Chapter - IV

DESIGN OF THE STUDY
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DESIGN

In the present study experimental-control group, pre-post test 2x2x3 factorial design was used. The independent variables in the present study were Health and Nutrition Education (HNE) of mothers, Socio-Economic Status (SES) and Age of pre-school children. Dependent variables were Height, Weight, Head-Circumference, Arm-Circumference, Chest Circumference, DQ₁ (on DST), DQ₂ (on VSMS), DQ_comb (Average of DQ₁ and DQ₂) Cognitive Skills & Motor Skills of pre-school children, Knowledge and Practices of mothers. Treatment variable of Health and Nutrition Education (HNE) was studied at two levels i.e. Control (CG) and Experimental Group (EG). Socio-Economic Status (SES) was also studied at two levels i.e. High SES (SESₗ) and Low SES (SESₗ). Age of children was studied at three levels i.e. 2-3 years, 3-4 years & 4-5 years. The layout of the factorial design used in the present study is given in Figure 4.1. The total number of combinations, come out to be 2x2x3 = 12 as shown in Figure 4.2.

Out of the twelve groups, six groups were of experimental mothers and six groups were of control mothers. The Knowledge and Practices of all the twelve groups of mothers were assessed before and after imparting them Health and Nutrition Education. Six experimental groups were imparted Health and Nutrition Education Anthropometric Measurements, DQ₁, DQ₂, DQ_comb scores, Cognitive and Motor Skill scores of all the pre-schoolers were also taken before and after imparting Health and Nutrition Education to their mothers. There were three Post Tests. Post Test I was conducted six months after the training of mothers. After Post Test I, mothers were again taught the same facts about Health and Nutrition for one day for two hours. Post Test II was conducted
Figure 4.1

Representing Layout of the Factorial Design

Levels of SES

Control

Experimental

Levels of HNE

Low SES

High SES

Age ranges

2-3

3-4

4-5

2 years

3 years

4 years

5 years
Figure 4.2

Representing number of combinations in 2x2x3 design

<table>
<thead>
<tr>
<th>CH 2-3 years - CG₁</th>
<th>EH 2-3 years - EG₁</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH 3-4 years - CG₂</td>
<td>EH 3-4 years - EG₂</td>
</tr>
<tr>
<td>CH 4-5 years - CG₃</td>
<td>EH 4-5 years - EG₃</td>
</tr>
<tr>
<td>CL 2-3 years - CG₄</td>
<td>EL 2-3 years - EG₄</td>
</tr>
<tr>
<td>CL 3-4 years - CG₅</td>
<td>EL 3-4 years - EG₅</td>
</tr>
<tr>
<td>CL 4-5 years - CG₆</td>
<td>EL 4-5 years - EG₆</td>
</tr>
</tbody>
</table>
**Figure 4.3**

Representing Design of the present study

**DESIGN**

<table>
<thead>
<tr>
<th>Experimental Groups</th>
<th>Control Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>EG₁ EG₂ EG₃ EG₄ EG₅ EG₆</td>
<td>CG₁ CG₂ CG₃ CG₄ CG₅ CG₆</td>
</tr>
</tbody>
</table>

**Pretest**

A. Measurement of Physical Growth Anthropometric measurements (measurement of Height, Weight, Head Circumference, Arm Circumference and Chest Circumference) of pre-schoolers.

   1. Technique described by Jelliffe

B. Measurement of Mental Growth

   1. Measurement of DQ, DQ₂, DQ₃ scores
   2. Developmental Screening Test by Bharathraj.

B. Measurement of DQ, DQ₂, DQ₃ scores

   1. Vineland Social Maturity Scale by Malin

C. Measurement of developmental skills in the area of Cognitive and Motor development.

   1. Portage Kit (Indian Adaptation by Kohli)


   1. Questionnaire developed by the investigator.

E. Assessment of Socio-Economic Status.

   1. SES scale by Kuppuswamy.

**Training**

One week training (one hour per day) on Health and Nutrition to each Experimental Group.

**Post Tests**

On A, B, C and D for recording gains in Anthropometric measurements, DQ₁, DQ₂, DQ₃ scores, Cognitive and Motor skills of pre-schoolers and Knowledge and Practices of mothers.

