CHAPTER – III

METHODOLOGY

3.1 UNIVERSE AND SAMPLE

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CHAPTER III

METHODOLOGY

The validity and dependability, of any research work is judged on the basis of the soundness and scientific ness of its methodology. The correct methodology plays a vital role in completing the research work scientifically. Therefore, the next step is to chalk out a suitable methodology to seek a scientific solution to the research problems through verification of its hypothesis. In the present research work, following methodological steps have been taken to obtain the empirical evidence in favour or against the problems and hypothesis. As such the methodological steps taken in the present investigation are discussed as under-

LOCATION OF THE STUDY AREA:

Study was carried out on pregnant mothers of the age group (20 to 40 years) registered under government and non-government hospitals localized in Bhilai and Durg city of Chhattisgarh state. While selecting the hospitals for the study, following criteria’s were emphasized –

a) Up to date records of registered pregnant mother

b) Sample comprised to different categories of hospital based on food habits of mother, weight gain of mother and haemoglobin level.

c) No such study has been undertaken earlier in this area.
**BACKGROUND INFORMATION:**

Bhilai is a city in the district of Durg, Chhattisgarh, in eastern central India.[1] The city is located 32 kilometres (20 mi) west of the state's capital, Raipur, on the main Howrah–Mumbai rail line, and National Highway 6. Bhilai is known for the Bhilai Steel Plant, the only manufacturer of rails in the country used by Indian Railways. Durg is a major city in Chhattisgarh state, central India east of the Seonath River (Shivnath River) and is part of the Durg-Bhilai urban agglomeration. It is the headquarters of Durg District.

### 3.1 UNIVERSE AND SAMPLE

The totality of statistical information is called the population or universe. The sample is a selected part of the population, on the basis of which the characteristics of the population are estimated and statistical hypothesis are tested. Therefore, it seems necessary to select a representative sample for estimating population characteristics, so that, generalization of inferences can be scientifically made. Goode and Halt (1952) has pointed out the two main basic characteristics of a good research sample. These are representativeness and adequacy. Representativeness of a sample means that it must include all such possible characteristics of the population that divide it into mutually exclusive segments. Adequacy of the sample refers
to its size. An adequate sample is one that ensures reliable results to whatever may be its size.

For the selection of data/sample prior permission was taken from the government and non-government hospitals of Durg district. This was facilitated by visiting the different hospitals, to explain the objectives of the present investigation as well as mode of the study program were also explained.

The pregnant mothers who were registered under government/non-government hospitals Bhilai and Durg cities were drawn from different hospitals of Bhilai and Durg cities of Chhattisgarh state to serve as sample. Care was taken to ensure that the family of the particular pregnant mother would not frequently migrate and would more or less permanent resident of the area.

Initially 10 hospitals/nursing homes were randomly selected from the Durg district for this study. To have homogeneous and unbiased sample, this study was carried out in 4 hospitals. These hospitals were:
### Table No. 3.1(a)

#### Distribution of sample size from different Hospitals

<table>
<thead>
<tr>
<th>Name of the Hospital</th>
<th>Type of Hospital</th>
<th>Number of Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>From govt. hospital</td>
</tr>
<tr>
<td>Chandulal Chandrakar Hospital Bhilai</td>
<td>Private</td>
<td>-</td>
</tr>
<tr>
<td>Apollo BSR Hospital Bhilai</td>
<td>Private</td>
<td>-</td>
</tr>
<tr>
<td>Jawaharlal Nehru Hospital and Research Centre</td>
<td>Government</td>
<td>60</td>
</tr>
<tr>
<td>District Hospital Durg</td>
<td>Government</td>
<td>60</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td></td>
<td><strong>240 subjects</strong></td>
</tr>
</tbody>
</table>

Thus, in the present study stratified random sampling technique based on probability principles is used to select an unbiased representative sample from the universe.
In stratified sampling, the population is subdivided into several parts, called strata and then a sub-sample is chosen from each of them. If the selection from strata is done by random sampling, the method is known as stratified random sampling. The subdivision into strata is purely random. Stratified random sampling may, therefore, be viewed as a mixture of purposive and random sampling and combines the advantages of both.

In this method the universe is divided into various homogenous subclasses or strata according to one or more specific characteristics of the population. Each stratum consists of the members who are very much alike or homogenous. In the present study, the pregnant mothers from the government and non-government hospitals from Durg district are split into number of categories on the basis of following specific characteristics:

Birth weight of New-born:-

1. Food Habits of mother: Good Food Habits Vs Bad Food Habits ($a_1a_2$)

2. Maternal weight gain: High Vs Low ($b_1b_2$)

3. Haemoglobin level: High Vs Low ($c_1c_2$)

On the basis of above mentioned specific characteristics a $2 \times 2 \times 2$ factorial design or 8 strata were formed. Each factor is to be varied at two levels. In a $2 \times 2 \times 2$ factorial design total numbers of 240 subjects were randomly selected following the stratified random sampling technique. The particulars of the finally selected samples are shown in Table no. 3.1(b).
### Table no. 3.1(b)

