MATERNAL AND INFANT NUTRITION ATTITUDES AND PRACTICES OF PHYSICIANS IN BRITISH COLUMBIA

by

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ABSTRACT

Periods of rapid growth are periods of special vulnerability to nutritional injury. Growth during pregnancy and in the first two years of life is more rapid than at any other stage in the life cycle and hence, optimum nutrition is vital at this time. Physicians are frequently the primary professionals concerned with the dissemination of nutrition advice to pregnant women and mothers of new infants. However, there are no studies in the literature that assess the quality of nutrition information provided by physicians in this important area of maternal and infant nutrition.

A study was designed to investigate the nutrition attitudes and practices of general practitioners, pediatricians and obstetricians in the province of British Columbia. The influence of selected variates upon the criterion variables, nutrition attitudes and practices, was assessed. Variates studied included demographic and professional data on country of medical training, sex of respondent, location and type of practice, years of practice, number of patients seen weekly, sources of nutrition information consulted, attendance at continuing education programs, additional training for specialization, and inclusion of nutrition in medical school education. The nature of the relationship between nutrition attitudes and practices was also assessed.

In March 1975, questionnaires were mailed to all 1981 practising general practitioners, pediatricians and obstetri-

cians in the province of British Columbia. Questionnaires were returned by 724 (41.3%) general practitioners, 69 (62.7%) pediatricians and 51 (43.2%) obstetricians. Responses from completed questionnaires were analyzed by computer; all tests were conducted at the 5% level of significance. Results were reported at the highest level of significance.

Mean scores for nutrition attitudes for general practitioners, pediatricians and obstetricians were 72%, 81% and 64% respectively. Nutrition practices' scores were 60%, 66% and 65% for general practitioners, pediatricians and obstetricians respectively.

Regression analysis indicated that nutrition attitude and practice scores of general practitioners were significantly higher for physicians who: (a) were female (b) consulted with a nutritionist-dietitian (c) had additional training (d) attended continuing education programs and (e) had nutrition in their medical school education. General practitioners who were in practice more than 10 years scored significantly lower on the attitude and practice tests.

Nutrition practice scores were significantly higher for pediatricians trained in Canada while nutrition attitude scores were higher for pediatricians who were in practice more than five but fewer than 10 years. Obstetricians' attitude scores were significantly lower for physicians who were in practice more than 10 years. Obstetricians who consulted with non-human sources of nutrition information other than professional journals and human sources of information other than

nutritionist-dietitians scored significantly higher on the nutrition practice test.

Correlation analysis showed that nutrition attitudes were significantly correlated to nutrition practices for general practitioners (r = 0.370), pediatricians (r = 0.259) and obstetricians (r = 0.424).

Student t-test analysis indicated that pediatricians' and obstetricians' practice test scores were significantly higher than those of general practitioners. There were no significant differences among the nutrition attitude scores for the three groups.

Implications for nutrition educators included the need for nutrition in the medical school curriculum, the incorporation of nutrition into continuing education programs and the need for nutritionists to act as consultants to physicians.

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CHAPTER I

INTRODUCTION

Background and Need

Nutrition during pregnancy and the first years of life is of the utmost importance to the health and well-being of the infant. The general physical condition of the young child, and particularly his nutritional status, are central to the fulfilment of his mental and physical capacities (Birch and Gussow, 1970).

In recent years, attention has been focused on the relationship of a number of maternal factors to the outcome of pregnancy. One of great significance is the general change in attitude regarding maternal weight gain in pregnancy. The once popular practice of restricting weight gain to fewer than 20 pounds for the normal pregnant woman is no longer recommended. The Committee of Maternal Nutrition, Food and Nutrition Board in the U.S.A. (1970) has suggested a total maternal weight gain of approximately 24 pounds, while prominent researchers in England recommend 27.5 pounds as a reasonable average weight gain for primigravidae (Hytten and Leitch, 1971). Indeed, the British Columbia Medical Association has endorsed the position paper established by the Nutrition in Pregnancy Committee of the Health Planning Council of British Columbia (1973) that recommends an average weight gain of 24 pounds. However, the

results from Nutrition Canada showing the specific findings in British Columbia (1975) indicate that caloric intakes for pregnant women in this province are generally below the acceptable levels that would promote this optimum weight gain.

In addition, pregnancy is no longer thought to be an appropriate time for obese women to practise weight reduction since limiting weight gain at this time may have adverse effects on the fetus. Felig (1973) has demonstrated that after an overnight fast, ketonemia in pregnancy is three times greater than in the non-gravid state. This suggests that severe caloric restriction should not be undertaken in pregnancy and weight reduction programs involving a severely limited intake of carbohydrates must be avoided.

Similarly, recent information demands a re-evaluation of indiscriminant salt restriction during pregnancy. Hytten and Leitch (1971) observed that pregnant women with edema had a lower incidence of low birth weight infants and a slightly reduced rate of infant mortality. They concluded that it was reasonable to regard edema as having physiologic rather than pathologic significance in pregnancy. Thus, restriction of sodium is not warranted for the general population and pregnant women should be allowed to salt their food to taste (Lindheimer and Katz, 1974).

The importance of optimum nutrition during infancy is gaining new impetus as evidence is mounting that malnutrition

during this stage of life may adversely affect learning and intelligence (Stoch and Smythe, 1963; Cravioto and Robales, 1965; Cravioto et al., 1966; Chase and Martin, 1970; Winick, 1973). Studies have indicated that severe undernutrition in the first years of life will cause permanent reduction in the total number of brain cells (Winick and Rosso, 1969; Rosso et al., 1970) but the consequences of mild undernutrition during this period are less clear.

Nutritionists are also questioning the practice of early introduction of solid foods into the infant's diet. Early weaning to solids may encourage overconsumption of foods which in turn may result in excessive fat accumulation in the infant (Taitz, 1971; Shukla et al., 1972; Oates, 1973; Dwyer and Mayer, 1973). In addition, the introduction of solids generally entails a switch from a diet high in fat to one high in carbohydrate, and in experimental animals, at least, this is considered to be detrimental (Hahn, 1973).

The practice of feeding skim milk to infants four to six months of age in an effort to treat real or imagined obesity is also causing concern. Fomon (1974) suggested that such infants probably deplete their fat stores and hence have no reserves to fall back on in the event of illness. They may also receive an inadequate supply of the essential fatty acid, linoleic acid.

Iron deficiency anemia among infants and toddlers is another factor of increasing importance (Fuerth, 1971; Owen

et al., 1971; Lanzkowsky, 1974). Some pediatric academies are recommending use of iron-fortified formulas from birth if the infant is not being breast-fed. Supplementation with iron-enriched cereals from approximately six to 18 months of age is also being advocated.

Since recent information has brought significant changes in our recommendations for nutrition during pregnancy and during the first years of life, it appears important to determine if this information is reaching the maternal population. The American College of Obstetricians and Gynecologists (1974) state that:

> . . . the prenatal patient represents an ideal opportunity for nutrition education which can have benefits extending far beyond her present pregnancy (p. 1).

Various investigators have pointed out that the physician is the primary professional upon whom homemakers rely for nutrition information (Young et al., 1956; Fox et al., 1970). Gifft et al. (1972) indicate that physicians are:

> . . . trusted and looked up to as authorities in matters pertaining to health (and) are highly respected legitimizers of nutrition information (p. 355).

However, physicians generally are not nutrition experts. Phillips (1971) showed that second year medical students were not familiar with many of the basic concepts and principles of nutrition. Kjellman (1974) demonstrated that knowledge of nutrition among medical students was poor but results from fifth

year students were significantly worse than those from third year students.

Although these studies (Phillips, 1971; Kjellman, 1974) investigated the nutrition knowledge of medical students, there do not appear to be any studies that investigated the nutrition knowledge of practising physicians. Yet, the American College of Obstetricians and Gynecologists (1974) state that:

> . . . the ultimate responsibility for ensuring a high quality nutrition component of maternity care services rests with the physician as the leader of the maternal health care team. The physician must therefore possess knowledge and skills in nutritional assessment and management (p. 9).

Nutrition knowledge, however, is not always a good indicator of nutrition attitudes and nutrition practices. In a study by Emmons and Hayes (1973) investigating the relationship of mothers' nutrition knowledge to the feeding practices of their children, no relationship was found between nutrition knowledge and nutrition practices. Similarly, Schwartz (1975) found that there was no correlation between the nutrition knowledge and the nutrition practices of Ohio high school graduates who had studied nutrition in Home Economics courses. On the other hand, Jalso et al. (1970), in a study of the nutrition attitudes and practices of 340 subjects who were members of various community organizations in New York State, found a high positive correlation between their nutrition attitudes and their nutrition practices. Thus, attitudes were directly related to practices.

Physicians generally provide a low response rate to survey research even when the subject of the research is considered to be of a non-threatening nature (Deutscher, 1953; Gullen and Garrison, 1973; Schiller and Vivian, 1974). Research dealing with the less threatening area of nutrition attitudes and practices may elicit a greater response than would similar research attempting to assess the more threatening area of nutrition knowledge.

Review of the existing literature indicates that information concerning maternal and infant nutrition is rapidly changing. Since the physician is the primary professional source of nutrition advice for many mothers, an investigation of physicians' attitudes and counselling practices is needed to assess the kind of nutrition information being disseminated to the maternal population.

Statement of the Problem

A survey was conducted among pediatricians, general practitioners and obstetricians in the province of British Columbia to ascertain their current attitudes and practices regarding maternal and infant nutrition. Comparisons were made between the criterion variables, nutrition attitudes and practices, and various demographic and professional variates.

This study was conducted with the co-operation and approval of the British Columbia Medical Association.

The following objectives were established for investigating the problem:

1. To assess the quality of maternal and infant nutrition information being disseminated to the maternal population by general practitioners, pediatricians and obstetricians.
2. To determine whether significant differences exist in the nutrition attitudes and practices of pediatricians, obstetricians and general practitioners in the province of British Columbia as related to:

    (a) location of medical training
    (b) sex of respondent
    (c) location of practice
    (d) years of practice
    (e) type of practice

(f) number of prenatal patients and/or infants seen weekly

(g) sources of nutrition information

(h) additional specialization or training

(i) number and type of continuing education programs with a nutrition component attended in the last two years

(j) extent of nutrition education in medical school training

3. To determine among pediatricians, obstetricians and general practitioners the nature of the relationship of nutrition attitudes to nutrition practices.

4. To determine whether significant differences exist between the nutrition attitudes and practices of general practitioners as compared to pediatricians and obstetricians.

This study was designed to meet these objectives and to modify and develop appropriate data collection instruments for this type of assessment.

Hypotheses

The following null hypotheses were tested:

1. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on location of their medical training.
2. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on sex of the respondent.
3. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on location of practice.
4. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on years of practice.
5. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on type of practice.
6. There will be no significant differences achieved in tests of nutrition attitudes and practices of general

practitioners, obstetricians and pediatricians based on number of prenatal patients and/or infants seen weekly.

7. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on sources of nutrition information consulted.
8. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on undertaking of additional specialization or training.
9. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on the number and type of continuing education programs attended in the last two years.
10. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on the extent of inclusion of nutrition in their medical school training.
11. There will be no significant correlation among the scores for nutrition attitudes and nutrition practices achieved by the general practitioners, obstetricians

and pediatricians.

12. There will be no significant difference in the scores for nutrition attitudes and practices between the general practitioners and the pediatricians. There will be no significant difference in the scores for nutrition attitudes and practices between the general practitioners and obstetricians.

Definitions of Terms

The following terms are defined for the purpose of this study:

General Practitioner - Conducts medical examinations, makes diagnosis, prescribes medicines and gives other medical treatments for various diseases, disorders and injuries of the human body. Examines patient and orders or performs various tests, analyses, and X-rays to provide information on the patient's condition. Analyzes reports and findings of tests and examination and diagnoses condition. Administers and prescribes treatments and drugs. Inoculates and vaccinates patient to immunize from communicable diseases. Provides prenatal care, delivers babies, and provides postnatal care to mother and infant. Promotes health by advising patient concerning diet, hygiene, and methods of prevention of disease. Makes house and emergency calls to attend to patient unable to visit office or clinic. Reports births, deaths, and outbreak of contagious diseases to governmental authorities. May refer patients to specialists and assist at surgical procedures. May conduct physical examinations of applicants for insurance to determine health and risk involved. May conduct pre-employment examinations for company or organization such as police force, and examine staff to determine eligibility for sick leave or disability claims. May provide care for passengers and crew aboard ship. Physician, General Practice, Family Doctor. (Canadian Classification and Dictionary of Occupations, 1971)

Pediatrician - Carries out medical care for children from birth through adolescence to aid in physical and mental growth and development: examines patients to determine presence of disorder to establish preventive health practices. Ascertains nature and extent of ailment, disease or injury; prescribes and administers medications, immunizations, and other medical treatments; and advises clients. Acts as consultant to other medical practitioners in illness of children. May diagnose and treat prenatal abnormalities and malformations. Child Specialist. (Canadian Classification and Dictionary of Occupations, 1971).

Obstetrician - Gynecologist - Treats women during prenatal, natal, and postnatal periods and diagnoses and treats diseases of the female reproductive tract. Examines patient to ascertain condition, utilizing physical findings, results of laboratory tests, and patient's statements as diagnostic aids. Determines need for modified diet and physical activities, and recommends plan. Examines patient periodically, and prescribes medication or surgery, if indicated. Delivers infant and cares for mother, for prescribed period of time, following childbirth. Diagnoses and treats female patients for diseases of the reproductive tract, using surgical procedures as required. May limit practice to diagnosing and treating diseases of the female reproductive tract, or treating women during prenatal, natal, and postnatal periods and be designated accordingly. (Canadian Classification and Dictionary of Occupations, 1971).

Nutrition Attitudes - Physicians' attitudes towards the importance of various aspects of nutrition during the prenatal period and during infancy. An attitude is a "learned, emotionally toned predisposition to react in a particular way toward something" (Redman, 1968, p. 67).

Nutrition Practices - Physicians' practices including the techniques and information pertaining to maternal and

infant nutrition used in counselling expectant mothers and mothers or guardians of infants. This includes counselling on food selection and sources of nutrients.

Clinic Practice - An establishment where patients are admitted for treatment by a group of physicians practising medicine together.

Private Practice - An establishment where patients are admitted for treatment by a single physician.

Infant - A baby ranging in age from birth to two years.

Metropolitan Area - The city of Vancouver and immediately surrounding area.

City - Settlement of over 5,000.

Town - Settlement of not less than 2,500 and not more than 5,000.

Village - Settlement of less than 2,500.

Assumptions

The following assumptions have been made for the purpose of this study:

1. The population studied, which accounts for 97% of all practising pediatricians, obstetricians and general practitioners in British Columbia, is representative of the entire population of practising pediatricians, obstetricians and general

practitioners in the province of British Columbia.

2. The physicians were involved in counselling expectant mothers and/or mothers of infants on matters of nutrition.
3. The physicians completed the questionnaire in good faith and without any help from books, colleagues or other resources.

CHAPTER II

REVIEW OF THE LITERATURE

Good health throughout the life cycle is important for every individual and nutrition is a vital component of good health. It has long been known that periods of rapid growth are periods of special vulnerability to nutritional injury. Two such periods of rapid growth occur during pregnancy and in infancy. Hence, special care must be taken to ensure optimum nutrition for the pregnant woman and her fetus and for the infant. It is the responsibility of the health professionals concerned with maternal and infant care to recognize the importance of nutrition at these stages of the life cycle and to encourage, counsel and direct the maternal population in the attainment of proper nutritional habits.

Nutrition in Pregnancy

Effect of Nutrition On the Outcome of Pregnancy

Optimum nutrition during pregnancy can have far-reaching effects on the health and well-being of the mother and infant. Formerly it was thought that the fetus was a total parasite from a nutritional point of view, growing normally at the expense of the mother. It is apparent now, however, that both the mother and the fetus are affected by the quantity and quality of

the maternal diet.

The effects of extreme nutritional deprivation during pregnancy on the mortality and morbidity of the offspring have been amply demonstrated in animal experiments. For obvious ethical reasons, such experiments cannot be performed on humans. Many studies that have attempted to assess the impact of nutrition on the course and outcome of human pregnancy have shown a correlative rather than a causative effect. (For reviews see Committee on Maternal Nutrition, 1970; Bergner and Susser, 1970; Osofsky, 1975). Nevertheless, this correlative relationship is so consistent that it provides convincing evidence that the prenatal diet does affect the health of the offspring.

A number of the early works that suggest a definite relationship between maternal nutrition and the outcome of pregnancy were obtained from large-scale observations. During World War II severe nutritional deprivation occurred for certain segments of the European population. In retrospective studies, Antonov (1947) in Leningrad and Smith (1947) in Holland, assessed the impact of wartime starvation on the maternal population. The results indicated a marked decrease in the fertility rate, significant increases in the prematurity and stillbirth rates and an increase in neonatal mortality during the period of deprivation.

In Great Britain the wartime situation contrasts with Leningrad and Holland but strengthens the hypothesis that nutrition is important to reproductive efficiency. At this time, the British government introduced a policy of food rationing in which pregnant women were given special priority (Baird, 1965). The quality of the diet of pregnant women, especially those in the low income groups, was significantly enhanced. Subsequently, the stillbirth rate fell a notable 25% during this period of improved nutritional intake.

Other studies of nutrition during pregnancy have been conducted when dietary intake was not regimented (Ebbs et al., 1942; Burke et al., 1943; Balfour, 1944; Cameron and Graham, 1944; Dieckman et al., 1951; Jeans et al., 1955). In general, the findings of these studies support the thesis that "good" diets have a more favourable effect on the outcome of pregnancy than do "poor" diets. In most cases a favourable effect on the outcome of pregnancy was considered to be a reduction in the incidence of prematurity, stillbirths and neonatal mortality. Generally, no consideration was given to the status of the mother at the termination of pregnancy.

Not all studies, however, have shown such a direct relationship between nutrition and infant viability (Williams and Fralin, 1942; McGanity et al., 1953; Macy et al., 1954;

Tompkins et al., 1955; Crump et al., 1959). One of the most comprehensive of these studies was conducted by McGanity and co-workers on over 2,000 pregnant women at Vanderbilt University in Tennessee. A complete nutritional evaluation of the gravida, including physical examination, biochemical determinations of body fluids and a seven day dietary record, was conducted during each trimester of pregnancy. The findings of the study indicated no direct relationship between nutrition and obstetric and fetal abnormalities. The authors concluded that either there was no direct causative relationship between malnutrition and the outcome of pregnancy or that the subjects of this study were above any such level of nutrition required to precipitate a detrimental effect.

It should be noted that in this study the incidence of low birth weight was slightly below the national average, which suggests that this group was certainly not at risk. Furthermore, the diets of these women were considered to be "gratifyingly varied" and 27% of the women with the lowest nutritional intakes were given vitamin or mineral supplements. These supplements were not included in calculating nutrient intakes and thus, deficiencies may have been recorded when in fact there were none.

Because of the inconsistencies in the results, research in this area was curtailed until recently. Habicht et al. (1974) reported the results of a nutritional supplementation program in

Guatemala. The data indicated that there were no significant differences in birth weight of offspring based on protein intake of mother. However, women who had ingested greater than 20,000 calories in the form of a supplement throughout the entire pregnancy had babies with birth weights significantly greater than those who had ingested fewer than 20,000 calories of supplement. The authors concluded that calories rather than protein appeared to be the limiting factor in influencing birth weight of the offspring.

Higgins (1972) in Montreal reported results on over 1,500 patients seen at the Montreal Diet Dispensary from 1963-71. Patients' diets were evaluated for nutritional intake and the patients were individually counselled on methods of improving their diets. Mothers on low incomes were provided with food supplements. The results indicated that the rates of perinatal mortality and prematurity were similar to those of the private patients and significantly lower than for other public clinic patients.

Although the findings of the above studies show some conflicting results, these inconsistencies may be related to problems in methodology and design rather than being indicative of a lack of an association between maternal diet and outcome of pregnancy. Additionally, Calloway (1974) has noted that:

> . . . most studies have based assessment of efficiency of treatments during pregnancy solely on the size and condition of the newly-born child and have shown a surprising lack of appreciation for the condition of the mother (p. 91).

Women can and do bear viable offspring at less than optimal nutritional intakes but the cost to the mother in terms of maternal depletion or delayed recovery rate may be considerable. This is particularly true for the pregnant adolescent who requires a high nutrient intake for her own growth as well as for that of the fetus. Pregnant adolescents are known to have a particularly high incidence of toxemia (Aznar and Bennett, 1961; Mussio, 1962; Israel and Woutersz, 1963; Claman and Bell, 1964; Committee on Maternal Nutrition, 1970) and anemia (Israel and Woutersz, 1963; Committee on Maternal Nutrition, 1970). Poor diets as well as inadequate prenatal care are often mentioned as important factors contributing to the toxemia in these very young mothers (Claman and Bell, 1964; Committee on Maternal Nutrition, 1970).

Weight Gain In Pregnancy

Although "good" nutrition or supplementation has not been consistently related to an improved outcome of pregnancy, total weight gain during pregnancy is strongly related to birth weight of the infant (Eastman and Jackson, 1968; Singer et al., 1968; Higgins, 1972). As weight gain during pregnancy

increases so does birth weight. Low birth weight is well established as an antecedent of increased mortality in infants, and of mental retardation and other neurological disorders (Bergner and Susser, 1970; Simpson et al., 1975).

In a review of weight gain during pregnancy, Hytten and Leitch (1971) concluded that a weight gain of 25-30 pounds is consistent with improved reproductive efficiency. These authors reviewed earlier works and based many of their conclusions on a large-scale study of normal primigravidae eating according to their appetites (Thomson and Billewicz, 1957). The average weight gain for these women was 27.5 pounds or 12.5 kilograms. The average weight gain for multigravidae was approximately two pounds fewer.

After an extensive review of the literature, the Committee on Maternal Nutrition (1970) reported 24 pounds or 10.9 kilograms as an optimum weight gain during pregnancy. This value was also adopted by the Nutrition in Pregnancy Committee (1973) in British Columbia. Although this figure is taken as the average weight gain for a normal woman, there does not seem to be any harm with intakes somewhat greater than this. Recent work does not bear out the claim that additional fat accumulation during pregnancy predisposes to toxemia or increased obstetrical difficulties in the normal pregnant woman (Committee on Maternal Nutrition, 1970). Moreover, Singer et al. (1968) have shown that excessive weight gain in pregnancy is associated

with increased infant birth weight and with improved intellectual ability of the child in later life.

A deterrent to pregnant women gaining an excessive amount of weight (greater than 35 pounds) is the possible relationship of excessive fat accumulation in pregnancy and subsequent later obesity. Some fat accumulation is a natural physiological consequence of pregnancy (Hytten and Leitch, 1971) that one should not attempt to avoid. In returning to ideal weight after parturition the Food and Nutrition Board of the National Academy of Sciences (1974) in its latest recommended allowances, have advocated a reduction in total caloric intake during lactation so that this stored energy might be used for milk production. Intakes of other nutrients must remain adequate.