**Post Test I**

Six Months after training

**Revision Period I**

One day revision for two hours after Post Test I

**Post Test II**

Twelve months after training

**Revision Period II**

One day revision for two hours after Post Tests II

**Post Test III**

Eighteen months after training
twelve months after the first training of mothers. After Post Test II, experimental mothers were once again given revision of what was taught to them six and twelve months ago. Post Test III was conducted eighteen months after the first training of mothers. Pictorial form of the design of the present study is represented in Figure 4.3.

The present design of the study was such that Health and Nutrition Education (HNE) of mothers was the major variable between the control and experimental groups. All other variables such as socio economic status, age, sex, living conditions and the schools they attended were the same for control and the experimental groups. Hence the observations were expected to provide an impact of Health and Nutrition Education of mothers.

SAMPLE

To conduct the present study, a sample of 600 mothers and their pre school children belonging to different socio economic levels and different age groups were randomly selected from different schools of Ambala city. Out of the sample of 600, 300 were the mothers and 300 were their pre school children. But after eighteen months only 240 children were available for the impact study. Those who were available for six months or twelve months were not taken for the impact study. Thus in the final sample, there were 240 pre school childrens and 240 were their mothers. (Total = 480). Out of the sample of 240 mothers, 120 formed an EG and 120 formed a CG. Out of the sample of 120 mothers, 60 mothers were from High SES and 60 mothers were from Low SES. Out of the sample of 60 mothers of High SES, 20 mothers had children of 2 to 3 years age, 20 mothers had children of 3 to 4 years age and 20 mothers had children of 4 to 5 years age. Out of the sample of 60 mothers of Low SES, 20 mothers had children of 2 to 3 years, 20 mothers had children of 3 to 4 years and 20 mothers had children of 4 to 5 years. Similarly out of the sample of 240 pre school children, 120 formed an EG and
Figure 4.4

Representing final sample of the present study

Final Sample

Mothers

(240)

Pre School Children

(240)

Experimental Group

(120)

Control Group

(120)

Experimental Group

(120)

Control Group

(120)

High SES

(60)

Low SES

(60)

High SES

(60)

Low SES

(60)

High SES

(60)

Low SES

(60)

High SES

(60)

Low SES

(60)

2-3 years (20)

3-4 years (20)

4-5 years (20)

2-3 years (20)

3-4 years (20)

4-5 years (20)

2-3 years (20)

3-4 years (20)

4-5 years (20)

2-3 years (20)

3-4 years (20)

4-5 years (20)

2-3 years (20)

3-4 years (20)

4-5 years (20)
120 formed a CG. Out of this 120 pre schoolers, 60 children were from High SES and 60 children were from Low SES. Out of the sample of 60 children of High SES, 20 children were of 2 to 3 years of age, 20 children were of 3 to 4 years age and 20 children were of 4 to 5 years age. Out of the sample of 60 children of Low SES, 20 children were of 2 to 3 years age, 20 children were of 3 to 4 years age and 20 children were of 4 to 5 years age. Figurical representation of the final sample has been shown in Fig 4.4.

High SES children were mostly from Public Schools and Low SES children were from Government Schools. In a group of same age, equal number of males and females were included The break up of the sample is shown in Table 4.1.

### Table 4.1
Table showing break up of the sample

<table>
<thead>
<tr>
<th>Name of the school</th>
<th>Initial Sample</th>
<th>Final Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.A.V Public School</td>
<td>40</td>
<td>32</td>
</tr>
<tr>
<td>Ambala City</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.A.V. Public School</td>
<td>34</td>
<td>28</td>
</tr>
<tr>
<td>Model Town</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambala City</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angel Public School</td>
<td>22</td>
<td>18</td>
</tr>
<tr>
<td>Model Town</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambala city</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Dua Model School</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>Model town</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambala City</td>
<td></td>
<td></td>
</tr>
<tr>
<td>St' Paul School</td>
<td>30</td>
<td>24</td>
</tr>
<tr>
<td>Model Town, Ambala City</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government Nursery School</td>
<td>26</td>
<td>20</td>
</tr>
<tr>
<td>Baldev Nagar, Ambala City</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government Nursery School</td>
<td>32</td>
<td>26</td>
</tr>
<tr>
<td>Prem Nagar, Ambala city</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government Nursery School</td>
<td>34</td>
<td>26</td>
</tr>
<tr>
<td>Model Town, Ambala City</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sanatam Dharam School</td>
<td>30</td>
<td>26</td>
</tr>
<tr>
<td>Ambala city</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government Nursery School</td>
<td>28</td>
<td>22</td>
</tr>
<tr>
<td>Durga Nagar, Ambala city</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>240</td>
</tr>
</tbody>
</table>
TOOLS USED

