases responsibility of home generally falls on the delicate shoulders of the female child whereas a male child gets all the freedom and lineancy from the parents. Similar differential attitude is applied for nutritional intake also where in mother gives major quantity of food to the male members, thus neglecting her own and her female children's nutritional requirements.

Such differential attitude of parents and burden of responsibilities at a premature age, not only hinders normal development of a girl but also brings drastic emotional changes in her. Being aware of this differential attitude of parents for their male and female children, it was felt that sex difference could be a factor affecting level of intelligence and emotional maladjustment and hence this variable of sex difference was included in the study.

Educational Status:

School education plays an integral role in the development of an individual's personality. It not only broadens the
thinking capacity and outlook of an individual but also widens the horizon of knowledge. It is very well accepted that whereas school education has a direct impact on the level of intelligence of an individual, it also simultaneously helps in building up other aspects of psychological development. For instance, it is generally believed that an intelligent person has a better control over his emotions than a person with less intelligence. However, this is a debatable belief and needs further investigation.

Keeping these views in mind, it was desirable to know whether children of different sex in different nutritional grades differ in their mental abilities and behaviour when given school education and when deprived of school education. Hence, the variable of educational status was included in the present study.

Interactional Groups:

In order to study in detail, the interaction between each group of all independent variables, 16 sub-groups were taken into consideration. The analysis of these interactional groups could give us a better picture about interdependence of three main variables upon each other and also confirm some of the well-known beliefs. For instance, in the present study comparative data of the following kind could only be arrived at by such interactional group analysis.
(a) Lesser females are educated (50.39%) in comparison of males (64.16%).

(b) Females are neglected in regard to nutritional intake. Females in IIIrd grade of malnutrition are 14.17% whereas males are 9.8%.

Besides above mentioned comparative groups, there are other non comparative groups which played a vital role in selection of the sample.

Lower Socio-Economic Strata:

Incidence of malnutrition increases because of two main reasons: poverty and lack of nutritional awareness. Both these causes are a part of lower socio-economic strata, thus higher incidence of malnutrition is found amongst them. Whereas in higher socio-economic strata malnutrition may be due to lack of awareness but is of much lower percentage. Hence urban slums were chosen for the selection of the sample since malnourished children were easily identifiable due to higher incidence.

Age Group:

It has been established by long term studies that effect of malnutrition on a child's development is more severe if the child has suffered from malnutrition either during prenatal period, early infancy or upto 5 years of age.

* These figures indicate the percentages of the present study by the investigator.
Consequences of malnutrition at such ages are retardation of physical growth, development and learning abilities and behaviour. (Venkatachalam, 1975). According to the report of study on the development of the pre-school child by Ministry of Education and Social Welfare (1972), it is in the first six years of life that the child is most vulnerable. Medical evidence has also shown that if health and nutrition are not neglected within the first few years of life, the learning capacity of the child is likely to improve even when its conventional intelligence is within or below the normal range.

In children malnutrition is associated with lower intelligence quotient than normal intelligence. Earlier the malnutrition more profound psychological retardation and impaired learning will be. Along with psychological retardation growth also suffers due to malnutrition.

This is the age period in which underprivileged children in many areas of the world frequently have varying degrees of protein malnutrition, especially after weaning, when the intake of nutritious milk and other animal protein is drastically cut and the child becomes dependent on the mother's resourcefulness in obtaining local and seasonal foods.

The fact that 60 percent of the mental growth is completed by the time child is four year old (Sharma, 1975) and that relatively there is three times as much mental development in the first six years of life as in the following twelve years (Ogburn and Nimkoff, 1968) led us to select the age group of six to twelve years for the present investigations on children.
(c) **Design:**

In the present study I.Q. for general intelligence and score on CBCL are dependent variables. Other dependent variables are:

(a) I.Q. for Speed of Response.

(b) I.Q. for Memory.

(c) I.Q. for Perception of Form.

(d) I.Q. for Comprehension.

(e) I.Q. for Sensation.

(f) I.Q. for Similarities.

(g) I.Q. for Reasoning.

(h) I.Q. for Practical Judgement.

(i) I.Q. for Vocabulary.

(j) I.Q. for Imagery.

(k) I.Q. for Ideational Judgement.

