CHAPTER – II

PROBLEMS AND HYPOTHESIS

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CHAPTER – II

PROBLEMS AND HYPOTHESIS

2.1 Problems: Their Statements -

When a researcher is keen to enhance his knowledge about natural events of a kind, he realizes a problem. The awareness of a problem motivates the researcher to involve in a research activity with the purpose to get the solution of problem he realizes. Thus awareness of a problem becomes the starting point of a research in any area of knowledge. Without a problem in view no research can take its birth without purpose. Hence, adequate statement of the research problem is prior and most important condition for any kind of research. A fundamental principle can be stated: If one is keen to get a solution of his problem, then one must generally know what the problem is. Therefore, it has been said that, “a large part of the solution of a problem lies in knowing what it is, one is trying to do.”

Since a problem takes birth in a state of confusion or ignorance, it takes the form of an interrogative statement that asks: what relation exists between two or more variables? The statement of problems should be such which specify the relationship between phenomena in such a way that this relationship can be empirically tested.

In scientific investigation the best way to frame research-worthy problems in the form of clear and unambiguous interrogative statement so as to imply
possibilities of empirical testing of the related research-worthy hypothesis (Kerlinger, 1966). Keeping in view, the purpose of the present investigation, the following problems have been set forth in an interrogative form to seek their scientific solutions—

1. Whether the food habits of mother during pregnancy exerts any effect on the birth weight of new-born?
2. Whether the maternal weight gain during pregnancy exerts any effect on the birth weight of new-born?
3. Whether haemoglobin level of mother during pregnancy exerts any effect on the birth weight of new-born?

It is clear from the above mentioned problems that an attempt has been made in the present study to deal with all four varieties of variables out of which three are Independent variables (viz. Food Habits, Maternal weight gain and Haemoglobin level) and one is Dependent variable (i.e., Birth weight). Therefore, before arriving at the right type of conclusion it is needed to specify the problem and it should be stated in such a way that it indicates the operational characteristics and properties of the variables involved in the present investigation.

Several research methodologists and behavioral scientists like Kerlinger (1978, 86), Goode and Hatt (1981) and many other have pointed out the best way to obtain a scientific solution for a research-worthy problem is to
formulate coherent research-worthy hypothesis, and variables concerned with the problem should be operationally defined.

2.2 Variables of interest and their specification –

Variables are characteristic of the participants or a situation in a given study that has different values or levels. Before arriving at the research worth hypothesis, it is better to understand the properties and characteristics of the dependent and independent variables involved in the present investigation.

2.2 (A) Dependent Variable:

A dependent variable reflects any effect associated with the manipulation of the independent variable(s). The selection of an appropriate dependent variable should be based on theoretical and practical consideration which is determined by a consideration of the sensitivity, reliability and practicability of the possible dependent variable. In selecting a dependent variable it should also be noted that the observations within each treatment level (or combination of treatment level) are normally distributed (Kirk, 1969). Here, in the present investigation birth weight of new-born baby is the dependent variable.
(1) *Birth weight*-

Birth weight is considered to be one of the most important and reliable parameters in the evaluation of foetal and neonatal well-being. Birth weight below 2.5kg (2500gm) has been found to be very closely associated with poor growth, not just in infancy but throughout the childhood. Birth weight can be affected by various factors including those related to foetal, placental, maternal, and environmental origin. (George, et al, 2003) The normal weight of new-born in India is 3.2kg. (Dutta, 1985).

There are basically two distinct determinants for birth weight:

- The duration of gestation prior to birth, that is, the *gestational age* at which the child is born

![Relation of weight and gestational age](image_url)

- The *prenatal growth rate*, generally measured in relation to what weight is expected for any gestational age.
The incidence of birth weight being outside what is normal is influenced by the parents in numerous ways, including:

- **Genetics**
- The health of the mother, particularly during the pregnancy
- Environmental factors, including exposure of the mother to secondhand smoke.
- Economic status of the parents gives inconsistent study findings according to a review on 2010, and remains speculative as a determinant.
- Other factors, like multiple births, where each baby is likely to be outside the AGA (appropriate for gestational age), one more so than the other.
- The average birth weight is 3.5 kg though the range of normal is between 2.5 and 5 kg (all but 5% of newborns will fall into this range).