For the purpose of the proposed study, the following tools were used:

(1) Body measurements were recorded using the technique described by Jelliffe (1966).

(2) Developmental Screening Test (DST) by BharathRaj (1977).

(3) Nagpur adaptation of Vineland Social Maturity Scale (VSMS) by Malin (1965).


(6) A Questionnaire developed by the investigator.

DESCRIPTION OF TOOLS

1. Technique described by Jelliffe

In a technique described by Jelliffe the landmarks used for these measurements are indicated in Fig. 4.5. In this technique, the weight is measured using a (Krups) weighting machine. The circumferential requirements are made with a flexible steel tape of minimum thickness of one cm.

(i) Height: is measured against a straight cemented vertical wall on which scale is made with a dark black pencil. The child after removing the shoes is made to stand against the wall in an erect position with heels together. The abdomen is pressed inside by one hand the knees are kept straight by the other hand of the helper. A flat sheet is held over the highest point of the head (Vertex) and reading taken.
Fig 4.5. Representing points of anthropometric measurements

- LINEAR MEASUREMENT
- CIRCUMFERENTIAL MEASUREMENTS

- HEAD
- CHEST
- ARM
- HEIGHT
(ii) Weight is recorded on weighting machine (Krups). The reading is taken after the needle is stabilised. The machine is calibrated with a 10 kg weight at least 3-4 times daily, during weighting of children. The children are weighed with minimum of clothing.

(iii) Head Circumference: is measured by placing the tape firmly round the frontal bones just superior to the supraorbital ridges, passing it round the head at the same level on each side and laying it over the maximum occipital prominence at the back.

(iv) Mid Upper Arm Circumference: is measured at right angle to the long axis of the humerus around the arm without compressing the tissues. Prior to recording this the child’s left arm is kept relaxed and slightly away from his side and a mark is placed on the upper arm-midway between the acromian and olecranon.

(v) Chest Circumference: is measured by placing the tape at the nipple line in mid-inspiration.

2. Developmental Screening Test by BharathRaj

Simplicity, precision, objectivity, reliability, validity and economy are the cardinal features of a good psychological test. The Developmental Screening Test (DST) by Bharathraj(1977) meets these criteria satisfactorily. It is designed for the purpose of measuring mental development of children from birth to 15 years of age. Larger number of items at early age permits assessment of very young children. The test provides for a brief and fairly dependable assessment without requiring the use of performance tests. Appraisal can be done in semi-structural interview with the child and the parent or a person well acquainted with the child. In its present form DST can be repeatedly used in assessments.
Originally, 124 items were derived from earlier schedule and studies, out of which finally 88 items were settled upon by the frequency or their appearance in the various sources consulted. At earlier levels considerable number of motor behaviour items appear as it has many neurological and integrated behavioural implications and as such constitute the natural starting point for development itself. There are items of adaptive behaviour which represent sensory-motor adjustment objects, persons, and situations. Language behaviour items for a place which are inclusive of all visible and audible forms of communication, like vocalization, words etc. Personal social behavioural items also find a place as they comprise of a child's personal responsiveness to the social culture of which he is a member e.g., play, cooperativeness etc.

An explanatory note for each item is omitted as it is superfluous and unnecessary. Each item is discrete and self explanatory and can be assessed objectively by a parent or a teacher or a clinician. The point under consideration is whether the concerned behavioural characteristic has emerged, has become explicit/manifest in the behavioural repertoire of the child or not i.e., whether the child is capable of doing it or not.