Particulars of the sample

<table>
<thead>
<tr>
<th>Groups</th>
<th>High maternal weight gain</th>
<th>Low maternal weight gain</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High Hb level</td>
<td>Low Hb level</td>
<td></td>
</tr>
<tr>
<td>Good food habits</td>
<td>(S₁)</td>
<td>(S₂)</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Bad Food Habits</td>
<td>(S₅)</td>
<td>(S₆)</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>60</td>
<td>240</td>
</tr>
</tbody>
</table>

N = 240, n = 30x8=240

This type of stratification is known as complex stratification. Thus, in this study we have 2x2x2 or strata as mentioned below-

1. Good Food Habits – High Maternal weight gain – High Haemoglobin level $S_s$
2. Good Food Habits – High Maternal weight gain – Low Haemoglobin level $S_s$
3. Good Food Habits – Low Maternal weight gain – High Haemoglobin level $S_s$
4. Good Food Habits – Low Maternal weight gain – Low Haemoglobin level $S_s$
5. Bad Food Habits - High Maternal weight gain – High Haemoglobin level $S_s$
6. Bad Food Habits - High Maternal weight gain – Low Haemoglobin level S
7. Bad Food Habits - Low Maternal weight gain – High Haemoglobin level S
8. Bad Food Habits - Low Maternal weight gain – Low Haemoglobin level S

At first verbal permission was taken from all the hospital/nursing homes authorities in order to take or copy the data from the records which they have maintained.

In the present investigation, records of mothers were taken from the hospitals of Bhilai/Durg city under the consultation of the Gynecologists or the hospital authorities in order to collect evidence or data following tools were used to carry out the present study-

The mothers selected were in the 1st trimester of their pregnancy. They were consulted in 3rd month, 6th month and 9th month for their dietary recall. A questionnaire was filled by them in the last trimester of pregnancy. In case, the record which was incomplete or some information was left then address of that lady was copied from the record and then she was visited.

3.2 TOOLS:

Following tools were used in the present investigation for appraisal of the dependent and independent variables-

DEPENDENT VARIABLE MEASURE

1. Birth weight: Birth weight of new-born was taken from the records of the hospitals/nursing homes.
INDEPENDENT VARIABLE MEASURE

1. **Food Habit Questionnaire:** Self-made questionnaire was used to find out whether there is any role of food habits of mother on the birth weight of new-born. The Food Habit Questionnaire (FHQ), based on Dietary Guidelines for Indian residents and the eating habits of Indian people consisted of the basic information which was copied from the records and of a set of 22 questions which was filled by the pregnant mother’s in their last trimester of pregnancy. Main food groups included in the FHQ were meats and poultry, fruits and vegetables, milk and milk products, cereals and pulses, soyabean, fats and oils etc. The food grouping was generally based on the similarity of nutrient profiles or culinary usage of the foods, mainly according to Indian food composition. The FHQ has to be filled by the pregnant women themselves in a hospital room. The repeated 24 hour recall was used as a reference method to validate the FHQ.

2. **Maternal weight gain:** Weight of the mother was taken in third month, sixth month and ninth month of pregnancy and then the total weight gain during pregnancy was calculated.

3. **Haemoglobin level:** Haemoglobin level of the mothers was taken from the records or the files which were maintained by the hospitals or nursing homes.
**SCORING:**  In the food habits questionnaire, the score given to the answers were 4, 3, 2, and 1. Lower score means Good food habits, likewise higher score means Bad food habits. The answer to each question is worth a specified number of points as outlined below. This tool takes into consideration the participant’s compliance to the major nutrition guidelines as well as to the Reversal Food Guide Pyramid. To derive the final score, total the points from each question.

Answer A is worth 4 points.

Answer B is worth 3 points.

Answer C is worth 2 points.

Answer D is worth 1 point.

### 3.3 RESEARCH DESIGN-

“A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure.” ChaireSelltiz and other (1962) said that the research design is the conceptual structure within which the research is conducted; it constitutes the blue print for the collection, measurement and analysis of data. Research design motivates the researcher to seek solution to his research worthy problem through empirical verification of his related hypothesis by way of
collecting the disciplined data. In this sense research design has been referred to as the mechanism of controlling variance through the principle of ‘Max Con Min’. ‘Max’ part of this principle instructs the researcher to go for maximization of the systematic variance. ‘Con’ refers to control overall such extraneous variables that would presumably influence the dependents variable. ‘Min’ part stands for the minimization of error variance. Error variance is produced from those factors which are beyond manipulative control of the researcher. The best way to minimize the error variances is to execute the proper control over the independent and extraneous variable and to use objective and reliable measures in the investigation.

**Factorial Design:**

In the present study, a 2x2x2 factorial design was thought to be the best suited as the independent variable, viz., food habits of mother, weight gain of mother and haemoglobin level were to be varied at two levels to study their main and interaction effects on dependent variable, i.e. birth weight of new-born. Therefore, a 2x2x2 factorial design was employed to verify the relationship between birth weight with their aforesaid independent variables or factors.

