CHAPTER – V
SUMMARY & CONCLUSION

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CHAPTER – V
SUMMARY & CONCLUSION

5.1 INTRODUCTION:

Children are truly the foundation of our nation. Hence, we should focus to promote their health and safeguard their future.

The birth of an infant is one of the most awe inspiring and emotional events that can occur in one’s lifetime. The new human being affects the lives of the members of family. If the neonate is not healthy, lovable infant as expected, parents find it difficult to cope with these changes and feel varying degree of turmoil and anxiety. (Maslow 1988)

Birth weight is considered to be one of the most important and reliable parameters in the evaluation of foetal and neonatal well-being. The normal birth weight of baby lies between 2500gm to 3500gm at birth and the infant gains 1.5lb (680gm) per month, whereas the birth weight of low birth weight baby is less than 2500gm.

According to WHO, Low birth weight infant is defined as “the baby whose birth weight is 2500gm or less irrespective of the gestational age” J. E Park (2004), Marlow (2005), Ghai O. P., Gupta Piyush, and Paul V. K. Wongs (2006), Dutta (2008).

About two-third of infant deaths occur within the first month of life. Prematurity, congenital anomalies, anoxia and hypoxia, and difficult labour and delivery
account for most of these. The mortality rate is higher in infants born to mothers of low income and the infants born to teenage mothers. The differences reflect the adverse effects of poverty, limited education, faulty nutrition, and other environmental factors. (Richmond, et al, 2001)

Alcohol, cigarette smoking, and drug addiction increase the likelihood of low birth weight, problems of growth and development, congenital defects, and mental retardation. (Dutta, 1985)

Low birth weight babies are classified after correlating both the birth weight and gestational age into two groups—Preterm babies and Small for date babies.

- **Preterm Babies**: These babies are born too early, before 37 weeks of gestation (less than 259 days). Their intrauterine growth may be normal, that is, their weight, length and development may be within normal limits for the duration of gestation. Births should only be prescribed as premature or preterm when the gestational age is less than 37 completed weeks.

- **Small for Date (SFD) babies**: Any infant whose birth weight is below the 10th percentile for the gestational age is “small for date”. These are the babies who may be born at ‘term’ (259 to 293 days) or ‘pre-term’. These babies are clearly the result of intrauterine growth retardation and are therefore low for the gestational age at which they are born. In developing countries, three-fourth of all the babies of low birth weight is full term.
Factors affecting the Birth weight of New-born:

Birth weight below 2.5kg (2500gm) has been found to be very closely associated with poor growth, not just in infancy but throughout the childhood, coronary heart disease, stroke and diabetes in adult life and malnutrition in early life may affect the developing brain. (Dutta, 1985)

Birth weight can be affected by various factors including those related to foetal, placental, maternal, and environmental origin. (George, et al, 2003)

There are several factors that contribute to the birth weight of new born-

1. **Pre-pregnancy weight:** Researchers say that cognitive deficits found in premature babies can be traced to a number of mom-related factors, and one of them is a woman’s pre-pregnancy weight. (Alice Park, 2012)

2. **Maternal age:** Maternal age is an important variable leading to LBW and preterm births. RY Aras (2013) indicated that a very young maternal age is causally implicated with an increased risk of having Low birth weight and preterm births.

3. **Pre-existing medical problems:** Chronic medical conditions (anaemia, renal disease, pulmonary disease, diabetes mellitus, collagen-vascular disease, cardiac disease) typically result in low birth weight babies, most likely due to a reduction in the delivery of nutrients to the foetus.
4. **Gestational Diabetes Mellitus (GDM):** The development of glucose tolerance during pregnancy, also known as gestational diabetes mellitus, allows for an increase in the availability of glucose to the foetus. The increase in the amount of "fuel" may lead to a larger baby.

5. **Gestational age at Birth:** The majority of weight gain occurs during the third trimester, especially during the last four weeks prior to delivery. During the last month, weight gains of as much as one half pound per week are possible. Therefore, the time of delivery definitely has an impact on birth weight.

6. **Foetal number:** In pregnancies with multiple gestations (twins, triplets, etc.), the average birth weight is less than that of a single delivery.

