Healthy Behaviors During Pregnancy and Their Impact on Maternal and Infant Health. A Longitudinal Study.

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ABSTRACT

The current research, titled "Nutritional Awareness and Health Status of Pregnant Women as Influenced by Nutritional Education and Counselling," set out to accomplish several goals. Firstly, it aimed to determine how well-nourished and healthy a group of pregnant women were. Secondly, it sought to understand how well-versed and informed these women already were. Thirdly, it planned to implement a nutrition education program using specially designed materials. Lastly, it planned to compare the participants' nutritional awareness levels before and after the intervention. Dietary assessment, anthropometric measurement, and clinical assessment of symptoms and signs were used to evaluate the nutritional status of pregnant women. Hospitals, clinics, nursing homes, and primary health centres provided the data for the pretested survey schedule and 24-hour dietary recall method. From Liberian hospitals, 250 pregnant women were chosen for the study. Nursing homes, basic health facilities, and hospitals were all visited in person to interview the participants. The respondent's body mass index (BMI) was computed in addition to their anthropometric measurements, which included their height in centimetres and weight in kilogrammes. Before becoming pregnant, 70.8% of the 250 women surveyed had a normal body mass index. In the past month, respondents' average weight gain during the second trimester was 4.29 kg, while during the first trimester it was 0.93 kg. When compared to the recommended daily allowance (RDA), the average dietary intake of the participants was lower in protein, iron, calcium, and folic acid. With the exception of carbohydrates, all nutrients in moderate-weight women's second trimester intake fell significantly short of the recommended daily allowance. Of the 250 people who took the survey, 41.6% said they favoured the type C diet (the four-meal pattern). Of those that participated, 53.6% were vegetarian. Nearly two-thirds of people who took the survey did not exercise frequently. Among those who participated, 34.0% reported experiencing morning sickness. Of those who took the survey, 55.6% were anaemic and 44.4% had normal haemoglobin levels. Nutrition education has a notable effect on the respondents' nutritional awareness. There was a considerable improvement in the participants' nutritional knowledge following the session.

Chapter 1
INTRODUCTION

For some women, being pregnant is an exhilarating and life-altering experience. As a physiological condition, pregnancy is known to cause a number of anticipated and typical alterations throughout the mother's organ systems. Assisted reproductive technology and gender are two ways in which pregnancy might occur. Forty weeks after a woman's last menstrual period (LMP), she will typically give birth. The typical length of a pregnancy is nine months, with each month lasting around 29½ days. The exact duration, as measured from the moment of conception, is approximately 38 weeks. The first eight weeks after conception are called the embryonic period, and the term foetus is used until delivery. Naturally, there are three distinct phases to a pregnancy. Origination occurs throughout the first twelve weeks of the first trimester. Origination is the process by which sperm get the egg ready to hatch. At this point, the fertilised egg begins to form the embryo and placenta as it travels down the salpinx and enters the uterus. Unsuccessful labour, the typical death of a developing life or baby, is most likely to occur in the third trimester. The thirteenth through the twenty-eighth week constitutes the trimester. Embryonic development may become noticeable about the midpoint of the third trimester. With the right medical treatment, more than 90% of babies can make it to the outer world by 28 weeks. Approximately twenty-nine to forty weeks make up the trimester. Although a pregnant woman may not always feel great, it is an incredible experience to sense a new life growing inside her (Khanna et al.,).

From one pregnancy to the next, and even within the same mother, each pregnancy is unique. Pregnancy symptoms can vary in duration; some are there throughout the whole of the pregnancy, while others are more transient or don't impact all women. The average duration of a pregnancy, beginning on the first day of a woman's last menstrual cycle (about the time before conception), is forty weeks. Each trimester of a pregnancy is distinct from the last. Twelve to thirteen weeks elapse during each of those times. All through pregnancy, both the mother's body and the growing baby undergo various changes (https://en.wikipedia.org/wiki/Pregnancy).

The lungs and central nervous system start to form in the first trimester of pregnancy, along with the limbs, brain, medulla, spinal cord, and lungs. The third month of a pregnant woman's pregnancy is a time of rapid bone and muscle development, the appearance of tooth buds, and the expansion of her digits. The epidermis is almost completely translucent, and the intestines start to form. The placenta develops so the growing baby can get the nutrients it needs. The foetus attaches itself to the placenta through a funiculus, which is an organ. It's the fetus's lifeline. The nutritional status of the mother before and during pregnancy has a direct impact on the neonate's health. If a pregnant woman eats healthily before being pregnant, she will be able to meet her foetus's nutritional needs without jeopardising her own health. Babies born to mothers who are somewhat well-nourished are less likely to be born prematurely, have healthier mothers, and experience fewer difficulties during pregnancy. Babies delivered during the hungry era were less likely to be premature, have a stillbirth, or be born with a deformity than those conceived at that time.

The mother's diet during pregnancy has an effect on the baby's size and health because it affects the baby's growth. Low Birth Weight (LBW) infants weighing less than 2,500g are a result of the inadequate nutrition of mothers at this time. Most of these infants are born prematurely, meaning they were conceived before 37 weeks of gestation, while the remainder have intrauterine growth retardation. Typically known as "morning sickness" due to its occurrence early in the day, nausea and vomiting can happen at any time throughout early pregnancy. Nausea during pregnancy might be caused by disruptions in the neurological system, an excess of proteins in the placenta, or an imbalance in the metabolism of carbohydrates.

Dietary issues during pregnancy also include constipation. The duct may occasionally become clogged due to the pressure of the expanding uterus. Common pregnancy symptoms throughout the third trimester include bloating and acid reflux. The growing uterus presses on the veins, which might cause mild, physiologic oedema in the limbs during the third trimester. There is a significant qualitative and quantitative demand for nutrients throughout foetal development. Inadequate nourishment throughout this time period causes babies to be born prematurely or with a low birth weight. The placenta plays a crucial role in the transport of oxygen and nutrients from the mother's blood to the developing baby. Folate, iron, and ascorbic acid are among the nutrients that might reach the developing baby in adequate amount, even if it means sacrificing maternal reserves, via the placenta.

Although the placenta facilitates the transfer of certain nutrients such as thiamine, riboflavin, vitamin B complex, pyridoxine, and vitamin D, a woman's nutrition may be questioned and reevaluated during pregnancy and even before conception due to uncertainties about her identity as a mother-to-be. Therefore, one of the few key periods when women are likely to be ready to change nutrition-related behaviours that are hard to shift at other times is during pregnancy, and especially a primary pregnancy. In light of this, pregnancy can be viewed as a major life transition for women, and it will positively impact their future dietary habits and those of their families. The "life course perspective" is responsible for introducing this incident.

Along with other conventional factors, such as long-term behavioural or health habits, cultural and environmental influences, and this life transition, these traditional variables play a role. It also opens up a whole new world of possibilities for initiatives that promote healthy eating. The goal is to have a better understanding of smoking habits before, during, and after pregnancy from a life cycle viewpoint. To gain a better understanding of pregnancy and nutrition from a life cycle perspective, it would be fascinating to see if women do in fact become more aware of their nutrition during pregnancy and, if so, how much weight they give it compared to other aspects of their lifestyle, such as exercise and personal cleanliness (Scwajer, 2012).

Pregnancy weight growth should be considered in relation to the mother's height, the amount of weight she carried before being pregnant, and the number of foetuses. Proper nutrition throughout pregnancy is essential for the mother's health, the health of her unborn child, and the readiness of her body to breastfeed. Several nutrients have

proven detrimental impacts of severe shortage, particularly during the periconceptional phase (Taleb et al., 2011). Unhealthy consequences for the developing baby could result from maternal malnutrition. Pregnancy-related dietary factors are also associated with the adult health problems experienced by the offspring. Premature birth, low birth weight, anaemia, cardiovascular disease, hypertension, diabetes, and obesity are all complications that can arise from inadequate nutrition. Pregnant women need an extra 18 grammes of protein and 350 extra calories per day.

Environmental variables, socioeconomic status, worm infestation, and insufficient calorie, vitamin C, iron, and protein intakes are among the many causes of nutrient deficiencies. Premature birth, low birth weight, and stillbirth are all outcomes of maternal malnutrition, which in turn is associated with socioeconomic and cultural variables (NIN, ICMR 2010). The level of a private's nutrition is strongly related to his or her physical well-being and ability to maintain regular health. Inadequate or improper diet lowers fitness and makes man susceptible to illness, whereas proper nutrition keeps man healthy and fit. A person's nutritional status is indicative of their health since it is determined by the nutrients they consume and how well their body uses them (Manna, 2012).

Women are disproportionately affected by nutritional deficiencies compared to men. This is due to various factors such as reproductive biology, low social status, family food insecurity, unclean living conditions, poor health services, poverty, lack of resources at the grassroots level, unequal status of girls, and inadequate education. The likelihood of malnutrition in women may be exacerbated by sociocultural norms and differences in home labour patterns. At least 120 million women in developing nations are underweight, and half of all pregnant women suffer from anaemia.

Being underweight reduces a woman's productivity and may raise her risk of disease and death, according to the research. That works out to over 30 million pregnant women in this country each year, with 27 million choosing to give birth naturally. According to the World Health Organisation (WHO), out of 536,000 maternal deaths worldwide per year, 136,000 occur in India. Disability-Adjusted Life Years lost due to maternal diseases alone accounted for 25% of India's total contribution to the global burden of disease in 1990, according to estimates.

Despite national safe motherhood regulations and programming measures, there is little indication that maternity has been considerably safer in India during the previous 20 years. With over one billion people and a 21% increase in the population over the past decade, India's Maternal Mortality Ratio (MMR) was estimated at 301 in 2003. After peaking at 212 per 100,000 live births in 2007–2009, the MMR fell to 178 per 100,000 in 2010–2012, and then again to 174 per 100,000 in 2015. A wide range of MMRs all of the states, however the major states in northern India are responsible for an outsized share of the fatalities. Kerala and Madras have rates that are equivalent to middle-income countries, whereas Rajasthan and Province have high rates of fertility and maternal mortality (Vora, 2009).

In 2012, there were approximately 213 million pregnancies; of these, 190 million were within the first trimester and 23 million were inside the second. There are 133 pregnancies for every 1,000 women in the 15–44 age bracket. Approximately 10% to 15% of all pregnancies result in an abnormal delivery cycle. There were 293,000 fatalities in 2013 due to pregnancy entanglements, a decrease from 377,000 in 1990. Maternal death, complications with preterm delivery, high blood pressure throughout pregnancy, maternal infection, and discouraged work are some of the main causes. All around the globe, 40% of pregnancies occur without medical intervention. According to this source, half of all unintended pregnancies terminate in miscarriage.

Roughly 140 million infants are born every year, while around 210 million women get pregnant. The lack of a skilled birth attendant is responsible for the delivery of about 25% of newborns globally. At least 45 mothers died in the course of giving birth or during physiological conditions in the Republic of India in 2015, accounting for one-third of all maternal deaths worldwide. Nevertheless, by 2030, the global goal is for 70% of pregnant women to have a skilled birth attendant present during their delivery, and for the majority of pregnant women to have received at least four prenatal care visits. According to recent data from the International Bank for Reconstruction and Development, the Republic of India's Maternal Morbidity Rate (MMR) was 174 per 100,000 live births in 2015, which is a significant decrease from the 212 reported in 2010.

As previously mentioned by the World Health Organisation (WHO), approximately 5 women in the country die every hour as a result of complications that arise during childbirth. One of the most serious issues is the excessive blood loss that occurs as a result of injuries.

Nevertheless, there is still a long way to go before we can achieve the 2019 goal of 28 IMR per 1,000 live births. The latest data from the Sample Registration Survey (SRS) Bulletin shows that the infant mortality rate (IMR) has dropped by eight percent, however there are still more baby deaths in rural areas. The infant mortality rate (IMR) in rural areas of the Republic of India is 38 per 1,000 live births, but it is 23 in urban areas. places in cities. According to the data, the number of infant deaths decreased by 90,000 in 2016 compared to 2015.

In the Republic of India, anaemia affects more than 75% of pregnant women, and it is still a major problem when it comes to preventing maternal illness, death, and low birth weight. Both the mother's and the child's biological processes and health were negatively impacted by premature delivery and excessively delayed pregnancies. But infections are still an important indirect cause of undernourishment; being undernourished makes one more susceptible to infections, and infections worsen undernourishment (Nisal, 2015).

In order to meet the demands of her relation, her own body, and to prepare for breastfeeding, expectant mothers should eat well. It is well-established and acknowledged that vitamin shortages can have negative repercussions, especially during pregnancy. In order to improve physiological condition outcomes and decrease maternal

mortality, early diagnosis of biological process insufficiency during physiological condition is crucial. In order to help underprivileged pregnant women improve their nutritional status, it is important to identify those with poor biological process standing and offer them nutrition instruction. Szwajcer et al. (2012) found that raising people's awareness about nutrition and nutrition behaviour leads to more data or a better grasp of these topics.

Pregnant women's mental, physical, organic, and occupational health are all adversely affected by nutritional deficiencies, which have far-reaching public health consequences. Inadequate iron intake is by far the most common biological process cause of anaemia. There will be a correlation with B complex deficiency, especially in physiological states. An abnormally high number of pregnant women pose unique health risks and necessitate extra precautions. The World Health Organisation has identified a decrease in the rate of low birth weight (LBW) as one of the global indicators of progress, as poor maternal nutrition and the subsequent Low Birth Weight (LBW) babies continue to be the leading cause of infant morbidity and mortality globally. The risk of foetal mortality, growth retardation, and other complications is increased in most babies with low birth weights even before they are born.

Chronic conditions in adulthood.

Education on proper nutrition is the cornerstone of any initiative to enhance biological processes (Devadas et al, 1970). The procedure will be described as a way to meet the demands of the biological process with food while also catering to cultural, psychological, and economic interests (Albanese, 1971). The goal of sustainability education is to promote healthy eating habits and other food-related behaviours that contribute to economic and social well-being through the use of a variety of instructional approaches supported by ecological arguments. According to Wikipedia, "Nutrition Education" encompasses activities at the individual, group, and strategy levels and is conveyed through distinct scenes.

Many initiatives, such as the Integrated Child Development Scheme (ICDS), the Reproductive Child Health (RCH), the National Nutrition and Anaemia Prevention Program (NNAPP), and the Child Survival and Safe Maternity Program (CSSM), have been launched by the government of the Republic of India to improve the nutritional status of pregnant women and breastfeeding mothers. Only 21% of women are able to reap the benefits of the ICDS theme in a physiological state, despite massive and multi-faceted efforts (Ajantha et al., 2015).

Statement of Problem

Chronic energy deficit, inadequate pregnancy weight growth, anaemia, and other nutritional deficiencies are common in women. Poor birth outcomes and high rates of maternal death are caused by these and insufficient obstetric care. Factors such as socio-demographic characteristics and the nutritional understanding of women throughout pregnancies contribute to maternal malnutrition, which is influenced by insufficient nutrition overall. Although improving maternal nutrition throughout pregnancy is associated with a lower risk of maternal illness and death. A woman's sensitivity to the significance of good nutrition increases throughout pregnancy, and she searches for better nutrition-related knowledge. Pregnant women are more anxious than ever before to know exactly what they should eat and how much of it they should consume.