For women who enter pregnancy in a state of obesity, no attempt should be initiated either to reduce weight or to restrict their weight gain (Committee on Maternal Nutrition, 1970; Pitkin et al., 1972). Marked caloric restriction, even with adequate protein intake, can result in utilization of protein for energy, thus making it unavailable for tissue growth and repair. In addition, it has been suggested that acetonuria, produced by the catabolism of maternal fat stores, may be associated with intellectual impairment in the offspring (Churchill, 1970).

Sodium Restriction

Toxemia of pregnancy is generally associated with edema and abnormal sodium retention. The routine restriction of salt during pregnancy in the hope of avoiding or reducing edema formation has gained widespread acceptance in medical practice. Although the relationship of sodium intake to the treatment of toxemia remains unclear, the dietary restriction of salt intake with the aim of preventing pre-eclampsia is ineffective (Committee on Maternal Nutrition, 1970; Pitkin et al., 1972; Lindheimer and Katz, 1974).

The evidence for utilizing sodium restriction in the treatment of toxemia is conflicting. In at least one study involving high and low sodium intakes for the treatment of acute toxemia, no differences in the clinical courses were apparent (Mengert and Tacchi, 1961). "Abnormal" weight gain, previously considered the hallmark of this disease, may not occur, and overt edema may not be present even when other manifestations of pre-eclampsia are severe (Lindheimer and Katz, 1974). Rhodes (1962) demonstrated that the severe forms of toxemia were associated with an abnormally low weight gain in pregnancy.

On the other hand, many normal pregnancies are accompanied by some degree of edema. Thomson et al. (1967) conducted a retrospective study of over 24,000 single legitimate births and found that nearly 40% of the mothers of these infants

experienced some evidence of edema. Moreover, women with edema had babies with greater birth weights and reduced rates of perinatal mortality. These differences, however, were not statistically significant. Hytten and Leitch (1971), after reviewing the data on total body water concluded that:

> . . . it seems reasonable to regard edema as having physiological rather than pathological significance in pregnancy (p. 348).

Thus, restriction of sodium in an attempt to eliminate edema is unwarranted.

Sodium, like other essential nutrients, is needed during pregnancy for normal fetal growth and development. Data from studies on pregnant rats (Pike, 1964; Pike and Gursky, 1970) indicated that sodium restriction may tax the physiological mechanisms of sodium conservation thereby preventing blood volume from expanding and leading to hyponatremia. Sodium depletion of the muscle, bone and brain of the maternal organism was evident in the restricted animals and fetuses of these pregnant rats had an increased moisture content, possibly indicating fetal immaturity (Kirksey et al. 1962). Although the results of studies with laboratory animals must be interpreted judiciously, it appears reasonable to suspect that severe sodium restriction may have deleterious effects in the human.

Lindheimer and Katz (1974) state that there are some pregnant women who tolerate sodium restriction poorly and that

routine salt restriction as a means of limiting edema and hence, weight gain is unnecessary. Since claims that salt restriction reduces the incidence of toxemia are unconvincing, these authors conclude that:

> . . . the pregnant woman should be allowed to salt her food to taste (p. 438).

In addition, it should be noted that in Canada, because of compulsory iodization, salt provides a significant amount of iodine to residents of regions low in this nutrient. Routine restriction of salt may, therefore, deprive pregnant women of an important source of an essential nutrient.

Iron Intake

Pregnancy imposes a considerable burden on iron needs, not only for the increased requirements of the fetus but also to compensate for the additional needs for increased maternal blood volume. Red cell volume increases approximately 30% while plasma volume increases about 50%. This results in a decrease in hemoglobin levels because of hemodilution. Some workers have speculated that this dilution might be necessary to facilitate blood flow through the maternal organism and placenta (Hytten and Leitch, 1971; Hall, 1974). Most investigators disagree, however, and suggest that a hemoglobin level above 12 g per 100 ml is an appropriate level during the latter part of pregnancy. Maintaining hemoglobin levels above this value requires an additional 700 mg of iron (Council on Food

and Nutrition, 1968), most of it in the latter half of pregnancy.

Iron stores in healthy young women may be insufficient to supply this additional iron. Scott and Pritchard (1967) studied 114 college women who had never been pregnant and who were from a relatively high socio-economic background. Iron stores were "scant or absent" (350 mg or less) in two-thirds of the sample. De Leeuw et al. (1966) studied the iron reserves of pregnant women and found that by the third trimester iron stores were absent in the majority of women. At the time of delivery 84% had no measurable reserves.

Since body reserves of iron may not be adequate to meet the additional demands of pregnancy, iron intake must be increased substantially. The Canadian Dietary Standard (1974) has established a recommended daily intake of 15 mg during pregnancy while the Food and Nutrition Board in the United States (1974) suggests a daily intake greater than 18 mg. These intakes can be somewhat difficult to obtain from diet alone since foods commonly consumed by women contain approximately 6 mg of iron per 1,000 calories. Pregnant women in the United States ingest approximately 13 or 14 mg of iron per day from dietary sources (Pritchard, 1970). Consequently, iron supplements during pregnancy appear to be necessary (Pritchard, 1970; Chanarin and Rothman, 1971; Pitkin et al., 1972; Scott et al., 1975). Since most of this iron is needed in the latter half of preg-

nancy and in view of the recent warning about the teratogenic effect of iron given in the first 56 days of pregnancy (Nelson and Forfar, 1971), it would seem appropriate to restrict supplements to the last half of pregnancy.

Dietary Practices of Pregnant Women

The nutritional requirements of the pregnant woman are greatly increased over those of the non-gravid state. In order to meet the increased nutrient allowances set by the Canadian Dietary Standard (1974) or the Food and Nutrition Board (1974) in the United States, it is necessary to choose foods carefully so as not to exceed the optimum caloric intake but still obtain the necessary protein, vitamins and minerals.

Several older studies have reported on the nutrient intakes of pregnant women (Ebbs et al., 1941; Burke et al., 1943; Jeans et al., 1952; Murphy and Wertz, 1954; Stevens and Ohlson, 1967). The major findings of these studies indicated that diets for expectant mothers were frequently inadequate in calcium, protein and iron. Vitamin and mineral supplementation increased the iron intake but did not alleviate the lack of calcium and protein in the diets of these women. More recent studies (Bartholomew and Poston, 1970; Nobmann and Adams, 1970; Harrill et al., 1973; Nutrition Canada, 1973; Thompson et al., 1974) have demonstrated that nutrient intakes during pregnancy remain below desirable levels. This is particularly

true for the pregnant adolescent (Weigley, 1975).

Bartholomew and Poston (1970) reported that intakes of protein, iron, vitamin A and vitamin C were below recommended dietary standards in a group of 200 patients registered in a prenatal clinic in South Carolina. The poor nutrition was attributed primarily to nutrition ignorance, and secondly, to specific dislikes for various foods. Superstitions and bizarre food customs played a smaller yet important role.

In 1970, Nobmann and Adams recorded the dietary intake of 46 prenatal patients and found the intakes of iron, calcium, vitamin A and riboflavin to be below two-thirds of the recommended dietary intake for over 20% of the sample. Vitamin-mineral preparations increased the intakes of all nutrients to acceptable levels except for protein and calcium.

The nutritive value of foods selected by a group of 30 patients in Colorado was assessed by Harrill and co-workers (1973). Comparison of mean dietary intake with the recommended dietary allowances showed that calcium, iron and thiamin were the nutrients least supplied by the foods eaten. Most patients took vitamin-mineral supplements but the content of these preparations was not included in the calculation of nutrient intake.

The report from Nutrition Canada (1973) on the nutritional status of pregnant women indicates that nutrient intakes are still inadequate in a significant portion of the maternal

population. The data on dietary intake (Table I) is based on a total sample of 894 pregnant women who were referred to Nutrition Canada by local health units.

TABLE I

PERCENTAGE OF PREGNANT WOMEN WITH INADEQUATE AND LESS-THAN-ADEQUATE INTAKES OF NUTRIENTS

Nutrient	General Population	
	Inadequate	Less-than-Adequate
Protein	3.3	8.5
Iron	24.8	22.6
Calcium	19.9	18.6
Potential Vitamin D	28.9	28.6
Vitamin A	10.9	14.9
Vitamin C	2.0	8.2
Thiamin	3.9	21.5
Riboflavin	5.0	17.0
Niacin	0.8	3.9

Source: Nutrition Canada, National Survey, Department of National Health and Welfare, Ottawa, Canada. 1973, p. 110.

Biochemical evaluation for a number of nutrients supported the dietary findings. Thirty percent of the pregnant women in the general population were classified as "at risk" because of low values for total serum protein. However, the decrease in serum protein levels is a normal occurrence during pregnancy

so the significance of this finding remains unclear. Hemoglobin values showed a moderate risk of anemia (values between 9.0 - 10.5 g per 100 ml) in 25% of the general population; 25% of the sample also had inadequate intakes of vitamin D.

The specific findings for British Columbia (Table II) showed that caloric intake, protein and vitamin D were below adequate for a significant proportion of the sample population. However, excessive intakes of vitamin D were also observed in a small number of pregnant women.

TABLE II

PERCENTAGE OF PREGNANT WOMEN IN BRITISH COLUMBIA WITH LESS THAN TWO-THIRDS OF THE RECOMMENDED DAILY INTAKE OF NUTRIENTS

Nutrient	Recommended Daily Intake[a]	% With Less Than 2/3 R.D.I.
Calories	2,400	21%
Protein	61 grams	12%
Potential Vitamin D[b]	400 I.U.	40%
Iron	15 mg	15%

Source: Nutrition Canada, The British Columbia Survey Report, Department of National Health and Welfare, Ottawa, Canada, 1975, p. Appendix Tables following p. 152.

[a] Based on Canadian Dietary Standard, 1974.

[b] May be higher than actual intake.

It should be noted that pregnant women in this survey did not constitute a probability sample and may therefore:

> . . . show a superior picture of health compared to that which actually exists in the pregnant population (Nutrition Canada, 1973, p. 103).

Nutrition Education For Pregnancy

Effective nutrition education is necessary in order to ensure optimum nutrition for the mother and the best possible nutritional start for the infant. It is evident from the previous studies that the dietary habits of many pregnant women are less than adequate. In recent years the most common approach to this problem of dietary inadequacy appears to have been the indiscriminant use of vitamin and mineral supplements by all pregnant patients regardless of nutrient intake (King et al., 1972; Pitkin et al., 1972; Thompson et al., 1974). In some cases the vitamin-mineral preparations did not contain the nutrients which were most deficient in the diet (Jeans et al., 1952; Harrill et al., 1973), while in others the contribution from the supplement alone exceeded the recommended allowance by 500% (Thompson et al., 1974).

Harrill et al. (1973) commented on the over-reliance by pregnant women on vitamin-mineral supplementation and stated that:

> . . . it has long been recognized that increased intake of one or more nutrients may increase the need of other nutrients which may or may not be provided by the supplementation (p. 165).

Excessive intakes of some vitamins and minerals may be potentially dangerous. High levels of vitamin D during pregnancy are possibly related to hypercalcemia in the infant (Pitkin et al., 1972); excessive intakes of vitamin C may induce a high requirement for ascorbic acid in the offspring (Cochrane, 1965); and high levels of vitamin supplements as well as iron preparations have been related to an increased incidence of abnormalities in the fetus (Nelson and Forfar, 1971).

Pitkin et al. (1972) suggested that an additional reason for the avoidance of routine supplementation is the:

> . . . false sense of security it may convey to either patient or physician regarding deficiencies of essential nutritional elements other than vitamins. Vitamins will certainly not compensate for poor food habits (p. 775).

Since routine supplementation does not appear to be appropriate, nutrition education in the form of increasing nutrition knowledge by dietary instruction may have a beneficial effect on improving food habits during pregnancy. The literature on this topic, although somewhat limited, suggests that diet instruction can affect nutrient intake in a positive way.

One of the earliest studies on the effects of diet education during pregnancy was conducted by Berry et al. (1952). During a dietary interview, diets were classified as either "good", "fair" or "poor". Patients who were randomly selected for the experimental group were given instructions at three periods throughout the pregnancy on specific ways to improve

their diets. At the end of pregnancy, more patients in the 'instructed' group had 'good' diets than did those in the 'control' group but this difference was not significant. However, the increase in the percentage of good diets over the percentage at the first interview was significant for 'instructed' patients but not for 'controls'. Greater improvement by 'instructed' patients was found for intakes of calcium, iron, vitamin A, thiamin and ascorbic acid.

In a study by Mason and Rivers (1970) on patients attending a prenatal clinic in New York, the relationship between dietary instruction and plasma ascorbic acid levels was assessed. Multiple regression analyses of the data indicated that dietary instruction made a significant difference in plasma levels of ascorbic acid. A high score on the nutrition knowledge test also contributed to maintenance of adequate plasma ascorbic acid levels.

In California, Nobmann and Adams (1970) studied the effectiveness of diet instruction offered by physicians at prenatal clinics. On the initial visit the experimental group listened to a 20 minute presentation by the physician on the importance and essentials of an adequate diet during pregnancy. At subsequent visits, patients were encouraged to maintain an adequate dietary intake. Physicians for the control group offered little dietary instruction. The results indicated that

for the patients who received more consistent dietary advice, the intakes of the major nutrients increased. Even so, changes in the diets were not large enough for many of the women to meet the recommended dietary allowances. The women indicated that increased appetite was the major reason for increasing their food intake. For the women who received dietary instruction, physicians were more important than family members or other health professionals in influencing dietary change.

Similar results are reported by Harrill et al. (1973). Dietary instructions were given to 28 prenatal patients by their attending physicians. In addition, 14 of these 28 patients received additional instruction in nutrition by either attendance at prenatal classes or formal instruction in nutrition. The results of this study indicated that the 14 women who had additional instruction had a better nutrient intake in the second and third trimesters of pregnancy than those who had not had such instruction.

Results of these studies suggest that nutrition education can be effective in producing a desirable change in dietary habits during pregnancy. Although the change in many cases was small it was in a positive direction. In most cases the improvement in dietary habits did lead to an increase in two important nutrients - calcium and protein. These nutrients are usually difficult to obtain from routine supplementation and are frequently lacking in the maternal diet.

Pregnant women, particularly primigravidae, are thought to be more receptive to nutrition education than any other group (Stearns, 1958; Gifft et al., 1972). Even if the mother is not motivated to improve her dietary intake for the sake of her own health, she will frequently do it for the welfare of her offspring. A positive attitude toward nutrition, sound nutritional advice, and assistance in interpreting and applying this advice to individual lifestyles can yield numerous benefits in promotion of positive nutritional practices. Nutrition education at this time in the life cycle may have a positive and lasting effect on food habits for both the pregnant woman and her family. It would then be hoped that this mother would start the next pregnancy in a state of improved nutritional health.

Nutrition in Infancy

Importance of Nutrition in Infancy

One of the most critical periods for optimum nutrition is during the first two years of life when growth and development are proceeding at a rapid pace. There are numerous reports in the literature concerning the severe consequences of protein-calorie malnutrition (PCM) and its effects on growth, mental development and behaviour (Monckeberg, 1968; Chase and Martin, 1970; Cravioto and Robales, 1965; Winick, 1973; Kallen, 1973).

Winick (1968) demonstrated that organ growth occurs in one of three main phases: (1) hyperplasia alone (2) hyperplasia accompanied by hypertrophy (3) hypertrophy alone. It is during the first two periods when cell division is occurring that nutritional deprivation is most critical. When malnutrition occurred during this time, irreversible impairment of mental ability of infants was apparently evident (Chase and Martin, 1970). Monckeberg (1968) showed that infants who were rehabilitated from marasmus in early life still lagged behind normal infants in verbal performance. However, many of the studies supporting the hypothesis that malnutrition is associated with either a lag or a deficit in intellectual develop-

ment are complicated by unfavourable socio-economic variables. Thus, it is impossible to say how much malnutrition per se contributes to the depressed cognitive development and how much may be a result of unfortunate social and environmental conditions.

In Western countries, severe PCM is relatively rare. Nutrition Canada (1973) reported only 2 cases of severe PCM (body weights less than 60% of the median for their age) in a total sample of 1,331. For infants and toddlers from birth to four years of age, 3.6% had clinical evidence of moderate PCM. The findings for the province of British Columbia (Nutrition Canada, The British Columbia Survey Report, 1975) showed no evidence of PCM. Most subjects in this age category ingested two to three times their protein requirements.

Nutritional inadequacies other than protein and calorie deficits do occur in North America although clinical manifestations are seldom evident. In most cases it is extremely difficult to assess the consequences of these milder forms of malnutrition. Nevertheless, nutrient deficiencies such as vitamin D resulted in 38 'full blown' cases of rickets in a major city of Canada (Barsky, 1968). In 1974, Nutrition Canada reported that 42.5% of the infants and toddlers had less than adequate intakes of vitamin D. Exposure to sunlight is generally considered to be an unreliable source of vitamin D

(Kodicek, 1973). This may be particularly pertinent to certain parts of Canada where exposure to sunlight may be limited. Other deficiencies such as iron deserve special attention.

Iron Deficiency

The normal full term infant has sufficient iron stores to last from three to six months of age. Consequently, infants over six months of age are more vulnerable to iron deficiency. The incidence of iron deficiency reaches a peak in the second year of life and then drops off in the later pre-school years. Iron deficiency occurs in this age group at all levels of socio-economic status, but it is most prevalent among children from low-income families. (For reviews see Lanzkowsky, 1974 and Theuer, 1974).

The incidence of anemia in infants varies directly with the standard used to describe anemia. Hemoglobin levels of less than 10 g per 100 ml were previously used to assess anemia. Using this standard, Fuerth (1971) reported an incidence of 3% in nine month old infants seen in private practice and Owen et al. (1971) observed an overall incidence of 5% in infants 12 to 23 months of age in the United States.

More recently, a hemoglobin level of less than 11 g per 100 ml was considered to be indicative of anemia. The

results of a study utilizing this value indicated an incidence of 16% in infants four to 24 months of age from low income families (Haddy et al. 1974). An additional 51% of the sample was considered to have iron deficiency without anemia, defined in this survey as a hemoglobin level of 11 g per 100 ml or above but a transferrin saturation level below 17%.

In a sample of Canadian infants six to 18 months of age of all socio-economic classes, 29% had hemoglobin levels below 10 g per 100 ml and 57% had hemoglobin levels less than 11 g per 100 ml (Milne et al. 1971). Nutrition Canada (1973) reported that 4.4% of the infants and toddlers in the general population had hemoglobin levels of less than 10 g per 100 ml. Utilization of the same hemoglobin standard demonstrated that only 1.7% of this age group were considered anemic in British Columbia. However, 23.2% had hemoglobin levels below 11 g per 100 ml (Nutrition Canada, The British Columbia Survey Report, 1975).

The clinical consequences of iron deficiency anemia are controversial. Owen et al. (1971) reported that iron deficiency may be associated with measurable underachievement in somatic growth. Pre-school children in Philadelphia who had iron deficiency anemia had poor attentiveness in school and lacked motivation (Beller and Howell, 1971). Webb and Oski (1973) have found a correlation between iron deficiency

anemia and poor scholastic performance in adolescents. Fuerth (1972) indicated that mothers of infants given an iron supplement had fewer complaints about their infant's daytime irritability and sleep patterns. Judisch et al. (1966) observed that abnormal appetite is commonly seen in infants who are iron deficient. Although none of these studies actually proves a cause and effect relationship, attainment of hemoglobin levels of 11 g per 100 ml or above for infants does appear to be a reasonable and realistic goal.

The Committee of Nutrition of the American Academy of Pediatrics (1971) has recommended iron-fortified formulas from birth to 12 months of age if the infant is not being breast-fed. Since breast-feeding is the optimum form of infant feeding it is possibly more appropriate to recommend the inclusion of iron-fortified foods or iron drops in the infant's diet until 18 months of age. An iron-fortified food frequently recommended is iron-enriched cereals. Many of these cereals have iron added as sodium iron pyrophosphate and early work (Schultz and Smith, 1958) indicated that iron in this form was readily absorbed from infant cereals. Recent work (Rios et al. 1975), however, demonstrated that healthy infants absorbed only about 1% of iron in the pyrophosphate form. Fomon (1974) reported that some infant cereals in the United States contain electrolytic iron that is reasonably well-absorbed. The use of cereals with

this new form of iron should increase iron absorption substantially. Unfortunately, many of these cereals are not yet on the market in Canada.

Breast-Feeding

The milk of each species is considered to be the optimum food for its newborn and the human is no exception. The decline in breast-feeding throughout the world is viewed with despair by nutritionists. In underdeveloped countries the decline frequently parallels an increase in infant mortality (Plank and Milanesi, 1973) but in developed countries the consequences are less severe.

There have been numerous reviews citing the considerable advantages of breast-feeding (Gunther, 1963; Jelliffe, 1968; MacKeith, 1969; Davies, 1969; Baum, 1971; Jelliffe and Jelliffe, 1971; Jelliffe and Jelliffe, 1975). The most important advantages for developed countries appear to be (1) easy availability, making it a convenient method of feeding for mother and child (2) well balanced nutrient content (with the possible exception of vitamin D) (3) less expensive than bottle-feeding (Jelliffe and Jelliffe, 1975) (4) improved mother-child interaction (Newton, 1971) (5) as a deterrent to infantile obesity (Taitz, 1971; Shukla et al., 1972; Jelliffe and Jelliffe, 1975) (6) reduced incidence of allergies (Gerrard, 1974). In addition,

breast milk provides considerable protection against early infant infections (Mata and Wyatt, 1971, Gerrard, 1974). Generally this is considered to be far more important in underdeveloped countries where standards of hygiene are low but Gerrard (1974) cautioned that this readily applied to parts of Canada, such as the Indian Reservations in Saskatchewan. Schaefer (1971) also found a higher incidence of middle ear infections in Canadian Eskimos who were bottle-fed than in infants who were breast-fed.

Breast milk is also relatively high in cholesterol (500 mg cholesterol per 100 g fat) as compared to cow milk (300 mg per 100 g fat) and vegetable fat formulas (approximately 50 mg per 100 g fat) Kuzdzai - Savoie, 1973). Since cholesterol is an important constituent of the brain and nervous system, Schubert (1973) has speculated that hypocholesterolemia during the first months of life may lead to abnormal development. Reiser (1973) showed that the blood cholesterol levels of adult male rats were inversely proportional to the amount of cholesterol in the breast milk on which they were raised. Hence, cholesterol challenge during infancy may be required for the development of the cholesterol degradation mechanisms.