The main independent variables are:

1. Nutritional Status.
2. Sex Difference.
3. Educational Status.

Nutritional status as a measure of the degree of malnutrition is treated on four levels - Normal, First, Second and Third grade. (N, I, II, and III).

Sex difference is treated at two levels - Male and Female. (M, F).

Educational status is treated on two levels - School going and Non school going. (SG, NSG).
The level of intelligence and emotional maladjustment have been studied in relation to -

Normal grade of nutrition and First grade of malnutrition
   Second grade of malnutrition
   Third grade of malnutrition.

First grade of malnutrition and Second grade of malnutrition
   Third grade of malnutrition.

Second grade of malnutrition and Second grade of malnutrition
   Third grade of malnutrition.

Second grade of malnutrition and Third grade of malnutrition.

Male and Female.

School going and Non school going.

Hypothesis:

(A) There is no difference between malnutrition and level of intelligence.

1. The level of intelligence does not differ in relation to -
   
i. Normal grade nutrition & I\textsuperscript{st} grade malnutrition.
   ii. Normal grade nutrition & I\textsuperscript{nd} grade malnutrition.
   iii. Normal grade nutrition & I\textsuperscript{rd} grade malnutrition.
   iv. I\textsuperscript{st} & I\textsuperscript{nd} grade malnutrition.
   v. I\textsuperscript{st} & I\textsuperscript{rd} grade malnutrition.
   vi. I\textsuperscript{nd} & I\textsuperscript{rd} grade malnutrition.
   vii. Male and Female.
   viii. School going & Non-school going.
2. The ability of speed of Response does not differ in relation to -
   i. Normal grade nutrition & 1st grade malnutrition
   ii. Normal grade nutrition & 2nd grade malnutrition
   iii. Normal grade nutrition & 3rd grade malnutrition
   iv. 1st & 2nd grade malnutrition.
   v. 1st & 3rd grade malnutrition.
   vi. 2nd & 3rd grade malnutrition.
   vii. Male and Female.
   viii. School going & Non-school going.

3. The ability of Memory does not differ in relation to -
   i. Normal grade nutrition & 1st grade malnutrition
   ii. Normal grade nutrition & 2nd grade malnutrition
   iii. Normal grade nutrition & 3rd grade malnutrition
   iv. 1st & 2nd grade malnutrition.
   v. 1st & 3rd grade malnutrition.
   vi. 2nd & 3rd grade malnutrition.
   vii. Male and Female.
   viii. School going & Non-school going.

4. The ability of Perception of Form does not differ in relation to -
   i. Normal grade nutrition & 1st grade malnutrition.
   ii. Normal grade nutrition & 2nd grade malnutrition.
   iii. Normal grade nutrition & 3rd grade malnutrition.
   iv. 1st & 2nd grade malnutrition.
   v. 1st & 3rd grade malnutrition.
vi. II\textsuperscript{nd} & III\textsuperscript{rd} grade malnutrition. 

vii. Male and Female.

viii. School going & Non-school going.

5. The ability of Comprehension does not differ in relation to -

i. Normal grade nutrition & I\textsuperscript{st} grade malnutrition.

ii. Normal grade nutrition & II\textsuperscript{nd} grade malnutrition.

iii. Normal grade nutrition & III\textsuperscript{rd} grade malnutrition.

iv. I\textsuperscript{st} & II\textsuperscript{nd} grade malnutrition.

v. I\textsuperscript{st} & III\textsuperscript{rd} grade malnutrition.

vi. II\textsuperscript{nd} & III\textsuperscript{rd} grade malnutrition.

vii. Male and Female.

viii. School going & Non-school going.

6. The ability of Sensation does not differ in relation to -

i. Normal grade nutrition & I\textsuperscript{st} grade malnutrition.

ii. Normal grade nutrition & II\textsuperscript{nd} grade malnutrition.

iii. Normal grade nutrition & III\textsuperscript{rd} grade malnutrition.

iv. I\textsuperscript{st} & II\textsuperscript{nd} grade malnutrition.

v. I\textsuperscript{st} & III\textsuperscript{rd} grade malnutrition.

vi. II\textsuperscript{nd} & III\textsuperscript{rd} grade malnutrition.

vii. Male and Female.

viii. School going and Non-school going.