Several nutritional deficits can develop from an unhealthy diet during pregnancy. It may be impossible to ignore the importance of a healthy diet during pregnancy. Problems with endocrine function, organ development, and the child's energy metabolism can result from inadequate nourishment, which is most dangerous during the first trimester of pregnancy. It can also hinder the foetal brain's development. All of the mother's normal dietary demands, including those of the developing foetus and her ability to maintain her own stocks of nutrients necessary for the health of the foetus and newborn, as well as for future breastfeeding, must be met by the mother's diet during pregnancy. Maintaining a balanced diet is the number one piece of advice. At all times, but especially during pregnancy, it is essential to adhere to a healthy, well-balanced diet. Research has shown that a significant number of women die each year as a result of complications related to pregnancy and childbirth, with the majority of these deaths occurring in the developing world. Many socio-sparing reasons are often cited as causes of pregnancy-related undernourishment in developing nations. Another factor exacerbating the problem is a lack of knowledge about basic and sensible ways to meet important nutritional needs during pregnancy. Numerous nations with weak or growing economies continue to be plagued by poor maternal dietary status and inadequate prenatal care, which leads to increased risk for women, low birth weight, and stillbirth (Rastogi et al., 2011).

One of the most important factors in promoting health is education. Achieving this objective requires identifying coaching requirements. Even while knowledge isn't behaviour, it will play a role in shaping food habits. Most women in developing nations do not get the recommended daily allowance (RDA) of nutrients, according to a number of studies. Changing one's behaviour is most difficult when one's knowledge, attitudes, and misconceptions stand in the way. Pregnancy outcomes, particularly foetal growth and maternal health, have far-reaching implications for community health.

Two major reasons for nutrition education research: first, the need to teach people how to make the most of the foods they have on hand, and second, the reality that the field of nutrition is constantly developing. In order to ensure the health of both mother and child, nutrition education equips pregnant women with the information, attitude, and self-assurance they need to make positive changes to their diets. Therefore, with all of this in mind "Healthy Behaviours During Pregnancy and Their Impact on Maternal and Infant Health" says the study. The following goals were pursued in conducting "a longitudinal study":

OBJECTIVES

✓   To assess the nutritional status and dietary pattern of selected pregnant women.

✓   To study existing nutritional knowledge and awareness of selected pregnant women.

Chapter 2
REVIEW OF LITERATURE

"Healthy Behaviours During Pregnancy and Their Impact on Maternal and Infant Health" is a pertinent piece of literature to the current investigation. "A Longitudinal Study" sources are referenced in this section.

According to **Alene et al. (2014),** pregnant women in this area of Ethiopia had a much higher prevalence of iron insufficiency than women in other parts of the country. Iron deficiency was found to be associated with being in the richest quintile of pregnancy, being gravid, taking iron supplements, and having MUAC. In order to reduce paleness, it is recommended to take press supplements and special attention in the latter stages of pregnancy. To further solidify and broaden these findings, further research on chance components of paleness, such as rural inhabitants, should be initiated.

Geographical detachment has reinforced conventional personalities and forced these folks to continue with their conventional agenda for a decade together, according to **Kaur et al. (2014).** They offer a green option. The mothers' periods of pregnancy and nursing are of the utmost importance to the Tharu people. Whenever a mother's ability to provide for her infant has a direct bearing on the health of the mother and kid. However, due to poverty, these women were unable to meet the increased demand for reduced carbohydrate consumption during pregnancy and the subsequent stages of lactation. The target audience also had a serious problem with the lack of awareness on the need for proper nutrition. Approximately all pregnant and breastfeeding women were selected for the detailed evaluation; 60 subjects were included in the mediation group and 10 subjects were included in the charge group. The results showed that 18% of mothers-to-be altered their eating habits during pregnancy and nursing. Nutritional status improved by 6% from the lowest to the highest need and 12% from the lowest to the highest.

According to **Khandat et al. (2014),** their haemoglobin (Hb) level is lower than the average value, which is 11–14 gm. The National Family Well-being Survey Research conducted in India found that the overall frequency of pallor among women aged 15–49 was 55.3%, among pregnant women it was 58%, and among children younger than three years old it was 80%. Weakness is the most rarely observed healthy disease on the earth, and it is the fundamental cause of 20 to 40 percent of maternal deaths. Twenty percent of all maternal deaths in India are caused by iron deficiency, making it the second most common cause of maternal death in the country. The purpose of this study is to determine the prevalence of iron deficiency and to examine factors associated with weakness in pregnant women from rural India living in the Beed district of the Maharashtra state.

Two hundred pregnant women from the Beed area, hailing from twenty different towns, were selected at random. Data was collected regarding socioeconomic position, pregnancy, dietary habits, and food consumption. The

specimens' haemoglobin estimate was completed. The material presented was presented in a factual manner. It was found in this study that the prevalence of sickliness was much higher. The examination women's competency, occupation, and low expectation for everyday luxuries were identified as contributory variables. Similarly, their awareness of pale skin and its counteracting action through general use of iron foliate pills and increase in food consumption were also identified. Marriage age, equality, and foetal death all contributed to haemoglobin level. Haemoglobin levels were influenced by prenatal administrations throughout the first trimester, as well as by the availability and use of iron foliate tablets exceeding three months.

The bulk of young women in rural areas are underweight, short, and malnourished, as shown by **Nagamani (2014).** Adolescent rural women in their pre-pregnancy states would not be in the best possible nutritional situation, according to the study's results. The study's results highlight the critical need of nutrition education programs and supplemental intervention strategies for enhancing the nutritional status and overall health of women living in low-income areas. Rural young women should be educated about the consequences of early marriage and maternity, and they should be provided with special nutritional inputs and better monitoring facilities before and during their pregnancies. This situation calls for immediate nutritional intervention and educational programs. In addition to bolstering the cycle of healthy motherhood, this would also guarantee the health and well-being of children born to mothers.

Members who used more oil had worse dietary review scores, according to **Ajantha et al. (2015).** There was no consideration of a modified eating regimen by 33% of the members. On the dietary review, most of the members got decent scores. Members knew they needed more food throughout pregnancy, but they didn't know how to change their diet or make the proper food choices; spouses and doctors were major influences in these matters. Therefore, pregnant women and their partners need to be educated on the importance of making healthy food choices throughout pregnancy.

Despite their greater prosperity, Indian children are noticeably smaller and shorter than their African counterparts, according to **Coffey (2015).** The fact that these variations manifest at such a young age suggests that they may reflect variations in mother health to some extent. To the best of my knowledge, this study presents the first agent estimates of pre-pregnancy body mass index and weight gain throughout pregnancy for sub-Saharan Africa and India by applying reweighting inference methodologies to the Demographic and Strength Surveys.

When comparing sub-Saharan African pregnant women to their Indian counterparts, he discovered that 42.2% of Indian pregnant women are underweight. India has a prevalence of prenatal malnutrition that is seven percentage points higher than the national average for women aged fifteen to forty-nine. Childbearing is difficult within the restricted age target, which increases the likelihood that Indian women will be underweight. This disparity is partially the result of a previously established connection between age, fertility, and underweight. Although both locations have low rates of pregnancy-related weight gain—roughly 7 kg for a full-term pregnancy—the average

pregnant woman in India ends up lighter than she was when she started her pregnancy in sub-Saharan Africa. India is home to one fifth of the world's births, making maternal welfare issues impacting Indian women of universal significance.

According to **Badesab (2015),** pregnancy is a normal physiological process, but it requires special attention during this time as the mother and the developing baby spend their whole lives in the womb. Pregnancy and childbirth are associated with an estimated 515,000 maternal deaths per year, with 99% of these deaths happening in developing nations. On a global scale, the maternal mortality ratio (MMR) is 450 per 100,000 live births in underdeveloped countries. 1 Pregnancy outcomes and maternal health are contextual factors that can be influenced by aspects, including socioeconomic status, cultural norms, and the ease with which people can obtain medical treatment. From December 2013 through November 2014, pregnant women living in the agricultural field practice region of a medical college in Karnataka, India, were randomly assigned to participate in this community-based cross-sectional study. Prior to the antenatal examination, all pregnant women who are about to give birth were surveyed using a pre-designed semi-structured questionnaire in order to collect pertinent data. There was an increased risk to the mother's and the unborn child's health since nearly 20% of the 257 participants had a negative obstetrics history, a quarter were married within the same family, and 33% experienced overexcited emesis. Low pregnancy intervals, pre-eclampsia, and anaemia are the most common issues impacting antenatal women's health. After NRHM was implemented in rural Davangere districts, pregnant women's health status improved and they utilised antenatal care more frequently. A large number of prenatal visits is not enough to alleviate the problems of anaemia and preeclampsia.

According to **Adikari et al. (2016),** one of the most important health concerns in the state is the mother's nutrition. Among pregnant women in a very provincial range, this study aimed to assess their nutritional status. From the Maternal and Child Health Centres, 133 pregnant women in their third trimester were recruited. The data was collected using an anthropometric measure, an approved food recurrence poll, and a previously administered general evaluation survey. Nutritional status was determined by measuring haemoglobin levels, body mass index (BMI), and weight gain or loss. We compared supplement admission data with pregnancy-specific Recommended Dietary Allowances (RDAs).

The inquiry test participants had an average age of 26.86±4.16 years. The first visit's pre-pregnancy body mass index determined that 15, 44, 35, and 5.3 percent of the patients were underweight, normal, overweight, and corpulent, respectively. During the trimester, they gained an average of 2.71±2.23 kg, which was lower than the recommended 4.84 kg. Out of the total, 24.57% displayed a deficiency (<11 gdL-1).

Daily caloric intake averaged 2472 kcal, with relative contributions from carbs (61.5), proteins (12.2), and fats (26.3), respectively. Although the average daily protein intake (74.19±13.64 g) was higher than the recommended daily allowance (RDA) of 59 g/day, the average daily intakes of calcium (844.9 mg), iron (16.5 mg), and folate

(420.9 mg) were lower than the RDA. Underweight, overweight, and inadequate supplement intake were all deemed to be health issues based on the results of the testing. In this regard, feasible pregnant women should be directed towards nutrition education in order to improve the nutritional condition of mothers.

Consequences for adolescence, pregnancy, and lactation (NFHS-3) are associated with chronic undernourishment (36%) and anaemia (55%), according to Daniel et al., (2016). The intervention group consisted of fifty pregnant women in their third trimester who were selected from twelve villages and had a body mass index (BMI) of 18.5 or lower. Women from the surrounding villages who were old enough to be in their third trimester and had a low body mass index (BMI) made up the non-intervention group. Weight growth during the third trimester of pregnancy, adherence to a 24-hour recall method for dietary variety adoption, and the percentage of change in hand-washing behaviour were all measured to determine the effect of nutrition education. The average weight gain for women who participated in the intervention was 8.7 kg. They also attended the ICDS centre for awareness programs regularly, which meant they went to three antenatal care (ANC) appointments per month.

The pregnant women demonstrated behavioural change by eating three square meals a day and increasing their intake of vegetables, lentils, and greens in addition to cereals. The women said that they regularly washed their hands before meals and after using the loo. Women in the intervention group gained 2.1 kg more than those in the control group over the course of the study. Changes in behaviour were observed in the intervention group women in the following areas: eating three square meals or more per day, washing their hands thoroughly before and after using the restroom, and getting enough sleep. There is a limited association between maternal weight increase and birth weight that depends on subsequent dosing between the two trial arms.

According to **Mudhaliar et al. (2017),** pre-pregnancy underweight has long been thought of as a risk factor for negative gestational outcomes, suggesting that maternal nutrition status is an important predictor of pregnancy outcomes. During the six months of this prospective, observational review, 220 pregnant women's dietary habits, weight, height, cure, lab parameters, anthropometric data, and other vitals were recorded at their scheduled clinical appointments. All medical records were reviewed and approved during the research. World Health Organisation Nutri Analysis 2007 was the statistical technique utilised. Among the pregnant women surveyed, over 80% were n the 20-to 30-year-old age bracket, and 35.45% were illiterate. Anaemia affected 78.19 percent of pregnant women in our study, with a total distribution of 60.45%.

Ladies who are expecting a child and weigh between 18.5 and 25 kg. The participants in this study consumed an average of 1839.8 ± 250.2 kcal and 63.1 ± 7.2 g of protein per day, with standard deviations calculated. Low birth weight was present at an incidence rate of 87.43% throughout the research period. Once upon a time, in India, low birth weight was thought to be caused by widespread maternal malnutrition. Without doing thorough studies, we would not be able to create an intervention to increase birth weight in Indian newborns, which is why a better

understanding of the relationship between birth size and maternal nutrition is vital.

The improvement of maternal health was one of India's thousand-year-old developmental goals, according to **Sindhu et al. (2017**). among spite of numerous strategies and objectives, the idea of promoting healthy incentives among pregnant women has remained a pipe dream in India. In contrast to professionals and health care workers, prenatal moms' families are the main sources of nutrition. It doesn't change the fact that pregnant women in the province adhere to various urban legends. Health professionals should focus more on healthy values, and prenatal classes should be careful about covering topics like adequate nutrition, its components, its sources, and the consequences of over- or under-nourishment, especially for women who lack education and training. More health professionals should be employed by the government to advise mothers on how to provide a healthy environment for their children.

Chapter 3
MATERIALS AND METHODS

The was carried out with the protocol which includes various methods and materials. The detail of materials, methods and techniques were adopted during the study are collaborated in this chapter.

1. **Design of the study**
2. **Selection of sample**
i. Selection of Area
ii. Selection of Respondents

3. **Collection of Data**
i. **Development of schedule for survey**
ii. **Data collection from respondents regarding**

a) General profile and personal data
b) Nutritional status of pregnant women
i. 24 hours dietary recall
ii. Anthropometric measurement
iii. Clinical Signs and Symptoms
iv. Biochemical Profile
v. General Awareness

4. **Development of Nutrition Education Materials**

i.   Documentary

ii.   Folders

iii. Chart

5.   Nutrition Education and its impact assessment

i.   Pre-exposure knowledge test

ii.   Exposure to nutrition education materials

a)   Nutrition education through documentary, folders and chart.

iii.   Post-exposure knowledge test

iv.   Score allotment

a)   Comparison of pre and post exposure score for impact analysis

b)   Assessment of gain in knowledge

6.   Data analysis and application of statistical tests

1.   Study Design

This study was a community based cross- sectional study with descriptive and analytical components on selected pregnant women of hospitals of Liberia District. Cross– sectional study or prevalence study is a type of observational study that analyses data collected from a population at a specific point of time.

2.   Selection of sample

i.   Selection of Study area

Liberia was selected purposively for the present research work because it was convenient and the researcher had very close access to it, so regular visits could be made for authentic collection of data for study. Selection of area for the baseline survey The different hospitals of Liberia city which were purposively selected for the baseline survey. The baseline survey was conducted with the help of a pretested survey schedule as shown in **Appendix A.**

iii. Selection of respondents: Sample size determination (Quantitative method):

The sample size was determined by the prevalence rate of malnutrition of the women. Based on this prevalence rate, the actual sample size for the study was determined using the formula for single population proportion.

$$n = \frac{Z^2 \times p \times q}{e^2}$$

Where n = Sample size

Z = z value corresponding to a 95% level of significance=1.96

p = Prevalence of malnutrition of women in Uttar Pradesh = 25.3% q =(1-p) e = Permissible error = 0.05 (5%)

Based on the NFHS-4 prevalence of malnutrition of women, p is taken up as 25.3 per cent (0.253)

q = 1-0.253 = 0.747

$$n = \frac{(1.96)^2 \times 0.253 \times 0.747}{(0.05)^2}$$

$$n = \frac{0.7260}{0.0025}$$

$$n = 290$$

According to quantitative determination sample size estimation was 290 but total of 250 pregnant women belonging to the age group 20-40 years were available for the study at the time period of study. Respondents collected from the hospitals, nursing-home, PHC (Primary Health Centres). Systematic purposive sampling technique was adopted.