Despite the apparent advantages of breast-feeding, bottle-feeding appears to be increasing in popularity. In the 1940's, approximately 65% of infants in the United States were

breast-fed during the newborn period (Bain, 1948). By 1972 only 10% to 15% of infants were breast-fed (Martinez, 1974) in the same country. Maslansky et al. (1974) in a study in New York City, reported that only 17% of mothers who attended child health clinics breast-fed their child at any one time. In Dublin, Kalapesi and Kevany (1974) indicated that 11% of mothers in their sample were breast-feeding at the time of discharge from hospital. Only 6.3% of a group of infants in England received breast milk beyond 12 weeks of age (Shukla et al. 1972).

Applebaum (1975) noted, however, that there is a trend from "the bottle back to the breast" in the industrialized countries. This increase in breast-feeding is more prevalent among the upper social classes (Rivera, 1971), college graduates (Ladas, 1972), and physicians (Harris and Chan, 1969).

The physician is thought to play a very important role in the success or failure of breast-feeding. This will be discussed in a later section of the review.

Introduction of Solids

Recent surveys have shown that solid foods, mainly in the form of cereals and fruits, become a part of the infant's dietary intake as early as one week of age (Taitz, 1974). This early consumption of solid foods leads to a high caloric intake and subsequent fat accumulation (Taitz, 1971; Shukla

et al., 1972; Dwyer and Mayer, 1973).

A number of studies (Lloyd, 1961; Asher, 1966; Eid, 1970) have demonstrated that fat babies generally remain fat throughout childhood. Although obesity is a disease of "multiple origins", it has been suggested that the degree of obesity is largely dependent on the number of fat cells present in the body (Hirsh and Knittle, 1970; Brook, 1972). In humans, cells are believed to increase in number (hyperplasia) during gestation and the first year of life (Winick, 1968); further growth results from an increase in cell size (hypertrophy). Brook (1972) found that children who became obese after the first year of life had more fat cells than those becoming obese after one year of age. Thus, overfeeding in early infancy may have long-term detrimental effects.

The results of a survey of 300 normal infants up to one year of age in England showed that 16.7% of these infants were suffering from infantile obesity and a further 27.7% were overweight (Shukla et al. 1972). Solid foods were given to 39.7% of these infants before they were four weeks old.

Oates (1973), in a study of 100 infants under six months of age, demonstrated that solid foods were generally introduced to the infant at three to four weeks of age. Excessive weight gains were more prevalent in artificially-fed than breast-fed infants in a study of six week old infants reported by Taitz

(1971). In this study, most infants received solids in the first week of life.

Possibly of more serious physiological consequence is the excessive renal solute load produced by the feeding of solids to very young infants (Davies, 1973; Taitz, 1974). Davies (1973) studied 60 infants from one to three months of age and found the incidence of hyperosmolarity (plasma osmolarity greater than 300 mOsm per liter) in breast-fed infants, formula-fed infants and infants fed formulas plus solid foods to be 0%, 11.1% and 40.5% respectively. The author emphasized that this high solute load greatly stressed the capacity of the kidney to maintain the normal tonicity of body fluids.

Introduction of solids into the infant's diet at an early age does not appear to have any nutritional benefit for the healthy infant. In view of the increase in the incidence of infantile obesity and the dangers of hyperosmolarity in the very young infant, solids should not be introduced until four to six months of age.

Infant Dietary Practices

The general decline in breast-feeding, with the concomitant increase in the early introduction of solids characteristic of the industrialized nations, has led to over-consumption of many nutrients in infancy (Shukla et al., 1972; Dwyer and Mayer, 1973). The one major exception is iron

(Filer and Martinez, 1964; Maslansky, 1974).

Filer and Martinez (1964) studied 4,146 infants at six months of age in the United States and concluded that more than half of the infants did not receive adequate iron intakes. Apparently the solid foods ingested were poor in iron content. Purvis' (1973) data on infants one to 13 months of age support these earlier findings. The lack of iron in the diets was attributed mainly to the discontinuance of iron-enriched cereal products at approximately six months of age. Vitamin supplements appeared to be an economic and nutritional waste since they elevated nutrient intakes well beyond recommended levels.

In New York City, a survey of infants under one year of age indicated that dietary nutrients were adequate except for iron and niacin (Maslansky et al. 1974). Iron intake was particularly low among girls aged nine to 12 months and represented only 37% of the recommended dietary allowances. Vitamin supplements were taken by 80% of the infants but only 47% of these supplements contained iron. This survey revealed a number of interesting findings regarding infant feeding practices. More than half of the infants had solids introduced within the first month of life. Also, more than 50% of the children were given solids added to the bottles. By 11 months of age, sweets in the form of sugar, candy, cake and cookies contributed a greater proportion of the calories to the infant's diet than did

vegetables. The authors state that:

> . . . in too many instances foods of low nutritive quality become part of the diet in the very young and increase in consumption with each month (p. 785).

Nutrition Canada (1973) reported low intakes of iron and vitamin D in the general population of zero to four year olds (Table III).

TABLE III

PERCENTAGE OF CHILDREN ZERO TO FOUR YEARS OF AGE WITH INADEQUATE AND LESS-THAN-ADEQUATE INTAKES OF NUTRIENTS

	General Population	
Nutrient	Inadequate	Less-than-Adequate
Protein	1.1	1.6
Iron	23.5	20.7
Calcium	13.1	13.0
Potential Vitamin D	17.9	42.5
Vitamin A	3.2	6.3
Vitamin C	3.9	6.6
Thiamin	1.4	15.0
Riboflavin	0.7	4.6
Niacin	0.3	2.0

Source: Nutrition Canada, National Survey, Department of National Health and Welfare, Ottawa, Canada, 1973, p. 66.

Transferrin saturation levels revealed that 12.7%

of this population group were at high risk of iron deficiency. Serum vitamin A values classified 22.8% of infants and toddlers at moderate risk. The specific findings for British Columbia were somewhat similar (Nutrition Canada, The British Columbia Survey Report, 1975). Although some infants were below the standard for vitamin D intakes, 13.2% of the infants under one year of age had more than 1,000 I. U. per day as a result of the excessive use of vitamin supplements. Education in the proper management of vitamin-mineral preparations is obviously needed.

Nutrition Education for Infancy

The young infant depends exclusively on others for his nutrient intake. Hence, the feeding behavior on the part of the mother is crucial to the nutritional and emotional well-being of the infant. Mothers need guidance, accurate up-to-date advice and enthusiastic support regarding infant feeding to help them select from the preponderance of information concerning infant feeding practices.

Education is needed for mothers regarding the many advantages of breast-feeding. Evidence that such education would be of benefit was provided by Sloper *et al*. (1975). These workers reported that holding ward seminars on the advantages of breast-feeding produced a 23% increase in the number of infants being totally breast-fed. This increase was statistically significant.

For mothers who do not elect to breast-feed, education is needed in the preparation of formulas. Numerous investigators have reported hypernatremia and even death because of over-anxious or unknowing mothers giving concentrated formulas to their infants (Taitz and Byers, 1972; Roloff and Stern, 1971; Coodin et al., 1971; Smith, 1974). Mothers must also be educated to the fact that a "fat" baby is not the desired goal of infant nutrition. Furthermore, use of vitamin supplements is over-emphasized in industrialized countries and although in many cases this results only in economic waste, in some cases it constitutes a potential hazard to life.

The shaping of food habits is thought to begin in the early years of life. The way in which new foods are introduced and the timing of this procedure contribute to the development of good eating habits. Gifft et al. (1972) point out that:

> . . . the food habits, attitudes toward food and nutrition knowledge of the parents form the framework within which the child develops his own food habits. This process begins during earliest infancy (p. 350).

Specific food likes and dislikes of the parents will almost certainly be conveyed to the child as the child begins eating solid foods. Even if a mother offers a food that she dislikes, her feelings will likely be communicated to the baby. Thus, a mother who is fond of sweets may condition her child to a preference for sweet foods. By the time the child enters school the basis for lifetime eating patterns is well established

(Gifft et al., 1972; Walker et al., 1973). It is therefore:

> . . . vital to the future nutritional health of children that parents at least be made aware that they are shaping a lifetime food pattern by the way they influence eating experiences during the early years (Gifft et al., p. 350, 1972).

Role of the Physician in Nutrition Education

The physician is in an important position to influence the dietary intake, and hence, the nutritional status of the pregnant and lactating woman and the young infant. He is regarded by much of society as the legitimizer of information on all aspects of health and is generally looked up to as a leader in these matters.

Numerous investigations have indicated that the physician is either the primary or one of the most important professionals from whom homemakers and others derive their nutrition information (Young et al., 1956; Fox et al., 1970; Gifft et al., 1972; Cho et al., 1974). Cosper and Wakerfield (1975) reported that the physician was an important professional along with the nutritionist in influencing the food choices of young women. Fox et al. (1970), in a survey of the diets of preschool children, observed that 70% of the mothers reported accepting advice from the physician during the first year of the child's life. Gifft et al. (1972) emphasize that:

> . . . the physician is in a crucial position to influence the behavior of parents in relation to feeding their children, for he is one of the primary sources that most parents have for information and guidance about what and how to feed their children (p. 351).

Members of the American College of Obstetricians and Gynecologists (1974) have similar feelings about the overall importance of the physician in prenatal nutrition care. The physician must possess knowledge of nutrition management and either provide these necessary services or delegate them to some other qualified professional. It is, however:

> . . . vital for the physician to demonstrate to the patient his or her concern with this important aspect of care (p. 11).

Baric (1970), in an analysis of the physician's responsibility in health education, indicated that the physician has a responsibility to legitimize 'preventive' measures in the attainment of optimum health and to give it a status relative to 'curative' medicine. In order to do this, the physician needs to be relatively certain of the benefit of any preventive measures that he recommends just as he must be with therapeutic measures. He must also take the initiative in certain beneficial health matters such as breast-feeding. Unfortunately, this frequently is not done. Shukla et al. (1972), in a study of infant feeding practices, noted that 81% of the mothers reported that neither doctor nor nurse advised them to breast-feed their infants. A further 16% said that breast-feeding was mentioned by

the doctor only casually. Applebaum (1975) noted that:

> . . . many mothers who wish to nurse are discouraged because of the physician's indifference to or ignorance of the matter (p. 98).

It appears, however, that the physician does desire to play an active role in the dissemination of nutrition knowledge to the public. The Lay Advisory Committee of the B. C. Chapter of the College of Family Physicians of Canada reported on the role of the family physician in British Columbia (Larsen, 1974). This report indicated that 93% of the medical doctors surveyed believed that the patient should see the physician for help with non-medical problems before approaching other resource personnel.

> . . . it appears . . . that the majority of both consumers and doctors expect physicians (to) have referral or counselling roles with respect to . . . nutritional matters (p. 103).

Paradoxically, medical school training generally places a minor role, if any, on the importance of nutrition in the medical curriculum (Mueller, 1967; Nutritional Sciences Training Committee, 1970; Committee on Nutrition Education in Medical Facilities, 1971; Council on Foods and Nutrition, 1973; Wen et al., 1973; Dutra de Oliveira, 1974; Dwyer and Stare, 1974). Nutrition is frequently only included as part of other courses, such as biochemistry, or if a faculty member has a particular interest in the subject. Many argue that there is no room for it in a curriculum that is already filled with essential medical

courses, with the result that only a few medical schools in the world are teaching nutrition (Dutra de Oliveira, 1974). Integration of nutrition information with other subject matter does not appear to be adequate (Dutra de Oliveira, 1974). Surveys that have investigated the nutrition knowledge of medical students indicated that their knowledge of nutrition was poor (Phillips, 1971; Kjellman, 1974).

Medical students are increasingly concerned with the social and preventive aspects of medicine and frequently show a desire to learn nutrition (Gifft et al. 1972). As yet, this willingness to learn nutrition apparently has not resulted in an increased knowledge of nutrition (Figure 1, Dutra de Oliveira, 1974).

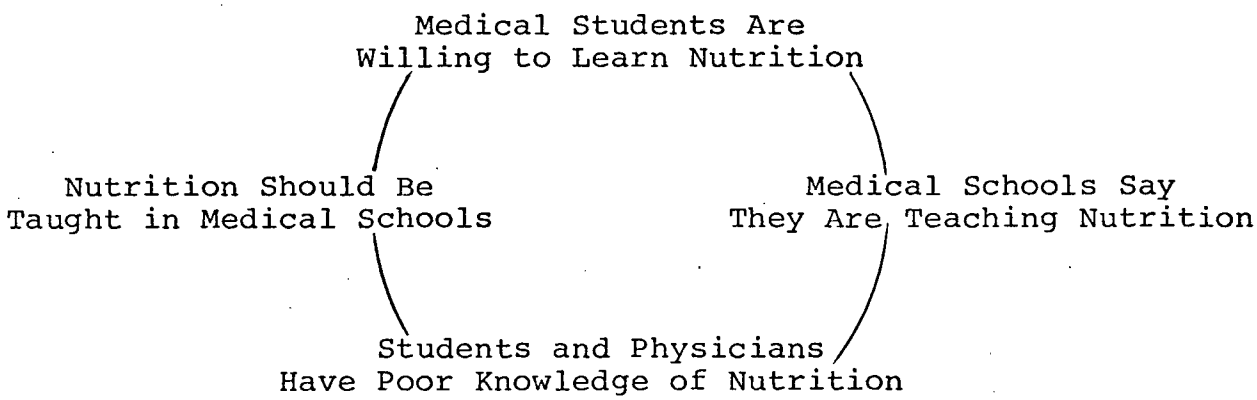

Figure 1 The vicious circle of nutrition teaching in medical schools.

Dutra de Oliveira (1974) commented that until nutrition is recognized as a subject important enough to be taught independently, it will not receive adequate emphasis or justice in the

medical school curriculum.

Attitudes and Practices

Attitudes are acquired predispositions to react in a characteristic way, usually favourably or unfavourably, toward a given type of person, situation, object or ideal (Kilander, 1968). Practices are overt gestures indicating an individual's preference and commitment in some observable activity (Rogers, 1973). An attitude is a predisposition to act, whereas a practice is overt.

According to Dillehay (1965), attitudes have three major components:

1. beliefs or cognition about the object
2. affect or feelings toward the object
3. behavioral tendencies to act

Since attitudes are comprised of these three components they are often thought of as systems. A change in any one part of the system, such as affect, will usually lead to changes in the other components i.e., beliefs and behavioral tendencies. As systems, attitudes will exhibit varying degrees of consistency. If an attitude topic is salient for an individual, the degree of consistency among the three components will be greater than if the topic is considered unimportant or is infrequently confronted (Dillehay, 1965; Scott, 1969). Thus, if nutrition is considered to be important by a physician he may have beha-

vioral tendencies to practice nutrition education.

Attitudes are based on one of three motivational supports: (Dillehay, 1965):

1. knowledge, either factual or gained from experience
2. ego-defence, protection of one's sense of adequacy
3. social adjustment

All three motivational bases may be acting simultaneously. Only when an attitude is based on knowledge alone will newly acquired information bring about a change in that attitude. When attitudes are based on defence of the ego the attitude is difficult to change and generally cannot be altered solely throughinformation or knowledge about the object of the attitude.

Attitudes formed through social adjustment may be susceptible to change through opinion leaders. The opinion leaders are generally individuals of high credibility because of additional experience or education (Gifft et al., 1972; Rogers, 1973). The physician is frequently regarded as an opinion leader since he is perceived as being extremely knowledgeable (Gifft et al., 1972). As an opinion leader, the physician is in an unique position to influence the attitudes of others. This is particularly true with the practice of breast-feeding where attitudes toward breast-feeding seem to be directly related to overt practices. Newton and Newton (1950) investigated the relationship of maternal attitudes toward breast-feeding to

success of breast-feeding. Attitudes were determined by means of an interview usually held within 24 hours of delivery. Behavior was assessed by measuring the amount of milk that each infant received. Mothers with positive attitudes toward feeding gave significantly more milk than mothers with doubtful or negative attitudes. Success of breast-feeding was also related to mothers' attitudes. Mothers who had positive attitudes were 74% successful while only 26% of those who had negative attitudes successfully breast-fed their infants. Similarly, Emmons and Hayes (1974) noted that mothers who held the attitude, "nutrition is important", had children who consumed a significantly greater amount of calcium than did children of mothers who did not feel that "nutrition is important". Thus, attitudes were related to practices.

Although attitudes do affect overt behavior (Rogers, 1973), caution must be used in inferring attitudes from behavior or in forecasting behavior from attitudes. Many other factors such as social influences, education and personal needs may have a bearing on behavior (Dillehay, 1965).

In contrast, behavior may be the motivating force in molding attitudes (Festinger, 1964). According to the theory of cognitive dissonance, if an individual behaves in a way that is discrepant with his beliefs, the beliefs may change so as to be more consistent with his actions. The discrepancy is believed

to be uncomfortable and consequently motivates a change in attitudes. The dissonance is reduced when attitudes are brought into line with actions.

There are no studies in the literature that relate physicians' attitudes to their counselling practices. It could be speculated that physicians, being intelligent individuals, would have attitudes consistent with their practices (Wicker, 1969). On the other hand, attitude questions of a general nature may not be reflected in specific behavioral practices (Wicker, 1969).

Survey Research by Mail Questionnaire

The mail questionnaire is a data collection instrument that is completed by the respondent rather than the researcher, and collected through the mail with no direct contact between the respondent and the researcher. The primary justification for the use of this method of data collection is that there is a need for information that cannot reasonably be obtained in another way (Clarke, 1970). Such is the case when data are being collected from a large sample of individuals over a wide geographical area.

Techniques, Advantages and Disadvantages

The most important aspect of this type of research is the questionnaire itself. The questionnaire statements must encompass all the necessary information, be unambiguous and easily answered (Harris, 1960). It must also be reliable, that is, yield consistent results and be accurate, or valid, measuring what it purports to measure.

According to Scott (1969) the questionnaire can utilize either an 'open-question' method or a 'closed-question' technique. This author concluded that the strongest advantage of closed questions is that they force the respondents' replies onto the dimension of interest of the researcher, thereby limiting the proportion of uncodable answers. The strongest

disadvantage appears to be the threat to rapport since many respondents find long lists of closed questions tedious and even insulting. Deutscher (1953), in a study of physicians' reactions to a mailed questionnaire, noted that:

> . . . men with above average intelligence and education tend to rebel if asked to make stereotypical judgements (p. 601).

Advantages and disadvantages of mail questionnaires are discussed by Wallace (1954) and Miller (1970). The primary advantage to using this technique is that it permits a researcher to survey a large group of people in a relatively short period of time. It is generally more economically feasible than other methods of survey research and may be even 60 times less expensive than the interview technique (Jackson, 1961). It is often easier to reach busy people by mail than to interview them personally. It also ensures anonymity to the respondents so that they are more likely to answer candidly. With the mail questionnaire the problem of interviewer and respondent biases are eliminated. This prevents the interviewer from recording a biased interpretation of the response and generally curtails the respondent from giving more socially acceptable responses (Colombotos, 1970). Wallace (1954) points out that mail questionnaires are particularly suited for populations that are somewhat homogeneous.

There are also a number of weaknesses or disadvantages to using mail questionnaires. The respondent may not answer

honestly or may disregard the instructions and not answer properly. Assurances of good intent and anonymity usually encourage honesty (Rummel, 1964). The single major disadvantage is that the mail questionnaire offers no control over who will reply. The individuals who do not choose to respond may be markedly different in important characteristics from those who do. This can introduce a very significant non-response bias that must be controlled in the analysis of the results.

Response Rate

Response to mail questionnaires can vary widely. Longsworth (1953) noted that the response rate could be as low as 7%. Many studies that are conducted by private organizations or unskilled personnel yield a response rate of 10% to 25% (Miller, 1970). Other surveys conducted by professionals on a small number of highly motivated respondents yielded 100% response (Levine and Gordon, 1958).

A limited number of studies reporting the response rate of physicians to mail questionnaires indicate values between these two extremes. Deutscher (1953) noted that 57% of 379 physicians returned questionnaires on 'Public Images of Female Occupations'. Gullen and Garrison (1973) reported an overall physician response rate of 45.1% on medical doctors' attitudes towards administrative practices in continuing education. In

a survey on physicians' receptivity to innovations to health care, an overall response rate of 66% was obtained after four reminders to return the questionnaire (Mechanic, 1974). Schiller and Vivian (1974) reported 36.4% of 2,000 physicians returned questionnaires on the role of the dietitian in the health care team.

Interest in, or familiarity with, the subject matter of the survey is one of the most important factors in eliciting a response (Longsworth, 1953; Wallace, 1954; Miller, 1970). Individuals who are more highly educated or who are professionals are also much more likely to respond (Miller, 1970). Literature in the social sciences suggests numerous ways in which responses can be increased (Longsworth, 1953; Miller, 1970; Dillman, 1972; Hackler and Bourgette, 1973). The most important of these are:

1. inclusion of a cover letter
2. endorsement by a sponsor
3. objective type questions
4. inclusion of a stamped, self-addressed envelope
5. printed questionnaire with an attractive format
6. follow-up reminders

Champion (1969), in a study of the general population, showed that adhesive postage stamps produced a slightly better response that bulk postage. Gullahorn and Gullahorn (1963), in a survey of college graduates, showed that higher classes of postage produced a higher yield, although the differences

were small.

When questionnaires are long of necessity, they should be made to look as short as possible (Levine and Gordon, 1958; Dillman, 1972). This can be accomplished through printing rather than mimeographing and use of both sides of the page. Kelsey and Acheson (1971) found no significant difference in the response rate from surgeons to either mimeographed or typed questionnaires. A personalized cover letter did not increase the response rate in this survey.

Follow-up is very important, and according to Miller (1970), can increase response rate by as much as 40%. Eckland (1965) increased his returns from 67% to 94% by persistent follow-up. Inducements such as a promise of the summary of the findings or the inclusion of money may increase the returns. Hackler and Bourgette (1973) demonstrated that the inclusion of one dollar significantly increased the response rate of a questionnaire sent to the mothers of school children.

Gullen and Garrison (1973) investigated factors influencing the rates of response to mail questionnaires by practising physicians. The purpose was to determine whether the assumptions made in the consumer and social sciences literature on increasing response rate to mail questionnaires could be applied to physicians. This survey assessed the attitudes of physicians in private practice regarding certain common administrative practices in continuing education. The two

main treatment variables were format (including both design and reproduction process) and postage (first class compared with third class). There were a total of seven sub-treatments.

The results showed that the response rate ranged from a low of 34.2% for a mimeographed two-part tear-off post card sent by bulk mail, to a high of 57.1% for a business-style letter sent by metered first class mail. Use of adhesive postage stamps did not produce an increase in response rate over metered postage. It was concluded by the authors that assumptions usually made by epidemiologists in designing mail surveys may be applied to the physician in private practice.