### 2.2 (B) Independent Variables:

The selection of an appropriate independent variable and its level should be based on results of previous experiment, concerned research literature and on theoretical and designing consideration. In the present investigation there are three independent variables, namely, Food Habits of mother, Maternal weight gain and Haemoglobin level of mother.

1. **Food Habits of Mother-**
Rapid changes have been taking place in the food habits of the population. By choice or compulsion, Indians across age groups and income categories are falling short in meeting the World Health Organization (WHO) recommended daily intake of five servings of fruit and vegetable, a new report has revealed.

In consuming only 3.5 servings of fruit and vegetables per day—a third short of the recommended intake—Indians are predisposing themselves to chronic diseases, the reason why the WHO issued that guideline, said the India’s Phytonutrient Report, a new publication by the Indian Council for Research on International Economic Relations and the Academic Foundation.

An affinity for fast food, long work hours and rising prices of fruit and vegetable are the leading reasons for a drop in their consumption.

India now has the greatest disease burden of any country, hastening what experts call an “epidemiological transition” from communicable to non-communicable or so-called lifestyle diseases.

To stop the spread of chronic diseases, the WHO had recommended eating at least 400 gm—five servings of 80 gm each—of fruit and vegetables a day. Indians have largely ignored that warning and this poor choice is showing up in mortality data.

Young adults aged 18 to 25 and students eat roughly three servings of fruit and vegetables compared to 3.5 helpings that adults consume, according to
the Phytonutrient Report. A busy work life coupled with long working hours was the leading reason cited for low consumption followed by the seasonal (and hence limited) availability of fruit and vegetables.

A healthy diet is an important part of a healthy lifestyle at any time, but is especially vital if pregnant or planning a pregnancy. Eating healthily during pregnancy will help your baby to develop and grow, and will keep you fit and well. A healthy diet provides the body with essential nutrition: fluid, adequate essential amino acids from protein, essential fatty acids, vitamins, minerals, and adequate calories.

The term food habits (or eating habits) refers to why and how people eat, which foods they eat, and with whom they eat, as well as the ways people obtain, store, use, and discard food. Individual, social, cultural, religious, economic, environmental, and political factors all influence people's eating habits.

Pregnancy is one of the most important developmental periods in life. Pregnant women should consume plenty of high-quality nutrients essential for the foetus development. Pregnant women should also eat foods rich in folate (B vitamins), iron and calcium, to ensure their foetus gets the elements it needs to develop. Women who lack essential nutrients at the start of pregnancy put their own health at risk and perpetuate a cycle of poor mother-child nutrition. A lack of essential nutrients during pregnancy, when the child’s brain is growing most rapidly, can have very long-term effects on the child’s physical and intellectual development and
performance in school. Poor nutrition in pregnancy can also cause the child to suffer from heart disease, high blood pressure, type 2 diabetes, poor immune system or depression. Pregnant women living in disadvantaged situations have more difficulty ensuring proper nutrition.

This dimension has been examined extensively by various investigators in numerous fields for instance areas like:

carried out a study on the food habits and related beliefs of pregnant British Bangladeshis.

As such, this dimension has been incorporated as independent variable in the present investigation.

(2) Maternal weight gain-

Maternal weight gain during pregnancy is a predictor of infant birth weight. Weight gain during pregnancy is crucial in the determination of foetal growth.

