METHODOLOGY
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Methodology is a specific way of performing an operation that implies precise deliverables at the end of each stage. It also refers to the theoretical analysis of the selected methods which are most appropriate to a field of study and principles particular to a branch of knowledge.

The present study is an attempt to investigate “A comparative study of health status of children in different Govt. and private aided schools and to assess the impact of Mid-day meal programme in Ghaziabad district”. The main objectives of the present study are:

1. To compare health status of children in different Government and Private aided schools.
2. To observe Mid-day meal menu
3. Preparation conditions of Mid-day meal
4. Identifying health problems of children
5. Impact of Mid-day meal on children
6. Problems in Mid-day meal programme
7. Suggestions for improvement.
This chapter describes the following procedure to achieve the objectives.

- Selection of locale (geographical area: Locale of study)
- Selection of sample from population
- Methods and procedure (research design)
- Variables used in the analysis
- Data collection
- Statistical techniques used for data analysis

3.1 Selection of locale (geographical area: locale of study)

The Research survey was took place in Ghaziabad District, Uttar Pradesh, where a mid-day meal scheme was introduced.

Area & Population:

The total area of the district (according to CENSUS 1991) was 2590.0 sq. kms. But after the formation of the new district Gautam Budh Nagar, it becomes 1933.3 sq. kms.

According to the District Statistical handbook-2006, total population of Ghaziabad district was 33,14,070 out of which 5,99,539 people were of schedule caste. There were 17,81,674 males and 15,32,396 females. Off all 14,97,655 people lived in villages and 18,16,415 people lived in the urban areas. There were 19,11,103 literate people in the district out of which 11,76,067 were males and 7,35,036 females. Density of population was 2887 Sq. Km. percentage of urban
population was 54.8, percentage of SC population were 18.1, percentage of male literates were 79.8, percentage female literates were 57.9, percentage of total literates were 69.7, and females per 1000 male were 860.

### 3.2 Selection of sample from population

A population can be defined as including all people or items with the characteristic one wish to understand. Because there is very rarely enough time or money to gather information from everyone or everything in a population, the goal becomes finding a representative sample (or subset) of that population.

“A research design is the arrangement of condition for collection and analysis of data in a manner that aim to combine relevance to the research purpose with economy in procedure” (Kothari, 1990).

Sampling is that part of statistical practice concerned with the selection of an unbiased or random subset of individual observations within a population of individuals intended to yield some knowledge about the population of concern, especially for the purposes of making predictions based on statistical inference. Sampling is an important aspect of data collection. A sample survey is a study that obtains data from a subset of a population, in order to estimate population attributes.
Map of Ghaziabad district.

Map of Bhojpur Block in Ghaziabad district.

Fig. 3.1 : Map of selected areas.
3.2.1 Multistage Stratified sampling (Probability Sampling Methods)

With stratified sampling, divide the population into separate groups, called strata. Then, a probability sample (often a simple random sample) is drawn from each group. Stratified sampling has several advantages over simple random sampling. For example, using stratified sampling, it may be possible to reduce the sample size required to achieve a given precision. Or it may be possible to increase the precision with the same sample size. When sub-populations vary considerably, it is advantageous to sample each subpopulation (stratum) independently. Stratification is the process of grouping members of the population into relatively homogeneous subgroups before sampling. Then random or systematic sampling is applied within each stratum. This often improves the representativeness of the sample by reducing sampling error.

A multistage stratified random sampling technique was used for the selection of the unit of the information in present study. Ghaziabad Rural consists of 8 blocks namely Bhojpur(Modinagar), Muradnagar, Razapur, Loni, Dhaulana, Hapur, Simbhawali, Garh Mukteshwar, out of them one block namely Bhojpur( population: 1,67,715) was selected randomly in the first stage. Bhojpur block consist of 51 villages where Mid-day meal programme were running, out of them 5 villages namely Begmabad, Gadana, Kadrabad, Bishokhar, Khanjarpur were selected randomly in second stage. Selected villages having population between 2000 to 16,000. Thus survey covered 5 villages spread over one block, 1 district. One
Prathmic Vidhyalaya from each village was randomly selected at third stage where Mid-day meal programme was running. A sample of 6 Children were randomly selected at fourth stage, from each class from 1 to 5. One teacher was selected from each class up to 1-5 classes. Principal was also interviewed from each school. Same selection was done for the following private aided schools Rukmani Modi junior section, Dayavati Modi Junior High school Bhojpur, Dayavati Modi Junior High school Dalipak sekri kala, Dayavati Modi Junior High school Devendrapuri, Dayavati Modi Junior High school Abbupur in Modinagar area. The selection of children and villages within block was based on ‘multistage stratified random’ sampling, with different stratification criteria (e.g., education 4682 Economic and Political Weekly November 1, 2003).

150 children, 25 teachers, 5 principals and 5 workers from government and 150 children, 25 teachers and 5 principals from private aided schools were selected to collect the data. Thus, 300 children, 50 teachers, 10 Principals and 5 workers were the unit of information for the present study.