Non-Response

Non-response to mail questionnaires can exist in one of two forms: complete non-response or partial non-response. Complete non-response may result from either failure to receive the questionnaire or failure to complete it. Partial non-response refers to a returned questionnaire with one or more relevant questions unanswered. Donald (1960) and Mayer and Pratt (1966) indicate that people who are not interested or personally involved in the subject matter of the survey are unlikely to respond.

Gannon et al. (1971) studied response rates in a survey of food store workers and found a lower response rate from those workers who were less educated, single and male. This

confirmed the earlier report that females and those with higher educational levels have higher response rates (Ellis et al. 1970). A survey of smoking habits (Seltzer et al. 1975) showed that non-respondents were more likely to be cigarette smokers than non-smokers. This trend persisted even when 87% of the questionnaires were returned.

The results of a survey by Mechanic (1974) on physicians' attitudes toward innovations in medical-care delivery showed that non-respondents included a higher proportion of older doctors, those who graduated from medical school in 1935 or earlier, those who were licensed to practice in 1940 or before, and those who were on full time salaries. Non-respondents were also less likely to belong to at least one specialty organization. None of these differences, however, was statistically significant.

Since certain segments of the sample may not respond to the questionnaire the data may not be representative of the original population. Hence, a non-response bias is introduced. If the sample population is relatively homogeneous, that is, they have a similar level of education and the same occupation, the possibilities of non-response bias are decreased (Wallace, 1953).

Mayer and Pratt (1966) suggested that non-response bias may be adjusted by weighing the actual responses to represent the entire sample or by extrapolating trends across response

waves. Both of these methods assume that non-respondents are the same as respondents. Other workers (Larson and Catton, 1959) have noted that late responders may be indicative of non-responders. According to these workers, it is possible to check for a non-response bias by comparing the early and late returns. If no significant differences in the scores are evident then one can assume that there is no non-response bias. Harris (1960) noted that an 80% response rate is necessary before the effects of non-response bias can be negated. At this rate of response the statistical results are the same as if 100% of the survey population responded.

Summary

This brief review of the literature demonstrates the significant effect of nutrition during the prenatal and postnatal periods on the later growth and development of the infant. Pregnant women and mothers must be made aware of the importance of nutrition at this time in the life cycle and take measures to ensure the best possible nutritional start for their infant.

It is the responsibility of health professionals in the areas of maternal and infant nutrition to advise and direct pregnant women and new mothers in the attainment of these

goals. Physicians as leaders of the health care teams should be cognizant of the current information available on nutrition and promote the acceptance of good nutritional habits in these patients. Determination of the attitudes and practices of those physicians most involved with maternal and infant nutrition will elucidate the kind of nutrition information being disseminated to the maternal population and assess the need for nutrition services in this vital area.

CHAPTER III

DESIGN OF THE STUDY

This study was designed to investigate the nutrition attitudes and counselling practices of general practitioners, pediatricians and obstetricians in the province of British Columbia. The nature of the relationship between the criterion variables (nutrition attitudes and practices) was assessed and the effect of selected, non-manipulable variates upon the criterion variates was determined. This study was designed as a pilot project to ascertain the kind of nutrition information being disseminated to mothers and hence, to explore the impact of recent developments in maternal and infant nutrition on the nutrition attitudes and practices of general practitioners, pediatricians and obstetricians.

The survey was conducted with the co-operation of the British Columbia Medical Association.

Research Design

A status, non-experimental study to establish the relationship between the criterion variables and the non-manipulable variates was conducted utilizing survey research techniques (Baker and Schutz, 1972).

The criterion (dependent) variables were: (1) attitudes toward nutrition and (2) nutrition counselling prac-

tices. The non-manipulable (independent) variables were categorized as: (1) demographic data which included country of medical training, location of practice and sex of respondent and (2) professional data which included years and type of practice, number of patients seen weekly, sources of nutrition information consulted, specialization of training, continuing education programs attended and the inclusion of nutrition in medical school training.

The nature of the relationship between the criterion variables and the variates was assessed. In addition, the nature of the relationship between the criterion variables themselves was determined.

Population

For this survey the study population was the entire population of practising general practitioners, pediatricians, and obstetricians registered with the British Columbia Medical Association and practising in British Columbia. This represented 97% of all practising general practitioners, pediatricians and obstetricians in the province. There were 1,753 general practitioners, 110 pediatricians and 118 obstetricians for a total sample of 1,981 physicians.

Data Collection

Data Collection Instruments

Data were collected by means of self-administered questionnaires (Appendix A). The questionnaires were designed to measure separately, nutrition attitudes and nutrition practices as well as to collect demographic information and professional data. A questionnaire that measured nutrition attitudes and practices concerning maternal nutrition was completed by obstetricians while a questionnaire that measured the nutrition attitudes and practices of infant nutrition was completed by pediatricians. Both questionnaires were combined and completed by the general practitioners.

Attitudes toward nutrition

Attitudes of obstetricians toward nutrition were measured by a data collection instrument developed for this study. The questionnaire consisted of 10 statements reflecting the importance of nutrition throughout pregnancy. This test was validated by a group of nutrition experts who had experience in the area of prenatal nutrition. The questionnaire was pretested by a group of adult nutrition experts. The scoring system (Table IV) validated by Schwartz (1973) was utilized. This system provided for two responses to each statement; the first response indicated whether the respondent agreed or disa-

greed and the second response indicated the degree of confidence with which the respondent agreed or disagreed. Each statement was scored from 0 to 7 with a possible attitude score between 0 and 70.

TABLE IV

SCORING SYSTEM FOR NUTRITION ATTITUDE TEST

Scale	Response	Degree of Certainty			
		Very Doubtful 1	Moderately Doubtful 2	Moderately Confident 3	Very Confident 4
Agree	Agree	4	5	6	7
	Disagree	3	2	1	0
Disagree	Disagree	4	5	6	7
	Agree	3	2	1	0

Pediatricians' nutrition attitudes were measured by a data collection instrument developed for this study. The questionnaire consisted of 10 statements reflecting the importance of nutrition throughout the first 2 years of life. This test was validated by a group of nutrition experts who had experience in infant nutrition. The pretest and scoring system

were analogous to that utilized for the assessment of obstetricians' attitudes.

Attitudes of general practitioners were measured by combining the data collection instrument for obstetricians' attitudes with the test for pediatricians' attitudes (Appendix A).

Nutrition practices

Nutrition practices of obstetricians were assessed by a data collection instrument developed for this study. The questionnaire consisted of 20 statements regarding nutrition counselling practices for pregnant women. This test was validated by a group of nutrition experts who had experience in the area of prenatal nutrition. The questionnaire was pretested by a group of adult nutrition experts. The scoring system, (Table V) indicated the frequency of a specific practice and took the form of 'always', 'frequently', 'sometimes', or 'never'. For this research, 'always' was designated as greater than 95% of the time; 'frequently' meant 50% to 95% of the time; 'sometimes' indicated 5% to 49% of the time; and 'never' assumed that the practice was conducted less than 5% of the time. Each statement was scored from 0 to 3, with a possible total score between 0 and 60.

TABLE V

SCORING SYSTEM FOR NUTRITION PRACTICE TEST

Scale	Response		Score
Always	Always	4	3
	Frequently	3	2
	Sometimes	2	1
	Never	1	0
Never	Never	1	3
	Sometimes	2	2
	Frequently	3	1
	Always	4	0

Pediatricians' nutrition practices were assessed by a data collection instrument developed for this study. The questionnaire consisted of 20 statements regarding nutrition counselling practices for infants. This test was validated by a group of nutrition experts who had experience in the area of infant nutrition. The pretest and scoring system were similar to that utilized for the assessment of obstetricians' nutrition practices.

Nutrition counselling practices of general practitioners were measured by combining the test for obstetricians' nutrition counselling practices with the test for pediatricians' practices.

Demographic information and professional data

Demographic and professional data (non-manipulable variates) were obtained in a separate section of the ques-

tionnaire. This section was composed of 11 questions on the physician's country of medical training, sex, location and type of practice, years in practice and number of prenatal patients and infants seen weekly. Sources of nutrition information, additional specialization or training, attendance at continuing education programs and the inclusion of nutrition in the medical school program were also studied.

Procedure

The data collection instruments were validated by nutrition experts in Canada and the United States (Appendix B). A validation questionnaire (Appendix B) was designed and used to collect information on clarity, precision and content of the data collection instruments. Sixteen of the 20 validators (80%) returned the validation questionnaires. Fourteen of these were received in time for incorporation of their suggestions into the final questionnaire. Statements that two or more validators disagreed with were deleted from the questionnaire. Other statements were revised in order to eliminate ambiguities.

The validated questionnaire was pretested in March, 1975, by graduate students and faculty members in Human Nutrition at the University of British Columbia. Sixteen graduate students and faculty members completed the questionnaire along

with a pretest questionnaire (Appendix C). The questionnaires were again revised to improve the clarity of the questions and to include the suggestions of the pretest subjects.

Packages containing a questionnaire, a cover letter eliciting support and stating the authorization for the study, and an addressed, stamped, return envelope were mailed to the subjects of this study in March 27, 1975. Return of the questionnaires by April 15, 1975, was requested. After the first deadline elapsed, a post-card reminder, stating a new deadline, was mailed to all subjects (Appendix A). A second post-card reminder was mailed to all subjects in May. The final cut-off date was set at May 27, 1975, which was 60 days from the initial mailing.

Upon receipt of the mail questionnaires the responses were coded and the questionnaires submitted to the Key-punching Service of the Computing Center at the University of British Columbia. Scoring of the nutrition attitudes and practices tests, frequency distributions and statistical analyses were performed by an IBM 370/168 computer, using programmes designed or furnished for this study, by personnel in the computing Center. The programmes selected for statistical analyses included the University of British Columbia Triangular Regression Package (Bjerring and Seagraves, 1974) as well as the Statistical Package for the Social Sciences (Nie et al. 1975).

A time schedule was designed in order to facilitate

completion of this study.

Schedule

Stage 1 - Planning and Preparation

1.	Design Study	December '74
2.	Develop questionnaire	January '75
3.	Validation of questionnaire by nutrition experts	February '75
4.	Write and print cover letters and reminder cards	February '75
5.	Pretest validated questionnaires	March '75
6.	Revise and print questionnaires	March '75
7.	Develop coding scheme	March '75

Stage 2 - Data Collection

1.	Assemble questionnaire packages	March '75
2.	Mail questionnaires to physicians	March '75
3.	Mail reminders	April-May '75

Stage 3 - Data Analyses and Interpretation

1.	Code questionnaire responses, check coding	April-May '75
2.	Key-punch from coded questionnaires	May '75
3.	Data analysis by computer	June '75
4.	Results and final report	June-July '75

Data Analysis

Data collected were coded, key-punched onto cards, and

treated statistically by computer analysis, to test the following hypotheses:

1. The relationship of nutrition attitudes to nutrition counselling practices for general practitioners, pediatricians and obstetricians (hypothesis 11) was determined by correlation analysis.
2. Comparison of nutrition attitudes and practice scores of general practitioners and pediatricians was conducted by t-test for significant differences in the group means. Comparison of nutrition attitudes and practice scores of general practitioners and obstetricians was conducted by t-test for significant differences in group means (hypothesis 12).
3. Stepwise regression analyses were carried out on the two criterion variables, nutrition attitudes and practices, to determine whether the non-manipulable variates were factors which related to the criterion variables (objective 2).
4. The relationship of each of location of medical training, location and type of practice, years of practice, sex of respondent, number of patients seen weekly, sources of nutrition information, number and type of continuing education programs attended and inclusion of nutrition education in medical

school training to nutrition attitudes and practices of general practitioners, pediatricians and obstetricians (hypotheses 1, 2, 3, 4, 5, 6, 7, 8, 9, 10) was tested by a one-way analysis of variance for significant differences in group means for each of the criterion variables.

5. Comparison of nutrition attitudes and practices of general practitioners, pediatricians and obstetricians who attended one continuing education programme to those who attended more than one programme was determined by t-test for significant differences in group scores.

In addition, a t-test was used to determine if there was a difference between early and late respondents for general practitioners, pediatricians and obstetricians. All results were reported at the highest level of significance.

CHAPTER IV

FINDINGS AND INTERPRETATIONS

In this study of general practitioners, pediatricians and obstetricians in the province of British Columbia, the nature of the relationship of nutrition attitudes and nutrition counselling practices to selected environmental variates was explored. The relationship between the two criterion variables (nutrition attitudes and practices) was also investigated.

Rates of Response

Questionnaires were sent to 1,981 practising physicians registered with the British Columbia Medical Association. A total of 844 questionnaires were returned, representing an overall response rate of 42.5% (Table VI). This rate of response compares favourably with others reported in the recent literature (Gullen and Garrison, 1973; Schiller and Vivian, 1974). Of the questionnaires received, 60 (3.0%) were returned unanswered, mainly because the physician was no longer engaged in the practice of obstetrics or pediatrics. Twenty questionnaires were incompletely answered, thus making their tabulation impossible.

TABLE VI

SUMMARY OF RESPONSE RATES FROM PHYSICIANS

Physician	Number Sent	Number Received	% Received
General Practitioners	1,753	724	41.3
Pediatricians	110	69	62.7
Obstetricians	118	51	43.2
Total	1,981	844	42.6

Comparison of Early and Late Respondents

The major disadvantage of the mail questionnaire as a survey research instrument is the researcher's lack of control over who responds. If non-respondents differ significantly from respondents on the issues being studied, a non-response bias may be introduced which could invalidate the interpretation of the survey. Results of studies have indicated that individuals who respond late to questionnaires are similar to those who do not respond at all (Larson and Catton, 1959; Roeher, 1963).

Of the 647 general practitioners who returned a completed questionnaire, 467 did so by the first deadline date and

hence, were designated as early respondents. The final 180 (28%) general practitioners to return questionnaires before the final cut-off date were considered to be late respondents. Questionnaires from pediatricians and obstetricians were divided in an analogous manner for early and late respondents (Table VII).

TABLE VII

NUMBER AND PERCENTAGE OF PHYSICIANS DESIGNATED AS EARLY AND LATE RESPONDENTS

Physician	Early	Late
General Practitioner	467 (72%)	180 (28%)
Pediatrician	59 (87%)	9 (13%)
Obstetrician	37 (77%)	11 (23%)

Results of t-test analyses for significant differences in group means of test scores for early and late respondents showed no significant differences at the 1% level for nutrition attitude scores or nutrition practice scores for general practitioners, pediatricians and obstetricians (Table VIII). Thus, if late respondents may be considered similar to non-respondents the non-response in this study should not bias the interpretation of the results.

TABLE VIII

COMPARISON OF EARLY AND LATE RESPONDENTS ON BASIS OF MEAN PERCENTAGE TEST SCORES

Physician	Mean Test Scores		Significance
	Early	Late	
General Practitioners'			
Nutrition Attitudes	72.75	72.32	N.S.
Nutrition Practices	60.11	59.87	N.S.
Pediatricians'			
Nutrition Attitudes	81.58	81.10	N.S.
Nutrition Practices	65.75	64.46	N.S.
Obstetricians'			
Nutrition Attitudes	62.43	69.99	N.S.
Nutrition Practices	64.15	66.52	N.S.

General Practitioners

Description of Respondents

Univariate frequency tables were designed to describe the demographic and professional characteristics of the general practitioners who responded to this survey.

Country of medical training

Most general practitioners who replied to the question-

naire received the majority of their medical training in Canada (Table IX).

TABLE IX

DISTRIBUTION OF GENERAL PRACTITIONERS BY COUNTRY OF MEDICAL TRAINING

Country of Medical Training	Number	%
Canada	449	70.0
Great Britain	121	18.8
United States	14	2.2
Ireland	9	1.4
Australia	7	1.1
Germany	5	0.8
India	3	0.5
Others	33	5.2
Total	641	100.0

Sex

Distribution of respondents according to sex showed that 593 (91.9%) of the respondents were male while 52 (8.1%) were female.

Location of practice

The highest percentage of respondents were from cities (excluding Vancouver) with populations greater than 5000 (Table X).

TABLE X

DISTRIBUTION OF GENERAL PRACTITIONERS BY LOCATION OF PRACTICE

Location	Number	%
Vancouver	228	35.3
Other City	300	46.4
Town	66	10.2
Village	52	8.1
Total	646	100.0

Years of practice

The majority of the general practitioners responding to the questionnaire were in practice for more than 10 years (Table XI).

TABLE XI

DISTRIBUTION OF GENERAL PRACTITIONERS BY YEARS OF PRACTICE

Years of Practice	Number	%
<5 years	181	28.0
>5 but < 10	131	20.2
>10 years	335	51.8
Total	647	100.0

Type of practice

More than 50% of the respondents were in clinic or group practice (Table XII).

TABLE XII

DISTRIBUTION OF GENERAL PRACTITIONERS BY TYPE OF PRACTICE

Type	Number	%
Private	305	47.6
Clinic	336	52.4
Total	641	100.0

Patients seen weekly

The majority of general practitioners (79.1%) see fewer than 10 pregnant women weekly but most physicians treat more than 10 infants per week (Table XIII).

TABLE XIII

DISTRIBUTION OF GENERAL PRACTITIONERS BY THE NUMBER OF PATIENTS SEEN WEEKLY

Number of Prenatal Patients	Number	%
<10	507	79.1
>10 but <25	132	20.6
>25	2	0.3
Total	641	100.0

Number of Infants	Number	%
<10	231	36.0
>10 but <25	344	53.7
>25	66	10.3
Total	641	100.0

Sources of nutrition information

Of the respondents, 636 general practitioners indicated that they use resource material for nutrition information (Table XIV). Professional journals were utilized more than any other source. Most physicians referred to more than one source of information. Consultation with a colleague was reported more frequently than consultation with a nutritionist-dietitian.

TABLE XIV

NUMBER AND PERCENTAGE OF GENERAL PRACTITIONERS INDICATING SOURCES OF NUTRITION INFORMATION

Source	Number	%
Professional journals	588	91.7
Government publications	399	62.2
Professional bulletins	379	58.6
Books	356	55.5
Health agency publications	349	54.4
Colleague	284	44.3
Nutritionist - Dietitian	277	43.2
Pharmaceutical companies' brochures	227	35.4
Magazines	207	32.2
Food manufacturers' brochures	163	25.4
Audiovisual aids	143	22.3
Public Health Nurse	113	17.6
Radio	94	14.6
Television	86	13.4
Home Economist	18	2.8
Other	28	4.4

Specialization

Table XV indicates that approximately 25% of the respondents had additional training for specialization in areas that may be related to nutrition. Some physicians had additional training in pediatrics or obstetrics although they still practiced as general practitioners. Specializations grouped together under the heading 'other' included training in tropical medicine or internal medicine. General practitioners who had training in surgery or anesthesiology were not included in Table XV.

TABLE XV

NUMBER AND PERCENTAGE OF GENERAL PRACTITIONERS HAVING ADDITIONAL TRAINING FOR SPECIALIZATION

Training for Specialization	Number	%
Obstetrics	38	5.9
Family Practice	27	4.2
Neonatology	24	3.7
Pediatrics	19	2.9
Public Health Diploma	13	2.0
Other	50	7.7
Total	161*	25.1*

* Ten of these physicians had more than one specialization.

Continuing education

The majority of physicians responding did not attend

continuing education programs (Table XVI). Only 18.8% of the respondents attended these programs and just 20 physicians registered for more than one program. The two continuing education programs listed, "Care of the High Risk Foetus and Newborn" and "Early Nutrition and Later Life", were programs offered in the province of British Columbia. However, many of the general practitioners attended continuing education programs presented in other Canadian provinces or in the United States.

TABLE XVI

NUMBER AND PERCENTAGE OF RESPONDENTS INDICATING ATTENDANCE AT CONTINUING EDUCATION PROGRAMS

Continuing Education Programs	Number	%
Care of the High Risk Foetus and Newborn	43	6.6
Early Nutrition and Later Life	14	2.2
Other	84	13.0
Total	121*	18.8*

* Twenty of these physicians attended more than one program.

Nutrition in medical education

Most of the respondents had never taken a course on nutrition (Table XVII). Some physicians indicated that nutrition was integrated with material in biochemistry courses and

had little practical relevance. (See Appendix D for physicians' comments to questionnaires). Forty percent of the respondents had no formal nutrition education.

TABLE XVII

NUMBER AND PERCENTAGE OF GENERAL PRACTITIONERS INDICATING TYPE OF NUTRITION EDUCATION IN MEDICAL SCHOOL

Format of Nutrition Education	Number	%
Course on Nutrition	14	2.1
Series of lectures	101	15.6
Integrated with other subject matter	338	52.2
No formal nutrition education	262	40.5

Nutrition Attitudes and Practices

Method of scoring

The test of nutrition attitudes (Appendix A) consisted of 20 statements each answered by 'Agree' or "Disagree' and by the degree of certainty for each response. Each statement was scored between 0 and 7 (Table IV). The mean total score for the attitude test was calculated by adding respondents' attitude scores and dividing by 630. This figure represents the total number of physicians who completed at least 19 of the 20 opinion statements. Questionnaires with more than one response missing were eliminated from the analysis. Mean scores for each statement on the test were obtained by totalling individual statement scores and dividing by the total number of answered statements. Those questionnaires with one unanswered statement were assigned the mean scores for that particular statement.

A separate section of the questionnaire consisting of 40 statements on nutrition counselling practices (Appendix A) was answered by indicating the frequency with which the practice was performed. The categories utilized were 'always', 'frequently', 'sometimes' and 'never' and were scored from 0 to 3 (Table V). A total of 620 respondents completed at least 38 of the 40 practice statements. The practice test was scored in a manner analogous to that of the nutrition opinion test. Scores from both tests were converted to percentages so

that the two variables could be analyzed from a common base.

Results of tests

The mean scores for tests of nutrition attitudes and practices are presented in Table XVIII. Attitude scores were considerably higher than practice scores for general practitioners.

TABLE XVIII

MEAN PERCENTAGE SCORES FOR NUTRITION ATTITUDE AND PRACTICE TESTS FOR GENERAL PRACTITIONERS

Test	Mean Score
Attitudes	72.64 ± 8.75[a]
Practices	60.05 ± 7.49

[a] Standard Deviation

Nutrition Attitudes: The mean test score for nutrition attitudes was 72.64% with a range from 42.9% to 92.1%. General practitioners scored lowest on items 3, 8, 9 and 10 (Table XIX). Apparently, few physicians feel that lactation is an appropriate time to eliminate excess fat accumulated during pregnancy even when the nutrient intake remains adequate. This is in direct contrast to the recommendations of the Food and Nutrition Board of the National Research Council (1973) which recommended a daily increased energy intake of only 500 calories during lactation to permit readjustment of maternal body-fat stores. (Answer key for all statements is in Appendix E).