Inclusion criteria- All pregnant women of first and second trimester belonging to the age group 20-40 years.

Exclusion criteria- Except pregnant women of first and second trimester all individuals were excluded from the study.

3. Collection of Data

a. General profile: This section includes the respondent's name, age, family type, family size, educational status, occupation status, occupation type and family annual income.

- **Age-** The age of the respondents were categorized in different groups i.e. 20-25 years, 25-30 years and 30-40 years.

- **Type of family-** The selected pregnant women were categorized according to their family type into two groups; nuclear and joint families. Those who were living alone, with spouse and unmarried children were considered as nuclear family and those who were living with their married children were classified as joint family.

- **Educational status-** The educational status of each selected respondent was categorized as post-graduate, graduate, intermediate, high school, primary education and illiterate.

- **Occupation-** The selected respondents were grouped according to their occupation as profession, shop owner/ clerk/ farmer, skilled worker, unskilled worker and unemployed (housewife).

- **Pregnancy status-** The pregnancy status of respondents was categorized according to trimester i.e. first trimester and second trimester.

- **Numbers of children (parity) -** Parity is the number of pregnancies carried to viable gestational age (live birth). It is divided into 1 child, 2 children, 3 children and more than 3 children.

- **Procedure of previous delivery-** The selected pregnant women who had not first pregnancy undergo delivery procedure which was categorized into two procedures: first Normal Vaginal Delivery (NVD) and second Lower Segment Caesarean Section (LSCS).

- **Complications during pregnancy-** Although all pregnant women have some complications or illness during her gestational period but some have severe health problems such as high blood pressure, low blood pressure, thyroid disorder, urinary tract infection, Gestational Diabetes Mellitus (GDM), vomiting, vertigo and nausea.

b. Nutritional status of pregnant women

i. Anthropometric assessment: Anthropometric assessment is concerned with the assessment of variation of physical dimensions, the gross composition and degree of nutrition. Hence, anthropometric measurements are useful criteria for assessing nutritional status. It included following measurements:

Measurements of height: A person's height can be influenced by a variety of internal and external factors. The maximal growth potential of an individual is determined by hereditary characteristics. The two most significant environmental factors are nutrition and morbidity. While standing, the subjects' heights were measured to within one tenth of an inch using a non-stretchable steel tape (Park, 2017). Everybody stood tall, hands hanging loosely at their sides, feet slightly apart, backs facing the wall, shoulders and heads leaning on it. The gathered data were used to calculate body mass index.

The most reliable indicator of nutritional inadequacy is a decrease in body weight, so measuring weight is considered the gold standard. Everyone was weighed using a portable digital scale with a 180-kilogram capacity. The participants were asked to stand on the scale without shoes, not to lean or hold anything, and their weight was recorded in kilogrammes. Gains in weight throughout pregnancy were computed using the acquired values.

Gaining weight when pregnant: "Getting fat" and "weight gain" are two completely different things. Putting on some pounds is a good indicator of your health. Gaining weight during pregnancy has two purposes: first, to provide energy for the growing baby, and second, to prepare for the possibility of breastfeeding. Prenatal nutrition and development can be better gauged by tracking the mother's weight gain. There is minimal to no weight gain (0.7-1.4 kg) in the first trimester. A subsequent aim should be a consistent increase in weight of 0.35 to 0.4 kg per week.

Trimesters	Expected weight gain (kg)
First trimester (upto 12 weeks)	0.7 to 1.4

Second trimester (13 to 28 week)	.6 to 6.4
Third trimester(29 week onwards)	.2 to 4.8

Source: (Khanna *et al.*, 2016)

- **Body Mass Index (**BMI**):** Body Mass Index (BMI) of each subject was calculated from the recorded height and weight measurement using the following formula **(Park, 2017).**

$$BMI = \frac{Weight\ (kg)}{Height^2(\text{m})}$$

A healthy weight for a pregnant woman is defined as her body mass index (BMI) in relation to her height. For women, body mass index (BMI) is a trustworthy measure of fatness and a tool for identifying risky weight categories.

She should gain 13–18 kg throughout pregnancy if her weight before conception was within the normal range for a woman of her height. Pregnant women should try to gain between half a kilogramme to three kilogrammes during the first trimester, and another half a kilogramme every week thereafter, for their babies' healthy development.

ii. **24 hours dietary recall:** The first stage of nutritional deficiency is identified by dietary assessment method. During this stage, the dietary intake of one or more nutrients is inadequate, either because of primary deficiency (low level in the diet) or because of a secondary deficiency. A dietary survey was conducted as described by **Park (2017).** Food habits and daily dietary intake were recorded during the diet survey. Information regarding the intake of food by selected pregnant women was collected using 24 hours dietary recall method. 24 hours dietary recall method is one of the most cost effective methods to characterize the average intake of large group. As such it was recorded in terms of cereals and pulses, milk and milk products, green leafy vegetables, roots and tubers, fruits, meat and poultry and oil and sugar. The respondents were asked about frequency intake of various food groups during interview of session. Frequency of consumption of non-vegetarian foods was also noted.

Average nutrient intake per day was calculated and compared with Recommended Dietary Allowances (RDA) for this age group using the food consumption tables given by **Gopalan *et al.*, (2015).**

iii. **Clinical Signs and Symptoms:** It is important practical method for assessing the nutritional status of community and the method is based on examination for changes believed to be related to inadequate nutrition. In order to find nutritional adequacy clinical examination was done.

All the selected pregnant women were examined for the presence or absence of any clinical signs and symptoms of malnutrition including general appearance for very good, good, fair, and poor; eyes was examined for presence or absence of pale conjunctiva; nail colour was examined for pale or normal colour; gums was examined for normal or bleeding; dermal lesion was present or absent; skin colour was examined for normal or pale colour; fatigue was present or absent; appetite was good or fair or poor ;abdominal pain present or absent ; morning sickness present or absent and behavioural implication was examined for normal or irritable.

iv.   **Biochemical Profile:** Data pertaining to haemoglobin (g/dl) and urinary tract infection presence or absence were recorded during the visit from the pathological reports of pregnant women.

v.   **Lifestyle:** Daily routine of pregnant women contain six items i.e. woke up time, sleeping time, meal skipping habit, exercise, smoking and alcohol consumption for the determination of lifestyle or lifestyle habits of pregnant women.

vi.   **General awareness:**

a) **Development of survey schedule –** The survey method was used for collection of data. Selected respondents were personally interviewed and necessary information was collected through developed schedule. The schedule is shown at **Appendix A.**

- **Knowledge test schedule for awareness**

A nutrition knowledge test schedule was developed for studying the pre and post nutrition education. This nutritional knowledge test schedule consisted of a set of 20 specific questions related to the nutrition awareness. The right answer of knowledge test schedule was given "3" marks for a question, while incorrect answer was given "0" mark. After that the scores obtained by the respondents were summed up to get the exact totals at pre and post exposure stages separately. These questions were prepared under the guidance of the advisor. The knowledge test schedule as shown at

Appendix A.

4.   **Development of Nutrition Education Materials:-** Nutrition education is a mechanism to enhance awareness, as a means to self-efficacy, surrounding the trigger of healthy behaviours. Three types of nutrition education materials had developed for educating the respondents. Such as – Documentary, Folders and Chart

5.   **Nutrition Education and its impact assessment**

i.   **Pre-exposure knowledge test:** The data collected by the survey schedule and knowledge test schedule in pre-intervention period. The test was applied to pregnant women aged between 20-40 years. Their answers were recorded in the performa by the investigator. Only one respondent was interviewed at a time in order to

prevent influence of answers given by the other respondents. The general information of respondents and anthropometric measurement was done only one time because it is not change in a short period of time.

ii. **Imparting nutrition education:** Nutrition education was imparted to the selected pregnant women. Following three ways of education were used:

➢ Documentary

➢ Folders

➢ Chart

On first visit of the respondents, they were educated by two educational materials i.e. folder and chart. Documentary was explained on the next week. We were requested to the respondents to come after one week and told them that the knowledgeable session is very important for their health and their baby.

iii. **ost-exposure knowledge test:** The post-exposure test was done after completion of all three educational materials. On the next visit date (after 25-30 days) given by doctor we were taken post exposure test. The same set of questions of knowledge test schedule which was used at pre-exposure stage was used to find out the impact of nutrition education on the knowledge level and daily practices related to food habits and nutrition of pregnant women.

iv. **Score allotment:** For the evaluation of effectiveness of nutrition education on selected pregnant women the exercise of knowledge test schedule was designed with scores allotted. The same set of knowledge test schedule was given to respondents for collecting data of pre-intervention and post-interventions. The nutritional knowledge test schedule consisted of a set of 20 specific questions related to the nutrition awareness. The right answer of knowledge test schedule was given "3" marks for a question, while incorrect answer was given "0" mark.

On account of wide variation in the scores obtained by the subjects their percentage of scores were computed and placed into three different categories:

0 to 20 – Low knowledge level

21 to 40 – Medium knowledge level 41 to 60 – High knowledge level

d). Comparison of pre and post exposure score for impact analysis- The impact of nutrition education provided to pregnant women was assessed by to comparing the score data of pre-exposure and post-exposure.

e). Assessment of gain in knowledge- Knowledge may be defined as the sum total of all information which a particular individual possesses about a particular item at a specific time. It can be defined as a body of

understood information as possessed by an individual **(English and English 1961).** Knowledge gain is any pre and post test change in a person's cognitive learning behaviour resulting from a specific learning behaviour. For assessing gain in knowledge the following formula suggested by **Singh *et al.,* 1993** was used.

Gain in Knowledge = (Score in post exposure test) – (Score in pre exposure test)

6. Data analysis and application of statistical test: The collected data were classified in the light of objectives of the study. The data collected were tabulated and analyzed statistically with the help of approved statistical techniques **(Gupta and Kapoor 2002).** Frequency, percentage, mean scores, paired t-test were applied.

Chapter 4

RESULTS AND DISCUSSION

In this chapter, we go over the study's results. What we eat has a significant impact on our health and our capacity to carry out daily tasks. Pregnancy amplifies the impact of poor diet on mental and physical health. The importance of proper nutrition to a pregnant woman's well-being is growing as the average lifespan continues to rise.

**Table 4.1: Distribution of Selected Respondents According to the Demographic Profile**

Serial No.	Particulars	Category	Frequency (n)	Percentage (%)
1	**Age (years)**	20-25 yrs	78	31.2
		25-30 yrs	99	39.6
		30-40 yrs	73	29.2
2	**Educational Status**	Graduate or Post Graduate	84	33.6
		Intermediate / Post High School Dip	98	39.2
		High School Certificate	20	8.0
		Primary School Certificate	17	6.8
		Illiterate	31	12.4
3	**Occupation**	Professional	41	16.4
		Clerical, Shop-owner, Farmer	23	9.2
		Skilled Worker / Labour	22	8.8
		Unemployed / Housewife	164	65.6
4	**Husband's Occupation**	Professional	45	18.0
		Clerical, Shop-owner, Farmer	92	36.8