7. **Placental allocation/ Uterine fibroids:** Abnormal placentation, especially placenta previa, can result in a decrease in the perfusion (blood supply) to the foetus. The presence of uterine fibroids may decrease perfusion by "stealing" blood away from the baby. Decreased perfusion results in decreased access to nutrients, thus resulting in lower birth weights.

8. **Smoking, Alcohol, bidi etc.:** If a woman smoke during pregnancy, the baby is exposed to harmful chemicals such as tar, nicotine, and carbon monoxide. Nicotine causes blood vessels to constrict, so less oxygen and nutrients reach the foetus. Carbon monoxide decreases the amount of oxygen the baby receives. When a pregnant woman drinks alcohol, it quickly reaches the foetus
through the placenta. In an adult, the liver breaks down the alcohol. A baby’s liver is not fully developed and is not able to break down the alcohol.

The period of pregnancy is the period of transition from conception till the new-born baby takes birth. It has been regarded as a very important period for both mother and new-born baby.

Survey of literature made it obvious that impact of heredity and environmental factors have been investigated.

Keeping in view the importance of factors influencing birth weight of the new-born in both personal and community life of the mankind, an attempt has been made in the present investigation to see how far food habits, maternal weight gain and haemoglobin level of mother do play their role in influencing the birth weight of the new-born under the caption – “STUDY OF BIRTH WEIGHT OF NEW-BORN IN RELATION TO FOOD HABITS, MATERNAL WEIGHT GAIN AND HAEMOGLOBIN LEVEL WITH SPECIAL REFERENCE TO DURG DISTRICT”.

Effect of Low birth weight on babies:
Low birth weight is closely associated with foetal and perinatal mortality and morbidity, inhibited growth and cognitive development, and chronic diseases later
in life. At the population level, the proportion of babies with a Low birth weight is an indicator of a multifaceted public-health problem that includes long-term maternal malnutrition, ill health, hard work and poor health care in pregnancy. On an individual basis, Low birth weight is an important predictor of newborn health and survival and is associated with higher risk of infant and childhood mortality.

MATERNAL WEIGHT GAIN:

Maternal weight gain during pregnancy is a predictor of infant birth weight. Weight gain during pregnancy is crucial in the determination of foetal growth. The ideal number of kilos a woman should gain during pregnancy is determined by her pre-pregnancy body mass index (BMI), which measures her weight in relation to her height.

FOOD HABITS OF MOTHER:

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

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

Good food habit (or healthy eating) is consuming the right quantities of foods from all food groups in order to lead a healthy life. A good diet is a nutritional lifestyle that promotes good health. A good diet must include several food groups because one single group cannot provide everything human needs for good health.

Bad food habit (or Unhealthy eating) is eating any food that is not regarded as being conducive to maintaining health. Unhealthy foods include fats (especially of animal origin), “fast” foods (which are low in fibre and vitamins), foods high in salt and tropical oils (e.g., fried potato crisps/chips), and cream-based (“white”) sauces (which are high in fat).
<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Additional daily requirements for pregnant women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>300 (in the second and third trimesters)</td>
</tr>
<tr>
<td>Protein</td>
<td>60 milligrams</td>
</tr>
<tr>
<td>Calcium</td>
<td>1200 milligrams</td>
</tr>
<tr>
<td>folate (folic acid)</td>
<td>15 milligrams</td>
</tr>
<tr>
<td>Iron</td>
<td>30 milligrams</td>
</tr>
</tbody>
</table>

Source: Nutritional needs during Pregnancy, University of Illinois-Chicago, College of Medicine, March 30, 2016.
HAEMOGLOBIN:

Haemoglobin is a very essential component of our blood. Its main function is to help to carry oxygen from our lungs to the cells of our organs. This provides the cell with energy to perform their functions optimally.