The investigation undertaken was of “ex post facto” on nature because the independent variables, namely; food habits, maternal weight gain, and haemoglobin level were beyond purposive manipulation of the
investigator. Since, the level of each independent variable is fixed, before conducting the investigation; it means that the investigator is interested only to find out the effect of a particular fixed value of the independent variable or factors.

Further keeping in view of the comparative tone and nature of the first three problems and hypothesis, the extreme groups (dichotomous groups) comparison oriented “research design” has been thought to be best suited one. Thus, it is to be registered here that in this piece of research only two designs namely, “comparative” and “2x2x2” factorial design have been employed.
Figure No. 3.3(a)

NOTATION – 2x2x2 TYPE FACTORIAL DESIGN

Food Habit (a)

- Good ($a_1$)
- Bad ($a_2$)

Maternal Weight Gain (b)

- High ($b_1$)
- Low ($b_2$)

Haemoglobin level (c)

- High ($c_1$)
- Low ($c_2$)

P levels of a, where $p = 2$ (or $a_1$, $a_2$)

Q levels of b, where $q = 2$ (or $b_1$, $b_2$)

R levels of c, where $r = 2$ (or $c_1$, $c_2$)
### BLOCK DIAGRAM OF PQR (2X2X2) FACTORIAL DESIGN

<table>
<thead>
<tr>
<th></th>
<th>b₁</th>
<th>b₂</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>c₁  b₂</td>
<td>c₁  b₂</td>
</tr>
<tr>
<td>a₁</td>
<td>s₁  s₂</td>
<td>s₃  s₄</td>
</tr>
<tr>
<td>a₂</td>
<td>s₅  s₆</td>
<td>s₇  s₈</td>
</tr>
</tbody>
</table>
A. Food Habits of mother
   - (a₁) Good food habits
   - (a₂) Bad food habits

B. Maternal weight gain
   - (b₁) High weight gain
   - (b₂) Low weight gain

C. Haemoglobin level
   - (c₁) High haemoglobin level
   - (c₂) Low haemoglobin level
Groups / Strata / Treatment combination = 2x2x2 = 8

(1) $a_1b_1c_1$
(2) $a_1b_1c_2$
(3) $a_1b_2c_1$
(4) $a_1b_2c_2$
(5) $a_2b_1c_1$
(6) $a_2b_1c_2$
(7) $a_2b_2c_1$
(8) $a_2b_2c_2$

Number of Ss in each stratum = 30

Total number of subjects = 30 x 8 = 240.
3.4 PROCEDURE AND SCORING:

To verify the hypothesis and to conduct the research in a scientific way, proper procedures must be followed. Procedure refers to the way or the steps to be followed to conduct the research. It has three major steps; first of all is the preparation and the research design part, second one is instruction and the data collection using various tools and the last one is conduction, scoring, measurement and analysis. The systematic procedure is very important in any research.
After explaining the nature of the study, permission was taken from the hospital authority of each of the selected hospital and nursing home to administer the questionnaire to the registered pregnant mothers.

To enhance the willingness and to encourage bonafide responses of the Ss, an effort was made to impress upon the subjects that co-operation and honesty on their part were essential to reveal a lot of important facts.

On the appointed day, with the help of hospital staff the test was conducted under laboratory like condition, in a group of 8 to 10 pregnant mothers. After distributing the questionnaire to the pregnant mothers, the aim of the research was explained to them and they were asked to answer the questionnaire without consulting each other. For most of the mothers, answering the questions was a new experience. It was made clear to them that it was not an examination and there were no right or wrong answers. All the doubts raised by the Ss were cleared by explanations. The subjects were assured that the answers given by them would be held in strict confidence, and their identity would not be disclosed and they were free to give answers whatever they felt. In this way a good rapport was established with the subjects to make them feel comfortable. Thereafter, the tests were administered as described below:

The printed instructions as well as the response system were explained to the subjects. To elicit the important facts from the Ss, they were assured regarding the secrecy of the test results. No specific time limit was
prescribed for this questionnaire. However, by and large, the subjects took nearly 25 to 30 minutes to complete this questionnaire.

The subjects were told -“Some question related to food habits is given below. Each question has two or more options before it. Read carefully every question, putting a tick mark in the options before it, according to your choice. The answer given by you would be kept in strict confidence. Your responses will be utilized only for research purposes. Therefore, kindly express your choice freely on every question. You can choose one or more option for each question.”

After giving the instruction to each subject, S, were asked to give their responses on one or more options by putting a tick mark before every option. Thus, for all 22 questions S, responses were obtained.

After obtaining the responses of all 240 cases on food habits questionnaire, the questionnaire was put to scoring. Thus, the total scores obtained by each subject on food habits during pregnancy were computed by adding all the scores of 22 questions.

The present study took nearly 12 months to collect data.

The obtained data were further analyzed by using relevant statistical tools as prescribed in the next chapter “Analysis and Interpretation.”