|		Skilled Worker / Labour	14	5.6
		Semi-skilled Worker	99	39.6
5	**Family Type**	Nuclear Family	120	48.0
		Joint Family	130	52.0
6	**Total Family Income (Rs. per month)**	>41,430	37	14.8
		20,715 - 41,429	26	10.4
		15,536 - 20,714	36	14.4
		10,357 - 15,535	70	28.0
		6,214 - 10,356	77	30.8
		2,092 - 6,213	3	1.2
		<2,091	1	0.4
7	**Family Size**	Less than 5	126	50.4
		5 - 7	46	18.4
		More than 8	77	30.8
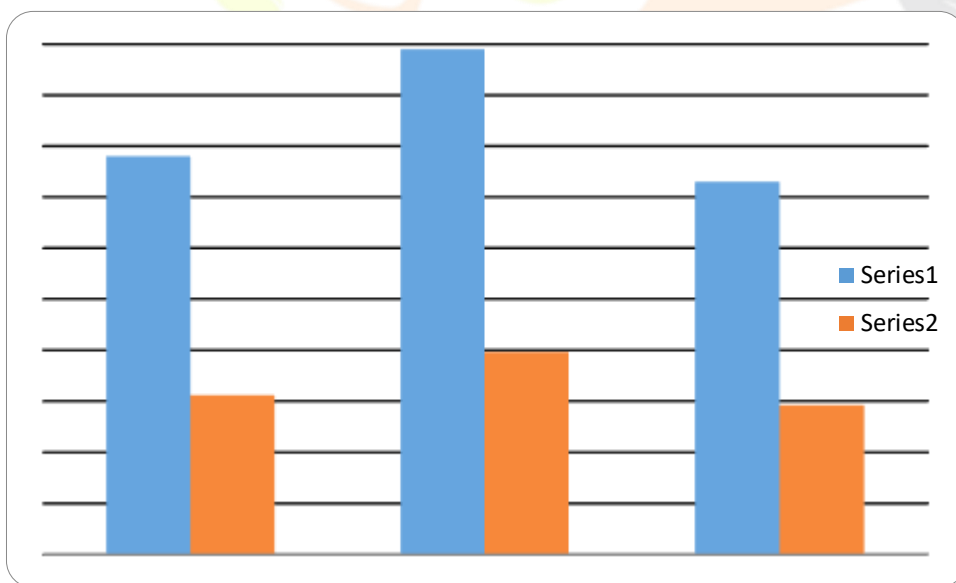
AGE: Sample of 250 pregnant women was included in the study, their age ranged between 20 -40 years. Among the selected pregnant women majority of percentage (39.6%) belongs to the age group of 25-30 years while 31.2 per cent belongs to the age group of below 25 years and 29.2 per cent belongs to the age group of 30- 40 years.
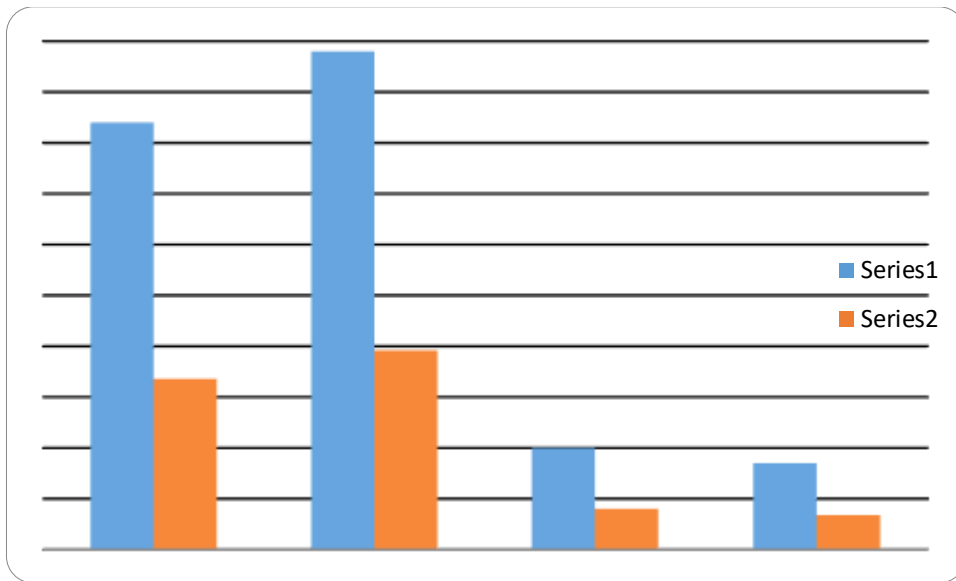
EDUCATION: Majority of selected pregnant women (39.2%) belong to the intermediate level while 33.6 per cent belong to the graduate and post graduate level 12.4 per cent of selected pregnant women were illiterate, 8 percent belongs to the high school level of education and 6.8 per cent of selected pregnant women belongs to the primary education level. According to **Chhabra and Bharadwaj (2013)** literacy rate in 12 urban slum clusters was higher than that of NFHS 3 data wherein 48 percent of urban poor women were found to be illiterate as compared to the 30.8 percent revealed in the present study.
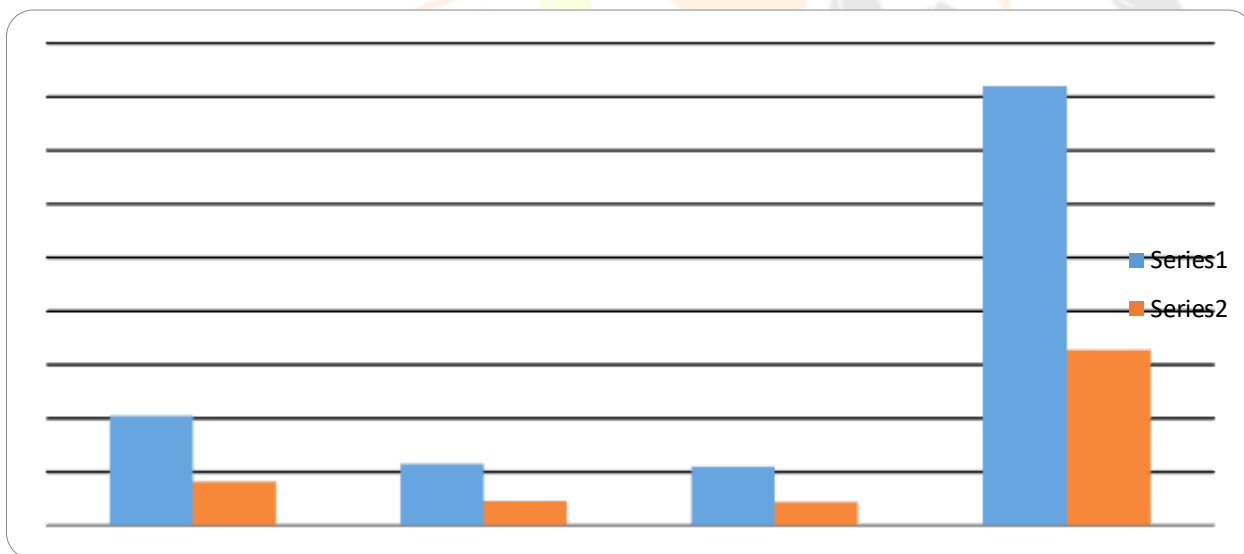
OCCUPATION: About 65.6 per cent of selected pregnant women were unemployed and 34.4 per cent of selected pregnant women were employed in different fields because nowadays when girls are read they also do job. But a lot of girls do not even work even after being read. According to **Ajantha *et al*., (2015)** more than half of the pregnant women had highest education level of graduation or above (53%) and 68 percent of them were home makers. There was 100 per cent of employment showed for husbands of selected pregnant women in different fields such as farmer, shop owner, clerk, teacher, private worker etc.
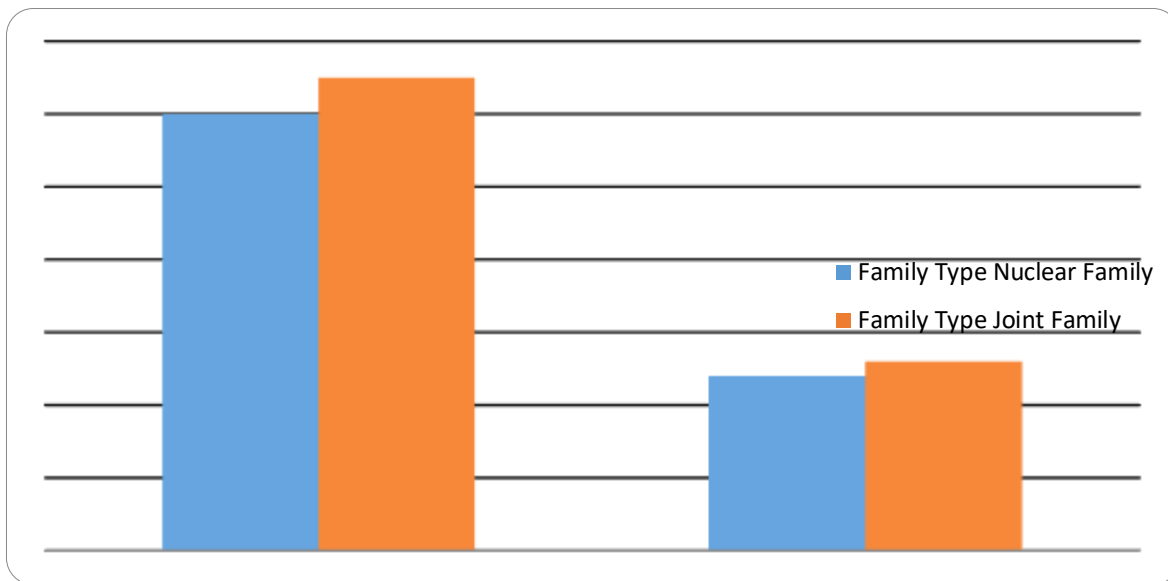
FAMILY TYPE: In Liberia there are two types of family type ever seen. Nuclear and Joint family type. Nuclear family is a type of family which consisting of a mother, a father and their children, not including grandparents, aunts, uncles, etc. A joint family or undivided family is a type of family which includes grandparents, parents, their children and also aunts, uncles etc. Even now in India there are custom of joint family so that it was observed that 52 per cent of pregnant women were from joint family type and 48 percent of pregnant women were from nuclear family type. According to **Jood *et al.,* (2002)** the majority of the respondents (80%) belonged to general category of caste and the maximum number of subjects (54%) were living in joint family.
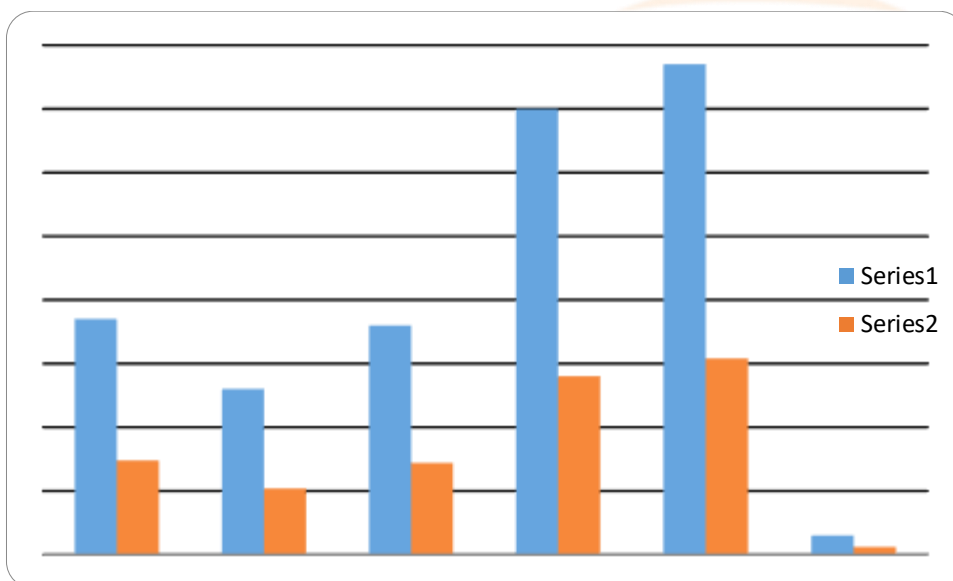
FAMILY INCOME: Maximum selected pregnant women (30.8%) had total family income per month ranged from 6214- 10356, 28 per cent of selected pregnant women had total income ranged from 10357- 15535, 14.8 per cent of selected pregnant women had a total income of family above 41430, 14.4 per cent of selected

pregnant women had total income ranged from 15536- 20714, 10.4 per cent of selected pregnant women had total income ranged from 20715- .41429, while 1.2 per cent of selected pregnant women had total income ranged from 2092- 6213 and only 0.4 per cent of selected pregnant women had total income Below 2091.
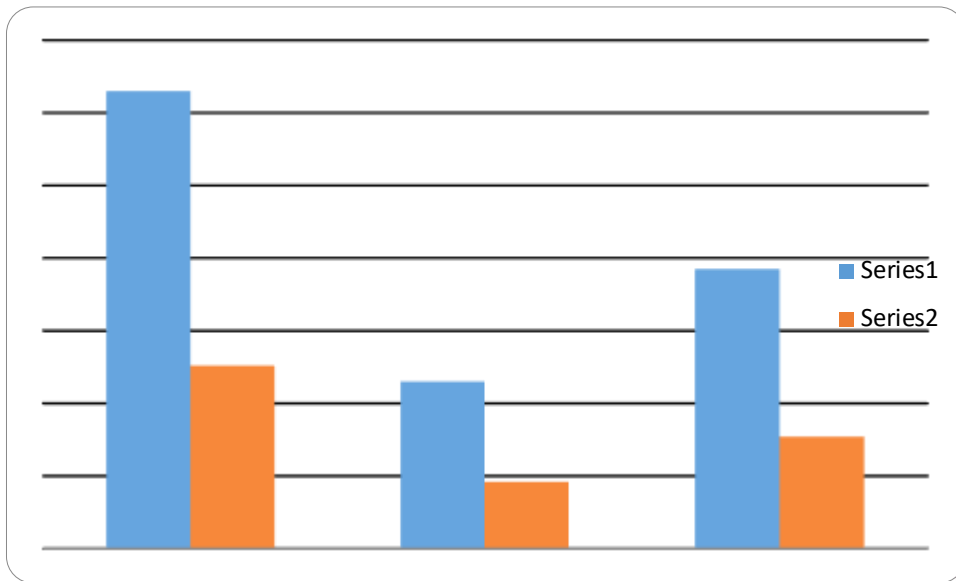
FAMILY SIZE: Even now in India people thought for both girl and boy as their children. So in desire of completion of family with boy and girl there are increases in family size. 30.8 per cent selected pregnant women belong to the family size of more than 8 members. So many people also thought for only child whether boy or girl and also for their financial condition so they do not reproduce so many children. Majority of selected pregnant women (50.4%) belongs to the family size of below 5 members, and 18.4 percent selected pregnant women belong to the family size 5-7 members.

Table 4.2: Distribution of Selected Pregnant Women According to Personal Data

Particulars	Frequency (n)	Percentage (%)
Pregnancy Status		
First Trimester	104	41.6
Second Trimester	146	58.4
Number of Pregnancies (Parity)		
First Pregnancy	104	41.6
Second Pregnancy	98	39.2
Third Pregnancy	35	14.0
> Third Pregnancy	13	5.2
Number of Children		
1 Child	98	39.2
2 Children	35	14.0
3 Children	8	3.2

> 3 Children	5	2.0
No Child (First Pregnancy)	104	41.6
Procedure of Previous Delivery		
Normal Vaginal Delivery	58	23.2
Lower Segment Caesarean Section	92	36.8
Not Gone Through Any Delivery Procedure (First Pregnancy)	104	41.6
Complications During Pregnancy		
High Blood Pressure (B.P.) + Hypothyroidism + Vomiting	7	2.8
High B.P. + Diabetes Mellitus (DM) + Vomiting + Vertigo	5	2.0
High B.P. + Gestational Diabetes Mellitus (GDM) + Urinary Tract Infection (UTI) + Nausea	3	1.2
High B.P. + GDM + Vertigo + Vomiting + Nausea	4	1.6
Low B.P. + GDM + Vomiting + Nausea	3	1.2
High B.P. + Nausea + Vomiting	19	7.6
Low B.P. + Vomiting + Nausea	13	5.2
Hypothyroidism + DM + Vomiting + Nausea	3	1.2
UTI + Nausea + Vomiting	29	11.6
Nausea + Vomiting	117	46.8
No Complications	47	18.8

The table 4.2 and fig. 4.1 to 4.4 shows the distribution of selected pregnant women on the basis of personal data related to pregnancy which were described as follows:

The majority of the pregnant women that were chosen are in the second trimester of their pregnancy (58.4%), while 41.6% are in the first trimester. Of the pregnant women who were chosen for the study, 41.6% were having their first child, 39.2% were expecting a second child, 14% were expecting a third child, and 5.2% were expecting more than one child.

The following statistics pertain to pregnancies: 41.6% were first-time mothers, 39.2% were pregnant for the

second time, and 14% were unborn. the women who were chosen to become pregnant conceived a third time, and 5.2% of those women conceived a third or more times.

When asked about their parity, 41.6% of the pregnant women surveyed said they were first-time mothers. Out of all the pregnant women surveyed, 39.2% have only one child, 14% have two, 3.2% have three, and 2% have more than three. For the simple reason that modern society has come to terms with the fact that sexes are fundamentally equal and so does not wish to raise both its family size and its spending.

Many expectant mothers believe that their pelvic bones and muscles won't be able to relax and contract properly during the delivery process if they don't engage in any physical activity while they're pregnant. As a result, they avoid working out and taking extra rest during their pregnancies. The following percentages of pregnant women have given birth in the past: 36.8% have had a lower segment caesarean section (LSCS) procedure, 23.2% had a normal vaginal delivery (NVD), and 41.6% have never given birth before since this is their first pregnancy.

DIFFERENCES: The results showed that pregnant women can experience a variety of difficulties, and in some cases, these complications can manifest in different ways. Most pregnant women experienced some sort of discomfort, such as morning sickness, nausea, or vomiting, according to Table 4.2. Nausea and vomiting affected the majority of respondents (46.8%). Only 18.8% of people who took the survey reported no problems. Infections of the urinary system, nausea, and vomiting affected 11.6% of pregnant women who were studied. Hypertension, nausea, and vomiting affected 7.6% of people who took the survey. 5.2% of pregnant women experienced nausea, vomiting, and low blood pressure.

2.8% of people who filled out the survey reported experiencing hypothyroidism, vomiting, and hypertension. Hypertension, vertigo, vomiting, and gestational diabetes mellitus were symptoms experienced by 2.0% of pregnant women. 1.6% of pregnant women who were studied experienced hypertension, hyperglycemia, vertigo, nausea, vomiting, and vomiting. 1.2% from nausea, excessive blood pressure, gestational diabetes, and UTIs.