Anaemia is the commonest medical disorder during pregnancy with iron deficiency anaemia being the most common type of anaemia during pregnancy and postpartum. It is associated with significant maternal and perinatal mortality and morbidity and is responsible for many direct and indirect maternal deaths. Maternal consequences of anaemia during pregnancy are well known and include cardiovascular symptoms, reduced physical and mental performance, reduced immune function, tiredness, reduced peripartum blood reserves and increased risk of blood transfusion during pregnancy and in postpartum period. (Kardjati, 2000)

The normal range for haemoglobin is:

For men, 13.5 to 17.5 grams per decilitre.

For women, 12.0 to 15.5 grams per decilitre.

Daily Recommended Allowance of iron:

Pregnant women: 27 milligrams (mg) of iron per day

Non-pregnant women: 18 mg
Sekhavat L, Davar R, and Hosseinidezoki S (2011) had made an attempt to study the relationship between maternal haemoglobin concentration and neonatal birth weight. The study concluded that maternal anemia was significantly associated with effect on birth weight. Also Hb > 13 g/dl was also associated with an increased risk of low birth weight.

**AIM OF THE STUDY:**

The present investigation is aimed to explore the present status of birth weight in relation to maternal weight gain, food habits and haemoglobin level to make aware about the factors responsible for birth weight of new-born.

If the children are allowed to grow up malnourished, then the cycle of ill health, low energy, low productivity, low incomes, low levels of financial and energy investment in improving family and community life will be perpetuated a new generation.

**OBJECTIVES OF THE STUDY:**

- To assess the maternal weight gain during different trimesters of pregnancy.
- To analyse the relationship between the food habits of the mother with the birth weight of the infant.
- To study the relationship between the total weight gain of mother with the birth weight of the infant.
• To investigate the relationship between the haemoglobin level of the mother with the birth weight of the infant.

• To explore the interactional relationship of Food Habits, Maternal weight gain and Haemoglobin level of the mother with the Birth weight of the newborn.

5.2 PROBLEM AND HYPOTHESIS:

Keeping in view, the purpose of the present investigation, the following problems have been set forth in an interrogative form to seek their scientific solutions-

(4) Whether the maternal weight gain during pregnancy exerts any effect on the birth weight of new-born?

(5) Whether the haemoglobin level of mother during pregnancy exerts any effect on the birth weight of new-born?

(6) Whether the food habits of the mother during pregnancy exerts any effect on the birth weight of new-born?

(7) Whether the food habits of mother, maternal weight gain during pregnancy and haemoglobin level of mother exerts any effect on the birth weight of new-born?
Considering the above mentioned statement of problems, it is clear that there exist one dependent variable i.e., birth weight of new-born and three independent variables namely, food habits of mother, weight gain of mother and haemoglobin level of mother.

**Birth weight:** Birth weight is the first weight of baby, taken just after he or she is born. A low birth weight is less than 2.5kgs. A high birth weight is more than 4kgs. Birth weight is one of the most accessible and most misunderstood variables in epidemiology. A baby's weight at birth is strongly associated with mortality risk during the first year and, to a lesser degree, with developmental problems in childhood and the risk of various diseases in adulthood.

**Maternal weight gain:** Gestational weight gain (GWG) is a unique and complex biological phenomenon that supports the functions of growth and development of the fetus. Gestational weight gain is influenced not only by changes in maternal physiology and metabolism, but also by placental metabolism.

**Food Habits of mother:** It refers to the nutrient intake, and dietary planning that is undertaken before, during and after pregnancy. Nutrition of the fetus begins at conception. For this reason, the nutrition of the mother is important before conception (probably several months before) as well as throughout pregnancy and breast feeding.
**Haemoglobin level:** Haemoglobin is the main functional constituent of the red blood cell, serving as the oxygen-carrying protein; it is a type of HEMOPROTEIN in which each molecule is a tetramer composed of four monomers held together by weak bonds. It consists of two pairs of polypeptide chains, the GLOBINS, each having an attached HEME molecule composed of iron plus a PROTOPORPHYRIN molecule.

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

**Differential Hypothesis:**

- It has been hypothesized that the birth weight of the new-born babies would be more whose mothers have good food habits as compared to the birth weight of the new-born babies whose mothers have poor food habits.