7. The ability of Similarities does not differ in relation to -

i. Normal grade nutrition & I\textsuperscript{st} grade malnutrition.

ii. Normal grade nutrition & II\textsuperscript{nd} grade malnutrition.

iii. Normal grade nutrition & III\textsuperscript{rd} grade malnutrition.

iv. I\textsuperscript{st} & II\textsuperscript{nd} grade malnutrition.
v. 1st & 3rd grade malnutrition.
vi. 2nd & 3rd grade malnutrition.
vii. Male and Female.
viii. School going & Non-school going.

8. The ability of Reasoning does not differ in relation to -

i. Normal grade nutrition & 1st grade malnutrition.
ii. Normal grade nutrition & 2nd grade malnutrition.
iii. Normal grade nutrition & 3rd grade malnutrition.
iv. 1st & 2nd grade malnutrition.
v. 1st & 3rd grade malnutrition.
vi. 2nd & 3rd grade malnutrition.
vii. Male and Female.
viii. School going & Non-school going.

9. The ability of Practical Judgement does not differ in relation to -

i. Normal grade nutrition & 1st grade malnutrition.
ii. Normal grade nutrition & 2nd grade malnutrition.
iii. Normal grade nutrition & 3rd grade malnutrition.
iv. 1st & 2nd grade malnutrition.
v. 1st & 3rd grade malnutrition.
vi. 2nd & 3rd grade malnutrition.
vii. Male and Female.
viii. School going & Non-school going.

10. The ability of Vocabulary does not differ in relation to -

i. Normal grade nutrition & 1st grade malnutrition.
ii. Normal grade nutrition & 2nd grade malnutrition.
iii. Normal grade nutrition & IIIrd grade malnutrition.
iv. 1st & IInd grade malnutrition.
v. 1st & IIIrd grade malnutrition.
vi. IInd & IIIrd grade malnutrition.
vii. Male and Female.
viii. School going & Non-school going.

11. The ability of Imagery does not differ in relation to -

i. Normal grade nutrition & 1st grade malnutrition.
ii. Normal grade nutrition & IInd grade malnutrition.
iii. Normal grade nutrition & IIIrd grade malnutrition.
iv. 1st & IInd grade malnutrition.
v. 1st & IIIrd grade malnutrition.
vi. IInd & IIIrd grade malnutrition.
vii. Male and Female.
viii. School going & Non-school going.

12. The ability of Ideational Judgement does not differ in relation to -

i. Normal grade nutrition & 1st grade malnutrition.
ii. Normal grade nutrition & IInd grade malnutrition.
iii. Normal grade nutrition & IIIrd grade malnutrition.
iv. 1st & IInd grade malnutrition.
v. 1st & IIIrd grade malnutrition.
vi. IInd & IIIrd grade malnutrition.
vii. Male and Female.
viii. School going & Non-school going.
13. There is no significant level of interaction within the four levels of nutritional status regarding level of intelligence.

14. There is no significant level of interaction between nutritional status and sex difference regarding level of intelligence.

15. There is no significant level of interaction between nutritional status and educational status regarding level of intelligence.

16. There is no significant level of interaction between sex difference and educational status regarding level of intelligence.

17. There is no significant level of interaction between nutritional status, sex difference and educational status regarding level of intelligence.

(B) There is no difference between malnutrition and emotional maladjustment.

1. Emotional maladjustment does not differ in relation to -
   i. Normal grade nutrition & 1st grade malnutrition.
   ii. Normal grade nutrition & 2nd grade malnutrition.
   iii. Normal grade nutrition & 3rd grade malnutrition.
   iv. 1st & 2nd grade malnutrition.
   v. 1st & 3rd grade malnutrition.
   vi. 2nd & 3rd grade malnutrition.
   vii. Male and Female.
   viii. School going & Non-school going.
2. There is no significant level of interaction within the four levels of nutritional status regarding emotional maladjustment.

3. There is no significant level of interaction between nutritional status and sex difference regarding emotional maladjustment.

4. There is no significant level of interaction between nutritional status and educational status regarding emotional maladjustment.

5. There is no significant level of interaction between sex difference and educational status regarding emotional maladjustment.

6. There is no significant level of interaction between nutritional status, sex difference and educational status regarding emotional maladjustment.