Problems with low blood pressure, gestational diabetes mellitus, nausea, vomiting, and vomiting occurred in 1.2% of cases. 1.2% experienced hypothyroidism, diabetes mellitus, vomiting, and nausea. Though it often strikes first thing in the morning, nausea and vomiting can strike at any time of day. At least half of all first-time mothers deal with this issue. In the fifth or sixth week of pregnancy, you could start to feel little queasy in the mornings.
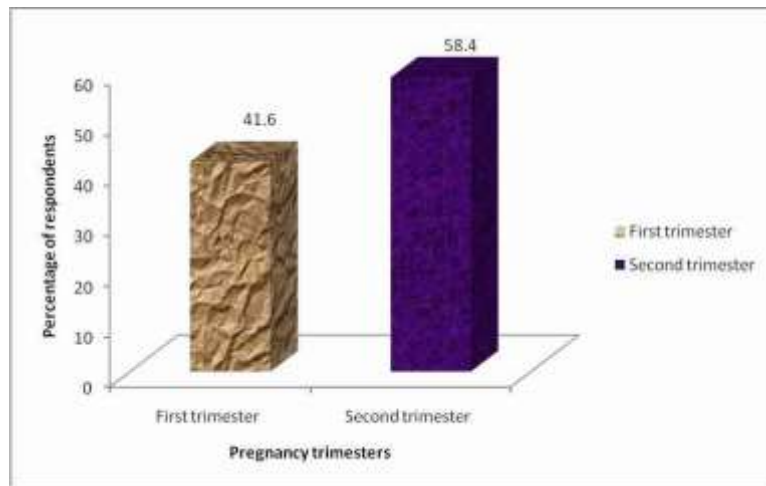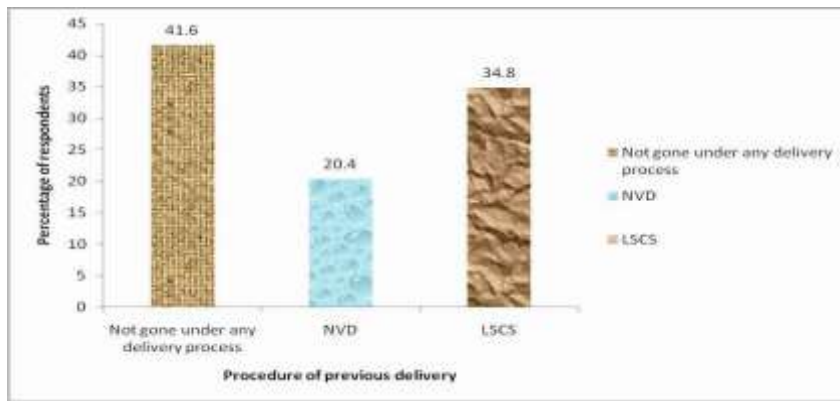
Fig:-4.1 Distribution of respondents according to the pregnancy status.

Fig:-4.2 Distribution of respondents according to the numbers of pregnancy.

Fig:-4.3 Distribution of respondents according to the parity.

Fig:-4.4 Distribution of respondents according to the procedure of previous deliveries.

Table 4.3 Distribution of respondents according to their BMI and pregnancy trimesters

S. No.	BMI Category	Number of Respondents (n)	Percentage of Respondents (%)	Average Weight Gain (kg)
1. First Trimester				
a. <18.5	7	2.8	1.45	0.7 - 1.4
b. 18.5 - 24.9	78	31.2	0.94	
c. 25.0 - 29.9	20	8.4	0.77	
2. Second Trimester				
a. <18.5	7	2.8	4.5	5.6 - 6.4
b. 18.5 - 24.9	99	39.6	4.35	
c. 25.0 - 29.9	36	14.4	4.24	
d. >30.0	4	1.6	2.5	

For each trimester, we divided the total number of pregnant women who participated in the survey by their body mass index (BMI). Weight increase, an essential and positive sign, was observed in all pregnant women in all trimesters (Table 4.3). Although the table revealed a typical growth in weight during the first trimester, the second trimester saw a decrease in weight gain compared to the reference average. However, when we looked at weight growth based on BMI, we saw that it happened less frequently. Because of the effects on both the mother and the developing baby, it is recommended that all pregnancies begin between 20 and 26 body mass index. The ideal amount to gain while pregnant is eleven to thirteen kilogrammes. The typical amount of weight gained in the first trimester ranges from 700 to 1400 grammes. After that, it's normal to consume 350 to 400 g weekly for the rest of the pregnancy. No pregnant woman should ever try to lose weight.

Table 4.4 Distribution of respondents according to weight gain in different trimesters

Trimester	Frequency (n)	Percentage (%)	Mean Weight Gain (kg)	Reference Weight Gain (kg)	t-cal	t-tab	Significant or Not
1st Trimester	104	41.6	0.93	1.05 (0.7 - 1.4)	1.927	1.660	S (Significant)
2nd Trimester	146	58.4	4.28	6 (5.6 - 6.4)	11.43	1.660	S (Significant)

* Source: - Khanna *et al*., (2015)

The distribution of responders based on weight growth in different trimesters is shown in Table 4.4 and picture 4.5. Among those who participated, 58.4% were in their second trimester and 41.6% were in their first. Both the second trimester (4.28 kg) and first trimester (0.93 kg) participants gained less weight than the reference group. Using a t-test, we discovered, at the 5% level of significance, that the reference weight gain and the weight gain during the trimesters were significantly different. Due to potential issues with morning sickness, nausea, and vomiting, the average intake of respondents was lower than the recommended daily allowance. During the trimesters, participants gained less weight than the reference group because their average caloric intake was lower. The embryo, which is around 2 inches in length, is described by Khanna et al. (2015) and has a weight of approximately 12 week to a fully developed infant weighing approximately three kilogrammes by the end of the period. During the early part of pregnancy, the foetal growth rate is rather sluggish. The daily growth increase is just 6 g in the 25th week of pregnancy, 40 g in the 34th week, and 13 g again at term. Gaining weight in a certain pattern is just as significant as gaining weight overall. Depending on a lot of factors, a healthy woman should aim to gain 12 to 13 kg by the conclusion of the pregnancy. The weight growth during pregnancy is due to several factors, including the growing foetus, larger uterus, placenta, and breast tissues, increased blood volume, amniotic fluid accumulation, and the body's fat reserves. Mayo Clinic (2012) also found that pregnant women shouldn't try to put on a lot of weight during the first trimester because doing so could make them sick with morning sickness. During the second and third trimesters, maintaining a steady weight growth should take precedence. Pregnant women did gain weight throughout the first three trimesters, but it wasn't quite enough to meet the recommended increases.
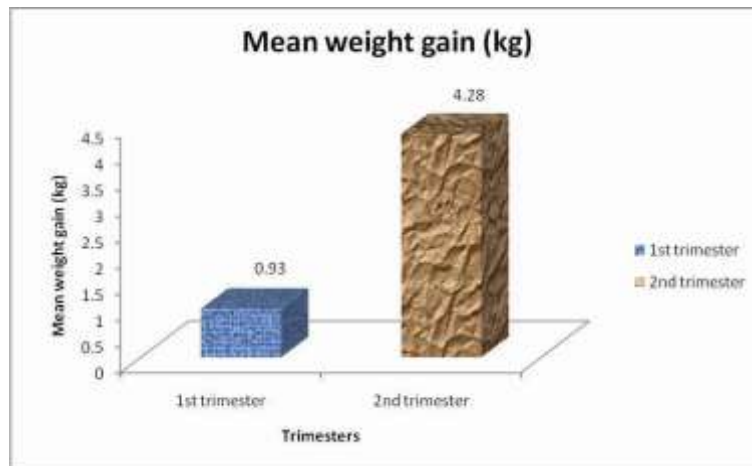
Fig:- 4.5 Weight gain in different trimesters.

Table 4.5 Distribution of selected pregnant women according to their past medical history

Medical Condition	Frequency (n)	Percentage (%)
Diabetes Mellitus (DM) + High Blood Pressure (High B.P.)	4	1.6
DM + High B.P. + Hypothyroidism	2	0.8
DM + Hypothyroidism	2	0.8
High B.P. + Hypothyroidism	6	2.4
High Blood Pressure	7	2.8
Obesity	7	2.8
Obesity + Infertility	3	1.2
Obesity + High B.P.	19	7.6
Renal Problems	2	0.8
No Past Medical Problem	**198**	**79.2**
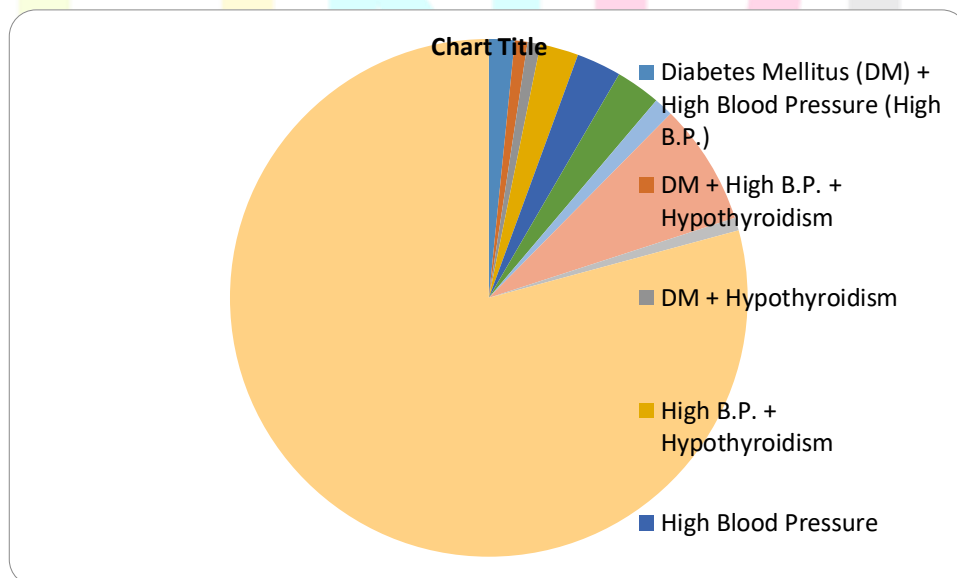
According to Table 4.5 and figure , a few pregnant women were already dealing with health issues when they became pregnant. The vast majority of pregnant women (79.5%) reported no history of health issues. Approximately 7.6% of people who took the survey also have hypertension. Approximately 2.8% of those who participated in the survey were overweight, and 2.8% were hypertensive. The following conditions were present in 2.4% of pregnant women who were chosen for the study: hypothyroidism with hypertension, diabetes mellitus with hypertension, obesity with infertility in 1.2% of pregnant women, and a 0.8 % combination of these three conditions. Among those who participated in the survey, 0.8% had a renal ailment and 0.8% had both diabetes and hypothyroidism. They inherited certain health issues from their parents and developed others as a result of their chaotic way of life. The disparity is statistically significant (p = 0.0001), as 40% of the women questioned suffer from many disorders (e.g., anaemia, hypertension, diabetes, and others such (brucellosis, allergies, renal failure, etc. asthma). The majority of pregnant women (15.38%) state that anaemia is the most prevalent nutritional issue they face.

Table 4.6 Distribution of selected pregnant women according to their family history

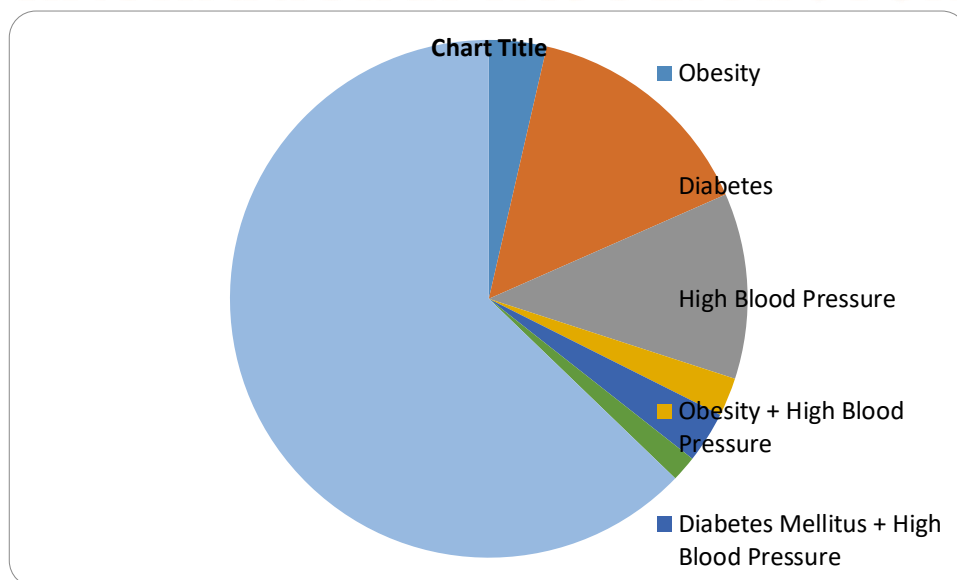| Condition	Frequency (n)	Percentage (%)
Obesity	9	3.6
Diabetes	37	14.8
High Blood Pressure	29	11.6
Obesity + High Blood Pressure	6	2.4
Diabetes Mellitus + High Blood Pressure	8	3.2
Obesity + Diabetes Mellitus + High Blood Pressure	4	1.6
No Family History	**157**	**62.8**

Table 4.6 shows that selected pregnant women had family history of obesity, diabetes mellitus and hypertension. Maximum selected pregnant women (62.8%) had no family history. About 14.8 per cent had family history of

diabetes mellitus, 11.6 per cent of selected pregnant women had family history of hypertension and 3.6 per cent of selected pregnant women had family history of obesity. There are some multiple response of diseases occurs such as 3.2 per cent of respondents had family history of both diabetes mellitus and high blood pressure. 2.4 per cent of pregnant women had family history of obesity and high blood pressure together and 1.6 per cent of respondents had family history of obesity, diabetes mellitus and high blood pressure.