- It has been hypothesized that the birth weight of the new-born babies would be more whose mothers have high weight gain as compared to the birth weight of new-born babies whose mothers have low weight gain.
• It has been hypothesized that the birth weight of the new-born babies would be more whose mothers have high haemoglobin level as compared to the birth weight of the new-born babies whose mothers have low haemoglobin level.

Interaction Hypothesis:

Two Factor Interactions-

• It has been hypothesized that the birth weight of the new-born babies would be more whose mothers have good food habits and high maternal weight gain as compared to the birth weight of new-born babies whose mothers have poor food habits and low maternal weight gain.

• It has been hypothesized that the birth weight of the new-born babies would be more whose mothers have good food habits and high haemoglobin level as compared to the birth weight of new-born babies whose mothers have poor food habits and low haemoglobin level.

• It has been hypothesized that the birth weight of the new-born babies would be more whose mothers have high maternal weight gain and high
haemoglobin level as compared to the birth weight of new-born babies whose mothers have low maternal weight gain and low haemoglobin level.

**Three Factor Interactions**:

- It has been hypothesized that birth weight of the new-born babies would be more whose mothers have good food habits, high maternal weight gain and high haemoglobin level as compared to the birth weight of new-born babies whose mothers have poor food habits, low maternal weight gain and low haemoglobin level.

**5.3 METHODOLOGY**:

The sampling technique adopted for this study was convenience (purposively) random sampling, because it comprised of those mothers who were pregnant. First a list of various Government and Non-Government hospitals and nursing homes from East, West, and Central Bhilai/Durg was made. Only those Hospitals or Nursing Homes were selected which maintained the records. Another aspect in selection of area was hospitals and nursing homes with attached Gynecology department wherein the authorities permitted to conduct the study.
The effective sample was confined to 240 subjects. The age group of these subjects was from 20-40 years.

For the collection of information, records of mothers were taken from the hospitals and nursing homes of Bhilai/Durg city under the consultation of the Gynecologists or the Head Doctor of the hospitals or Nursing Homes.

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

5.4 RESEARCH DESIGN

The research design chosen for this study was Ex-post Facto (2x2x2 factorial design).
5.5 STATISTICAL TREATMENT OF DATA:

For the verification of two factor, three factor, joint action hypothesis a 2x2x2 factorial design was adopted, in which each independent variable was varied at two levels. After picking out the cases for the eight cells pertaining to 2x2x2 factorial design homogeneity of variance of the scores was tested.

Next, the birth weight scores of the new-born babies were subjected to 2x2x2 ANOVA treatment (Analysis of Variance), as applied to uncorrelated data having equal/unequal number.

Analysis of Variance (Three Way):

In the present research work, the main and interactional effects of three independent variables namely food habits, maternal weight gain and haemoglobin...
level on dependent variable i.e. birth weight of new born are to be ascertained. All three independent variables i.e. food habits, maternal weight gain and haemoglobin level employed in the present investigation has two levels. Thus, a 2x2x2 (pqr) factorial design has been employed in the present study, where each subject is tested under one of the pqr treatment conditions. Here, three way ANOVA (Second Order ANOVA) is reckoned most suitable statistics for analyzing the data. The total variation in a three-dimensional design is partitioned into 12 components namely, three main effects, three first order interactions, and one second order interaction (three factor interaction) and within treatment effect (error). Therefore, summary tables required for statistical analysis are as below: AB, AC, BC, ABC.

**Post ANOVA Treatment: Newman-Keuls Test:**

If the F-ratio is significant, it indicates that a set of K (three or more) population means are not equal and thus the directional hypothesis is accepted. In order to find out, which of the various subset means differ from other means, more specific comparisons are required among the K means after obtaining a significant F-ratio. The statistical techniques employed for comparing the treatment means for establishing which of the various means differ from each other are called post-hoc comparisons tests. In the present investigation, a Newman-Keuls test was worked out for multiple group comparisons during post ANOVA treatment.