(C) There is no difference between level of intelligence and emotional maladjustment.

1. There is no correlation between two sets of scores on Binet Kamat Intelligence Scale and Child Behaviour Checklist in:
   
   i. Normal grade of nutrition.
   ii. First grade of malnutrition.
   iii. Second grade of malnutrition.
   iv. Third grade of malnutrition.
   v. Males.
   vi. Females.
   vii. School going.
   viii. Non-School going.
Description of the Tools Used:

The following tools were used for assessing the level of intelligence (I.Q.) and emotional maladjustment (score on CBCL) on 300 children with different nutritional status, sex difference and educational status.

1. Binet Kamat Intelligence Scale (1964):

BKIS is an Indian revision of Binet Stanford Scale of 1916 and its further revisions. After initial experiments of Wundt in 1879 and Cattell in 1890, publication of intelligence test of Binet and Simon in 1905, 1908, and 1911 were the landmarks in history of mental testing.

With an objective to select the right type of intelligence test, Alfred Binet after grading certain tests according to their difficulty came out with his first scale in 1905. These tests were further elaborated and rearranged in an age scale in his 1908 and 1911 versions. Other important revisions of this scale are Goddard 1911, Kuhlmann 1912, 1922, Stanford revision of Terman, 1916 and further Stanford revision of 1937 by Lewis, Terman and Merrill.

In India the first attempt to adapt the Binet scale was done by Prof. C. Herbert Rice of Lahore. But as this adaptation had not covered many important aspects V.V. Kamat (1967) undertook a revision in 1934 to suit Indian conditions. Sample selected for experiments was neither very advanced nor very backward, thus representing the general population of India. Besides translating the test in Marathi, Kannada and Gujarati,
many tests and material of the scale were replaced or amended to suit Indian conditions. A reappraisal of the Bombay, Karnataka revisions was done in 1964 with a view to see whether the original tests were valid in the changed circumstances after 30 years or not. The only difference found was that the I.Q. obtained in a specific age group is somewhat higher than 1934 version. This difference may in part be due to general advancements in the level of intelligence of the population within the gap of 30 years.

BKIS is a standardized performance scale that assesses I.Q. of an individual on general intelligence and also I.Q. on eleven sub-factors.

1. Speed of Response.  
2. Memory.  
3. Perception of form.  
5. Sensation.  
7. Reasoning.  
8. Practical judgement.  
10. Imagery.  
11. Ideational judgement.

The I.Q. on BKIS was calculated by first determining Mental age and Chronological age of the child on the basis of Basal age and Ceiling age. Thus $I.Q. = \frac{MA}{CA} \times 100$

Basal age = Age in which all determined tests are passed.

Ceiling age = Age in which all determined tests are not passed.

This test contains total 97 sub-tests all distributed in different age groups ranging from 3 to 22 years.
For the purpose of allocating the tests to the proper ages Prof. Burt assumed that the average percentage is to be taken into account rather than the percentage of any one year because a test can not be passed by only 20% of the age group to which it is assigned, but it may be passed by 70 to 80% of another age group. Since this assumption was not very practical to be followed, the method adopted in the 1964 - reappraisal based on 1934 revision of Kamat is to take the average percentage of the year of test, the year previous and the year following.

The real criterion of the accuracy of the scale is the coincidence of the mean mental chronological age of every age group of the scale, or the mean I.Q. of every age group in the different parts of the scale coming as close as possible to 100. But only after three trials mean I.Q. closer to 100 was obtained. The standard deviation of I.Q. for the entire group was 18.7 while Terman found it to be 13 for his group.

Although V.V. Kamat has not mentioned, the reliability of his revision of Stanford Binet, a study by Chen et al (1982) can be quoted here to show how reliable and valid the items used in this scale are. They studied the extent to which different cultural groups (Chinese and Australian) vary in their concepts of intelligence and whether items on Stanford Binet and WAIS represented intellectual aspect of an individual or not. Ratings indicated that the majority of items in both the scales appear relevant for both Australian and
Chinese subjects. Amongst items rated on relevance and on difficulty, there are some which are included in BKIS used in present investigation. In descending order of rating they are: Picture analysis, Reasoning, Picture absurdity, Repeating passages, Similarities, Differences, Repeating digits reversed, Repeating digits and Vocabulary.