The clinical course of pregnancy and childbirth depends on a number of factors such as genetic, dietary, and environmental factors. Diet as a single factor has probably a profound influence on the health of the mother. Child survival is correlated with birth weight and birth weight in turn is correlated to the weight gain of the mother during pregnancy. The mean gain in body weight during pregnancy in undernourished women ranges from 6.0 to 6.5 kg in India and other developing countries. This is very much less than that (12.5kg) reported for pregnant women in Western countries.

Weight of mothers in the first and last trimester of pregnancy and thus the total weight gain of mothers during pregnancy is called as Maternal weight gain and it is considered as Independent Variable.
General guidelines for pregnancy weight gain

<table>
<thead>
<tr>
<th>Pre-pregnancy weight</th>
<th>Recommended weight gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight (BMI &lt; 18.5)</td>
<td>28 to 40 lbs. (about 13 to 18 kg)</td>
</tr>
<tr>
<td>Normal weight (BMI 18.5 to 24.9)</td>
<td>25 to 35 lbs. (about 11 to 16 kg)</td>
</tr>
<tr>
<td>Overweight (BMI 25 to 29.9)</td>
<td>15 to 25 lbs. (about 7 to 11 kg)</td>
</tr>
<tr>
<td>Obese (BMI 30 or more)</td>
<td>11 to 20 lbs. (about 5 to 9 kg)</td>
</tr>
</tbody>
</table>

Maternal weight gain during pregnancy has encouraged many researchers like: Thorsdottir I and Birgisdottir BE (1998), had made an attempt to study different weight gain in women of normal weight before pregnancy; Luis and Daniel (1999), carried out a study on optimal weight gain during pregnancy; Grandi (2003), carried out a study on Relationship between maternal anthropometry and weight gain with birth weight, low birth weight, small for date, and prematurity; Christine, et al (2004), had made an attempt to study the efficacy of an intervention to prevent excessive gestational weight gain; Wanjiku and Denise (2004), carried out a study on obstetric outcomes associated with increase in BMI category during
pregnancy; Meaghan A Leddy, et al (2008), carried out a study on the impact of maternal obesity on maternal and foetal health; Judith E Brown, et al (2009), had made an attempt to study the variation in new born size according to pregnancy weight change by trimester 1, 2, 3; UnniMette and StamnesKoepp (2011), carried out a study on Mothers weight before and during pregnancy affect baby’s weight; S. Upadhyay, et al (2011), had made an attempt to study the association between maternal BMI and the birth weight of neonates.

However, the survey of review of literature shows that this dimension has not been studied systematically in ‘birth weight of new-born’ sample so far. Therefore, inclusion of this variable in the present investigation is expected to cast new light in the hitherto unexpected arena.

(3) *Maternal haemoglobin level-

Iron is a mineral that has long been known to be important during pregnancy. It’s essential to making hemoglobin, the molecule that carries oxygen to the cells and tissues of the body. During pregnancy, blood volume increases by 30%, which means women need more iron to make more hemoglobin. This is especially true during the 2nd and 3rd trimester. If a woman enters pregnancy without sufficient iron stores, she will become anemic during the later stages of pregnancy. This is why the Recommended Daily Allowance (RDA) for iron goes from 18 mg/d in non-pregnant women to 27 mg/d in pregnant women.
The concentration of haemoglobin in the blood tends to be lower during pregnancy than in normal women, because the plasma volume increases by about 50% on an average and the volume of circulating red cells increases by about 20%. Anaemia in pregnancy is also associated with increased maternal morbidity. Maternal deaths to the extent of 15-20% are directly or indirectly due to anaemia. Severe anaemia has adverse effects on both the mother and the foetus. Even lower degree of anaemia is associated with poor pregnancy outcome. Hence it is important to diagnose and treat anaemia in pregnancy to ensure optimal health of the mother and the new-born.