The items included in the schedule stand for discrete and discernible characteristics representative of the respective age levels. At each age level, items are drawn from behavioural fields like motor development, speech-language development, and personal-social development. These behavioural items have been selectively chosen from the earlier schedules incorporating also the results from three Indian studies (Hedge, 1971; NCERT, 1971; Phatak, 1971). Items in DST donot always stand for the mean/median age at which they make appearance. Instead there is an upward tilt, giving the benefit to the child. Thus, for example, the item toilet control present' appears
at 3 years meaning thereby that at least by three years of age a normal child has acquired toilet control. Majority of normal children, i.e., about 70 to 90 percent of them should be able to perform the behavioural items present at the appropriate age levels.

Sixty percent of the items stand for clearly discernable behavioural characteristics enabling the clinician on the spot evaluation of the item. The remaining 40 percent of items can be evaluated based on the information given by a parent/relative. Here also the items are so chosen as to lessen the weightage of bias from the informant. The DST items are not to be scored quantitatively, it is more a clinical instrument intended for use in estimating the developmental status of a child.

Appraisal of the child is done as on other developmental schedules starting from a 'Basal Age' where all characteristics at a particular age are passed and generally moving through upper age levels. Assessment is simply a matter of determining how well a child's behaviour fits on age level constellation rather than another by direct comparison. The schedule has very few culturally laden items. Testing can be done in semi-structured interview with a parent or person well acquainted with the child.

3. Vineland Social Maturity Scale (Nagpur Adaptation)

Vineland Social Maturity Scale (VSMS) developed by Doll (1936) has been a useful instrument for estimating the differential social capacities of an individual. It measures the social competence of an individual. Social competence is a universal human attribute and is not something static. It varies with physical and cultural conditions according to time, place, and circumstances. Social competence may be defined as the functional ability of the human organism for exercising personal independence and social responsibilities.
Although VSMS is intended for use with a normal population as well as with the mentally deficient, it was first conceived as an aid in the diagnosis of feeble minded. It is intended to differentiate between mentally deficient individuals who are socially inadequate and those who are competent to conduct their personal and social lives. This scale is unique in having been constructed and standardized on the model of Stanford-Binet Scale. Since appearance in 1935, VSMS has been widely used in conjunction with the stanford-Binet and other intelligence tests to assess Social Age (SA) relative to Mental Age (MA) or Social Quotient (SQ) relative to intelligence Quotient (IQ).

Doll (1935) has noted a high correlation between SA and MA (r = .86) and Patterson (1943) reported all the more high correlation (r = .96) for the same relationship on a sample of normal children with respect to MA functioning. Goulet and Baylay (1963) have shown a consistent and high correlation between VSMS, SA, and Binet Mental Age. This scale was adapted by Malin in 1965 in Nagpur (Appendix II).

The original scale goes up to the 25th year of age but Nagpur centre has limited the Indian adaptation up to the 15th year as the cultural changes in the upper years are more drastic as compared to the norms of Doll's original scale. Unlike many other scales, this one is based upon a well defined rationale and has been systematically constructed (Malin, 1965). Behaviour items of the scale are arranged in order of normal average life age progression and are numbered in arithmetical sequence from 1 to 117. That is, items of the scale are arranged in order of increasing difficulty and represent progressive maturation and adjustment to the environment in the following 8 categories: (i) Self-help general, (ii) self help eating, (iii) self-help dressing, (iv) self direction, (v) occupation, (vi) communication, (vii) Locomotion and (viii) socialization.
Items are scored after interviewing some one well acquainted with the subjects (parents or teachers). SA is then obtained. This is divided by Chronological Age (CA), yielding a SQ. Since SA provides a basis upon which training can be programmed for children, the scale has had wide use in clinics for children and adolescents because it is a valuable device for interviewing and counselling both parents and children.

4. Portage Training kit

Portage guide to early education was originally developed by Shearer and Shearer (1972). Portage kit comprised of:

(i) A Developmental Check List

(ii) A box of Teaching Cards

(iii) Activity Charts

(i) Developmental Check List:

The items of the developmental check list are learnt during the time from birth to six years of age. These behaviours are listed in the order in which they are usually sequentially performed by a normal child from one period of development to another. This check list consists of items in a series of sequential behavioural steps in the developmental areas of (i) socialization (ii) language development (iii) self help skills. (iv) cognitive and (v) motor development. There is also an area called Infant stimulation which lists behaviour appropriate to children under six months of age and which cover all the five developmental areas.