3.3 Methods and procedure (Research design)

Selection of research design is a crucial step to work on the objectives. Looking in to objectives following time frame, clinical examination self-structured constructed Performa and anthropometric measurements were selected to collect the required unit of information.
3.3.1 Time frame

The mid-day meal survey was took place between July 2009 and July 2010.

3.3.2 Clinical examination

Clinical examination is the process by which a doctor investigates the body of a patient for signs of disease. Researcher had investigated clinical examination using self constructed Performa which includes health information in terms of children’s hair, face, lips, tongue, teeth, gums, skin, nails, and skeletal system.

3.3.3 Self Constructed Performa

This includes general information in terms of demographic and other characteristics i.e. age, sex, type of family and income, father and mother education, Number of siblings etc. and information regarding Mid-day meal in the form of objective questions. Researcher had presented two types of Performa specific to Government and private aided schools. Each Performa having separate sets of questions sheet which were specific to children, teachers, principal, and workers of NGO.

Researcher was expected to interview to:

(1) The head Teacher of the primary school

(2) Teachers of the school

(3) The person in charge of cooking the mid-day meal and

(4) A sample of 6 children from each class up to 1 to 5.
3.3.4 Anthropometric measurements of children

Anthropometry is a valuable index for the evaluation of nutritional status of children. Anthropometric measurements were recorded in terms of height, mid arm circumference, head circumference, weight, chest circumference. According to Jalliffe (1966): “Nutritional anthropology is concerned with the measurement of the variations in the physical dimensions and the gross composition of the human body at different age levels and degree of nutrition”

3.3.5 Variables used in the analysis

**Independent variable:** Following independent variables were used in the analysis

<table>
<thead>
<tr>
<th>Table 3.3.4: Independent variables used in the analysis</th>
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<tbody>
<tr>
<td>Variable</td>
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<tr>
<td>Predictor variables</td>
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<tr>
<td>Sex of Children</td>
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<td>Mother’s education:</td>
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<td></td>
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<td>Father’s education</td>
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<tr>
<td>Hindu</td>
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<tr>
<td>Muslim</td>
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<tr>
<td><strong>Religion of Children</strong></td>
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<tr>
<td><strong>Class of the Children</strong></td>
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<td><strong>Caste of the Children</strong></td>
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<td><strong>Type of family</strong></td>
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<td><strong>Family income in Rs. per month</strong></td>
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<td><strong>Occupation of Father/Mother</strong></td>
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<tr>
<td><strong>No of siblings</strong></td>
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<td><strong>Anthropometric Measurement</strong></td>
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<td><strong>Nutritional intake of children</strong></td>
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<tr>
<td>Teacher</td>
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<tr>
<td>Principal</td>
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<tr>
<td>Worker</td>
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</tbody>
</table>

**Dependent variable:**

According to Kerlinger (1990) “Dependent variable is the presumed effect of an independent variable”. The dependent variables of this study were outcomes of the health status of children and impact of Mid-day meal.

### 3.3.6 Data collection

After selecting sampling method, Data were collected from the various schools. The procedure followed by researcher for the collection of relevant data is discussed below.

#### 3.3.6.1 Pilot Study

A pilot, or feasibility study, is a small experiment designed to test Mid-day meal and gather information prior to a larger study, in order to improve the latter’s quality and efficiency. A pilot study can reveal deficiencies in the design of a proposed experiment or procedure and these can then be addressed before time and resources are expended on large scale studies. A pilot study is normally small in comparison with the main experiment and therefore can provide only limited information on the sources and magnitude of variation of response measures.
A pilot study was carried out on 30 children, 5 teachers, and 1 principal belonged to Ghaziabad district. Data was collected with the uniform instructions but the subject of pilot study was not included in the actual study. The reliability was calculated with the spearmen’s split half correlation method and was found to be 86.57% with a validity of 85.65%. These values are highly positive and hence, Performa is suitable and valid.

3.3.6.2 Actual Data Collection

Actual data collection is in Cross-Sectional nature. Cross-sectional data refers to data collected by observing many subjects (such as individuals, schools etc.) at the same point of time, or without regard to differences in time. Analysis of cross-sectional data usually consists of comparing the differences among the subjects. Cross-sectional data differs from time series data also known as longitudinal data, which follows one subject's changes over the course of time.

To administer the test on subjects, the researcher did an unannounced visit in schools of Government as well as private aided. Researcher met to Principal of school and introduced as a research scholar and provided the proof for the same.

Principal introduced the researcher to teachers and children of the school. Researcher used the questioner method for data collection. Initially, children were hesitating in giving the answers of the question then researcher assured that it was not an examination. They were told that there were no right and wrong answer to any item in the questioner. One by one selected children replied the answer and
response was recorded by researcher. Researcher had also used different method to attract the attention of children (some stories, and eatable for the children). Other responded (i.e. teacher, principal, staff from NGO) also responded on questioner from the prescribed Performa. Since The Performa was in Hindi Language, it was easy for the respondent to understand and respond precisely.

Each and every subject was individually measured by the researcher for standing height, weight, mid arm circumference, chest circumference as explained earlier.