Validity of the Scale as a Whole:

The validity of the scale was tested by correlating the I.Q. as determined by the scale with the teacher's estimates of intelligence. This correlation coefficient between the I.Q. and the teachers estimates worked out to be nearly 0.5, which is fairly high. It shows how the scale as a whole agrees with the teacher's estimates.

Validity of the Tests:

The validity of each test was examined as follows: a four fold table was drawn up and the correlation of the pluses and minuses of each test with mental age, as determined by the scale as a whole was worked out. The correlation coefficients of the tests were generally higher than 0.7, thus testifying to the validity of the tests.

As BKIS is widely used in research undertaken in India, the latest available reappraisal of 1964 based on the 1934 revision was used. The data was collected from the lower socio-economic strata, so there was no possibility of changing the norms so rapidly and during the try out it was found satisfactory. This is why the local revision based on
the smaller sample and for the purpose of Ph.D work was ignored.

2. Child Behaviour Check List:

This CBCL developed and standardized by T. Achenbach (1983) was used to measure emotional maladjustment. This checklist is designed to record in a standardized format the behavioural problems and competencies of children aged 4 to 16 years. This standardized paper pencil measure of emotional behaviour consists of 113 items which are scored on a 3 step response scale of "Yes—Sometimes—No" type. This checklist covers mainly 12 emotional behaviour characteristics differing in boys and girls. They are—

1. Schizoid or anxious.
2. Depressed.
3. Uncommunicative.
4. Obsessive compulsive.
5. Somatic complaints.
8. Aggressive.
10. Schizoid obsessive
11. Sex problems.
12. Cruel.

These items obtain parents report of the amount, and quality of their child's participation in activities, games, hobbies, chores, friendships, school functioning and how well the child gets along with others or plays and works by himself/herself.

Norms for the test are available on a total of 2,300 children which are further grouped according to age. Each
sample of boys and girls aged 6 to 11 and 12 to 16 years are numbered 450 whereas each sample of boys and girls aged 4 to 5 years are numbered 250. Percentile norms for boys and girls have also been provided.

Reliability:

The authors have calculated the intraclass correlation coefficient (ICC) from one way analysis of variance to assess various types of reliability in scoring the behaviour problem and social competence items of the CBCL. Used in this way, the ICC reflects the proportion of total variance in item scores that is associated with differences among the items themselves, after the variance due to a specific source of unreliability has been substracted.

Test-Retest Reliability of Item Scores:

Ratings of non-referred children from CBCL were used to assess test retest reliability. The overall ICC was 0.952 for the 113 behaviour problems. Long term stability was assessed by computing ICC for CBCL obtained from 12 mothers of non-referred children at 3 month intervals. These ICCs were 0.838 for behaviour problems ($p > 0.001$).

Inter-Interviewer Reliability of Item Scores:

To assess this reliability, scores obtained by 3 interviewers on 241 matched trials of children were compared for a total sample of 723 children. The overall ICC was 0.959 for the behaviour problems ($p > 0.001$).
Test-Retest Reliability of Scale Scores:

In order to assess agreement in both rank ordering and magnitude of scale scores, the authors of CBCL computed test retest reliabilities for raw scale scores in terms of Pearson correlations and 't' tests of differences between the scores. Reliabilities for each sex, age group on behaviour problem scales are separately shown. ICC of all these groups is higher than 0.61 ($P > 0.100$).

Validity:

Content Validity -

The content validity of the CBCL is viewed in terms of whether its items are related to the clinical concern of parents and mental health workers. It was found that 116 of the 118 behaviour problems items were significantly ($P > 0.01$) associated with clinical status, as established independently of the CBCL.

Construct Validity -

Correlations between the total CBCL behaviour problem score and total scores on other widely used parent rating forms are as high as those typically found between tests of general intelligence, while correlations between profile scales and the scales of the other rating forms are in the range often found among the subtests of different intelligence tests.

Criterion-Related Validity -

Using referral for mental health services as a criterion,
the authors of CBCL presented evidence for criterion related validity in terms of significant differences ($P > 0.001$) between demographically-matched referred and non-referred children on all profile scores for all sex/age groups. Most of the affects associated with clinical status accounted for a large percentage of variance in the scores with the effects of socio-economic status, race and age within sex/age group partialled out. Socio-economic status had more significant effects than race or age with sex/age groups, but all demographic effects were small.