Table 4.7 Distribution of selected pregnant women according to their clinical examinations

| Parameter	Category	Frequency (n)	Percentage (%)
General Appearance	Good	80	32.0
	Fair	145	58.0
	Poor	25	10.0
Appetite	Good	69	27.6
	Fair	99	39.6
	Poor	82	32.8
Eye Colour	Normal	232	92.8
	Pale	18	7.2
Skin Colour	Normal	232	92.8
	Pale	18	7.2
Fatigue	Present	179	71.6
	Absent	71	28.4
Morning Sickness	Yes	117	46.8
	No	133	53.2
Abdominal Pain	Yes	105	42.0
	No	145	58.0
Behavioural Implication	Normal	149	59.6
	Irritable	101	40.4
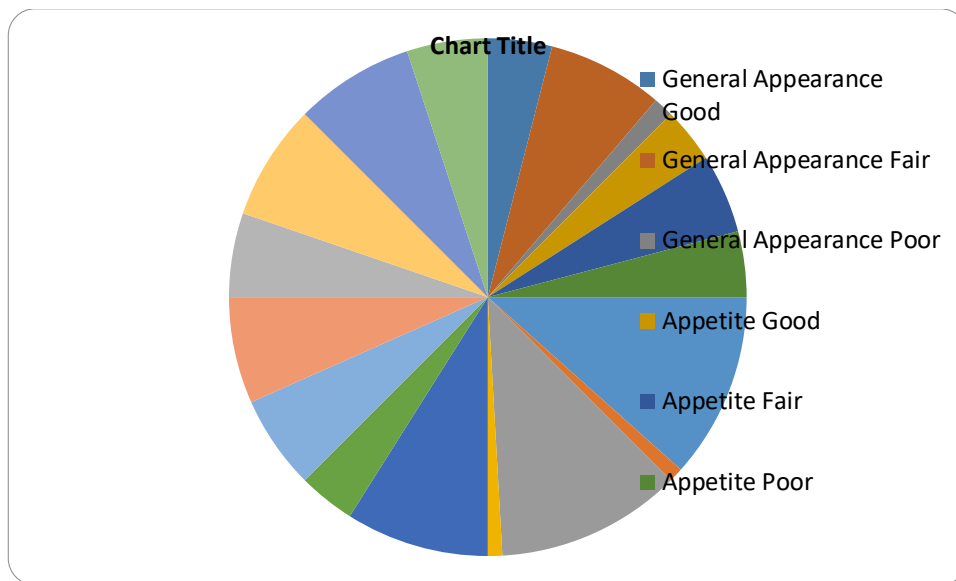
Table 4.7 displays the results of the respondents' clinical evaluations. While 58% of people surveyed thought their overall appearance was fair, 32% thought it was nice, and 10% said it was terrible. The majority of responders (39.6%) had an excellent appetite, while 32.8% reported a weak one. During the first trimester of pregnancy, some women have morning sickness, nausea, vomiting, and heartburn, which can make it difficult for them to eat well. After the first trimester, women often report feeling better and having a greater appetite as a result of the increased blood volume and foetal weight. In fact, 27.9% of respondents reported having a good appetite. In a survey where some pregnant women were anaemic, 92.8% of respondents had normal skin and eye colours and 7.2% had pale complexion. Due to the added weight that affects their posture and other difficulties, almost 71.6% of pregnant women reported feeling exhausted during the course of their pregnancy. According to the survey, 28.4% of people felt normal. Most respondents (53.2%) did not experience morning sickness symptoms after completing the first trimester of pregnancy. However, 46.8% did experience morning sickness symptoms, such as nausea and vomiting, during the first trimester of pregnancy. It's worth noting that some pregnant women experience morning sickness symptoms throughout their pregnancy, so even after completing the first trimester, some women still experience vomiting and nausea. Abdominal pain was reported by approximately 42% of pregnant women, while 58% of respondents reported no such pain. As your body adapts to carry a growing baby, you may experience some discomfort in your abdomen during your pregnancy. While most stomachaches are harmless to both mother and child, there are a few that could be dangerous. While 40.4% of people reported irritability, 59.6% had normal behavioural consequences. Hormonal changes, carrying more weight, and the associated nausea, vomiting, morning sickness, and other symptoms can make pregnant women irritable.

Table 4.8 Biochemical profile of selected pregnant women according to Anaemia Category

S. No.	Hemoglobin Level	Frequency (n)	Percentage (%)
1	Normal (Hb 12.0 - 16.0 g/dl)	111	44.4
2	Mild (Hb 10.0 - 10.9 g/dl)	108	43.2

| 3	Moderate (Hb 7.0 - 10.0 g/dl)	27	10.8
4	Severe (Hb < 7.0 g/dl)	4	1.6
Total		**250**	**100**
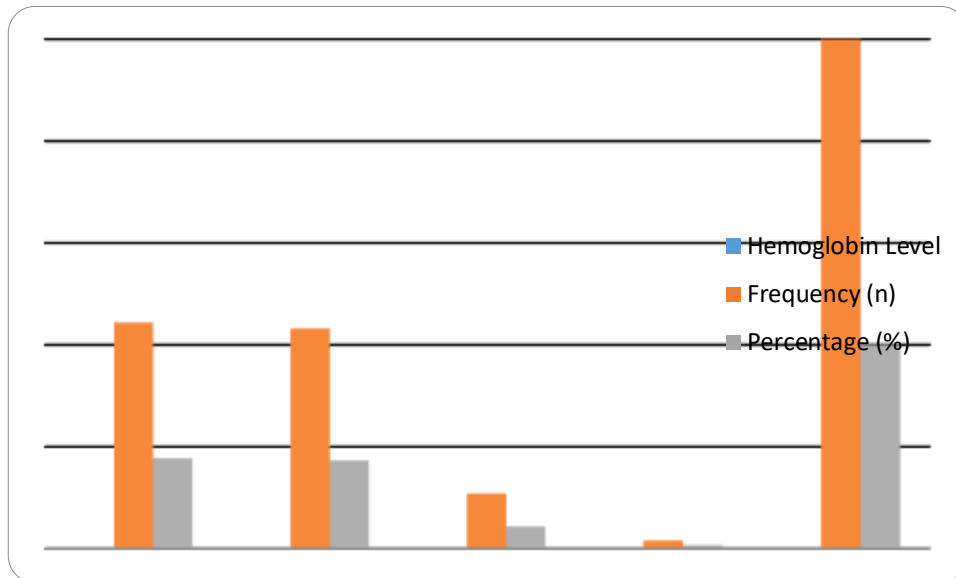
Distribution of responders according to haemoglobin level is shown in figure 4.6 and table 4.8. Hb levels between 12.0 and 16.0 g/dl were considered normal by the majority of respondents (44.4 %). The mild anaemic group consisted of around 43.2% of the participants, the moderate anaemic group of about 10.8%, and the severe anaemic group of less than 1.6%. Of the 250 people who filled out the survey, 139 were anaemic due to ignorance, whereas 111 were not. They are completely clueless as to what to eat to boost their haemoglobin levels. They eat plenty of green leafy vegetables, but they cut out vitamin C-rich meals, which prevents their bodies from absorbing iron properly. Unfortunately, many expectant mothers skip out on iron-rich foods and green, leafy vegetables. Iron supplements with milk are taken by some pregnant women who are unaware that milk contains a lot of calcium, which greatly hinders the body's ability to absorb iron. The inhibitory effect of iron prevents the consumption of calcium-rich meals at the same time. It is recommended to take iron with vitamin C-rich foods and calcium with vitamin D-rich foods for optimal absorption. Foetal growth and the success of the pregnancy are both negatively impacted by maternal anaemia. There are several negative outcomes linked to anaemia during pregnancy, including an increased risk of maternal and perinatal mortality, hypoxia, early delivery, low birth weight, and other complications. Haemoglobin (Hb) levels naturally decrease throughout the second trimester of pregnancy. A physiological drop in blood viscosity allows for improved placental circulation, which is linked to an increase in plasma volume. According to ICMR data, 13% of the population in India suffers from mild anaemia, 57% from moderate anaemia, and 12% from severe anaemia.

In India, nutritional deficiency anaemia during pregnancy is still a big issue. Fewer than 8.89% of pregnant women who were studied by Priyadarshani and Asha (2016) were found to be within normal limits. There was a

prevalence of moderate anaemia at 34.44%, mild anaemia at 47.78%, and severe anaemia at 8.89% among the participants. Data analysis of the prevalence of anaemia among pregnant women showed that 91% of the women in the study were anaemic, a shockingly high rate. Only 9% of the women in the study were not anaemic. Anaemia with a haemoglobin level below 7 g/dl was also detected in 8.89% of pregnant women, a condition that poses a significant risk to the pregnancy's outcome.

Hossain et al. (2013) found that among pregnant women in rural and urban areas, 16% and 9% were severely anaemic, 54% and 38% were moderately anaemic, 24% and 42% were mildly anaemic, and 6% and 11% were non-anemic, respectively. Pregnant women living in cities had better access to nutritious food than those in rural areas, according to the survey's overall findings.
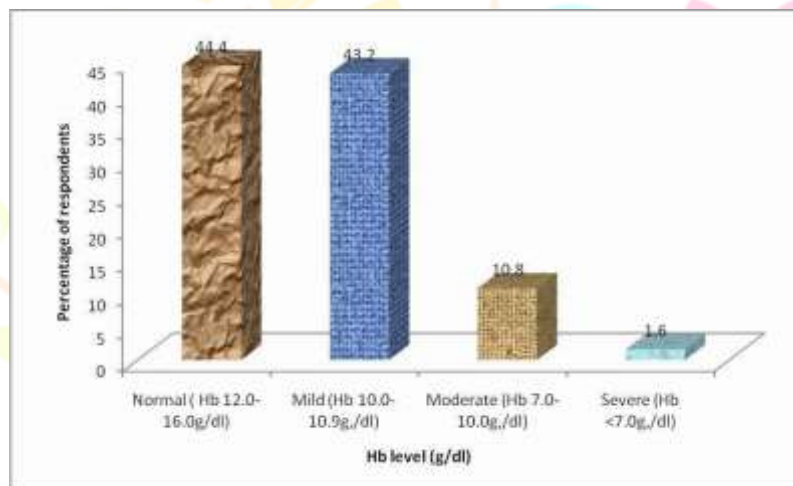
Fig.:- 4.6 Distribution of respondents according to the haemoglobin level.

Table 4.9. Duration of sleep

Lifestyle Parameter	Category	Frequency (n)	Percentage (%)
Duration of Sleep	8-10 hours	85	34.0
	5-7 hours	165	66.0
Exercise	Yes	83	33.2
	No	167	66.8
Smoking	Yes	0	0.0
	No	250	100.0

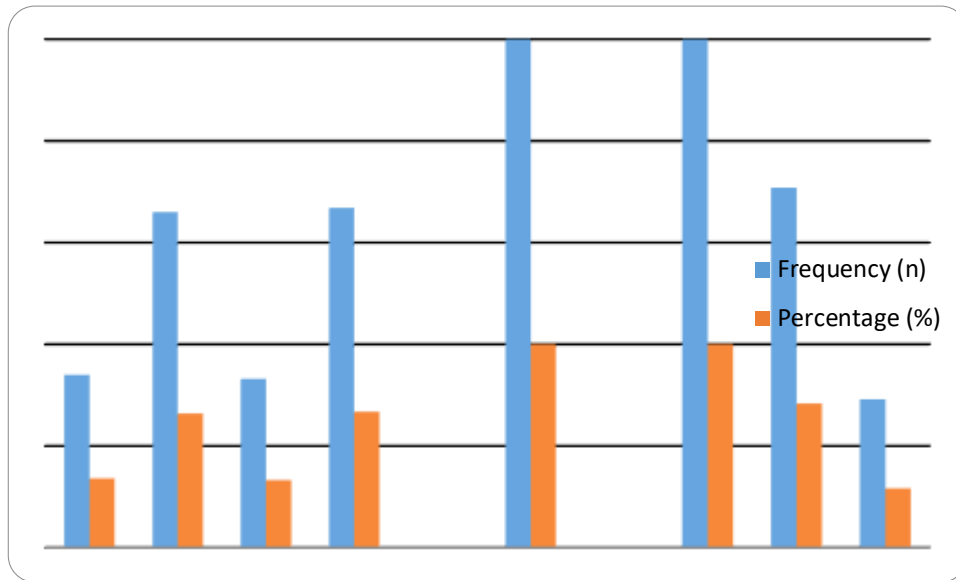| Alcohol	Yes	0	0.0
	No	250	100.0
Meals Skipped	Yes	177	70.8
	No	73	29.2

Table 4.9 shows that only 34 percent of selected pregnant women took proper sleep for 8-10 hours and rest of 66 percent of selected pregnant women took rest for only 5-7 hours. Most of selected pregnant women (66.8%) did not exercise regularly whereas about 33.2 percent of selected pregnant women exercise regularly. Majority of pregnant women don't do exercise because either they wake up late in the morning or they have so many household work. Some women have myth that exercising during pregnancy can have some complications. None of the selected pregnant women were smoking and also does not consume alcohol due to Indian custom. Because in India mostly in undeveloped and developing cities there are custom that women don't do smoking and alcohol consumption. But in metropolitan cities there are some women which take alcohol and also do smoking. About 70.8 percent of selected pregnant women skipped their meal because of the pattern of meal. They take meal only two times because they cooked in the morning and all working members take their food and go to on the work and then the respondents also take their food in the morning and then after take only tea. And when working members and their husbands come back to home in the evening or night they take their food after when all members were taken their food. Only 29.2 percent of selected pregnant women were not skipped their meal.

Table 4.10 Distribution of selected pregnant women according to their dietary pattern

S. No.	Dietary Pattern	Frequency (n)	Percentage (%)
1	Type A*	33	13.2
2	Type B*	62	24.8

| 3	Type C*	104	41.6
4	Type D*	51	20.4
Total		**250**	**100**

*[Type A= Brunch + Dinner]

*[Type B= Breakfast+Lunch+Dinner]

*[Type C= Breakfast+Lunch+Evening tea+Dinner]

*[Type D= Breakfast+Mid-morning+Lunch+Evening tea+Dinner+Bed time]
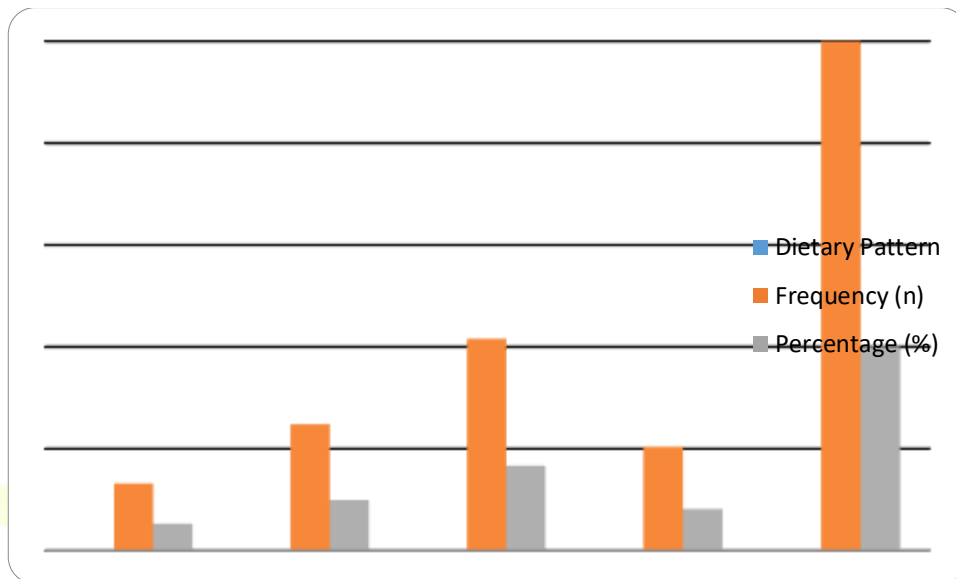
In terms of dietary patterns, the data from Table 4.10 and Figure 4.7 show that 41.6% of respondents favoured a type C pattern, which consists of four meals per day. Next came type B, which consists of three meals per day. Type D, which consists of six meals per day and is the optimal pattern of diet intake for any individual, was preferred by 20.4% of respondents. Finally, 13.2% of respondents preferred a type A pattern, which consists of two meals per day. The subjects' eating habits were straightforward, with just two main meals per day, according to Garg and Kashyap (2006). Subjects' food consumption varied greatly between categories, and there was no discernible change in eating patterns throughout pregnancy. Pregnant women often ate two large meals a day, in the early afternoon and the evening, as reported by Jood et al. (2002).
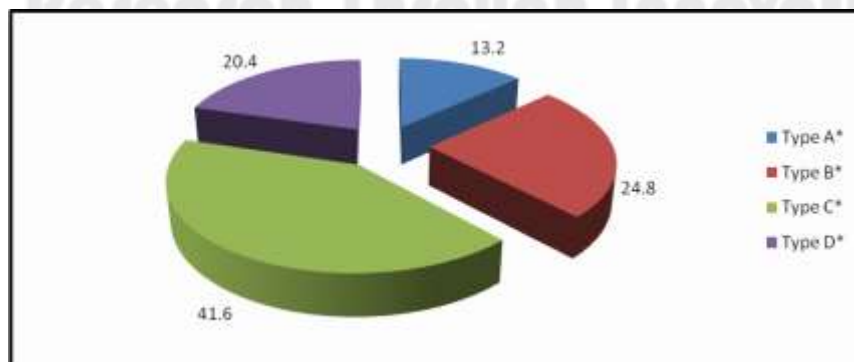
Fig: - 4.7 Distribution of selected pregnant women according to their dietary pattern