TABLE XIX

STATEMENTS MEASURING NUTRITION ATTITUDES FOR WHICH GENERAL PRACTITIONERS RECEIVED LOWEST MEAN SCORES

Statement	Correct Response	Possible Score	Mean Score
3. Lactation is a good time to get rid of excess weight accumulated during pregnancy as long as nutrient intake remains adequate.....	Agree	7.0	3.2
8. I feel that pregnant women need so much folic acid that it is difficult to get it from diet alone.....	Agree	7.0	3.2
9. Provided that they enter pregnancy with adequate hemoglobin levels, women need to increase their iron intake only during the last half of pregnancy.....	Agree	7.0	2.8
10. I feel that there is little practical, accurate information on maternal nutrition in the current scientific journals and books.....	Disagree	7.0	2.9

Surprisingly, many physicians felt that there was little accurate, practical information in the current scientific journals and books and yet they listed the scientific journals as their major source of nutrition information (Table XIV).

The highest mean attitude score (6.6) was achieved on

statement 6 concerning physicians informing pregnant women about breast-feeding. Average scores for all attitude questions have been listed in Appendix F.

Nutrition practices: General practitioners had a mean practice test score of 60.05% with a range from 33.3% to 88.3%. Lowest mean scores were achieved on statements 4, 8, 15, 22, 28, 30, 33, 34, and 38 (Table XX).

TABLE XX

STATEMENTS MEASURING NUTRITION COUNSELLING PRACTICES FOR WHICH GENERAL PRACTITIONERS RECEIVED LOWEST MEAN SCORES

Statement	Correct Response	Possible Score	Mean Score
4. I advise healthy expectant women who do not drink milk to take a calcium supplement.....	Never	3.0	0.9
8. I encourage the average pregnant woman to gain approximately 1 pound per week in the last 20 weeks of pregnancy.....	Always	3.0	1.1
15. I prescribe a multivitamin supplement for my prenatal patients even when their dietary intake appears adequate..	Never	3.0	0.9
22. I ask mothers from what sources their 1 - 2 year olds obtain vitamin C.....	Always	3.0	1.1

Table XX (continued)

Statement	Correct Response	Possible Score	Mean Score
28. I recommend that human milk alone is adequate in nutrient content for the first two months of life.....	Never	3.0	0.9
30. I recommend that iron fortified foods or iron drops be a part of the infant's dietary regimen during the 2nd year of life.....	Always	3.0	1.2
33. I recommend that by the time the child is 5 months of age he should be eating cereals, fruits, vegetables and meats.....	Never	3.0	0.8
34. I recommend that a multi-vitamin supplement be given to healthy infants.....	Never	3.0	1.2
38. I encourage mothers to include about 25 grams of protein in the daily diet of a 1 - 2 year old.....	Always	3.0	1.1

It is evident that vitamin preparations (statements 15 and 34) are recommended widely even when dietary intake is adequate. Yet iron-fortified foods or iron drops are not generally recommended for infants (statement 30). The results of numerous studies (Filer and Martinez, 1964; Purvis, 1973; Nutrition Canada, 1973; Maslansky et al., 1974) have shown that it is iron rather than vitamins which is most likely to be

lacking in the infant's diet.

Few physicians encourage a weight gain of approximately one pound per week in the last 20 weeks of pregnancy for the normal pregnant woman (statement 8). This is contrary to the recommendations of several committees and investigators (Committee on Maternal Nutrition, 1970; Hytten and Leitch, 1971; Nutrition in Pregnancy Committee, 1973) who suggest a total weight gain in the vicinity of 24 to 28 pounds. Generally, four to eight pounds are gained during the first 20 weeks of pregnancy, leaving approximately 20 pounds to accumulate during the latter part.

Relationship of attitudes to practices

A highly significant positive correlation (r = 0.370) was found between nutrition attitudes and practices of general practitioners. This correlation was significant at the 1% probability level. These results confirm the earlier work of Jalso et al., (1965) who found a strong positive correlation between nutrition opinions and practices (r = 0.63) for adult members of community organizations in New York State. Other workers (Newton and Newton, 1950; Schwartz, 1975) have found a similar positive relationship between nutrition attitudes and practices.

It is gratifying to observe that many physicians feel that pregnant women should be informed about breast-feeding and encourage breast-feeding among their pregnant patients

(statements 6, 2 and 31 in Table XXI). This is in contrast to reports in the recent literature that physicians apparently did little to encourage breast-feeding (Shukla et al., 1972; Applebaum, 1975). However, few physicians realized that breast milk is inadequate in some nutrients (particularly Vitamin D) and must be supplemented (Kodicek, 1973; Fomon, 1974; Committee on Nutritional Misinformation, 1975).

TABLE XXI

COMPARISON OF NUTRITION ATTITUDES AND PRACTICES OF GENERAL PRACTITIONERS CONCERNING BREAST-FEEDING

Statement	Correct Response	Possible Score	Mean Score
Attitude			
6. Pregnant women should be informed about the pros and cons of breast-feeding.....	Agree	7.0	6.6
Practices			
2. I consider the possibility of breast-feeding with the pregnant women I see in my practice.....	Always	3.0	2.8
28. I recommend that human milk alone is adequate in nutrient content for the first two months of life.....	Never	3.0	0.9
31. I encourage healthy mothers of infants to breast-feed for the first six months.....	Always	3.0	2.1

Attitudes and practices on the introduction of solids into the infant's diet showed that most physicians do not feel pressured by mothers to introduce solids at an early age; they appear to do so on their own initiative (Table XXII).

TABLE XXII

COMPARISON OF NUTRITION ATTITUDES AND PRACTICES OF GENERAL PRACTITIONERS CONCERNING EARLY INTRODUCTION OF SOLIDS

Statement	Correct Response	Possible Score	Mean Score
Attitude			
17. Many mothers are anxious to have their infants ingest solids as soon as possible and I feel that it is best to go along with this.....	Dis-agree	7.0	5.1
Practices			
23. I encourage mothers to give cereals added to the bottle for a healthy infant who isn't satisfied with milk alone.....	Never	3.0	1.6
25. I recommend the early (within 2 months of birth) introduction of solids such as cereals and fruits.....	Never	3.0	1.6
33. I recommend that by the time the child is 5 months of age he should be eating cereals, fruits, vegetables and meats.....	Never	3.0	0.8

The Relationship of Selected Variates to Nutrition Attitudes and Practices

The relationship of the non-manipulable variates to the criterion variables (nutrition attitudes and practices) were investigated in two ways: by one-way analysis of variance using Scheffe's test and analysis of variance using stepwise multiple regression. Scheffe's test allows multiple comparisons of a number of means taken two at a time, even when the means are from groups of unequal size. In order to reduce the total number of variates, a number of similar variates were grouped under one heading. Stepwise regression analysis determined which of the variates studied had a significant effect on the criterion variables. This effect is independent of the effect of all other variates.

One-way analysis of variance

Location of medical training: Table XXIII indicates that location of medical training was not significantly related to nutrition attitudes and practices. Since 88.8% of the general practitioners were trained in either Canada or Great Britain (Table IX), the remaining countries were grouped together as one category.

TABLE XXIII

MEAN PERCENTAGE SCORES OF GENERAL PRACTITIONERS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON LOCATION OF MEDICAL TRAINING

Test	Country			Significance
	Canada	Great Britain	Other	
Attitudes	73.01	72.38	71.04	N.S.
Practices	59.88	60.48	60.17	N.S.

Sex: Female general practitioners scored significantly higher on tests of nutrition attitudes and practices than did their male counterparts (Table XXIV).

TABLE XXIV

MEAN PERCENTAGE SCORES OF GENERAL PRACTITIONERS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON SEX OF RESPONDENT

Test	Sex		Significance $P < 0.01$
	Male	Female	
Attitudes	72.36	76.21	S.
Practices	59.64	65.08	S.

Location of practice: There was no significant difference in the scores on the nutrition attitudes and practices tests based on location of practice (Table XXV).

TABLE XXV

MEAN PERCENTAGE SCORES OF GENERAL PRACTITIONERS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON LOCATION OF PRACTICE

Test	Location of Practice				Significance
	Vancouver	Other City	Town	Village	
Attitudes	72.85	73.04	70.69	72.04	N.S.
Practices	60.28	59.79	60.82	59.60	N.S.

Years of practice: One way analysis of variance indicated that general practitioners who were in practice for more than 10 years scored significantly lower on the nutrition attitude and practice tests than physicians who were in practice for fewer than five years and between five and 10 years (Table XXVI).

TABLE XXVI

MEAN PERCENTAGE SCORES OF GENERAL PRACTITIONERS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON YEARS OF PRACTICE

Test	Years of Practice			Significance $P<0.001$
	<5 years	>5 years <10	>10 years	
Attitudes	73.41	74.81	71.32	S.
Practices	61.46	61.06	58.85	S.

Type of practice: Table XXVII indicates that type of

practice had no significant effect on the attitudes and practices of general practitioners.

TABLE XXVII

MEAN PERCENTAGE SCORES OF GENERAL PRACTITIONERS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON TYPE OF PRACTICE

Test	Type of Practice		Significance
	Private	Clinic	
Attitudes	72.31	72.87	N.S.
Practices	59.94	60.05	N.S.

Number of prenatal patients: There was no significant difference in the scores of nutrition attitudes and practices based on number of patients seen weekly (Table XXVIII). Although physicians who see more than 25 patients weekly appear to have higher scores, there were only two physicians in this group (Table XIV).

TABLE XXVIII

MEAN PERCENTAGE SCORES OF GENERAL PRACTITIONERS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON NUMBER OF PRENATAL PATIENTS SEEN WEEKLY

Test	Number of Prenatal Patients			Significance
	<10	>10 but <25	> 25	
Attitudes	72.42	73.39	80.35	N.S.
Practices	59.60	61.62	64.15	N.S.

Number of infants: The number of infants seen weekly had no significant effect on the test scores of respondents (Table XXIX).

TABLE XXIX

MEAN PERCENTAGE SCORES OF GENERAL PRACTITIONERS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON NUMBER OF INFANTS SEEN WEEKLY

Test	Number of Infants			Significance
	<10 infants	>10 infants but <25	>25	
Attitudes	72.50	72.64	73.05	N.S.
Practices	59.59	60.14	60.56	N.S.

Additional training for specialization: Physicians who had additional training scored significantly higher than general practitioners without any additional specialization (Table XXX).

TABLE XXX

MEAN PERCENTAGE SCORES OF GENERAL PRACTITIONERS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON ADDITIONAL TRAINING FOR SPECIALIZATION

Test	Training for Specialization		Significance $P<0.05$
	Training	No Training	
Attitudes	74.00	72.26	S.
Practices	62.34	59.31	S.

Continuing Education: Respondents who had attended one

or more continuing education programs were grouped under one heading and compared to respondents who had not attended any continuing education programs. Analysis of variance indicated that there was a significant difference in the nutrition attitude and practice tests based on these two groups (Table XXXI).

TABLE XXXI

MEAN PERCENTAGE SCORES OF GENERAL PRACTITIONERS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON ATTENDANCE AT CONTINUING EDUCATION PROGRAMS ATTENDED

Test	Continuing Education Programs		Significance $P < 0.01$
	Attendance	No Attendance	
Attitudes	75.04	72.16	S.
Practices	63.07	59.40	S.

Mean test scores of physicians who attended more than one continuing education programs were compared to general practitioners who attended only one program. Table XXXII indicates that there was no significant difference in the test scores of these two groups.

TABLE XXXII

MEAN PERCENTAGE SCORES OF GENERAL PRACTITIONERS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON NUMBER OF CONTINUING EDUCATION PROGRAMS ATTENDED

Test	Number of Continuing Education Programs		Significance
	1	>1	
Attitudes	74.73	76.78	N.S.
Practices	62.60	65.93	N.S.

Nutrition in medical school: General practitioners who had no formal nutrition education scored significantly less than those who had some training in nutrition (Table XXXIII).

TABLE XXXIII

MEAN PERCENTAGE SCORES OF GENERAL PRACTITIONERS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON NUTRITION EDUCATION IN MEDICAL SCHOOL

Test	Nutrition in Medical School		Significance $P < 0.05$
	Nutrition	No Nutrition	
Attitudes	73.46	71.61	S.
Practices	60.60	59.25	S.

Stepwise regression results

The relationship of the non-manipulable variates to the two criterion variables was investigated by stepwise multiple regression. As most variates were not ordinal, but nominal, bases for comparison were selected. The base for comparison of country of medical training to nutrition attitudes and practices was Canada. In a like manner, bases were chosen for the other variates; sex base - male; location of practice - Vancouver; years of practice - fewer than five years; type of practice - private; number of prenatal patients - fewer than 10; number of infant patients - fewer than 10; and nutrition in medical school training - no nutrition. Sources of nutrition information, additional specialization and attendance at continuing education programs needed no bases for comparison.

Nutrition attitude test: The results of stepwise regression analysis for the nutrition attitude test are reported in Table XXXIV. General practitioners who did not receive their medical training in the countries listed under 'demographic information' were categorized into groups. One group consisted of physicians from Ireland; a second group listed medical doctors from Germany; a third consisted of all other general practitioners, most of whom were from European countries and the Orient. Stepwise regression analysis showed that respondents listed in the third category (from all other countries) scored significantly lower on the nutrition attitude test when compared to

physicians trained in Canada. Physicians who were in practice for more than 10 years scored significantly lower than those who were in practice for less than five years.

TABLE XXXIV

STEPWISE REGRESSION RESULTS FOR VARIATES SIGNIFICANTLY RELATED TO MEAN PERCENTAGE SCORES ACHIEVED BY GENERAL PRACTITIONERS ON THE NUTRITION ATTITUDE TEST

Variate	Coefficient	Probability
Constant	70.63	
Location of medical training: Other country	-6.21	< 0.001
Sex: Female	3.71	< 0.01
Years of practice: >10	-2.35	< 0.001
Number of prenatal patients: >25	14.06	< 0.05
Sources of nutrition information: Books	2.75	< 0.001
Consultation with a nutritionist-dietitian	3.00	< 0.001
Additional specialization or training: Pediatrics	4.31	< 0.05
Family Practice	4.84	< 0.01
Nutrition education: Research or extra courses in nutrition	11.83	< 0.05

Female general practitioners scored significantly higher

than their male counterparts as did those physicians who had additional training in pediatrics or family practice. Medical doctors who had research training in nutrition or had undertaken additional nutrition courses also had significantly higher test scores. Physicians who consulted books or a nutritionist-dietitian scored significantly higher on the nutrition attitude tests.

The coefficient of determination (r^2) for the stepwise regression analysis of the nutrition attitude scores was 0.134. Thus, the variates studied accounted for only 13.4% of the variance in nutrition attitudes.

Nutrition practice test: Stepwise regression analysis indicated that a number of variates were significantly related to nutrition practice test scores (Table XXXV). Most of these were the same variates that were significantly related to attitude scores.

Physicians who were from 'other' countries scored significantly lower when compared to general practitioners who had received their training in Canada. Significantly lower scores were also achieved by general practitioners who were in practice for more than 10 years and those who consulted pharmaceutical brochures for information on nutrition.

TABLE XXXV

STEPWISE REGRESSION RESULTS FOR VARIATES SIGNIFICANTLY RELATED TO MEAN PERCENTAGE SCORES ACHIEVED BY GENERAL PRACTITIONERS ON THE NUTRITION PRACTICE TEST

Variate	Coefficient	Probability
Constant	57.20	
Location of medical training:		
Other countries	-4.10	<0.01
Sex: Female	5.04	<0.001
Years of practice: >10	-2.11	<0.001
Sources of nutrition information:		
Government publications	1.48	<0.05
Pharmaceutical brochures	-1.26	<0.05
Books	3.22	<0.001
Consultation with a nutritionist-dietitian	1.54	<0.01
Additional specialization or training:		
Pediatrics	4.25	<0.01
Continuing education programs:		
Care of the High Risk Foetus	3.44	<0.01
Early Nutrition and Later Development	4.19	<0.05
Other	2.33	<0.01
Nutrition education		
Research or extra courses in nutrition	10.58	<0.05

Significantly higher test scores were obtained by female physicians when compared with males. General practitioners who utilized government publications, books or a nutritionist-dietitian for nutrition information also scored significantly higher. Additional training in pediatrics and attendance at continuing education programs significantly increased the scores of respondents.

The coefficient of determination (r^2) was 0.192. Hence, only 19.2% of the variance in the nutrition practice test was attributed to the variates studied.

Summary of General Practitioners' Results

The findings from this survey on general practitioners' nutrition attitudes and practices support hypothesis 3 (no relationship between the criterion variables and location of practice) and hypothesis 5 (type of practice). Hypothesis 1 (location of medical training); 2 (sex of respondent); 4 (years of practice); 6 (number of patients seen weekly); 7 (sources of nutrition information); 8 (additional training); 9 (attendance at continuing education programs); and 10 (inclusion of nutrition in medical school training) were all partially rejected. Furthermore, hypothesis 11 (correlation between attitudes and practices) was also rejected for general practitioners.

Pediatricians and Obstetricians

Description of Respondents

Univariate frequency tables were designed to describe the demographic and professional characteristics of the pediatricians and obstetricians who responded to this survey.

Country of medical training

The majority of pediatricians and obstetricians responding to the questionnaire obtained their medical training in Canada (Table XXXVI).

TABLE XXXVI

DISTRIBUTION OF PEDIATRICIANS AND OBSTETRICIANS BY COUNTRY OF MEDICAL TRAINING

Country	Pediatricians		Obstetricians	
	No.	%	No.	%
Canada	35	54.6	22	50.0
Great Britain	17	26.6	17	38.6
Australia	1	1.6	1	2.3
United States	0	0	3	6.8
Other	11	17.2	1	2.3
Total	64	100.0	44	100.0

Sex of respondent

Most pediatricians and obstetricians who returned questionnaires were males (Table XXXVII).

TABLE XXXVII

DISTRIBUTION OF PEDIATRICIANS AND OBSTETRICIANS BY SEX

Sex	Pediatricians		Obstetricians	
	No.	%	No.	%
Male	63	92.6	45	93.8
Female	5	7.4	3	6.2
Total	68	100.0	48	100.0

Location of practice

Only two locations (Vancouver and other city) were represented by the respondents (Table XXXVIII).

TABLE XXXVIII

DISTRIBUTION OF PEDIATRICIANS AND OBSTETRICIANS BY LOCATION OF PRACTICE

Location	Pediatricians		Obstetricians	
	No.	%	No.	%
Vancouver	42	62.7	29	60.4
Other city	25	37.3	19	39.6
Total	67	100.0	48	100.0

Years of practice

Distribution of respondents according to years of practice indicated that the majority of pediatricians and obste-

tricians have been in practice more than 10 years (Table XXXIX).

TABLE XXXIX

DISTRIBUTION OF PEDIATRICIANS AND OBSTETRICIANS BY YEARS OF PRACTICE

Years of practice	Pediatricians		Obstetricians	
	No.	%	No.	%
<5 years	5	7.4	7	14.6
>5 but < 10	8	11.8	5	10.4
>10 years	55	80.8	36	75.0
Total	68	100.0	48	100.0

Type of practice

The majority of specialists responding to this survey were engaged in private practice (Table XL).

TABLE XL

DISTRIBUTION OF PEDIATRICIANS AND OBSTETRICIANS BY TYPE OF PRACTICE

Type of practice	Pediatricians		Obstetricians	
	No.	%	No.	%
Private	49	73.1	35	74.5
Clinic	18	26.9	12	25.5
Total	67	100.0	47	100.0

Number of patients

As expected, pediatricians see more patients weekly than do obstetricians (Table XLI). Almost 50% of the obstetricians see fewer than 10 patients weekly while approximately 40% of the pediatricians see more than 25 infants weekly.

TABLE XLI

DISTRIBUTION OF PEDIATRICIANS AND OBSTETRICIANS BY NUMBER OF PATIENTS SEEN WEEKLY

Number of Patients (infant & prenatal)	Pediatricians		Obstetricians	
	No.	%	No.	%
<10	15	22.1	23	48.9
>10 but <25	26	38.2	17	36.2
>25	27	39.7	7	14.9
Total	68	100.0	47	100.0

Sources of nutrition information

Of the respondents, 65 (95.6%) pediatricians and 47 (97.9%) obstetricians indicated that they use resource material for nutrition information (Table XLII). Professional journals were utilized more than any other source and consultation with a nutritionist-dietitian ranked fifth with both groups of specialists.

TABLE XLII

NUMBER AND PERCENTAGE OF PEDIATRICIANS AND OBSTETRICIANS INDICATING SOURCES OF NUTRITION INFORMATION

Sources of Nutrition Information	Pediatricians		Obstetricians	
	No.	%	No.	%
Professional journals	64	98.4	44	93.6
Professional bulletins	51	78.4	34	72.3
Books	48	73.8	27	57.4
Government publications	44	67.6	28	59.5
Nutritionist-Dietitian	43	66.1	19	42.5
Pharmaceutical companies' brochures	32	49.2	16	34.0
Health agency publications	31	47.6	15	31.9
Food manufacturers' brochures	30	46.1	4	8.5
Colleague	27	41.5	10	21.2
Audiovisual aids	24	36.9	12	25.5
Magazines	21	32.3	16	34.0
Television	12	18.4	5	10.6
Radio	10	15.3	6	12.7
Public Health Nurse	10	15.3	3	6.3
Home Economist	3	4.6	1	2.1
Other	4	6.1	1	2.1

Additional training for specialization

Table XLIII indicates that approximately 47% of the pediatricians and 20% of the obstetricians had additional training. Specializations grouped under the title 'other' included training in cardiology, allergies, internal medicine and nephrology.

TABLE XLIII

NUMBER AND PERCENTAGE OF PEDIATRICIANS AND OBSTETRICIANS INDICATING ADDITIONAL TRAINING FOR SPECIALIZATION

Training For Specialization	Pediatricians		Obstetricians	
	No.	%	No.	%
Neonatology	14	20.5	6	12.5
Family Practice	2	2.9	2	4.1
Public Health Diploma	1	1.4	0	0.0
Other	18	26.4	2	4.1
Total	32*	47.0*	10	20.7

* Three physicians had more than one of the above specialties.

Continuing education

Approximately one-half of the respondents attended at least one continuing education program (Table XLIV).

TABLE XLIV

NUMBER AND PERCENTAGE OF PEDIATRICIANS AND OBSTETRICIANS INDICATING ATTENDANCE AT CONTINUING EDUCATION PROGRAMS

Continuing Education Programs	Pediatricians		Obstetricians	
	No.	%	No.	%
Care of the High Risk Foetus and Newborn	17	25.0	18	37.5
Early Nutrition and Later Life	13	19.1	1	2.1
Other	10	14.7	5	10.4
Total	34*	50.0*	23	47.9

* Six pediatricians attended more than one continuing education program.

Nutrition education in medical schools

Approximately 30% of the pediatricians and 56% of the obstetricians responding to the questionnaire had received no formal nutrition education (Table XLV).