Reliability check list on the Portage check list was conducted by two clinical psychologists who independently evaluated the performance simultaneously with the
primary testers. The mean percentage agreement was then calculated over all reliability checks. The mean percentage agreement on the portage check list was 93.0 their range being 87.1 - 97.7 % (Revill and Blonder, 1979)

(ii) Curriculum Guide:

Curriculum guide is a box of 580 cards. On one card there is corresponds to each behavioural description on the developmental check list.

Each card mentions a number of activities which have proved helpful on teaching the behaviour listed on the checklist. Some of the activities on card must be followed sequentially; Some are separate activities; rest of the cards contain both sequential and separate activities. For infant stimulation there were 45 cards pertaining to 45 items of brief description in the areas.

(iii) Activity Charts

It is a combined instructional and recording form for the parents. It contains the following features.

Behaviour of item to be taught, frequently for which it is to be taught, criterion of attainment and directions. Parents are asked to keep daily record of on the activity charts. This daily record of a week enables the more visitor to validate the parent's recording. This activity charts enables the lone advisor to offer suggestions and reinforcement.

In the present study Indian Adaptation of Portage Kit by Kohli et al. was used. Portage Basic Training Course for Early Stimulation of the Pre School Children in India is to reduce Developmental Deficits of Disadvantaged Young Children but it can be
successfully used for the normal preschool children. This Portage model consists of a checklist of behavioural items, the space to record individual child developmental progress and a card file listing possible methods of teaching those behaviours. The checklist and cards are divided into six sections/areas namely infant stimulation, socialization, language, self help, cognitive and motor. Each area is further divided into a number of behaviour skills ranging from 78-140 and they are arranged in order of the usual sequence in which they are learnt by a normally developing child. They are numbered area wise and divided into age groups. In the present study developmental checklist of Cognitive and Motor area are used.

5. Socio-Economic Status Scale, Urban (Kuppuswamy, Revision, 1981)

Kuppuswamy’s Socio-Economic Status Scale has two versions, viz., urban and Rural. In the present investigation the Urban version has been used.

The present scale has been standardized primarily for use in socio-economic investigations in Urban parts of India. This scale has been prepared mainly to provide a simple instrument which could be used without spending much time and effort and to obtain a correct measure of socio-economic status of a person.

While preparing the draft of the scale, attention was paid to the minimum variables to be kept in the scale. Experience of the author showed that the three important variables contributing to the socio-economic status in Urban areas are: education, occupation and income. So these variables were selected for the scale.

The final form of the Socio Economic Status Scale (Urban) contains seven items in each of the three variables. The Scale can be used by collecting information about an individual’s socio-economic background in a specially devised information
inventory. Then the score card can be completed and the status score of the individual can be worked out. The variables mentioned earlier in the scale are as follows:

(i) Education

With respect to education categorization depends upon the length and type of education. In the top category postgraduate as well as high grade professional education are put together. The lower grade professional education which is post high school will be put in the third category. Naturally illiterate is kept at the bottom. Weightage given to scale items are as shown below:

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>WEIGHTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Professional degree or Hons., M.A. and above</td>
<td>7</td>
</tr>
<tr>
<td>2. B.A. or B.Sc. Degree</td>
<td>6</td>
</tr>
<tr>
<td>3. Intermediate or Post-High School Diplomas</td>
<td>5</td>
</tr>
<tr>
<td>4. High School Certificate</td>
<td>4</td>
</tr>
<tr>
<td>5. Middle School Completion</td>
<td>3</td>
</tr>
<tr>
<td>6. Primary School or Literature</td>
<td>2</td>
</tr>
<tr>
<td>7. Illiterate</td>
<td>1</td>
</tr>
</tbody>
</table>

(ii) Occupation

Here the problem of categorization involves many complications. The lowest category consists of persons who are employed irrespective of their general and professional education or training.