Table 4.11 Distribution of respondents according to food habit

S. No.	Food habit	Total (N=250)	
		n= frequency	Percentage (%)
1.	Vegetarian	134	53.6
2.	Non-vegetarian	59	23.6
3.	Ovo-vegetarian	57	22.8
Total		250	100
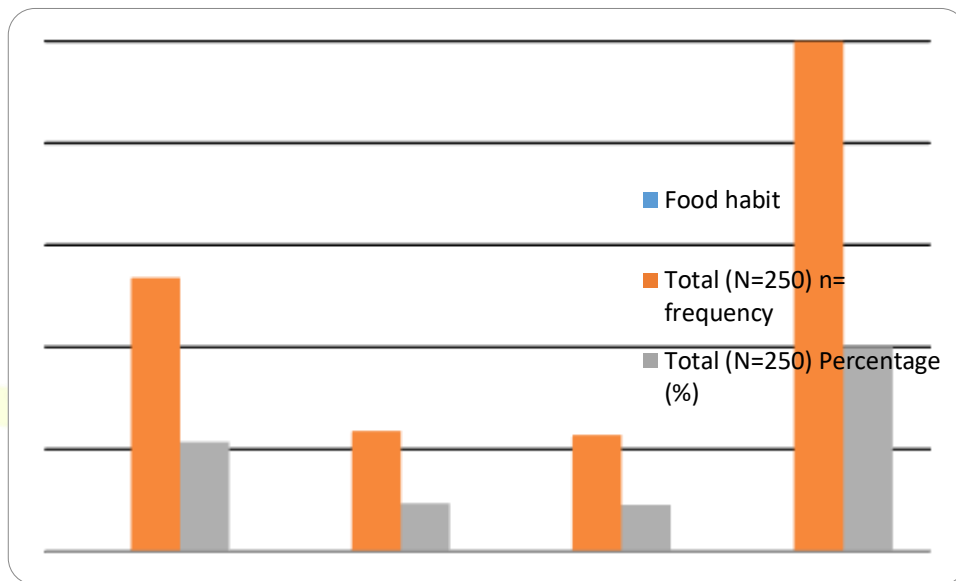
The table 4.11 and fig 4.8 shows the distribution of respondents according to food habit. It was revealed that most of the respondents were vegetarian (53.6%) because most of the pregnant women are belongs to Hindu religion. About 23.6 percent of the respondents were non- vegetarian. Only 22.8 percent of the respondents were ovo- vegetarian or eggitarian. The dietary habits of individuals vary according to regional customs and tradition.
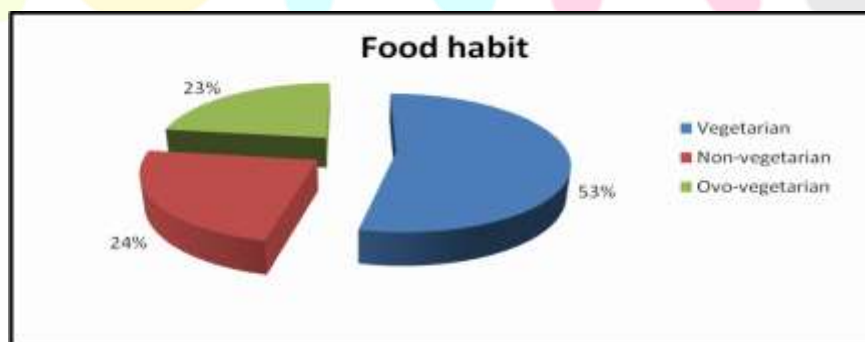
Fig: - 4.8 Distribution of selected pregnant women according to food habits

Table 4.12 Distribution of respondents on the basis of food consumption frequency

Food Item	Daily (n, %)	4-6 times/week (n, %)	2-4 times/week (n, %)	1-2 times/week (n, %)	Occasionally (n, %)	Never (n, %)
Cereals	250 (100)	-	-	-	-	-
Pulses	190 (76)	50 (20)	10 (4)	-	-	-
Milk and Milk Products	46 (18.4)	72 (28.8)	28 (11.2)	18 (7.2)	47 (18.8)	39 (15.6)
Green Leafy Vegetables (GLVs)	62 (24.8)	76 (30.4)	59 (23.6)	22 (8.8)	13 (5.2)	18 (7.2)
Roots and Tubers	228 (91.2)	22 (8.8)	-	-	-	-
Fruits	83 (33.2)	67 (26.8)	28 (11.2)	18 (7.2)	32 (12.8)	22 (8.8)
Eggs	11 (4.4)	-	29 (11.6)	33 (13.2)	43 (17.2)	134 (53.6)
Meat and Meat Products	17 (6.8)	11 (4.4)	31 (12.4)	21 (8.4)	36 (14.4)	134 (53.6)
Fats and Oils	250 (100)	-	-	-	-	-
Oilseeds	-	-	-	-	250 (100)	-
Sugar and Jaggery	232 (92.8)	-	-	-	-	18 (7.2)

The eating habits of certain pregnant women are displayed in Table 4.12. Liberia was the reason one hundred percent of responders were eating cereal every day. While 76% of people said they ate pulses every day, 20% said they ate them four to six times a week, and 4% said they ate them two to four times a month. Pulses and cereals both help adults get the essential fatty acids (EFAs) they require because of their high total fat content (both visible and invisible) (Gopalan et al., 2015).

Pulses are a part of some women's diets even though they don't particularly enjoy them, especially during pregnancy. Milk and milk products are consumed by around 28.8% of the respondents. 4 to 6 times weekly, 18.8% of respondents drink milk or milk products sometimes, 18.4% drink milk or milk products daily, 11.2% drink

milk or milk products 2 to 4 times per week, 7.2% drink milk or milk products 1 to 2 times per week, and 15.6% drink milk or milk products never.

Women don't drink milk every day because they believe it's better to share the milk with their husband and children if there's too much. However, some pregnant women now regularly drink milk because of increased awareness. A little over 30% of people polled said they ate green leafy vegetables four to six times a week, while 25% said they ate them every day, 23.6% said they ate them twice a week, 8.8% said they ate them once or twice a week, 7.2% said they never ate them, and 5.2% said they ate them sometimes. While 91.2% of people who took the survey ate roots and tubers at least once a day, 8.8% said they ate them four to six times a week. The percentage of people who eat fruits on a daily basis varied across the survey, with 33.2% doing so, 26.8% doing so four to six times a week, and 12.8% doing so sometimes. No one ever ate an egg, according to 53.6% of respondents. In terms of frequency of egg consumption, 17.2% and 13.2% of respondents reported eating eggs occasionally and once or twice weekly, respectively. In contrast to the 4.4% who reported eating eggs every day, 11.2% said they ate eggs between two and four times each week. In terms of meat and meat products consumption, 53.6% of respondents said they never ate them, 14.4% said they ate them occasionally, 12.4% said they ate them 2–4 times per week, 8.4% said they ate them 1–2 times per week, and 6.8% said they ate them daily.

Among those who took the survey, just 4.4% reported eating meat four to six times weekly. While 100% of people who took the survey regularly consumed fats and oils, 100% of people who took the survey occasionally consumed oilseeds such flaxseed, gingelly seed, etc. Oilseeds are sometimes consumed by pregnant women due to the misconception that they are hot, and the belief that the misuse of hot substances might cause miscarriage. Only 7.2% of respondents never ate sugar or jaggery due to their diabetes, while 92.8% of respondents regularly ingested these sweets.

Had a boring eating routine because there wasn't enough variety in their diet. Jood et al. (2002) found that rural pregnant women in semi-arid, arid, and rainy districts consumed an average of 470.2, 470.5, and 370.2 grammes of grains per day, corresponding to 78%, 96%, and 96% of the RDI, respectively. The average daily consumption of pulses by pregnant women in desert zones was 15.8, semi-arid zones was 19.3, and wet zones was 35.3 grammes. In the summer, respondents in all three zones didn't eat any green leafy vegetables (GLVs) since they weren't easily available. While pregnant, women in the Hisar zone ate an average of 26.0 gm of roots and tubers, while those in the Bhiwani zone ate 40.2 gm and those in the Kurukshetra zone 25.9 gm. In all three zones, the intake of milk and milk products was relatively low, falling between 14% and 182% of the RDI. The majority of rural residents kept dairy cows and other milk-producing animals at home, which led to increased milk consumption. On a daily basis, pregnant women consumed more fat and oils than what is recommended by the RDI. The increased fat consumption was a result of eating more fatty meals and dairy products, as well as eating

more saturated fat from pulses, veggies, and chapatti. Summertime mean daily sugar intakes for rural pregnant women in the three zones were 50% and jaggery intakes of 74% of RDI, respectively.

Table 4.13 Distribution of respondents according to their nutrient intake in first trimester

Sedentary respondents of first trimester n=77								
Nutrients	Energy (Kcal)	Protein (g)	CHO (g)	Fat (g)	Iron (mg)	Calcium (mg)	Vitamin C (mg)	Folic acid (μg)
Average Nutrient intake	1998.7± 140.84	67.4± 6.64	249.7± 12.65	36.68± 4.88	29.30± 4.27	893.8± 14.70	66.81± 3.03	266.7± 7.81
RDA	2250	78	237.5	30	35	1200	40	600
Difference	251.3	10.6	-12.2	-6.68	5.7	306.2	-26.8	333.3
t-cal	15.656	13.927	8.512	12.024	11.680	183.417	78.124	105.099
t-tab	1.664	1.664	1.664	1.664	1.664	1.664	1.664	1.664
Result	S*	S*	S*	S*	S*	S*	S*	S*
Moderate respondents of first trimester n=27								
Average Nutrient	2082.7± 167.57	73.9± 6.80	267.8± 16.80	35.1± 4.72	31.1± 4.62	918.7± 12.75	63.48± 6.72	279.62± 11.40
RDA	2580	78	287	30	35	1200	40	600
Difference	497.3	4.1	19.2	-5.1	3.9	281.3	-23.48	320.38
t-cal	15.418	3.611	5.545	5.239	4.330	114.869	18.565	104.129
t-tab	1.703	1.703	1.703	1.703	1.703	1.703	1.703	1.703
Result	S*	S*	S*	S*	S*	S*	S*	S*

* S= Significant

*NS= Not Significant

Table 4.13 shows the nutrient consumption data for the average sedentary responders. With the exception of fat and vitamin C, the chosen respondents' nutrient consumption during the first trimester of pregnancy was lower than the Recommended Dietary Allowances (RDAs) for the majority of nutrients. Average nutritional intake was lower in the first trimester compared to the second because respondents experienced nausea, vomiting, and unease and were unable to eat properly. The recommended daily allowance (RDA) was 251.3 kcal more than the average energy intake (1998.7±140.84 kcal). The reason their average protein intake (67.4±6.64g) was 10.6 g lower than the recommended daily allowance (RDA) was because they did not regularly consume pulses, milk, or milk products. It is possible that the desire to consume spicy, greasy, sour, fried, and fatty meals to alleviate the nausea and vomiting contributed to the average fat intake being greater than the recommended daily allowance (36.68±4.88g).

The recommended daily consumption of iron during pregnancy is 35 mg, however, the average iron intake of the participants was 5.7 mg lower, at 29.30±5.33 mg. Also, the recommended daily allowance of calcium (893.8±114.70mg) was not met. The reason why the average vitamin C intake was 26.8 mg greater than the recommended daily allowance (RDA) was because people who suffer from nausea and vomiting tend to eat more citrus fruits, such as lemons, oranges, and mausambi, in an effort to alter their taste buds. Under the recommended daily allowance, the average consumption of folic acid was below 166.7±27.81 µg.

In the first trimester, moderate responses had lower than average dietary intakes compared to the sedentary women, but higher than the RDAs for all nutrients except fat and vitamin C. There was a disparity of 497.3 kcal between the recommended daily allowance and the average energy intake, which was 2082.7±167.57 kcal. Protein intake was decreased by 4.1g compared to the RDA, with an average of 73.9±5.80g. The recommended dietary allowance (RDA) was exceeded by the average fat consumption (36.80± 3.72g). The recommended daily consumption of iron during pregnancy is 35 mg, however, the average iron intake of the participants was 3.9 mg lower, at 31.1±4.62 mg. Also, the recommended daily allowance of calcium (918.7±212.75mg) was not met. The average daily allowance of vitamin C was 23.48 mg more than what was needed. The recommended daily allowance (RDA) for folic acid was more than the average consumption (179.62± 21.40µg).

The average consumption of several nutrients in relation to the recommended daily allowance (RDA) was determined by Kavitha et al. (2011). Because dietary requirements and nutrient availability can differ from one person to the next, this method accounts for both (Gopalan et al., 2002). Mehrotra and Tiwari (2009) found that less than two thirds of pregnant women (67.11%) had a daily caloric intake of less than 2000 kcal. The percentage of pregnant women who consumed more than 2000 kcal energy per day was just 32.89%. The average calorie intake for women, with a standard deviation of 234.07 kcal, is 1873.90 kcal, which is equal to 80.23% of the recommended daily allowance. In the past, women's energy consumption was either less than 2000 kcal or more than 2000 kcal, respectively, depending on their home status (72.81 percent rural vs. 61.40 percent urban). The average energy consumption values for women living in rural areas were 1842.11±209.07 kcal, whereas those for women living in urban areas were 1905.70±253.60 kcal. According to the ICMR (1992), these average values correspond to 87.72% and 90.75% of the RDA, respectively. According to the statistical study, pregnant women living in rural areas consumed far less energy than pregnant women living in urban areas (t = 2.066, df = 226, p < 0.05). Research conducted in Ludhiana, Punjab, found that 65% of pregnant women consumed less than 2000 kcal of energy per day.