TABLE XLV

NUMBER AND PERCENTAGE OF PEDIATRICIANS AND OBSTETRICIANS INDICATING TYPE OF NUTRITION EDUCATION IN MEDICAL SCHOOL

Format of Nutrition Education	Pediatricians		Obstetricians	
	No.	%	No.	%
Course on Nutrition	0	0.0	0	0.0
Series of lectures	13	19.1	2	4.1
Integrated with other subject matter	34	50.0	22	45.8
No formal nutrition education	20	29.4	25	52.1

Nutrition Attitudes and Practices

Method of scoring

The test of nutrition attitudes for pediatricians (Appendix A) consisted of 10 statements, each answered by 'Agree' or "Disagree' and the degree of certainty for the response. Each statement was scored between 0 and 7 (Table IV). The mean total score for the attitude test was calculated by adding respondent attitude scores and dividing by 65. This figure is the total number of pediatricians who completed at least nine of the 10 statements. Questionnaires with more than one response missing were eliminated from the study. Mean scores for each statement on the test were obtained by totalling individual statement scores and dividing by the total number of answered statements. Those questionnaires with an unanswered statement were assigned the mean score for that particular statement.

The test of nutrition attitudes for obstetricians (Appendix A) was scored in an analogous manner. A total of 48 obstetricians completed at least nine of the 10 attitude statements.

Nutrition practice tests consisted of 20 statements that were answered 'always', 'frequently', 'sometimes' and 'never'. Questionnaires with more than one unanswered statement were eliminated from analysis. Thus, a total of 67 pediatricians and 46 obstetricians completed at least 19 of the 20 practice statements. Again those questionnaires with one unanswered

statement were assigned the mean score for that statement.

Results of tests

The mean percentage scores for pediatricians and obstetricians on the nutrition attitude and practice tests are shown in Table XLVI. Obstetricians' scores for nutrition attitudes and practices were very similar (64.16% and 64.72% respectively). Pediatricians' scores were much higher on the attitude test than on the practice test (81.51% and 65.57% respectively).

TABLE XLVI

MEAN PERCENTAGE SCORES FOR NUTRITION ATTITUDE AND PRACTICE TESTS FOR PEDIATRICIANS AND OBSTETRICIANS

Test	Pediatricians Mean Scores	Obstetricians Mean Scores
Attitudes	81.51 ± 11.88[a]	64.16 ± 11.23
Practices	65.57 ± 6.67	64.72 ± 10.36

[a] standard deviation

Nutrition attitudes: The mean test scores for pediatricians' nutrition attitudes was 81.5% with a range from 45.7% to 100.0%. Pediatricians scored lowest on statements 3, 6 and 10 (Table XLVII). A number of physicians felt that it was impossible for an infant to be a lacto-ovo vegetarian and still be well-nourished. Although these infants may have difficulty obtaining sufficient iron, iron drops or iron-fortified foods are readily available. Some physicians do not appear to be aware

of the high quantity of salt found in many commercially prepared infant foods. Although recent legislation in the United States decreased substantially the acceptable salt level for infant foods, no comparable measures have been taken in Canada.

TABLE XLVII

STATEMENTS MEASURING NUTRITION ATTITUDES FOR WHICH PEDIATRICIANS ACHIEVED LOWEST MEAN SCORES

Statement	Correct Response	Possible Score	Mean Score
3. I believe that many commercially prepared infant foods contain too high a quantity of salt.....	Agree	7.0	4.5
6. It is important to investigate the infant's dietary intake at each office visit.....	Agree	7.0	4.9
10. In my opinion, it is impossible for an infant to be a lacto-ovo vegetarian (eats eggs and milk products but no meat, fish or poultry) and still be well-nourished.....	Disagree	7.0	4.3

The mean score for nutrition attitudes achieved by obstetricians was 64.16% with a range from 34.3% to 90.0%. Statements 3, 8, 9 and 10 had the lowest mean scores (Table XLVIII). Some obstetricians are apparently unaware of the high recommended allowances set for folic acid in Canada and the United States. The Food and Nutrition Board of the National Academy of Sciences

(1974) and the Canadian Dietary Standard (1974) have suggested intakes of approximately 800 µg daily. This quantity is extremely difficult to obtain from dietary sources (Hoppner et al. 1972) and a supplement is frequently recommended (Committee on Maternal Nutrition, 1970; American Dietetic Association Position Paper, 1975).

TABLE XLVIII

STATEMENTS MEASURING NUTRITION ATTITUDES FOR WHICH OBSTETRICIANS ACHIEVED LOWEST MEAN SCORES

Statement	Correct Response	Possible Score	Mean Score
3. Lactation is a good time to get rid of excess weight accumulated in pregnancy as long as nutrient intake remains adequate.....	Agree	7.0	2.6
8. I feel that pregnant women need so much folic acid that it is difficult to get it from diet alone.....	Agree	7.0	3.0
9. Provided that they enter pregnancy with adequate hemoglobin levels, women need to increase their iron intake only during the last half of pregnancy.....	Agree	7.0	2.3
10. I feel that there is little practical, accurate information on maternal nutrition in the current scientific journals and books.....	Disagree	7.0	2.9

Nutrition practices: The mean score for pediatricians on the nutrition practice test was 65.6% with a range from 51.7% to 83.3%. Pediatricians scored lowest on statements 8, 10, 13 and 14 (Table XLIX). Many pediatricians prefer the early introduction of solids and favour multivitamin supplements for healthy infants. It appears that a number of pediatricians are not cognizant of the fact that it is iron rather than vitamins which is generally low in infants' diets.

The mean score for each practice statement is listed in Appendix F.

TABLE XLIX

STATEMENTS MEASURING NUTRITION PRACTICES FOR WHICH PEDIATRICIANS ACHIEVED LOWEST MEAN SCORES

Statement	Correct Response	Possible Score	Mean Score
8. I recommend that human milk alone is adequate in nutrient content for the first two months of life..	Never	3.0	0.9
10. I recommend that iron fortified foods or iron drops be a part of the infant's dietary regimen during the 2nd year of life.....	Always	3.0	1.1
13. I recommend that by the time the child is 5 months of age he should be eating cereals, fruits, vegetables and meats.....	Never	3.0	0.7
14. I recommend that a multivitamin supplement be given to healthy infants..	Never	3.0	1.2

On the nutrition practice test obstetricians obtained a mean test score of 64.7% with a range from 36.7% to 81.7%. Lowest scores were achieved on statements 4, 8, 15 and 19 (Table L). Some degree of weight restriction (statement 8)

appeared to be evident. Restricting dietary carbohydrates to 50 g daily (statement 19) may indeed be detrimental to the offspring (Churchill, 1970; Felig, 1973). Again there is evidence of an over-reliance on multivitamin supplements during pregnancy.

TABLE L

STATEMENTS MEASURING NUTRITION PRACTICES FOR WHICH OBSTETRICIANS ACHIEVED LOWEST MEAN SCORES

Statement	Correct Response	Possible Score	Mean Score
4. I advise healthy expectant women who do not drink milk to take a calcium supplement.....	Never	3.0	1.0
8. I encourage the average pregnant woman to gain approximately 1 pound per week in the last 20 weeks of pregnancy.....	Always	3.0	1.3
15. I prescribe a multivitamin supplement for my prenatal patients even when their dietary intake appears adequate...	Never	3.0	0.9
19. When my prenatal patients are gaining too much weight I recommend that they restrict dietary carbohydrates to approximately 50 grams daily.....	Never	3.0	1.6

Comparison of attitudes to practices

A significant positive correlation (r = 0.259) was found between nutrition attitudes and practices for pediatricians.

This correlation was significant at the 5% level. Obstetricians also achieved a highly significant positive correlation (r = 0.424) between attitudes and practices which was significant at the 1% level.

Attitudes generally appeared to be reflected in the physicians' counselling practices. One important exception for pediatricians (Table LI) and obstetricians (Table LII) concerned the substitution of multivitamin supplements for dietary advice. Both groups of specialists had the attitude that it was important to give nutritional advice but a much smaller percentage of physicians actually gave this advice to their patients.

TABLE LI

COMPARISON OF ATTITUDES AND PRACTICES FOR PEDIATRICIANS CONCERNING NUTRITIONAL ADVICE

Statement	Correct Response	Possible Score	Mean Score
Attitude			
2. If an infant is receiving a multivitamin supplement, I feel that I don't need to be concerned about his diet.....	Disagree	7.0	6.4
Practices			
2. I ask mothers from what sources their 1 - 2 year olds obtain vitamin C.....	Always	3.0	1.8
20. I encourage mothers to include at least 2 glasses (16 oz.) of milk in a 1 - 2 year old's diet...	Always	3.0	1.9

TABLE LII

COMPARISON OF ATTITUDES AND PRACTICES FOR OBSTETRICIANS CONCERNING NUTRITIONAL ADVICE

Statement	Correct Response	Possible Score	Mean Score
Attitude			
2. As long as the expectant mother takes a multivitamin supplement, I do not need to give advice on nutrition.....	Disagree	7.0	6.3
Practices			
5. I recommend that expectant patients include a citrus fruit or juice in their daily diet.....	Always	3.0	1.8
10. I recommend that my prenatal patients include an iron-rich food (i.e. organ meats) in their weekly diets.....	Always	3.0	1.8
12. I give pregnant adolescents specific instructions on food sources of protein....	Always	3.0	1.9
14. I encourage my prenatal patients to have four glasses of milk or the equivalent in dairy products daily.....	Always	3.0	1.7

The Relationship of Selected Variates to Nutrition Attitudes and Practices

The relationship of the non-manipulable variates to the criterion variables (nutrition attitudes and practices) was investigated by one-way analysis of variance using Scheffe's test and by stepwise multiple regression.

One-way analysis of variance

Location of medical training: Table LIII indicates that location of medical training was not significantly related to nutrition attitude and practices for obstetricians nor to pediatricians' nutrition attitudes. Pediatricians trained in Canada scored significantly higher on the practice test than did physicians trained in Great Britain. However, pediatricians trained in Great Britain scored significantly higher than pediatricians trained in all other countries combined.

TABLE LIII

MEAN PERCENTAGE SCORES OF PEDIATRICIANS AND OBSTETRICIANS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON LOCATION OF MEDICAL TRAINING

Test	Country			Significance $P < 0.01$
	Canada	Great Britain	Other	
Pediatricians'				
Attitudes	83.98	79.46	79.89	N.S.
Practices	67.75	64.01	61.66	S.
Obstetricians'				
Attitudes	62.71	63.94	72.83	N.S.
Practices	64.29	64.90	65.33	N.S.

Sex of respondent: There were no significant differences in the mean nutrition attitude and practice test scores for pediatricians and obstetricians based on sex of the respondents (Table LIV).

TABLE LIV

MEAN PERCENTAGE SCORES OF PEDIATRICIANS AND OBSTETRICIANS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON SEX OF RESPONDENT

Test	Sex of Respondent		Significance
	Male	Female	
Pediatricians'			
Attitudes	81.68	79.45	N.S.
Practices	65.58	65.40	N.S.
Obstetricians'			
Attitudes	63.77	70.00	N.S.
Practices	64.08	73.90	N.S.

Location of practice: Physicians who practice in Vancouver did not have scores significantly different from physicians who practised in other cities on either the attitude or practice tests (Table LV).

TABLE LV

MEAN PERCENTAGE SCORES OF PEDIATRICIANS AND OBSTETRICIANS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON LOCATION OF PRACTICE

Test	Location		Significance
	Vancouver	Other City	
Pediatricians'			
Attitudes	81.02	82.50	N.S.
Practices	65.65	65.40	N.S.
Obstetricians'			
Attitudes	65.26	62.47	N.S.
Practices	66.32	62.23	N.S.

Years of practice: One-way analysis of variance did not indicate any significant differences in mean test scores of pediatricians and obstetricians based on years of practice (Table LVI).

TABLE LVI

MEAN PERCENTAGE SCORES OF PEDIATRICIANS AND OBSTETRICIANS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON YEARS OF PRACTICE

Test	Years of Practice			Significance
	<5 years	>5 but <10	>10 years	
Pediatricians'				
Attitudes	82.85	89.62	80.13	N.S.
Practices	69.02	65.00	65.33	N.S.
Obstetricians'				
Attitudes	70.00	69.97	62.21	N.S.
Practices	67.15	57.02	65.35	N.S.

Type of practice: There were no significant differences in the mean nutrition attitude and practice scores for pediatricians and obstetricians based on type of practice (Table LVII).

TABLE LVII

MEAN PERCENTAGE SCORES OF PEDIATRICIANS AND OBSTETRICIANS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON TYPE OF PRACTICE

Test	Type of Practice		Significance
	Private	Clinic	
Pediatricians'			
Attitudes	81.54	80.97	N.S.
Practices	64.86	67.59	N.S.
Obstetricians'			
Attitudes	65.21	61.89	N.S.
Practices	65.64	62.28	N.S.

Number of patients: Number of patients seen weekly did not have a significant effect on the mean test scores for attitudes or practices of pediatricians and obstetricians (Table LVIII).

TABLE LVIII

MEAN PERCENTAGE SCORES OF PEDIATRICIANS AND OBSTETRICIANS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON NUMBER OF PATIENTS SEEN WEEKLY

Test	No. of infants or prenatal patients			Significance
	<10	>10 but <25	>25	
Pediatricians'				
Attitudes	78.46	82.79	81.74	N.S.
Practices	65.10	64.74	66.60	N.S.
Obstetricians'				
Attitudes	61.23	67.47	66.47	N.S.
Practices	63.34	68.34	62.40	N.S.

Specialization or training: Physicians who had additional training were compared to those physicians with no such training (Table LIX). There was no significant difference between these two groups based on mean test scores.

TABLE LIX

MEAN PERCENTAGE SCORES OF PEDIATRICIANS AND OBSTETRICIANS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON ADDITIONAL SPECIALIZATION OR TRAINING

Test	Specialization or Training		Significance
	Training	No Training	
Pediatricians'			
Attitudes	82.85	81.60	N.S.
Practices	65.75	65.86	N.S.
Obstetricians'			
Attitudes	67.27	63.33	N.S.
Practices	64.68	64.73	N.S.

Continuing education: Table LX indicates a significant difference between practice test scores of obstetricians who attended continuing education programs compared to those who did not. There were no significant differences in nutrition attitude scores for obstetricians. Attendance at continuing education programs did not have a significant effect on the nutrition attitude and practice scores for pediatricians.

TABLE LX

MEAN PERCENTAGE SCORES OF PEDIATRICIANS AND OBSTETRICIANS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON ATTENDANCE AT CONTINUING EDUCATION PROGRAMS

Test	Continuing Education Programs		Significance $P < 0.05$
	Attendance	No Attendance	
Pediatricians'			
Attitudes	81.46	83.04	N.S.
Practices	64.81	66.94	N.S.
Obstetricians'			
Attitudes	65.71	62.73	N.S.
Practices	68.50	61.25	S.

Pediatricians who attended more than one continuing education program did not score significantly differently from physicians who attended only one program (Table LXI). Similar analysis could not be performed for obstetricians because the sample group was too small.

TABLE LXI

MEAN PERCENTAGE SCORES OF PEDIATRICIANS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON NUMBER OF CONTINUING EDUCATION PROGRAMS ATTENDED

Test	Number of Continuing Education Programs		Significance
	1	>1	
Attitudes	82.95	73.14	N.S.
Practices	64.55	66.32	N.S.

Nutrition education in medical training: On the attitude and practice tests, pediatricians and obstetricians who had some nutrition education in their medical school training did not have scores significantly different from physicians who had no nutrition education (Table LXII).

TABLE LXII

MEAN PERCENTAGE SCORES OF PEDIATRICIANS AND OBSTETRICIANS FOR NUTRITION ATTITUDE AND PRACTICE TESTS BASED ON NUTRITION EDUCATION IN MEDICAL SCHOOL

Test	Nutrition Education		Significance
	Nutrition	No Nutrition	
Pediatricians'			
Attitudes	82.21	81.18	N.S.
Practices	66.00	65.49	N.S.
Obstetricians'			
Attitudes	65.64	62.79	N.S.
Practices	63.27	66.05	N.S.

Stepwise regression analysis

The relationship of the non-manipulable variates to the two criterion variables was investigated by stepwise multiple regression. The number of variates was reduced by combining a number of similar variates into one group. Countries of medical

training were reduced to three groups: Canada, Great Britain and others, with Canada being used as a base for comparison. Sources of nutrition information were combined into 4 groups: Group 1 was professional journals; Group 2 consisted of all other non-human sources of information; Group 3 was consultation with a nutritionist-dietitian; and Group 4 contained all other human sources of information. Other variates were grouped as to additional training or no such training; attendance at continuing education programs or no attendance; and nutrition in medical school or no nutrition.

Pediatricians: The results of stepwise regression analysis for pediatricians are reported in Table LXIII. On the attitude test physicians who were in practice more than five years but fewer than 10 years scored significantly higher than pediatricians who were in practice fewer than five years.

Pediatricians trained in Great Britain and in other countries scored significantly lower on the nutrition practice test than did physicians trained in Canada.

The coefficient of determination (r^2) for the attitude test was 0.06 and for the practice test 0.144. Thus, the variates studied accounted for 6% and 14.4% respectively, of the variance.

TABLE LXIII

STEPWISE REGRESSION RESULTS FOR VARIATES SIGNIFICANTLY RELATED TO MEAN PERCENTAGE SCORES ACHIEVED BY PEDIATRICIANS ON THE NUTRITION ATTITUDE AND PRACTICE TESTS

Variate	Coefficient	Probability
Attitude Test		
Constant	80.373	
Years of practice > 5 but < 10	9.251	< 0.05
Practice Test		
Constant	67.742	
Country		
Great Britain	-3.735	< 0.05
Other countries	-6.086	< 0.01

Obstetricians: Obstetricians who were in practice more than 10 years scored significantly lower than physicians who were in practice fewer than five years on the nutrition attitude test (Table LXIV). Physicians who utilized sources of nutrition information from Group 2 (non-human sources other than professional journals) scored significantly higher on the attitude test.

Stepwise regression results for the practice test showed that obstetricians who consulted nutrition information from Group 2 and Group 4 (human sources of information excluding nutritionist-dietitian) scored significantly higher than those who consulted other resources.

The coefficient of determination (r^2) for the attitude

tude test was 0.204 and for the practice test 0.260. Thus, the variates studied accounted for 20.4% and 26.0% respectively, of the variance.

TABLE LXIV

STEPWISE REGRESSION RESULTS FOR VARIATES SIGNIFICANTLY RELATED TO MEAN PERCENTAGE SCORES ACHIEVED BY OBSTETRICIANS ON THE NUTRITION ATTITUDE AND PRACTICE TESTS

Variate	Coefficient	Probability
Attitude Test		
Constant	58.55	
Years of Practice >10	-9.30	<0.01
Sources of nutrition information Group 2	13.72	<0.05
Practice Test		
Constant	53.34	
Sources of nutrition information		
Group 2	9.88	<0.05
Group 4	8.98	<0.01

Summary of Pediatricians' and Obstetricians' Results

The findings from this survey on nutrition attitudes and practices support hypothesis 2 (no relationship between the criterion variables and sex of respondent); 3 (location of practice); 5 (type of practice); 6 (number of patients); 7 (sources of nutrition information); 8 (additional training); 9 (attendance at continuing education programs) and 10 (inclu-

sion of nutrition in medical school curriculum) for pediatricians. Hypothesis 1 (location of medical training); hypothesis 4 (years of practice) and hypothesis 11 (correlation between attitude and practices) were all rejected for pediatricians.

For obstetricians, the results of this study support hypothesis 1 (no relationship between criterion variables and location of medical training); 2 (sex of respondent); 3 (location of practice); 5 (type of practice); 6 (number of patients); 8 (additional training); 10 (inclusion of nutrition in medical school training). Hypothesis 4 (years of practice); 7 (sources of nutrition information); 9 (attendance at continuing education programs) and 11 (correlation between attitudes and practices) were all rejected for obstetricians.

Comparison of Nutrition Attitudes and Practices of General Practitioners, Pediatricians, and Obstetricians

Comparisons of test scores for nutrition attitudes and practices were made between general practitioners and pediatricians and between general practitioners and obstetricians. The attitude test for general practitioners was divided into two tests of 10 statements each. The first 10 statements were identical to the 10 attitude statements completed by obstetricians; the last 10 statements were the same as those completed by pediatricians. Thus, comparisons were made between the obstetricians' test and the first 10 statements of the general practitioners' test; the pediatricians' tests was compared to the final

10 statements of the general practitioners' test.

The practice test for general practitioners was divided and compared to the pediatricians and obstetricians' test in an analogous manner. Analysis for significant differences between mean scores are reported in Tables LXV and LXVI.

TABLE LXV

COMPARISON OF MEAN PERCENTAGE SCORES FOR NUTRITION ATTITUDES AND PRACTICES BETWEEN GENERAL PRACTITIONERS AND PEDIATRICIANS

Test	Physician		Significance $P < 0.001$
	General Practitioner	Pediatrician	
Attitudes	79.91	81.51	N.S.
Practices	60.02	65.57	S.

TABLE LXVI

COMPARISON OF MEAN PERCENTAGE SCORES FOR NUTRITION ATTITUDES AND PRACTICES BETWEEN GENERAL PRACTITIONERS AND OBSTETRICIANS

Test	Physician		Significance $P < 0.01$
	General Practitioner	Obstetrician	
Attitudes	65.38	64.16	N.S.
Practices	60.17	64.72	S.

Pediatricians and obstetricians scored significantly higher than general practitioners on the nutrition practice

tests. However, there were no significant differences among the 3 groups on the nutrition attitude tests. Attitude scores for pediatricians were considerably higher than those for obstetricians (81.5 and 64.1 respectively) but these scores are not directly comparable because different test instruments were used.

Practice test scores of 60.0%, 64.7% and 65.6% for general practitioners, obstetricians and pediatricians respectively, do appear low. It is, however, important to realize that these low scores are not necessarily indicative of inappropriate nutrition practices; they may in some cases simply represent the lack of nutrition counselling by the physician.

CHAPTER V

SUMMARY AND IMPLICATIONS

This chapter is a brief review of the objectives, design and major findings of this study. Implications that became apparent from the interpretation of the findings were also discussed.

Summary

This study was designed to investigate the nature of the relationship of selected variates to the maternal and infant nutrition attitudes and practices of general practitioners, pediatricians and obstetricians in the province of British Columbia. The relationship of nutrition attitudes to practices was also assessed.