All persons who are doing work which involves neither education nor training will come into the category of unskilled, e.g. watchman, peon, cooly, domestic servant, etc.
To the semiskilled group along all those persons who need some training to do their routine jobs efficiently, e.g., factory or workshop labourer, laboratory and library assistant, the car cleaner, etc. The petty shopkeeper may also be put into this category because he cannot pursue his occupation without some training regarding where to purchase, how to purchase and how to sell.

The skilled workers are those with a long training in a rather uncomplicated work. The mason, the carpenter, the mechanic, the radio serviceman, the engine driver, the car driver, the telephone or telegraph operator - all come into this category.

In the next group we have persons with some training in arithmetic and probably also in reading and writing. The work here is also essentially of a repetitive nature. The clerk, the typist, the accountant are typical if this group of workers. They must have some general education and some training. The elementary school teacher also comes into this group. The shopkeeper as well as the farm owner comes into this category. They cannot continue in their occupation unless they know how to keep accounts and look after the routine management. Many of railway occupations like station master, Guard etc., also go into this category. Similarly the news correspondent, the salesman and the insurance agent may also be put into this category so long as they operate at the routine level. If they show greater initiative, they move into higher categories.

The semi-professional group consists of occupation which involve post-high school or college education. They may also involve lower grade professional training but the jobs are essentially of a routine nature. We might put into this group not only mechanical and electrical engineers if the technological institutions, but also the High School Teachers, the Lecturers in the College, the Junior Administrators, the Junior Medical Practitioners, Insurance Inspectors, Commission Agents, Musicians, the Research Assistants, etc.
Finally, we have the professional group. This group is involved in decision making processes and in laying down policies and in executing them. They also imply creative work. Most of them have very high general as well as professional education. But this may not be always necessary. Historically as well as even in contemporary life we have seen many men who have risen to high eminence in the military, business, and administrative field with hardly any general it professional education. But all of them involve high organizational ability controlling a large number of human beings. Many professions also involve dealing with vast sums of money. To this category belong the doctors, senior administrative officers, senior lecturers, Readers and professors, Principals of Colleges, Advocates, Engineers, Planters owning or managing large estates, expert Musicians, Newspaper Editors, Auditors, Architects, Managing Directors of industrial and business firms, Bank Managers, etc. Weightage given to different categories of occupations are as follows:

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>WEIGHTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Professionals</td>
<td>10</td>
</tr>
<tr>
<td>2. Semi-Professionals</td>
<td>6</td>
</tr>
<tr>
<td>3. Clerical, Shop-owners, Farm-owners, etc.</td>
<td>5</td>
</tr>
<tr>
<td>4. Skilled worker</td>
<td>4</td>
</tr>
<tr>
<td>5. Semiskilled worker</td>
<td>3</td>
</tr>
<tr>
<td>6. Unskilled worker</td>
<td>2</td>
</tr>
<tr>
<td>7. Unemployed</td>
<td>1</td>
</tr>
</tbody>
</table>
(iii) Income

It must be recognized that while it is easier to obtain exact information regarding education and occupation, it is rather difficult to get exact information regarding income. On the other hand, the categories are very clear because they involve members. The only safety is that the items are broad so that light arrows will not greatly affect the weightage on this variable and much less the final SES score.

The appropriate weightage scores given against the items may be encircled for each category. The scores may then be entered in the last column. Addition of these three scales will give the final score which determines the status category. The corresponding status category out of the five categories of the scale appearing at the end of the card may be encircled and may also be put in the relevant box on the top of the Score card. Revised weightage given to different categories of income are as follows:

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>WEIGHTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Above Rs. 10,000 per month</td>
<td>12</td>
</tr>
<tr>
<td>2. Between Rs. 7500 and 10,000</td>
<td>10</td>
</tr>
<tr>
<td>3. Between Rs 5000 and Rs. 7500</td>
<td>6</td>
</tr>
<tr>
<td>4. Between Rs 4000 and Rs 5000</td>
<td>4</td>
</tr>
<tr>
<td>5. Between Rs 2500 and Rs. 4000</td>
<td>3</td>
</tr>
<tr>
<td>6. Between Rs 1500 and Rs. 2500</td>
<td>2</td>
</tr>
<tr>
<td>7. Below Rs. 1500</td>
<td>1</td>
</tr>
</tbody>
</table>
The scale and the social classes divided on the basis of the total score are as follows:

<table>
<thead>
<tr>
<th>Total Score</th>
<th>Scale</th>
<th>Social Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 - 29</td>
<td>I</td>
<td>Upper</td>
</tr>
<tr>
<td>16 - 25</td>
<td>I</td>
<td>Upper Middle</td>
</tr>
<tr>
<td>11 - 15</td>
<td>II</td>
<td>Lower Middle</td>
</tr>
<tr>
<td>5 - 10</td>
<td>IV</td>
<td>Upper Lower</td>
</tr>
<tr>
<td>Below 4</td>
<td>V</td>
<td>Lower</td>
</tr>
</tbody>
</table>

It is assumed that the differences between categories is more significant than differences within each category. It is further assumed that the weighted scores of the three variables could be added in order to get the final score for socio-economic status. It is also assumed that education, occupation and income are the three essential variables which determine the socio-economic status in a modern society. For the purpose of the present study, class I and II i.e. upper and upper middle were included in High SES category and class III, IV and V were included in low SES category.

6. Questionnaire developed by the Investigator

It was a demand of the present study to construct a questionnaire to know about awareness of mothers on Health and Nutrition. To judge their knowledge on Health, Hygiene, Sanitation, Food Constituents, Balanced diet, Malnutrition, Meal Planning, Food fads, Healthy eating and cooking practices, the questionnaire was prepared. To cull out items for the questionnaire a thorough survey of related literature was done. The investigator was also engaged in formal discussions with mothers and children...
field to get general overview of their food habits, health and nutrition practices. The investigator visited schools to check what children get as mid day meals and general standard of health and hygiene was observed. Detailed notes of their activities and responses were carefully recorded. These notes and recordings were thoroughly scrutinised. Based on these recordings, discussions, reactions, survey and related literature, the items for the questionnaire were prepared. The items were then written carefully in simple Hindi. There were two parts of the questionnaire. The first part contained 40 test items to test the knowledge of mothers on food, health and hygiene. This part of the questionnaire was Multiple Choice. Each test items had four responses, out of which only one response was correct. The arrangement of answers was done in such a manner so as to minimise the chances of earning credit merely by guess work alone. Item answered correctly was given a score of one. Those answered incorrectly or not answered were given zero. The second part of the questionnaire contained 30 test items to test the practices of mother on food, health and hygiene. This part had Yes/No type test items and then they had to give the reason for Yes or No. One mark was kept for Yes response and further one mark for telling the reason. After the construction of a questionnaire it was sent to 10 judges (Nutrition Experts) from Delhi and Chandigarh for evaluation. The questionnaire was pretested on few mothers. Keeping in view the suggestions of nutrition experts and the difficulties expressed by mothers at the time of pre-test, the questionnaire was suitably modified. Finally thirty seven test items were left in first parts, and twenty five test items were left in second part.

**PROCEDURE OF DATA COLLECTION**

The data of the present study was collected in the following phases:-

**Phase I - Identification of mothers and their pre-school children.**

In the first phase of data collection, mothers and their pre-school children
(2 to 5 years) were identified from different schools of Ambala City. Socio Economic Status of mothers and children were judged by administering SES scale urban by Kuppuswamy(1981).

Phase II - Pre Test Period

In the second phase, Pre Test was done by administering questionnaire (prepared by the investigator) to all the groups of mothers to test their initial Knowledge, and Practices on Health and Nutrition. The questionnaire was administered by the investigator personally on each mother. The investigator took the help of trained assistants for data collection. Proper instructions were given to the assistants and made sure that subject understands the question clearly and gives correct response. The subjects were open to ask any question for the clarification of doubts and it was fully explained to them.