Table 4.14 Distribution of respondents according to their nutrient intake in second trimester

Nutrients	Energy (Kcal)	Protein	CHO (g)	Fat (g)	Iron (mg)	Calcium (mg)	Vitamin C (mg)	Folic acid
Sedentary respondents of second trimester n= 127								
Average Nutrient intake	2069.8±147.97	72.1±7.89	367.5±37.44	34.6±4.91	30.3±4.67	937.4±169.74	58.52±7.43	177.4±21.26
RDA	2250	78	337.5	30	35	1200	40	300
Difference	180.2	5.9	-30	-4.6	4.7	262.6	-18.52	322.6
t-cal	3.722	.314	.050	0.627	1.127	7.432	1.974	70.9
t-tab	.660	.660	.660	.660	.660	.660	.660	.660
Result	*	*	*	*	*	*	*	*
Moderate respondents of second trimester n= 19								
Average Nutrient	2203.5±45.96	75.3±6.65	393±34.67	36.7±2.97	31.7±4.76	923.4±171.11	58.7±3.38	197.7±21.33
RDA	2580	78	387	30	35	1200	40	300
Difference	376.5	2.7	-6.0	-6.70	3.3	276.6	-18.6	302.3
t-cal	5.703	.707	.015	.870	.991	3.581	.101	79.5
t-tab	.729	.729	.729	.729	.729	.729	.729	.729
Result	*	*	NS*	*	*	*	*	*

* S= Significant *NS= Not Significant

The average food consumption of the sedentary respondents throughout the second trimester is shown in Table 4.15. Aside from carbohydrates, lipids, and vitamin C, the majority of nutrients were below the recommended daily allowance. Compared to the first trimester, the average food consumption of the second trimester respondents was higher. Their weights rose in tandem with the rise in total calories. There was a 180.2 kcal discrepancy between the recommended daily allowance and the average calorie intake (2069.8±147.97 kcal). The average daily allowance of protein (72.1±7.89 g) was 5.9 g less than what is recommended. The recommended daily allowance (RDA) was exceeded by the average consumption of fat (34.6±4.91 g) and carbohydrates (367.5±37.44 g). Respondents consumed 4.7 mg less iron than the average (30.3±4.67 mg). The recommended daily allowance (RDA) for calcium was likewise exceeded by the average daily consumption (937.4±169.74mg). The RDA was not met by the daily mean consumption of folic acid, which was 177.4±21.26µg.

With the exception of carbohydrates, lipids, and vitamin C, the moderate respondents' second-trimester food intake was lower than the RDA. However, it was higher than that of the sedentary women in the first trimester. A discrepancy of 376.5 kcal separated the average energy intake (2203.5±45.96 kcal) from the RDA. The RDA was exceeded by 2.7 grammes, but the average protein intake was 75.3±6.65 grammes. Intake of fat (36.7±2.97

g) was greater than the recommended daily allowance (RDA). The recommended daily consumption of iron during pregnancy is 35 mg, however, the average iron intake of the participants was 3.3 mg lower, at 31.7±4.76 mg. Just like the recommended daily allowance, the average daily calcium consumption was lower at 923.4±51.11 mg. Consumption of vitamin C (83.3± 13.38 mg) exceeded the recommended daily allowance (RDA) by 23.3 mg. Folate intake, on average, was lower than the recommended daily allowance (197.7±7.33µg).

During their pregnancies, some women took iron and folic acid supplements, whereas the majority of women did not take any supplements at all, even though their doctors had recommended them. Some women didn't take their medication as prescribed, while others believed the notion that it was unnecessary during pregnancy. Because it prevents macrocytic anaemia during pregnancy, promotes normal foetal growth, and has a good effect on newborn birth weight, folic acid supplementation should be taken by all women of childbearing age. The production of DNA and RNA, two crucial building blocks of life, increases dramatically during development, driving up the demand for folic acid. A higher blood volume necessitates an increase in red blood cell (RBC) formation, which in turn requires folate. Folic acid supplementation is best done before conception, as the neural tube closes around 28 days into the pregnancy. Folic acid supplements, at a dosage of 400 to 800 mcg daily, should be started by women trying to get pregnant during the periconceptional period.

Pregnant women need 35 milligrammes of iron daily, according to the ICMR. There is a 40-50 percent rise in maternal blood volume, which necessitates an iron supplementation of 5 milligrammes per day to facilitate haemoglobin production. An estimated 170 milligrammes of iron is lost by the mother through perspiration and skin. Furthermore, a high haemoglobin level (18-22 g/dl) is typical for newborns. The placenta and foetus both need iron to grow. Once your iron needs for pregnancy start to rise, around week 12 into your pregnancy, it is OK to start taking iron supplements at a dosage of 30 mg daily.

Table 4.15 Pre- exposure and post- exposure data of Nutrition Education

S.No.	Question	Pre-exposure	YES (%)	NO (%)	Post-exposure	YES (%)	NO (%)
1	Do you know about the basic nutritional requirement of pregnant women?	44.8	55.2	72.4	27.6		
2	Do you know the policies of iron and vitamin A supplementation through govt. for pregnant women?	15.6	84.4	57.6	42.4		

3	Do you use iron utensils for cooking?	46.4	53.6	85.2	14.8		
4	Do you know iron and vitamin A rich foods?	53.6	46.4	73.2	26.8		
5	Do you know about calcium rich foods?	42.8	57.2	61.2	38.8		
6	Do you include citrus fruits in your diet?	54.8	45.2	77.2	22.8		
7	Do you know the importance of germinated food grains?	11.6	88.4	69.2	30.8		
8	Do you know folic acid rich foods?	9.2	90.8	64.4	35.6		
9	Are you aware of any nutritional deficiency diseases during pregnancy?	6.4	93.6	58.4	41.6		
10	Do you know about iodine deficiency during pregnancy?	15.6	84.4	68.4	31.6		
11	Do you take iron and folic acid supplements?	48.8	51.2	74.4	25.6		
12	Do you have knowledge about the quantity of food intake?	27.6	72.4	68.4	31.6		
13	Do you have knowledge about harmful effects of undernutrition?	25.2	74.8	66.0	34.0		
14	Do you have knowledge about the sources of carbohydrate, proteins, iron, vitamins?	30.8	69.2	74.8	25.2		
15	Do you know about the importance of nutrition in foetal growth?	44.8	55.2	58.0	42.0		
16	Do you have knowledge about weight gain in pregnancy?	53.2	46.8	77.2	22.8		
17	Do you know about water intake during pregnancy?	23.6	76.4	72.8	27.2		

18	Do you know about absorption of calcium and iron in our body?	22.8	77.2	59.6	40.4		
19	Do you know about the need for vitamin C in the body?	23.6	76.4	38.8	61.2		
20	Do you know about the need for zinc?	22.8	77.2	41.2	58.8		
Mean	**Nutritional Knowledge Level**	31.2		65.92			

*S= Significant

Table 4.17 shows the nutritional knowledge after providing nutrition education through nutrition education materials like chart, folder and documentary. Calculated value of t-test for knowledge of the respondents regarding the nutritional awareness during pregnancy is more than tabulated value of t at 5 per cent level. Therefore it is concluded from above data that there is significant impact of nutrition education on awareness of the respondents. After intervention about 34.72 per cent rise in knowledge level of respondents.

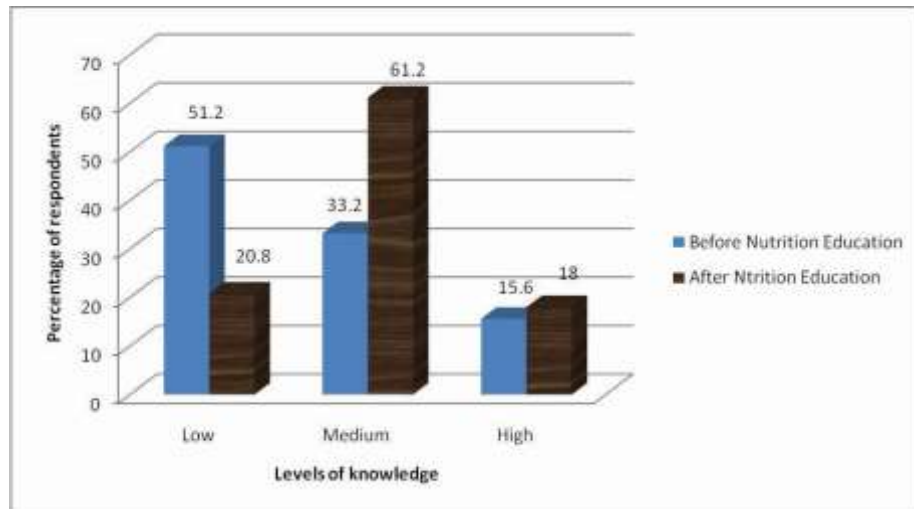**Table 4.16 Assessment of Nutritional Knowledge Pre and Post Education Intervention**

Level of Knowledge	Pre-Intervention Frequency (n)	Pre-Intervention Percentage (%)	Post-Intervention Frequency (n)	Post-Intervention Percentage (%)
Low (0-21)	128	51.2	52	20.8
Medium (21-40)	83	33.2	153	61.2
High (41-60)	39	15.6	45	18.0

Respondents' nutritional knowledge was evaluated both before and after the nutrition education intervention, as shown in Table 4.18 and picture 4.9. In terms of nutritional knowledge, the majority of respondents (51.2%) had a low level before the education intervention, while 33.2% had a medium level, and 15.6% had a high level. With the education intervention in place, the majority of respondents (61.2%) fell into the medium knowledge category, while 20.8% were in the low knowledge category and 18.0% were in the high knowledge category. The current study demonstrated a notable rise in the level of awareness among the participants, who saw a substantial increase from 33.2% to 61.2% in the medium knowledge category. The percentage of people with a poor level of knowledge dropped dramatically from 51.2% to 20.8%, while the percentage of people with a high degree of knowledge rose from 15.6% to 18%. In a study conducted by Fallah et al. (2013), it was found that pregnant women whose levels of awareness about healthy nutrition were significantly higher after receiving at least two educational sessions on the topic went from 3% before the intervention to 31% after (P < 0.001). These findings are in line with those of Verbeke (2007), who also discovered that the solution to population safety issues can be

found through education on nutrition and food intake. The study also found that, with the exception of working women, pregnant women had very little dietary information prior to the intervention.

Figure: - 4.9 Assessment of Nutritional Knowledge Before and After Education Intervention

Table 4.17 Comparison of pre exposure mean scores and post exposure mean scores of respondents

Levels of Knowledge	Pre-exposure Mean Score	Post-exposure Mean Score	Difference	t-calculated	t-tabulated	Result
Low	12.72	20.3	7.58	10.79	1.660	Significant (S)*
Medium	29.31	36.1	6.8	9.64	1.664	Significant (S)*
High	49.0	56.6	7.6	7.51	1.684	Significant (S)*

*S= Significant

The mean scores of the pre- and post-exposure tests are compared in Table 4.19. There was a statistically significant improvement in the nutrition knowledge score of participants with lower levels of knowledge between the baseline and post-test (mean difference = +7.58). Similarly, individuals with a medium level of nutrition awareness demonstrated a significant improvement in their nutrition knowledge score between the pre- and post-tests (mean difference = 6.8), and there was a statistically significant improvement in the nutrition knowledge score of the highest-level respondents (mean difference = +7.51). The same result was also found by Cannoosamy et al. (2016): a significant rise in the average nutrition knowledge score between the pre- and post-test periods (mean change = +17.1, p < 0.001). Of those who took the nutrition knowledge test, 92% reported an increase in their knowledge after the test, while 8% reported no change from their initial score.

Chapter 5

FINDINGS CONCLUSION AND RECOMMENDATIONS

Findings

The current study found that out of 250 pregnant women surveyed, 70.8% fall into the normal body mass index category, 22.4% are overweight, 1.6% are obese, and 5.2% are underweight. Participants' weight increased significantly throughout each trimester. In the past month, respondents' average weight gain during the second trimester was kg, compared to 0.93 kg during the first trimester.

In comparison to the Recommended Dietary Allowances (RDAs), the average nutrient consumption of the participants was lower in carbs, protein, iron, calcium, and folic acid. With the exception of carbohydrates, where there was no statistically significant change during the second trimester, pregnant women's average nutrient consumption differed significantly from their RDA throughout both trimesters. The type C dietary pattern was chosen by 41.6% of respondents, followed by type B by 24.8%, type D by 20.4%, the optimal pattern of food consumption for every individual, and type A by 13.2%. The majority of responders (53.6%) identified as vegetarian. A whopping 66% of people who took the survey reported no symptoms of morning sickness at all. Abdominal pain was reported by approximately 42% of pregnant women, while 58% of respondents reported no such pain. Nearly half of the people who took the survey were anaemic, whereas nearly half had normal haemoglobin levels.

Providing nutrition education through developed nutition education materials (documentary, chart, and folders) had a significant impact on the nutritional knowledge of the respondents. After receiving nutrition education, the majority of respondents (61.2%) gained a medium level of knowledge, indicating that nutrition education had a positive effect on their knowledge.

Conclusion

The study aimed to assess and improve the nutritional knowledge of pregnant women regarding essential nutrients, food intake, and the risks associated with malnutrition during pregnancy. The results demonstrate a significant enhancement in knowledge across various nutritional aspects, particularly regarding iron, vitamin A, calcium, and folic acid intake, following an educational intervention.

Pre-exposure findings revealed that many pregnant women lacked basic nutritional knowledge related to pregnancy. For instance, only 44.8% of respondents were aware of the basic nutritional requirements for pregnant women, and the knowledge of government policies for iron and vitamin A supplementation was particularly low (15.6%). Similarly, many respondents had little awareness of the importance of folic acid-rich foods, the impact of nutrition on fetal growth, and the need for adequate water intake during pregnancy. The data also indicated that many women were not fully aware of the harmful effects of undernutrition and the need for micronutrients like zinc and vitamin C.

Post-exposure findings, however, showed a remarkable increase in knowledge. For example, awareness of the basic nutritional requirements of pregnant women rose to 72.4%, and the percentage of women aware of the

importance of iron and vitamin A supplementation through government programs increased to 57.6%. The number of women who reported using iron-rich utensils for cooking also increased dramatically from 46.4% pre-exposure to 85.2% post-exposure. The significant difference between pre-exposure and post-exposure mean scores, supported by statistical tests (t-calculated values exceeding t-tabulated values), confirms the effectiveness of the educational intervention in enhancing nutritional knowledge.

This significant improvement highlights the importance of educational interventions in improving maternal health and nutrition, which is crucial for both the mother's well-being and the proper development of the fetus. Despite the positive changes, there were still areas requiring further attention, such as increasing awareness of the importance of folic acid, the role of germinated food grains, and the prevention of nutritional deficiency diseases.

Recommendations

1. **Expand Educational Programs**: Implement more comprehensive and widespread educational interventions that focus on the importance of balanced nutrition, essential nutrients, and pregnancy-specific dietary guidelines.

2. **Target Specific Nutrients**: Provide additional education on the importance of folic acid, calcium, and vitamin C, as many women still lacked awareness about these crucial nutrients.

3. **Increase Awareness of Government Programs**: Strengthen outreach programs to inform pregnant women about available government policies for supplementation of iron, vitamin A, and other essential nutrients.

4. **Promote the Use of Iron Utensils**: Encourage the use of iron utensils in cooking by educating women on the benefits of improving iron absorption from meals.

5. **Focus on Food Diversity**: Educate pregnant women on the variety of iron and vitamin A-rich foods, particularly through visual aids or interactive demonstrations, to enhance their practical knowledge.

6. **Address Under-nutrition**: Create awareness campaigns to address the risks of undernutrition during pregnancy and the long-term effects on maternal and fetal health.

7. **Nutrition Counseling for High-Risk Groups**: Provide tailored nutritional counseling for women at higher risk of complications, such as those with low hemoglobin levels or pre-existing conditions like diabetes or high blood pressure.

8. **Incorporate Nutrition into Routine Prenatal Care**: Integrate nutritional education into routine prenatal visits, ensuring that all pregnant women are educated about dietary needs, supplements, and lifestyle modifications.

9. **Promote Community-Based Support Systems**: Develop community-based support groups or forums where pregnant women can share experiences and learn from each other's dietary practices and knowledge.

10. **Monitor and Evaluate the Effectiveness of Interventions**: Continuously evaluate the impact of nutritional education programs through follow-up surveys and feedback to ensure that knowledge retention is sustained and to make necessary adjustments for future programs.

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