The following objectives were established for investigating the problem:

1. To assess the quality of maternal and infant nutrition information being disseminated to the maternal population by general practitioners, pediatricians and obstetricians.
2. To determine whether significant differences exist in the nutrition attitudes and practices of pediatricians, obstetricians and general practitioners in the province of British Columbia as related to:

(a) location of medical training

(b) sex of respondent

(c) location of practice

(d) years of practice

(e) type of practice

(f) number of prenatal patients and/or infants seen weekly

(g) sources of nutrition information

(h) additional training for specialization

(i) number and type of continuing education programs with a nutrition component attended in the last two years

(j) extent of nutrition education in medical school training

3. To determine among pediatricians, obstetricians and general practitioners the nature of the relationship of nutrition attitudes to nutrition practices.

4. To determine whether significant differences exist between the nutrition attitudes and practices of general practitioners as compared to pediatricians and obstetricians.

Data collection instruments were designed for this study to assess the nutrition attitudes and practices of physicians. In March 1975, validated questionnaires were sent to all practicing general practitioners, pediatricians and

obstetricians registered with the British Columbia Medical Association. The sample consisted of 1753 general practitioners, 110 pediatricians and 118 obstetricians. Questionnaires were returned from 724 (41.3%) general practitioners, 69 (62.7%) pediatricians and 51 (43.2%) obstetricians.

Nutrition attitudes of pediatricians were assessed by a test consisting of 10 statements related to the importance of nutrition during the first two years of life. A similar test also consisting of 10 statements was designed to measure the nutrition attitudes of obstetricians toward prenatal nutrition. Both tests were combined to measure general practitioners' nutrition attitudes.

Assessment of nutrition counselling practices was conducted by a test of 20 statements reflecting the nutrition advice disseminated by pediatricians. Nutrition counselling practices of obstetricians were investigated by a similar test of 20 statements on nutrition advice given to prenatal patients. Again both tests were combined and administered to general practitioners.

Demographic and professional data concerning the selected environmental variates were collected in a separate section of the questionnaire.

The data were treated statistically to test the following hypotheses:

The following null hypotheses were tested:

1. There will be no significant differences achieved in

tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on location of their medical training.

2. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on sex of the respondent.
3. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on location of practice.
4. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on years of practice.
5. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on type of practice.
6. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on number of prenatal patients and/or infants seen weekly.
7. There will be no significant differences achieved in tests of nutrition attitudes and practices of general

practitioners, obstetricians and pediatricians based on sources of nutrition information consulted.

8. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on undertaking of additional specialization or training.

9. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on the number and type of continuing education programs attended in the last two years.

10. There will be no significant differences achieved in tests of nutrition attitudes and practices of general practitioners, obstetricians and pediatricians based on the extent of inclusion of nutrition in their medical school training.

11. There will be no significant correlation among the scores for nutrition attitudes and nutrition practices achieved by the general practitioners, obstetricians and pediatricians.

12. There will be no significant difference in the scores for nutrition attitudes and practices between the general practitioners and the pediatricians. There will be no significant difference in the scores for nutrition attitudes and practices between the general practitioners and obstetricians.

The relationship of the non-manipulable variates to the two criterion variables (nutrition attitudes and practices) was determined by one-way analysis of variance using Scheffe's test and stepwise regression analysis. Correlation analysis was employed to determine the relationship of nutrition attitudes to nutrition counselling practices. Comparison of nutrition attitude and practice scores between general practitioners and pediatricians and between general practitioners and obstetricians was conducted by t-test for significant differences in group means. All hypotheses were tested at the 5% level of significance. Results were reported at the highest level of significance.

The major findings of this study for general practitioners were:

1. The mean test scores for nutrition attitudes and practices of general practitioners were 72.6% and 60.0% respectively.
2. The lowest mean scores were achieved for nutrition practices related to:
   (a) use of multivitamin supplements during pregnancy and infancy
   (b) early introduction of solids
   (c) nutrition advice for infancy
   (d) weight gain during pregnancy
3. Female general practitioners scored significantly higher on the attitude and practice tests than their male counterparts.

4. General practitioners who were in practice for more than 10 years scored significantly lower on both tests than physicians who were in practice less than 10 years.
5. Medical doctors who had additional specialization or training scored significantly higher on tests of nutrition attitudes and practices than general practitioners with no additional training for specialization.
6. Physicians who attended continuing education programs scored significantly higher than physicians who did not attend any programs. General practitioners who attended more than one continuing education program did not score significantly different from those who had attended one program.
7. Significantly higher scores were obtained on the attitude and practice tests by physicians who had nutrition in their medical school training than by physicians who had no nutrition.
8. General practitioners who consulted books or a nutritionist-dietitian scored significantly higher on the attitude and practice tests than physicians who did not consult these sources of nutrition.
9. General practitioners who were trained in 'other' countries scored significantly lower on the atti-

tude and practice tests than did physicians trained in Canada.

10. No significant consistent relationship was found between location of practice, type of practice, number of prenatal patients and number of infants and the two criterion variables.
11. Nutrition attitudes were positively correlated (r = 0.370) to nutrition counselling practices for general practitioners.

The major findings of this study for pediatricians were:

1. The mean percentage test scores for nutrition attitudes and practices were 81.5 and 65.5 respectively.
2. The lowest mean scores were achieved for nutrition practices related to:
   (a) early introduction of solids
   (b) supplementation of breast milk
   (c) use of multivitamin supplements during infancy
3. Pediatricians who were trained in Canada scored significantly higher on the nutrition practice test than physicians trained in all other countries. No consistent significant relationship was evident between country of medical training and the scores

achieved on the attitude test.

4. Pediatricians who were in practice for more than 5 years but less than 10 scored significantly higher on the nutrition attitude test than physicians who were in practice less than 5 years. No consistent significant relationship was found between nutrition practices and years of practice.
5. There was no significant relationship between sex of the respondent, location of practice, type of practice, number of patients, sources of nutrition information, additional training for specialization, attendance at continuing education programs, inclusion of nutrition in the medical school curriculum and the two criterion variables.
6. Nutrition attitudes were positively correlated ($r = 0.259$) to nutrition counselling practices.

The major findings of this study for obstetricians were:

1. The mean percentage test scores for the nutrition attitudes and practice tests were 64.1 and 64.7 respectively.
2. The lowest mean scores were achieved for nutrition practices related to:
   (a) use of multivitamin supplements during pregnancy
   (b) restriction of weight gain during pregnancy

3. Obstetricians who were in practice more than 10 years scored significantly lower on the nutrition attitude test than obstetricians who were in practice less than five years. No significant consistent relationship was evident between years of practice and scores obtained on the practice test.
4. Obstetricians who consult non-human sources of nutrition information other than professional journals, scored significantly higher on the attitude and practice tests. Obstetricians who consulted with human sources of nutrition information other than a nutritionist-dietitian, also scored significantly higher on the nutrition practice test.
5. There was no significant relationship between sex of the respondent, location of medical training, location or type of practice, number of patients, additional specialization for training, inclusion of nutrition in the medical school education and the two criterion variables.
6. There was no significant consistent relationship between attendance at continuing education programs and the nutrition attitude and practice scores.
7. Nutrition attitudes were positively correlated ($r = 0.424$) to nutrition counselling practices.

Comparison of the mean percentage scores for general practitioners, pediatricians and obstetricians indicated that pediatricians scored significantly higher on the nutrition practice test than did the general practitioners. Obstetricians scored significantly higher than the general practitioners on the nutrition practice test. There was no significant difference in the nutrition attitude scores for the three groups.

Implications

Some of the findings of this study should be gratifying to health professionals concerned with maternal and infant nutrition. The relatively high response rates, the encouragement of breast-feeding among the maternal population and the awareness of the importance of nutrition in the first two years of life must be considered positive attitudes toward nutrition by many physicians.

The results of this survey, however, also indicate that physicians need to improve their nutrition counselling practices in some important areas of maternal and infant nutrition. The following recommendations are based on this premise.

Relative to the area of utilizing acceptable sources of nutrition information, the following specific implications are suggested:

1. Physicians, especially general practitioners, should utilize the expertise of nutritionists

and dietitians for up-dating their nutrition counselling practices.

2. An assessment is needed to determine whether there are sufficient nutritionists to supply these consultant services to the general practitioners, pediatricians and obstetricians.
3. Nutrition information services should be established to provide physicians with sources of reliable nutrition information.

Specific implications concerning the establishment of continuing education programs are:

4. Continuing education programs should be designed to have greater appeal to physicians, especially general practitioners.
5. More continuing education programs with a nutrition component should be implemented in order to improve nutrition attitudes and practices in maternal and infant nutrition for general practitioners, pediatricians and obstetricians.
6. Continuing education programs should include some emphasis on sources of reliable nutrition information, the use of multivitamin supplements and the effects of early nutrition on later life.

Specific implications on the inclusion of nutrition in the medical school curriculum are:

7. Nutrition should be included in the medical school curriculum in a manner which correlates with practical application.
8. Nutrition in medical schools should emphasize the role of nutrition in preventive medicine and hence, its importance in maternal and infant nutrition.

Recommendations for additional research in this area include:

9. A survey using a larger sample size of pediatricians and obstetricians should be undertaken to establish reliably the relationship of the demographic and professional variables to nutrition attitudes and practices.
10. A study should be undertaken to assess the maternal population's compliance with the nutrition advice given by physicians.

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APPENDIX A

DATA COLLECTION INSTRUMENTS AND FOLLOW-UP POSTCARDS

General Practitioners

No. _____
Card _____

NUTRITION OPINIONS

Some statements concerning maternal and infant nutrition are made below. We are interested in your judgement of each statement, in terms of how it reflects your personal opinion or feelings. If the statement describes how you feel, circle 'A' for agree; if the statement does not describe how you feel, circle 'D' for disagree. After you have made your decision, indicate how sure you are about your decision:

Circle 1. if you are VERY DOUBTFUL about your decision (A or D)
2. if you are MODERATELY DOUBTFUL about your decision
3. if you are MODERATELY CONFIDENT about your decision
4. if you are VERY CONFIDENT about your decision

PLEASE BE SURE TO RESPOND TWICE TO EACH STATEMENT.

Sample: Nutrition is important to good health. (A) D 1 2 (3) 4

This opinion is agreement with moderate confidence that nutrition is important to good health.

		Agree or Disagree	Degree of Confidence	Disregard this Column
1.	Time devoted to counselling patients on proper nutrition is time well invested.	A D	1 2 3 4	6 7
2.	As long as the expectant mother takes a multi-vitamin supplement, I do not need to give advice on nutrition.	A D	1 2 3 4	8 9
3.	Lactation is a good time to get rid of excess weight accumulated in pregnancy as long as nutrient intake remains adequate.	A D	1 2 3 4	10 11
4.	Restricting maternal weight gain to less than 20 pounds, decreases the likelihood of severe toxemia.	A D	1 2 3 4	12 13
5.	Salt restriction is necessary for a majority of the pregnant population.	A D	1 2 3 4	14 15
6.	Pregnant women should be informed about the pros and cons of breast feeding.	A D	1 2 3 4	16 17
7.	Caloric restriction may be indicated in pregnancy because it will usually result in a smaller infant and hence an easier delivery.	A D	1 2 3 4	18 19

		Agree or Disagree	Degree of confidence	Disregard this Column
8.	I feel that pregnant women need so much folic acid that it is difficult to get it from diet alone.	A D	1 2 3 4	20 21
9.	Provided that they enter pregnancy with adequate hemoglobin levels, women need to increase their iron intake only during the last half of pregnancy.	A D	1 2 3 4	22 23
10.	I feel that there is little practical, accurate information on maternal nutrition in the current scientific journals and books.	A D	1 2 3 4	24 25
11.	Mother's milk is the optimum food for a healthy, newborn infant.	A D	1 2 3 4	26 27
12.	If an infant is receiving a multi-vitamin supplement, I feel that I don't need to be concerned about his diet.	A D	1 2 3 4	28 29
13.	I believe that many commercially pre-pared infant foods contain too high a quantity of salt.	A D	1 2 3 4	30 31
14.	Anemia is rarely, if ever, seen in infants of higher socioeconomic status.	A D	1 2 3 4	32 33
15.	I feel that as long as a child is gaining weight, I don't have to worry about his nutrition.	A D	1 2 3 4	34 35
16.	It is important to investigate the infant's dietary intake at each office visit.	A D	1 2 3 4	36 37
17.	Many mothers are anxious to have their infants ingest solids as soon as possible and I feel that it is best to go along with this.	A D	1 2 3 4	38 39
18.	As long as the infant is not sick he is being fed properly.	A D	1 2 3 4	40 41
19.	A very important period for good nutrition is the first two years of life.	A D	1 2 3 4	42 43
20.	In my opinion, it is impossible for an infant to be a lacto-ovo vegetarian (eats eggs and milk products but no meat, fish or poultry) and still be well-nourished.	A D	1 2 3 4	44 45

PLEASE CHECK TO BE SURE ALL STATEMENTS HAVE BEEN ANSWERED

Demographic Information

Please check (✓) where appropriate.

Disregard this Column

1. In what country did you obtain the majority of your medical training?

_____ Australia
_____ Canada
_____ France
_____ Great Britain
_____ India
_____ United States
_____ other (please specify)

_____

2. What is your sex?

_____ Male
_____ Female

3. In which of the following areas is your practice located:

_____ metropolitan area (Vancouver)
_____ other city (population > 5,000)
_____ town (population 2,500 - 5,000)
_____ village (population < 2,500)

Professional Data

4. How many years have you been practising medicine?

_____ less than 5 years
_____ more than 5 years but less than 10 years
_____ more than 10 years

5. What is your type of practice?

_____ private (solo)
_____ clinic (group)

6. What is the number of prenatal patients seen weekly?

_____ less than 10 prenatal patients
_____ more than 10 but less than 25
_____ more than 25 prenatal patients

7. What is the number of infants (less than two years of age) seen weekly?

_____ less than 10 infants
_____ more than 10 but less than 25
_____ more than 25 infants

Disregard this Column

8. Please check all the sources on nutrition information used in your work.

_____ professional journals
_____ professional bulletins
_____ government publications
_____ health agency publications (eg. Can. Diabetic Assoc.)
_____ audiovisual aids (films, tapes, etc.)
_____ magazines
_____ radio
_____ television
_____ food manufacturers' brochures or labels
_____ pharmaceutical companies' brochures or labels
_____ books
_____ consultation with a nutritionist-dietitian
_____ consultation with a colleague
_____ consultation with a public health nurse
_____ consultation with a home economist
_____ other (please specify)

_____

9. Do you have any additional specialization or training in medicine?

_____ neonatology
_____ public health diploma
_____ other (please specify)

_____

10. Please check if you attended any of the following continuing education programs.

_____ Care of the High Risk Foetus & Newborn - May '74
_____ Early Nutrition and Later Life - June '74
_____ other (please specify)

_____

11. Please check which of the following pertains to your medical school training.

_____ course on nutrition lasting at least 13 weeks
_____ series of lectures on nutrition
_____ nutrition integrated with other course material
_____ no formal nutrition education
_____ other (please specify)

_____

NUTRITION PRACTICES

Some statements concerning maternal and infant nutrition are made below. Please indicate whether you conduct each practice - 'Always' (> 95% of the time), 'Frequently' (approximately 50 - 95% of the time), 'Sometimes' (approximately 5 - 49% of the time), or 'Never' (< 5% of the time), by circling the appropriate number 1 - 4.

	Always	Frequently	Sometimes	Never
Sample: I tell my patients that nutrition is important throughout pregnancy.	4	(3)	2	1

This answer would indicate that you frequently tell patients that nutrition is important throughout pregnancy.

	Always (> 95%)	Frequently (50 - 95%)	Sometimes (5 - 49%)	Never (< 5%)	Disregard this Column
1. At the first prenatal visit, I check the quality of the patient's diet.	4	3	2	1	46
2. I consider the possibility of breast feeding with the pregnant women I see in my practice.	4	3	2	1	47
3. I recommend that healthy pregnant women ingest approximately 65 grams of protein daily.	4	3	2	1	48
4. I advise healthy expectant women who do not drink milk to take a calcium supplement.	4	3	2	1	49
5. I recommend that expectant patients include a citrus fruit or juice in their daily diet.	4	3	2	1	50
6. I advise my prenatal patients who smoke to stop during pregnancy.	4	3	2	1	51
7. I recommend that healthy pregnant women increase their caloric intake 25% above the non-pregnant requirement.	4	3	2	1	52
8. I encourage the average pregnant woman to gain approximately 1 pound per week in the last 20 weeks of pregnancy.	4	3	2	1	53

		Always (> 95%)	Frequently (50 - 95%)	Sometimes (5 - 49%)	Never (< 5%)	Disregard this Column
9.	I prescribe megavitamin therapy for many pregnant women.	4	3	2	1	54
10.	I recommend that my prenatal patients include an iron-rich food (i.e. organ meats) in their weekly diets.	4	3	2	1	55
11.	I recommend to pregnant women who are obese that they limit their weight gain during pregnancy to 10 pounds or less.	4	3	2	1	56
12.	I give pregnant adolescents specific instructions on food sources of protein.	4	3	2	1	57
13.	I prescribe an iron supplement in the last half of pregnancy for my prenatal patients.	4	3	2	1	58
14.	I encourage my prenatal patients to have four glasses of milk or the equivalent in dairy products daily.	4	3	2	1	59
15.	I prescribe a multivitamin supplement for my prenatal patients even when their dietary intake appears adequate.	4	3	2	1	60
16.	I recommend that my prenatal patients eat a wide variety of foods each day.	4	3	2	1	61
17.	Any prenatal patient who gains over 15 pounds before term is advised to limit her salt intake.	4	3	2	1	62
18.	I give pregnant women who are vegetarians specific instructions on food sources of protein and iron.	4	3	2	1	63
19.	When my prenatal patients are gaining too much weight I recommend that they restrict dietary carbohydrates to approximately 50 grams daily.	4	3	2	1	64

		Always (> 95%)	Frequently (50 - 95%)	Sometimes (5 - 49%)	Never (< 5%)	Disregard this Column
20.	I recommend that all my prenatal patients take a fluoride supplement if their water supply is not fluoridated.	4	3	2	1	65
21.	I recommend waiting at least 10 hours after birth before giving the healthy newborn either the breast or a formula.	4	3	2	1	66
22.	I ask mothers from what sources their 1 - 2 year olds obtain vitamin C.	4	3	2	1	67
23.	I encourage mothers to give cereals added to the bottle for a healthy infant who isn't satisfied with milk alone.	4	3	2	1	68
24.	I tell parents that it is generally less expensive to prepare sieved or blenderized foods than to buy commercially prepared foods.	4	3	2	1	69
25.	I recommend the early (within 2 months of birth) introduction of solids such as cereals and fruits.	4	3	2	1	70
26.	I recommend the introduction of a source of iron for healthy infants between 3 - 6 months of age.	4	3	2	1	71
27.	I prescribe a fluoride supplement for my pediatric patients if the water supply is not sufficiently fluoridated.	4	3	2	1	72
28.	I recommend that human milk alone is adequate in nutrient content for the first two months of life.	4	3	2	1	73
29.	If a 3 - 4 month old infant is overweight according to height and weight charts, I recommend the substitution of skim milk for formula.	4	3	2	1	74
30.	I recommend that iron fortified foods or iron drops be a part of the infant's dietary regimen during the 2nd year of life.	4	3	2	1	75

		Always (> 95%)	Frequently (50 - 95%)	Sometimes (5 - 49%)	Never (< 5%)	Disregard this Column
31.	I encourage healthy mothers of infants to breast feed for the first six months.	4	3	2	1	76
32.	I tell mothers who give vitamin supplements to give only the recommended dosage.	4	3	2	1	77
33.	I recommend that by the time the child is 5 months of age he should be eating cereals, fruits, vegetables and meats.	4	3	2	1	78
34.	I recommend that a multi-vitamin supplement be given to healthy infants.	4	3	2	1	79
35.	I advise mothers to introduce a wide variety of foods into their infant's diet before he is two years of age.	4	3	2	1	80

No. _____

Card _____

36.	I recommend sugar water (about 1 tsp. sugar/qt. H_2O) as a pacifier for children.	4	3	2	1	6
37.	To decrease the likelihood of atherosclerotic heart disease in later life, I recommend a low cholesterol intake early in infancy.	4	3	2	1	7
38.	I encourage mothers to include about 25 grams of protein in the daily diet of a 1 - 2 year old.	4	3	2	1	8
39.	I tell mothers that megavitamin therapy should be used in treating hyperactivity in infants.	4	3	2	1	9
40.	I encourage mothers to include at least 2 glasses (16 oz.) of milk in a 1 - 2 year old's diet.	4	3	2	1	10

PLEASE CHECK TO BE SURE ALL STATEMENTS HAVE BEEN ANSWERED

Thank you for taking the time to complete this questionnaire.

Obstetricians

No. _____
Card _____

NUTRITION OPINIONS

Some statements concerning maternal nutrition are made below. We are interested in your judgement of each statement, in terms of how it reflects your personal opinion or feelings. If the statement describes how you feel, circle 'A' for agree; if the statement does not describe how you feel, circle 'D' for disagree. After you have made your decision, indicate how sure you are about your decision:

Circle 1. if you are VERY DOUBTFUL about your decision (A or D)
2. if you are MODERATELY DOUBTFUL about your decision
3. if you are MODERATELY CONFIDENT about your decision
4. if you are VERY CONFIDENT about your decision

PLEASE BE SURE TO RESPOND TWICE TO EACH STATEMENT.

Sample: Nutrition is important to good health. (A) D 1 2 (3) 4

This opinion is agreement with moderate confidence that nutrition is important to good health.

		Agree or Disagree	Degree of Confidence	Disregard this Column
1.	Time devoted to counselling patients on proper nutrition is time well invested.	A D	1 2 3 4	6 7
2.	As long as the expectant mother takes a multi-vitamin supplement, I do not need to give advice on nutrition.	A D	1 2 3 4	8 9
3.	Lactation is a good time to get rid of excess weight accumulated in pregnancy as long as nutrient intake remains adequate.	A D	1 2 3 4	10 11
4.	Restricting maternal weight gain to less than 20 pounds, decreases the likelihood of severe toxemia.	A D	1 2 3 4	12 13
5.	Salt restriction is necessary for a majority of the pregnant population.	A D	1 2 3 4	14 15

		Agree or Disagree	Degree of Confidence	Disregard this Column
6.	Pregnant women should be informed about the pros and cons of breast feeding.	A D	1 2 3 4	16 17
7.	Caloric restriction may be indicated in pregnancy because it will usually result in a smaller infant and hence an easier delivery.	A D	1 2 3 4	18 19
8.	I feel that pregnant women need so much folic acid that it is difficult to get it from diet alone.	A D	1 2 3 4	20 21
9.	Provided that they enter pregnancy with adequate hemoglobin levels, women need to increase their iron intake only during the last half of pregnancy.	A D	1 2 3 4	22 23
10.	I feel that there is little practical, accurate information on maternal nutrition in the current scientific journals and books.	A D	1 2 3 4	24 25

PLEASE CHECK TO BE SURE ALL STATEMENTS HAVE BEEN ANSWERED

Demographic Information

Disregard this Column

Please check (✓) where appropriate.