<table>
<thead>
<tr>
<th>Units</th>
<th>Nonpregnant</th>
<th>First Trimester</th>
<th>Second Trimester</th>
<th>Third Trimester</th>
</tr>
</thead>
<tbody>
<tr>
<td>g/dL</td>
<td>12 -15.8</td>
<td>11.6 - 13.9</td>
<td>9.7 - 14.8</td>
<td>9.5 -15</td>
</tr>
<tr>
<td>g/L</td>
<td>120 -158</td>
<td>116 - 139</td>
<td>97 - 148</td>
<td>95 - 150</td>
</tr>
</tbody>
</table>


In the present study, haemoglobin level of mother has been included as an independent variable. So far, as haemoglobin and its influence upon birth weight of new-born is concerned very few studies have been conducted in
the last few decades. Haemoglobin level during pregnancy has encouraged many investigators like: Narayan (1999), reported that maternal anaemia when present from early pregnancy is associated with an increased risk of infants with low birth weight; Black (2000), carried out a study which shows that anaemia is an important risk factor contributing to the high incidence of low birth weight; Devendra, et al (2001), carried out a study on risk factors for anaemia in pregnancy; Uchimura, et al (2003), carried out a study on Anaemia and Birth weight; Priti Agrawal and Bina Chaturvedi (2004), carried out a clinical study of Foetamaternatal outcome in pregnant anaemic patients; Mehta and Dodd (2004), carried out a study to compare the benefits of different levels of iron supplementation on maternal iron status and pregnancy outcome; Sharma (2012), had made an attempt to study Anaemia which is quiet common among women living in cities is one of the reasons for giving low birth weight babies. Since no systematic study has been conducted, the inclusion of haemoglobin in the present investigation as one of the independent variables seems quite logical.

2.3 Hypothesis& Their Formulation-

Hypothesis facilitates the extension of knowledge in an area. They provide tentative explanations of facts and phenomena and can be tested and validated. Thus hypothesis are a powerful tool in scientific inquiry to
achieve dependable knowledge. It helps to relate theory to observation and observation to theory.

Hypothesis are “important and indispensable tools of scientific inquiry, they are working instrument and important bridge between theory and empirical inquiry” (Kerlinger, 1986). However, a sound and scientific formulation of hypothesis involves theoretical and deductive reasoning based on previous empirical results in the related area.

The premises stated below contains the gist of the theoretical and empirical features of the variable of the present investigation-

**PREMISES**-

- **Food Habits of mother during pregnancy:** The term *food habits* (or *eating habits*) refers to why and how people eat, which foods they eat, and with whom they eat, as well as the ways people obtain, store, use, and discard food. Individual, social, cultural, religious, economic, environmental, and political factors all influence people's eating habits.

If the diet of pregnant women is poor to begin with, it is even more important to make sure she should have a healthy diet now. She needs more vitamins and minerals, especially *folic acid* and *iron*. She needs a few more calories during your pregnancy as well. Getting the diet right for pregnancy is more about what to eat than about how much. Limit junk food, as it has lots of calories with few or no nutrients.
Good food habit (or healthy eating) is consuming the right quantities of food from all food groups in order to lead a healthy life. A good diet is a nutritional lifestyle that promotes good health. A good diet must include several food groups because one single group cannot provide everything human needs for good health.

Bad food habit (or Unhealthy eating) is eating any food that is not regarded as being conducive to maintaining health. Unhealthy foods includes fats (especially of animal origin), “fast” foods (which are low in fibre and vitamins), foods high in salt and tropical oils (e.g., fried potato crisps/chips), and cream-based (“white”) sauces (which are high in fat).