Anthropometric measurements (Height, Weight, Head Circumference, Arm Circumference and Chest Circumference of all pre-schoolers) were recorded by a technique as described by Jelliffe. For measuring intelligence, Developmental Screening Test (DST) by Bharathraj(1977) was administered individually by the investigator on all the preschool children. The maximum behavioural items that a child should do were calculated as per their chronological age. Developmental Age (DA) of the child was calculated by the formula

$$DA = \frac{C.A}{Behavioural \ items \ a \ child \ should \ do} \times Behavioural \ items \ a \ child \ could \ actually \ do$$

Developmental Age (DA) of each child was then converted into Developmental Quotient (DQ) by using the formula.
In order to assess Social Age (SA) of all preschool children, Vineland Social Maturity Scale adapted by Malin (1965) was used. Here also the maximum behavioural items that a child should do were calculated as per their chronological age. Social Age (SA) of the child was calculated by the formula:

\[
SA = \frac{C.A.}{\text{Behavioural items a child should do}} \times \text{Behavioural items a child could actually do.}
\]

Social Age (SA) of each child was then converted into Social Quotient (SQ) by using the formula:

\[
SQ = \frac{SA}{C.A.} \times 100
\]

In the present study, DQ obtained from DST and SQ obtained from VSMS were hereafter called as \(DQ_1\) and \(DQ_2\) respectively. \(DQ_{comb}\) of each child was computed by averaging \(DQ_1\) and \(DQ_2\). \(DQ_{comb}\) was obtained for each child.

Cognitive abilities and Motor skills of preschool children were judged by administering checklists from Portage Kit (Indian Adaptation by Kohli, 1992). The maximum behaviour items a child should do on Cognitive and Motor Check list were calculated as per their chronological age. Cognitive and Motor scores were calculated in the similar way as \(DQ_1\) and \(DQ_2\).

**Phase III - Training Period**

In the third phase, Health and Nutrition Education was given to the mothers of only EG by the investigator herself. Each group was given education for one hour daily.
for one week. Subject matter for giving Health and Nutrition Education was prepared by the investigator. It included constituents of food, balanced diet, deficiency diseases in children, personal, food and environmental hygiene and preparation of low cost nutritious food for pre-school children. No education was given to the mothers of the CGs.

Phase IV  Post Test I

In the fourth phase, Post Test I was conducted on all the mothers and pre school children (Experimental and Control) six months after the education. In this post test, gain in anthropometric measurements, DQ scores, Cognitive and Motor Skill scores of pre-schoolers, Knowledge and Practices of mothers were noted by administering same tests which were administered at the time of Pre Test.

Phase V  Revision Period I

In the fifth phase, all that was taught to the mothers of EGs on Health and Nutrition was revised after the Post Test I. Revision was done for one day for two hours only. CGs were not given any revision.

Phase VI  Post Test II

Post Test II was conducted on all the mothers and pre school children (experimental and control) after twelve months of first training period. In this Post Test also gain in Knowledge and Practices of mothers on Health and Nutrition, gain in Anthropometric measurements, DQ scores, Cognitive and Motor skill scores of pre school children were noted by administering same tests which were administered at the time of Pre-Test.
Phase VII  Revision Period II

In the seventh phase, after the Post Test II, again the same facts on Health and Nutrition were revised with the mothers of EGs for one day for two hours only. This revision was done so that they donot forget what was taught to them twelve months ago.

Phase VIII  Post Test III

In the last phase, Post Test III was conducted on all the mothers and pre school children (Experimental and Control) after eighteen months of first training period. Once again, gain in Knowledge and Practices of mothers on Health and Nutrition, gain in anthropometric measurements and DQ scores of pre schoolers were noted by administering same tests which were administered at the time of Pre-Test.

STATISTICAL ANALYSIS

Various statistical techniques were applied for testing research hypotheses. A brief description of these techniques is made here as following :-

1. Raw scores of DST and VSM were converted in to DQ₁ and DQ₂ respectively so as to obtain average of combined DQ₃ (DQ comb).

2. Descriptive statistics namely, Mean, Median, SD, Skewness and Kurtosis of Pre-Test scores for total sample and individual groups were obtained.

3. Analysis of variance, 2x2x3 factorial design for equal cell frequencies on gain scores of all the twelve variables was applied to know the main effects and interactive effects.

4. Significance of difference between means was arrived at by 't' test.

5. Graphic representation was done wherever necessary.