1. In what country did you obtain the majority of your medical training?

_____ Australia
_____ Canada
_____ France
_____ Great Britain
_____ India
_____ United States
_____ other (please specify)

_____

2. What is your sex?

_____ Male
_____ Female

3. In which of the following areas is your practice located?

_____ metropolitan area (Vancouver)
_____ other city (population > 5,000)
_____ town (population 2,500 - 5,000)
_____ village (population <2,500)

Professional Data

4. How many years have you been practising medicine?

_____ less than 5 years
_____ more than 5 years but less than 10 years
_____ more than 10 years

5. What is your type of practice?

_____ private (solo)
_____ clinic (group)

6. What is the number of prenatal patients seen weekly?

_____ less than 10 prenatal patients
_____ more than 10 but less than 25
_____ more than 25 prenatal patients

Disregard this Column

7. Please check all the sources on nutrition information used in your work.

_____ professional journals
_____ professional bulletins
_____ government publications
_____ health agency publications (eg. Can. Diabetic Assoc.)
_____ audiovisual aids (films, tapes, etc.)
_____ magazines
_____ radio
_____ television
_____ food manufacturers' brochures or labels
_____ pharmaceutical companies' brochures or labels
_____ books
_____ consultation with a nutritionist-dietitian
_____ consultation with a colleague
_____ consultation with a public health nurse
_____ consultation with a home economist
_____ other (please specify)

_____

8. Do you have any additional specialization or training in medicine?

_____ neonatology
_____ public health diploma
_____ other (please specify)

_____

9. Please check if you attended any of the following continuing education programs.

_____ Care of the High Risk Foetus & Newborn - May '74
_____ Early Nutrition and Later Life - June '74
_____ other (please specify)

_____

10. Please check which of the following pertains to your medical school training.

_____ course on nutrition lasting at least 13 weeks
_____ series of lectures on nutrition
_____ nutrition integrated with other course material
_____ no formal nutrition education
_____ other (please specify)

_____

NUTRITION PRACTICES

Some statements concerning maternal nutrition are made below. Please indicate whether you conduct each practice - 'Always' (> 95% of the time), 'Frequently' (approximately 50 - 95% of the time), 'Sometimes' (approximately 5 - 49% of the time), or 'Never' (< 5% of the time), by circling the appropriate number 1 - 4.

	Always	Frequently	Sometimes	Never
Sample: I tell my patients that nutrition is important throughout pregnancy.	4	(3)	2	1

This answer would indicate that you frequently tell patients that nutrition is important throughout pregnancy.

		Always (> 95%)	Frequently (50 - 95%)	Sometimes (5 - 49%)	Never (< 5%)	Disregard this Column
1.	At the first prenatal visit, I check the quality of the patient's diet.	4	3	2	1	26
2.	I consider the possibility of breast feeding with the pregnant women I see in my practice.	4	3	2	1	27
3.	I recommend that healthy pregnant women ingest approximately 65 grams of protein daily.	4	3	2	1	28
4.	I advise healthy expectant women who do not drink milk to take a calcium supplement.	4	3	2	1	29
5.	I recommend that expectant patients include a citrus fruit or juice in their daily diet.	4	3	2	1	30
6.	I advise my prenatal patients who smoke to stop during pregnancy.	4	3	2	1	31
7.	I recommend that healthy pregnant women increase their caloric intake 25% above the non-pregnant requirement.	4	3	2	1	32
8.	I encourage the average pregnant woman to gain approximately 1 pound per week in the last 20 weeks of pregnancy.	4	3	2	1	33
9.	I prescribe megavitamin therapy for many pregnant women.	4	3	2	1	34
10.	I recommend that my prenatal patients include an iron-rich food (i.e. organ meats) in their weekly diets.	4	3	2	1	35

		Always (> 95%)	Frequently (50 - 95%)	Sometimes (5 - 49%)	Never (< 5%)	Disregard this Column
11.	I recommend to pregnant women who are obese that they limit their weight gain during pregnancy to 10 pounds or less.	4	3	2	1	36
12.	I give pregnant adolescents specific instructions on food sources of protein.	4	3	2	1	37
13.	I prescribe an iron supplement in the last half of pregnancy for my prenatal patients.	4	3	2	1	38
14.	I encourage my prenatal patients to have four glasses of milk or the equivalent in dairy products daily.	4	3	2	1	39
15.	I prescribe a multivitamin supplement for my prenatal patients even when their dietary intake appears adequate.	4	3	2	1	40
16.	I recommend that my prenatal patients eat a wide variety of foods each day.	4	3	2	1	41
17.	Any prenatal patient who gains over 15 pounds before term is advised to limit her salt intake.	4	3	2	1	42
18.	I give pregnant women who are vegetarians specific instructions on food sources of protein and iron.	4	3	2	1	43
19.	When my prenatal patients are gaining too much weight I recommend that they restrict dietary carbohydrates to approximately 50 grams daily.	4	3	2	1	44
20.	I recommend that all my prenatal patients take a fluoride supplement if their water supply is not fluoridated.	4	3	2	1	45

PLEASE CHECK TO BE SURE ALL STATEMENTS HAVE BEEN ANSWERED

Thank you for taking the time to complete this questionnaire.

Pediatricians

No. _____
Card _____

NUTRITION OPINIONS

Some statements concerning infant nutrition are made below. We are interested in your judgement of each statement, in terms of how it reflects your personal opinion or feelings. If the statement describes how you feel, circle 'A' for agree; if the statement does not describe how you feel, circle 'D' for disagree. After you have made your decision, indicate how sure you are about your decision:

Circle 1. if you are VERY DOUBTFUL about your decision (A or D)
2. if you are MODERATELY DOUBTFUL about your decision
3. if you are MODERATELY CONFIDENT about your decision
4. if you are VERY CONFIDENT about your decision

PLEASE BE SURE TO RESPOND TWICE TO EACH STATEMENT.

Sample: Nutrition is important to good health. (A) D 1 2 (3) 4

This opinion is agreement with moderate confidence that nutrition is important to good health.

		Agree or Disagree	Degree of Confidence	Disregard this Column
1.	Mother's milk is the optimum food for a healthy, newborn infant.	A D	1 2 3 4	6 7
2.	If an infant is receiving a multivitamin supplement, I feel that I don't need to be concerned about his diet.	A D	1 2 3 4	8 9
3.	I believe that many commercially prepared infant foods contain too high a quantity of salt.	A D	1 2 3 4	10 11
4.	Anemia is rarely, if ever, seen in infants of higher socioeconomic status.	A D	1 2 3 4	12 13
5.	I feel that as long as a child is gaining weight, I don't have to worry about his nutrition.	A D	1 2 3 4	14 15
6.	It is important to investigate the infant's dietary intake at each office visit.	A D	1 2 3 4	16 17
7.	Many mothers are anxious to have their infants ingest solids as soon as possible and I feel that it is best to go along with this.	A D	1 2 3 4	18 19
8.	As long as the infant is not sick he is being fed properly.	A D	1 2 3 4	20 21
9.	A very important period for good nutrition is the first two years of life.	A D	1 2 3 4	22 23
10.	In my opinion, it is impossible for an infant to be a lacto-ovo vegetarian (eats eggs and milk products but no meat, fish or poultry) and still be well-nourished.	A D	1 2 3 4	24 25

PLEASE CHECK TO BE SURE ALL STATEMENTS HAVE BEEN ANSWERED

Demographic Information

Disregard this Column

Please check (✓) where appropriate.

1. In what country did you obtain the majority of your medical training?

_____ Australia
_____ Canada
_____ France
_____ Great Britain
_____ India
_____ United States
_____ other (please specify)

_____

2. What is your sex?

_____ Male
_____ Female

3. In which of the following areas is your practice located?

_____ metropolitan area (Vancouver)
_____ other city (population > 5,000)
_____ town (population 2,500 - 5,000)
_____ village (population < 2,500)

Professional Data

4. How many years have you been practising medicine?

_____ less than 5 years
_____ more than 5 years but less than 10 years
_____ more than 10 years

5. What is your type of practice?

_____ private (solo)
_____ clinic (group)

6. What is the number of infants (less than two years of age) seen weekly?

_____ less than 10 infants
_____ more than 10 but less than 25
_____ more than 25 infants

Disregard this Column

7. Please check all the sources on nutrition information used in your work.

_____ professional journals
_____ professional bulletins
_____ government publications
_____ health agency publications (eg. Can. Diabetic Assoc.)
_____ audiovisual aids (films, tapes, etc.)
_____ magazines
_____ radio
_____ television
_____ food manufacturers' brochures or labels
_____ pharmaceutical companies' brochures or labels
_____ books
_____ consultation with a nutritionist-dietitian
_____ consultation with a colleague
_____ consultation with a public health nurse
_____ consultation with a home economist
_____ other (please specify)

_____

8. Do you have any additional specialization or training in medicine?

_____ neonatology
_____ public health diploma
_____ other (please specify)

_____

9. Please check if you attended any of the following continuing education programs.

_____ Care of the High Risk Foetus & Newborn - May '74
_____ Early Nutrition and Later Life - June '74
_____ other (please specify)

_____

10. Please check which of the following pertains to your medical school training.

_____ course on nutrition lasting at least 13 weeks
_____ series of lectures on nutrition
_____ nutrition integrated with other course material
_____ no formal nutrition education
_____ other (please specify)

_____

NUTRITION PRACTICES

Some statements concerning infant nutrition are made below. Please indicate whether you conduct each practice - 'Always' (> 95% of the time), 'Frequently' (approximately 50 - 95% of the time), 'Sometimes' (approximately 5 - 49% of the time), or 'Never' (< 5% of the time), by circling the appropriate number 1 - 4.

	Always	Frequently	Sometimes	Never
Sample: I tell my patients that nutrition is important throughout infancy.	4	(3)	2	1

This answer would indicate that you frequently tell patients that nutrition is important throughout infancy.

		Always (> 95%)	Frequently (50 - 95%)	Sometimes (5 - 49%)	Never (< 5%)	Disregard this Column
1.	I recommend waiting at least 10 hours after birth before giving the healthy newborn either the breast or a formula.	4	3	2	1	26
2.	I ask mothers from what sources their 1 - 2 year olds obtain vitamin C.	4	3	2	1	27
3.	I encourage mothers to give cereals added to the bottle for a healthy infant who isn't satisfied with milk alone.	4	3	2	1	28
4.	I tell parents that it is generally less expensive to prepare sieved or blenderized foods than to buy commercially prepared foods.	4	3	2	1	29
5.	I recommend the early (within 2 months of birth) introduction of solids such as cereals and fruits.	4	3	2	1	30
6.	I recommend the introduction of a source of iron for healthy infants between 3 - 6 months of age.	4	3	2	1	31
7.	I prescribe a fluoride supplement for my pediatric patients if the water supply is not sufficiently fluoridated.	4	3	2	1	32
8.	I recommend that human milk alone is adequate in nutrient content for the first two months of life.	4	3	2	1	33
9.	If a 3 - 4 month old infant is overweight according to height and weight charts, I recommend the substitution of skim milk for formula.	4	3	2	1	34

		Always (> 95%)	Frequently (50 - 95%)	Sometimes (5 - 49%)	Never (<5%)	Disregard this Column
10.	I recommend that iron fortified foods or iron drops be a part of the infant's dietary regimen during the 2nd year of life.	4	3	2	1	35
11.	I encourage healthy mothers of infants to breast feed for the first six months.	4	3	2	1	36
12.	I tell mothers who give vitamin supplements to give only the recommended dosage.	4	3	2	1	37
13.	I recommend that by the time the child is 5 months of age he should be eating cereals, fruits, vegetables and meats.	4	3	2	1	38
14.	I recommend that a multivitamin supplement be given to healthy infants.	4	3	2	1	39
15.	I advise mothers to introduce a wide variety of foods into their infant's diet before he is two years of age.	4	3	2	1	40
16.	I recommend sugar water (about 1 tsp. sugar/qt. H_2O) as a pacifier for children.	4	3	2	1	41
17.	To decrease the likelihood of atherosclerotic heart disease in later life, I recommend a low cholesterol intake early in infancy.	4	3	2	1	42
18.	I encourage mothers to include about 25 grams of protein in the daily diet of a 1 - 2 year old.	4	3	2	1	43
19.	I tell mothers that megavitamin therapy should be used in treating hyperactivity in infants.	4	3	2	1	44
20.	I encourage mothers to include at least 2 glasses (16 oz.) of milk in a 1 - 2 year old's diet.	4	3	2	1	45

PLEASE CHECK TO BE SURE ALL STATEMENTS HAVE BEEN ANSWERED

Thank you for taking the time to complete this questionnaire.

APPENDIX B

VALIDATION QUESTIONNAIRE AND CORRESPONDENCE WITH VALIDATORS

Validation Questionnaire

1. Do the questions for pediatricians and general practitioners represent an adequate variety of topics on infant nutrition?
   Yes _____ No _____ If not, what is missing? _____
   _____

2. Do the questions for obstetricians and general practitioners represent an adequate variety of topics on maternal nutriton?
   Yes _____ No _____ If not, what is missing? _____
   _____

3. Do you agree with our answers (answer sheet enclosed)?
   Yes _____ No _____ If not, which statements and answers do you query?

Section & Number	Comment
_____	_____
_____	_____
_____	_____
_____	_____

4. Are any of the statements ambiguous? Yes _____ No _____
   If yes, which ones?

Section & Number	Comment
_____	_____
_____	_____
_____	_____
_____	_____

5. Do the questions cover an adequate amount of information to obtain a valid estimate of the nutrition attitudes and practices of obstetricians, pediatricians and general practitioners?
   Yes _____ No _____

6. Is the scoring system appropriate for obtaining an estimate of nutrition attitudes and practices? Yes _____ No _____
   If not, why not? _____
   _____

7. Is the order of the sections, i.e., Opinions-Demographic Data-Practices, appropriate? Yes _____ No _____ If not, why not?
   _____

8. Do you wish to have a copy of the final questionnaire along with a synopsis of the final results? Yes _____ No _____
   If yes, please complete the following:

   Name:

   Address:

   Additional Comments:

THANK YOU FOR YOUR TIME AND VALUABLE ASSISTANCE

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APPENDIX C

PRETEST QUESTIONNAIRE

Pretest

Cover Letter

1. Is the purpose of the questionnaire clearly stated? Yes _____
   Comment: No _____
   _____

2. Are the instructions adequate? Yes _____ No _____
   Comment:
   _____

3. Does the letter make you want to fill in the questionnaire?
   Yes _____ No _____
   Comment:
   _____

General Layout

1. Do you feel that the order of the sections i.e., Opinions, Demographic Data, Practices, is appropriate? Yes _____ No _____
   Comment:
   _____

Answering Scheme

1. Are the instructions for answering clear? Yes _____ No _____
   Comment:
   _____

2. Is the answering scheme easy to follow? Yes _____ No _____
   Comment:
   _____

Statements

1. Are any statements:

	Section & Number	Comment
ambiguous		
obviously biased		
not complete or too long		
too easy or too difficult		

2. Do you think the statements are adequate to obtain information on attitudes and practices of physicians? Yes _____ No _____
   Comment:
   _____

Overall Questionnaire

1. Is the questionnaire too long? Yes _____ No _____
2. Is the questionnaire too time-consuming? Yes _____ No _____
3. Do the questions appear repetitious i.e., are the 'practice' questions too similar to the 'attitude' questions? Yes _____ No _____

APPENDIX D

PHYSICIANS' COMMENTS TO QUESTIONNAIRES

Listed below are a number of voluntary comments which accompanied the completed questionnaires.

Favourable:

" Congratulations on your questionnaire! Good points. "

" Interesting study. Nutrition is my second interest. "

" I'm very interested in nutrition and the results of your excellent questionnaire. "

" I offer my praise to the people involved in conducting this study. "

Unfavourable:

" Dumb questionnaire. "

" I hope I'm not mistaken in recognizing the present kick in nutrition as a fad that will soon outlive its absurdity. "

" Many of the questions are misleading. They are so phrased that the expected answer is already included; otherwise, it reveals the ignorance in the answer. "

" I spent my lunch hour answering this garbage just so somebody can write a Ph. D. paper. "

Other interesting comments:

" I realize that I should spend far more time re nutrition with pregnant patients. "

" With some chagrin I return your questionnaire. I've tried to find nutrition information for a number of years now and this questionnaire makes it obvious how unsuccessful I've been. "

" Best of luck but I think the only way to improve better nutrition habits is through a massive public education program. Also, give more practical training in nutrition to medical students. "

" I wish you well in improving nutrition which is the major world problem but ask you not to be too hard on us G. P.'s. Too many smart-alecs push their own diet programs and criticize family doctors without really knowing what we know about our patients and about nutrition. Perhaps you could help by sending pamphlets to our offices for distribution to our patients. "

" Getting mothers to remember the 4 food groups is not easy. "

" Lectures in nutrition were timed too early in medical school. They were not taken seriously since we had no clinical correlation. "

" Nutrition in medical school was poorly done. "

" University training in nutrition was very poor. "

" University training in nutrition was sadly lacking. "

" Nutrition in medical school had little practical relevance. "

" It is no use informing women about breast-feeding; they do what they want to anyway. "

" Since many questionnaires are sent to my office I answer only the ones where a personal contact has been made. "

" If a large number of doctors have not replied I am not surprised as I thought it was something of an examination in nutrition, and most of us probably were a bit inaccurate. "

" I feel a dietitian or nutritionist must be considered a 'specialist' and that having a formally trained person to do routine dietary counselling would not be an effective way of using the dietitian's training. "

" It was fun. "

APPENDIX E

ANSWER KEYS FOR NUTRITION ATTITUDE AND PRACTICE TESTS

ANSWER KEY FOR NUTRITION ATTITUDE TEST
FOR GENERAL PRACTITIONERS

Statement Number	Correct Response
1	Agree
2	Disagree
3	Agree
4	Disagree
5	Disagree
6	Agree
7	Disagree
8	Agree
9	Agree
10	Disagree
11	Agree
12	Disagree
13	Agree
14	Disagree
15	Disagree
16	Agree
17	Disagree
18	Disagree
19	Agree
20	Disagree

ANSWER KEY FOR NUTRITION PRACTICE TEST FOR GENERAL PRACTITIONERS

Statement No.	Correct Response	Statement No.	Correct Response
1	Always	21	Never
2	Always	22	Always
3	Always	23	Never
4	Never	24	Always
5	Always	25	Never
6	Always	26	Always
7	Never	27	Always
8	Always	28	Never
9	Never	29	Never
10	Always	30	Always
11	Never	31	Always
12	Always	32	Always
13	Always	33	Never
14	Always	34	Never
15	Never	35	Always
16	Always	36	Never
17	Never	37	Never
18	Always	38	Always
19	Never	39	Never
20	Never	40	Always

ANSWER KEY FOR NUTRITION ATTITUDE TEST
FOR PEDIATRICIANS

Statement Number	Correct Response
1	Agree
2	Disagree
3	Agree
4	Disagree
5	Disagree
6	Agree
7	Disagree
8	Disagree
9	Agree
10	Disagree

ANSWER KEY FOR NUTRITION PRACTICE TEST
FOR PEDIATRICIANS

Statement No.	Correct Response
1	Never
2	Always
3	Never
4	Always
5	Never
6	Always
7	Always
8	Never
9	Never
10	Always
11	Always
12	Always
13	Never
14	Never
15	Always
16	Never
17	Never
18	Always
19	Never
20	Always

ANSWER KEY FOR NUTRITION ATTITUDE TEST
FOR OBSTETRICIANS

Statement Number	Correct Response
1	Agree
2	Disagree
3	Agree
4	Disagree
5	Disagree
6	Agree
7	Disagree
8	Agree
9	Agree
10	Disagree

ANSWER KEY FOR NUTRITION PRACTICE TEST
FOR OBSTETRICIANS

Statement No.	Correct Response
1	Always
2	Always
3	Always
4	Never
5	Always
6	Always
7	Never
8	Always
9	Never
10	Always
11	Never
12	Always
13	Always
14	Always
15	Never
16	Always
17	Never
18	Always
19	Never
20	Never

APPENDIX F

MEAN SCORES FOR NUTRITION ATTITUDE AND PRACTICE TESTS

MEAN SCORES OF NUTRITION ATTITUDES
ATTAINED BY GENERAL PRACTITIONERS

Statement Number	Mean Score
1	5.9
2	6.3
3	3.2
4	4.0
5	4.9
6	6.6
7	6.0
8	3.2
9	2.8
10	2.9
11	6.3
12	6.5
13	4.4
14	5.1
15	6.2
16	5.1
17	5.1
18	6.2
19	6.5
20	4.5

MEAN SCORES OF NUTRITION COUNSELLING
PRACTICES ATTAINED BY GENERAL PRACTITIONERS

Statement Number	Mean Score	Statement Number	Mean Score
1	1.7	21	1.7
2	2.8	22	1.1
3	1.4	23	1.6
4	0.9	24	1.9
5	1.7	25	1.6
6	2.2	26	2.0
7	2.2	27	2.4
8	1.1	28	0.9
9	2.4	29	1.5
10	1.7	30	1.2
11	2.1	31	2.1
12	1.5	32	2.7
13	2.7	33	0.8
14	1.5	34	1.2
15	0.9	35	2.5
16	2.1	36	2.5
17	2.2	37	2.4
18	1.9	38	1.1
19	1.5	39	2.9
20	1.9	40	1.9

MEAN SCORES OF NUTRITION ATTITUDES
ATTAINED BY PEDIATRICIANS

Statement Number	Mean Score
1	6.5
2	6.4
3	4.5
4	5.6
5	6.3
6	4.9
7	5.5
8	6.4
9	6.4
10	4.3

MEAN SCORES OF NUTRITION COUNSELLING PRACTICES ATTAINED BY PEDIATRICIANS

Statement Number	Mean Score
1	2.4
2	1.8
3	2.1
4	1.8
5	1.8
6	2.3
7	2.6
8	0.9
9	1.9
10	1.1
11	2.4
12	2.8
13	0.7
14	1.2
15	2.4
16	2.7
17	2.3
18	1.6
19	3.0
20	1.9

MEAN SCORES OF NUTRITION ATTITUDES
ATTAINED BY OBSTETRICIANS

Statement Number	Mean Score
1	5.7
2	6.3
3	2.6
4	4.4
5	5.0
6	6.7
7	6.1
8	3.0
9	2.3
10	2.9

MEAN SCORES OF NUTRITION COUNSELLING PRACTICES ATTAINED BY OBSTETRICIANS

Statement Number	Mean Score
1	1.9
2	2.7
3	1.7
4	1.0
5	1.8
6	2.1
7	2.1
8	1.3
9	2.5
10	1.8
11	2.2
12	1.9
13	2.9
14	1.7
15	0.9
16	2.2
17	2.2
18	2.1
19	1.6
20	2.1