Initially data was treated by descriptive statistical techniques – mean and standard deviation. For further analysis data was subjected to ANOVA test.
Differential Hypothesis and their Statistical Verifications:

_Hypothesis 1:_

In Hypothesis 1, it was hypothesized that the birth weight of the new-born babies would be more whose mothers have good food habits as compared to the birth weight of the new-born babies whose mothers have poor food habits. In order to verify this hypothesis, a comparison of the mean scores of the birth weight of new born pertaining to the two groups, viz., group consisting of mothers with good food habits and group consisting of mothers with poor food habits was made.

The results revealed that the babies of selected mothers with good food habits were significantly heavier as compared to the new-born babies of the mothers with poor habits beyond .01 level of significance. Thus, hypothesis 1 is accepted.

_Hypothesis 2:_

In Hypothesis 2, it was hypothesized that the birth weight of the new-born babies would be more whose mothers have high weight gain as compared to the birth weight of new-born babies whose mothers have low weight gain. In order to verify this hypothesis, a comparison of the mean scores of the birth weight of new born pertaining to the two groups, viz., group consisting of mothers with high maternal weight gain and group consisting of mothers with low maternal weight gain was made.
The results revealed that the babies of selected mothers with high maternal weight gain were significantly heavier as compared to new-born babies of mother with low maternal weight gain beyond .01 level of significance. Thus, hypothesis 2 is accepted.

**Hypothesis 3:**

In Hypothesis 3, it was hypothesized that the birth weight of the new-born babies would be more whose mothers have high haemoglobin level as compared to the birth weight of the new-born babies whose mothers have low haemoglobin level. In order to verify this hypothesis, a comparison of the mean scores of the birth weight of new born pertaining to the two groups, viz., group consisting of mothers with high haemoglobin level and group consisting of mothers with low haemoglobin level was made.

The results revealed that the babies of selected mothers with high haemoglobin level were significantly heavier as compared to the new-born babies of mother with low haemoglobin level beyond .01 level of significance. Thus, hypothesis 3 is accepted.

**Interactional Hypothesis and their Statistical Verifications:**
To study the international effects of independent variable on birth weight of new born babies, three two factors and one three factors interactional hypotheses were put for statistical verifications.

**Two-Factor Interactional Hypothesis:**

To examine the effects two-way interactions among food habits, maternal weight gain and haemoglobin level, three two factor international hypotheses were formulated in the present investigation.

The statistical descriptions of these two factor interactional hypotheses are mentioned separately.

*Hypothesis 1:*

In the two factor interactional hypothesis 1, it was hypothesized that the new born babies of mothers with good food habits and high maternal weight gain would be heavier as compared new born babies of mothers with poor food habits and low maternal weight gain.

The results revealed that the F ratio of the interactional effect of food habits and maternal weight gain on weight of new-born babies has been found to be statistically not significant.
Thus, hypothesis I did not receive empirical support in the present study. Therefore, it can be said that the joint action of these two factors were unable to generate significant variance upon birth weight of new born babies. Thus, hypothesis I is rejected.

**Hypothesis 2:**

In the two factor interactional hypothesis 2, it was hypothesized that the new born babies of mothers with good food habits and high haemoglobin level would be heavier as compared new born babies of mothers with poor food habits and low haemoglobin level.

The results revealed that the F ratio of the interactional effect of good food habits and high haemoglobin level of mothers and poor food habits and low haemoglobin level of mothers on birth weight of new-born babies has not found to be significant.

Therefore, it can be said that the joint action of these two factors were unable to generate significant variance upon birth weight of new born babies. Thus, hypothesis 2 is rejected.

**Hypothesis 3:**

In the two factor interactional hypothesis 3, it was hypothesized that the new born babies of mothers with high maternal weight gain and high haemoglobin level...
would be heavier as compared new born babies of mothers with low maternal weight gain and low haemoglobin level.

The results revealed that the F ratio of the interactional effect of high maternal weight gain and high haemoglobin level of mothers and low maternal weight gain and low haemoglobin level of mothers on birth weight of new-born babies has not found to be significant.

Therefore, it can be said that the joint action of these two factors were unable to generate significant variance upon birth weight of new born babies. Thus, hypothesis 3 is rejected.