### 3.4 Statistical tools to be used

Collected data were analyzed and tabulated in the tables. Statistical tools were used to analysis the data for the prediction and suggestions. Research work was carried out at 95% confidence level. Various statistical terms have been defined below.

**Table 3.4.1: Statistical tests used and their purpose.**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Statistical tests</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Percentage</td>
<td>To study the distribution of variables.</td>
</tr>
<tr>
<td>2</td>
<td>Arithmetic mean</td>
<td>To study the central value.</td>
</tr>
<tr>
<td>3</td>
<td>Standard deviation</td>
<td>To know the variability among the observations.</td>
</tr>
<tr>
<td>4</td>
<td>t-test</td>
<td>To test the difference between means of two groups.</td>
</tr>
<tr>
<td>5</td>
<td>$X^2$ test</td>
<td>To know the association between two attributes.</td>
</tr>
</tbody>
</table>
3.4.1.1 Percentage:

Single comparisons were made on the basis of the percentage. For the drawing percentages the frequency of a particular cell was multiplied by 100 and divided by the total number of respondents in the particular category.

3.4.1.2 Arithmetic mean:

Arithmetic mean is the average used in the present study.

\[
\bar{X} = A + \frac{\sum f \times U}{\sum f} \times i
\]

Where,

- \( \bar{X} \) = Arithmetic mean
- \( A \) = Assumed mean
- \( \sum f \times U \) = mean product of frequency and deviation from the assumed mean
- \( i \) = Total frequency
3.4.2 The Standard Deviation:

The standard deviation is the square root of the variance. Thus the standard deviation of a population is:

$$\sigma = \sqrt{\sigma^2} = \sqrt{\frac{\sum (X_i - \mu)^2}{N}}$$

Standard deviation of grouped data \((\sigma) = \sqrt{\frac{\sum (x_i - \mu)^2 f_i}{\sum f_i}}\)

where \(\sigma\) is the population standard deviation, \(\sigma^2\) is the population variance, \(\mu\) is the population mean, \(x_i\) is the \(i^{th}\) element from the population, \(f\) is the frequency of the elements and \(N\) is the number of elements in the population.

And the standard deviation of a sample is:

$$\sigma = \sqrt{\frac{\sigma^2}{n - 1}} = \sqrt{\frac{\sum (x_i - \mu)^2}{(n - 1)}}$$

where \(\sigma\) is the sample standard deviation, \(\sigma^2\) is the sample variance, \(\mu\) is the sample mean, \(x_i\) is the \(i^{th}\) element from the sample, and \(n\) is the number of elements in the sample.
3.4.3 Test of Significance:

t-test can be expressed as

\[ t = \frac{|X_1 - X_2|}{C.S.E.} \]

where \( X_1, X_2 \) are the means of the first and second group and C.S.E. means combined standard error.

Calculate C.S.D. and C.S.E.

C.S.D. is the combined standard deviation which is calculated by the following formula.

\[
C.S.D. = \sqrt{\frac{(n_1 - 1)\sigma^2_1 + (n_2 - 1)\sigma^2_2}{n_1 + n_2 - 2}} \quad \text{if} \quad \begin{cases} (n_1 \leq 30) \\ (n_2 \leq 30) \end{cases}
\]

\[
C.S.D. = \sqrt{\frac{n_1\sigma^2_1 + n_2\sigma^2_2}{n_1 + n_2}} \quad \text{if} \quad \begin{cases} (n_1 > 30) \\ (n_2 > 30) \end{cases}
\]

\[
C.S.D. = \sqrt{\frac{\sigma^2_1 + \sigma^2_2}{2}} \quad \text{if} \quad (n_1 = n_2 = n)
\]

C.S.E. means combined standard error. It is calculated by following formula.

\[
C.S.E. = C.S.D. \sqrt{\frac{1}{n_1} + \frac{1}{n_2}} \quad \text{if} \quad (n_1 \neq n_2)
\]
Where \( n_1 \) and \( n_2 \) are the number of observations, and \( \sigma_1 \) and \( \sigma_2 \) are standard deviations of the first and second group respectively.

For equal sample sizes: the degree of freedom for t test is (DF) = 2\( n \) - 2 where \( n \) is the number of participants in each group.

For unequal sample sizes: DF= \( n_1 + n_2 - 2 \).
3.4.4 CHI-SQUARE ($\chi^2$) Test

The chi-square ($\chi^2$) test is used to determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more categories.

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

Where:

- $O$ is the Observed Frequency in each category
- $E$ is the Expected Frequency in the corresponding category
- $df$ is the "degree of freedom" (n-1)
- $\chi^2$ is Chi Square

**Formula for $E^{nth}$:**

$$\text{Expected frequency (E}^{nth}) = \frac{\text{Sum of rows} \times \text{Sum of column}}{\text{Total observations}}$$

When two tables are in consideration for chi square calculation then degree of freedom can be calculated as

$$d.f. = (c-1)(r-1)$$

Where:

- $c$ is number of column
- $r$ is the number of rows in the table
3.5 Assumptions:

Following assumption had been made

- Selected sample presents the population.
- Results from survey could be differing from time to time (collected data is cross sectional in nature).
- Respondent had provided the answer truthfully