Although there are many other tests in the field of psychology, CBCL is a recent check list with comprehension and latest list of behaviour problems in which more or less the complete picture of various manifestations is found.

This CBCL was selected for the present investigation as the applicability of each item of CBCL in our culture has been estimated by Dr. Pratiksha H. Raval during her clinical practice and it was found satisfactory. However, this work is not published as this is a pre-pilot study of standardization of the CBCL in Indian cultural setting.

(E) Method of Administering Tests:

The tests were administered in two sessions. In the first session BKIS was administered on the subject. The child chosen for the study was first made comfortable before administering the test. Along with the informal talk to make the child feel at ease, following instructions were given:
"I am going to either ask you some questions, or make you repeat some numbers or ask you to perform few tasks. You should try to follow the instructions carefully and do as you are asked to do. If you are not able to understand the instructions, you can ask for clarification without any hesitation. But instructions will not be repeated again and again. Don't be afraid to answer and try to answer all the questions so that you can get more marks. Now shall we start?"

After the child is mentally prepared to perform on BKIS, the test is started. Simultaneously the distracting factors like crowd, noise etc. are tried to be controlled, and kept minimal, thus enabling the subject to perform with full concentration. Time factor plays a vital role in the administration of the test. Each and every sub-test is administered according to the time allotted to it. Thus total time taken differs from subject to subject depending on till what age and how many sub-tests the child is able to attempt.

In the second session the parents of the same child who was selected for BKIS were contacted and were asked to describe their child in regard to the 113 items of CBCL on the following scale:

1. Very true or often true,
2. Sometimes or somewhat true,
3. Not true (as far as you know).

After the parent consented to be interviewed, the following instructions were given:
I would like to ask you some questions about this (selected subject) child of yours. There are total 113 questions. I will read each question and you have to answer either very true or, sometimes true or not true as closely as it describes your child. Please do not hesitate in telling the truth as by hiding the facts it will not give a clear picture of your child's behavioural patterns. For every question think how closely on this three point scale you can describe your child and then answer. Now before I start tell me about your and your spouse's occupation?

After the instructions, all the 113 items are asked and it is insisted that the parent answers each and every question. Instructions and the test required in all a time of maximum thirty minutes. For both the sessions subjects were tested on door to door basis at their willingness and convenience.

(F) Statistical Analysis:

To verify the hypothesis formed, following statistical analysis were carried out.

1. I.Q. : I.Q. on general intelligence and on all the factors of intelligence was obtained for every individual subject by BKIS.

2. Score : Total score on all the 113 items of CBCL was obtained for every individual subject on the following three point rating scale.
1. Very true or often true  2
2. Sometimes or somewhat true  1
3. Not true  0

3. Means (\(\bar{X}\)) and Standard Deviation (S.D.): Measures of central tendency and variability. Means (\(\bar{X}\)) and Standard Deviations (S.D.) were calculated for all the sub-groups on both BKIS and CBCL.

4. 't' test: To analyse the significance of mean differences the 't' test was used.

5. 'F' one way analysis of variance: Since the main aim of the study is to analyse the effects of PEM on level of intelligence and emotional maladjustment, 'F' one way analysis of variance, for unequal number of observations in cells was used.

6. 4 X 2 X 2 Factorial design for the analysis of variance: An analysis was planned to study the interactional effect of nutritional status, sex difference and educational status on level of intelligence and emotional maladjustment, for which 4 X 2 X 2 factorial unweighted means analysis of variance for unequal number of observations in cells was used, as suggested by Winer (1962).

7. Graphic Pattern Profile:

1. To further study the interactional relation between the independent variables in regard to all eleven sub-factors on BKIS, graphic pattern profiles were made.
2. To have a proper visual perspective of scoring pattern amongst the factors of CBCL, graph profiles for males and females were made.

8. Significant Difference between two percentages of CBCL items: Percentages of occurrence of each CBCL item were calculated. On this basis significant difference between two percentages was calculated.

9. Correlation Coefficient: To study the correspondence between two sets of scores on BKIS and CBCL, correlation coefficient by product moment method was calculated.