<table>
<thead>
<tr>
<th>Food Habit (A)</th>
<th>Good(A1)</th>
<th>Bad(A2)</th>
</tr>
</thead>
</table>

- **Maternal weight gain:** Maternal weight gain during pregnancy is a predictor of infant birth weight. Weight gain during pregnancy is crucial in the determination of foetal growth and results of the studies conducted by earlier investigations shows that extreme weight gain during pregnancy is potentially hazardous. WHO suggests that assessment of the velocity or increment of weight gain in the second and third trimester of pregnancy is essential for monitoring intrauterine growth.
Optimal weight gain during pregnancy is about 11 to 13 kgs. About 900gm to 1800gm is an average weight gain during the first trimester. Thereafter 450gm per week during the remainder of pregnancy is usual. (Ganity, et al, 1999)

- **Maternal haemoglobin level:** Anaemia is the commonest medical disorder during pregnancy with iron deficiency anaemia being the most common type of anaemia during pregnancy and postpartum. It is associated with significant maternal and perinatal mortality and morbidity and is responsible for many direct and indirect maternal deaths. Maternal consequences of anaemia during pregnancy are well known and include cardiovascular symptoms, reduced physical and mental performance, reduced immune function, tiredness, reduced peripartum blood reserves and increased risk of blood transfusion during pregnancy and in postpartum period. (Kardjati, 2000)
Normal haemoglobin level during pregnancy ranges from 10 – 14 g/dl, Hb values during first trimester ranges from 11.0-14.3 g/dl, during second trimester the hemoglobin levels is from 10.0-13.7 g/dl, hemoglobin level during the third trimester of pregnancy is between 9.8-13.7 g/dl. In some cases there will be gradual decrease in hemoglobin values with the fetus growth, that’s because increased blood volume of the pregnant by 30% which makes relative low level of hemoglobin and iron deficiency during the pregnancy episode, so that iron supplementation may be needed.

Low hemoglobin levels during pregnancy is not a disease, it’s a normal physiological change and need to follow up.

To seek the scientific solution of the problem the differential, two factor interactions and three factor interactions hypothesis will be formulated and put for the empirical verification.

Differential Hypothesis:

- Using premises $a_1$ and $a_2$ as the base it has been hypothesized that the birth weight of the new-born babies would be more whose mothers have good food habits ($a_1$) as compared to the birth weight of the new-born babies whose mothers have poor food habits ($a_2$).
- Taking premises $b_1$ and $b_2$ as the base it has been hypothesized that the birth weight of the new-born babies would be more whose
mothers have high weight gain ($b_1$) as compared to the birth weight of new-born babies whose mothers have low weight gain ($b_2$).

- Using premises $c_1$ and $c_2$ it has been hypothesized that the birth weight of the new-born babies would be more whose mothers have high haemoglobin level ($c_1$) as compared to the birth weight of the new-born babies whose mothers have low haemoglobin level ($c_2$).

**Interaction Hypothesis:**

**Two Factor Interactions**-

- Using premises $a_1$ $a_2$ and $b_1$ $b_2$ it has been hypothesized that the birth weight of the new-born babies would be more whose mothers have good food habits and high maternal weight gain ($a_1$ $b_1$) as compared to the birth weight of new-born babies whose mothers have poor food habits and low maternal weight gain ($a_2$ $b_2$).

- Using premises $a_1$ $a_2$ and $c_1$ $c_2$ it has been hypothesized that the birth weight of the new-born babies would be more whose mothers have good food habits and high haemoglobin level ($a_1$ $c_1$) as compared to the birth weight of new-born babies whose mothers have poor food habits and low haemoglobin level ($a_2$ $c_2$).

- Using premises $b_1$ $b_2$ and $c_1$ $c_2$ it has been hypothesized that the birth weight of the new-born babies would be more whose mothers have
high maternal weight gain and high haemoglobin level \((b_1 c_1)\) as compared to the birth weight of new-born babies whose mothers have low maternal weight gain and low haemoglobin level \((b_2 c_2)\).

**Three Factor Interactions-**

- Using premises \(a_1 a_2, b_1 b_2\) and \(c_1 c_2\) it has been hypothesized that birth weight of the new-born babies would be more whose mothers have good food habits, high maternal weight gain and high haemoglobin level \((a_1 b_1 c_1)\) as compared to the birth weight of new-born babies whose mothers have poor food habits, low maternal weight gain and low haemoglobin level \((a_2 b_2 c_2)\).