Three Factor Interactional Hypothesis:

Lastly, in the three factor interactional hypothesis, it was hypothesized that new born babies of mothers with good food habits, high maternal weight gain and high haemoglobin level would be heavier as compared to new born babies of mothers with poor food habits, low maternal weight gain and low haemoglobin level.

The results revealed that the obtained F ratio is statistically significant beyond .01 level of significance. This finding indicates that the joint action effect of food habits, maternal weight gain and haemoglobin level of pregnant women has generated significance variance upon birth weight of new born babies. Thus, the hypothesis is accepted and has received empirical support in the present study.
Therefore, it can be stated that the new born babies of mother with good food habits, high maternal weight gain and high haemoglobin level were significantly heavier as compared to new born babies of mothers with poor food habits, low maternal weight gain and low haemoglobin level.

5.6 CONCLUSION:

On the basis of analysis and interpretation of the findings, the following conclusions emerged out –

Birth weight of a newborn depends upon heredity and environmental factors.

Most of these factors interact and it is difficult to single out any one main factor.

Thus, this study was carried out to assess the Birth weight of Newborn in relation to Food Habits, Maternal Weight gain and Haemoglobin level (with special reference to Durg District)

Birth weight of Infant was found to be positively correlated with Food habits of mother, Haemoglobin level of mother and weight gain of mother during pregnancy. Babies with Low Birth Weight were born to mothers having haemoglobin level less than 9 gm%. Low Birth Weight babies were also born to mothers having total weight gain less than 9 kg.
Thus it was observed from the study that the mothers who were non-anaemic, and the mothers who were mild anaemic, their babies birth weight were normal i.e., more than 2.5 kg. Also mothers whose weight gain during pregnancy was more than 9 kg, their baby’s birth weight was normal.

Hence it has been concluded from the study that the Birth weight of Infant is directly related with the Food habits, Maternal weight gain and Haemoglobin level.

5.7 LIMITATIONS OF THE STUDY:

Likewise, if the following limitations of the present study are kept in mind, the temptation to go for tall claims can be avoided:

1. The sample of the present study was drawn from the pregnant mothers of Durg district. Therefore, the results can be generalized.

2. In the present investigation, fixed model was used in the manipulation of independent variables. Therefore, the results of this study can be generalized only for these specific levels on the independent variables.

3. The present investigation is an ex-post facto enquiry in which we cannot control the situations precisely as in the experimental enquiry.

4. Due to practical difficulties and manifold selection criteria, investigator could identify only 30 cases in each cell of 2x2x2 factorial design. In fact
more cases in each cell might have enhanced the power of generalization of
the findings.

5. The relevant data required for the study was collected from the records of
recognized and reputed hospitals of Durg District.

6. Only those Hospitals or Nursing Homes were selected which maintained the
records.

7. The hospitals and nursing homes with attached Gynecology department
wherein the authorities permitted to conduct the study were selected.

SUGGESTIONS:

1. Since the sample of the present study has been drawn from the pregnant
mothers of Durg district, therefore, the inferences drawn in the present study
are applicable only to this particular region. A broad based sample from
different geographical areas could have increased the power of
generalization in the present study.

2. The present study was conducted on 240 pregnant mothers. Our sample
containing 30 cases in each cell. The sample population may be extended to
further validate the results.

3. In the present investigation, birth weight of new-born has been studied in the
light of only three variables namely; food habits, maternal weight gain and
haemoglobin level. Further studies should be conducted to verify the effect
of other important variables like smoking, age of the mother, level of education etc.

5.8 RECOMMENDATION FOR FURTHER RESEARCH:

Doctors, social workers, other health professionals and counselors should strive to create awareness about healthy baby among the masses by holding many research programmes.

5.9 SOCIAL SIGNIFICANCE:

- Increase awareness about low birth weight through publications and symposia.
- The government should take proactive initiative to promote good health awareness programs for the pregnant mothers across the civil society.
- Guest lectures, talks and programs can be held to promote and to make people aware about the importance of diet during pregnancy.
- Conclusions of the present investigation may help doctors, parents, pregnant mothers as well as counsellors in understanding the importance of food habits, maternal weight gain and haemoglobin level during pregnancy.