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A comparison of the nutrition knowledge, attitudes and dietary habits of nursing and non-nursing students

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ABSTRACT

FACULTY OF SOCIAL SCIENCES
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A comparison of the nutrition knowledge, attitudes and dietary habits of nursing and non-nursing students

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The aim of the study was to investigate whether nursing students who receive education in nutrition have different dietary intakes and attitudes towards healthy eating to non-nursing students and whether their eating habits and food choices are influenced by different factors. The study used triangulation as a strategy to combine two different methodologies, drawing on both qualitative and quantitative data. Four focus group discussions were conducted with 30 students to identify the factors influencing their eating habits and food choices. These factors were used as statements to which students responded, using Likert scales, in the second part of the study, a self-completion questionnaire. This consisted of four parts: a food frequency questionnaire, that examined fat and fibre intake, a nutrition knowledge questionnaire, that explored knowledge of nutrients and general nutrition knowledge, factors influencing eating habits and food choice and attitudes toward healthy eating, and open questions exploring understanding of the term 'healthy eating' and 'intention to change to a healthier diet'. 195 questionnaires were distributed to a convenience sample of nursing and non-nursing students at a university in the south of England: 38 nursing students and 52 non-nursing students completed the questionnaire.

The results indicated that the nursing students ate a healthier diet, in terms of fibre and unsaturated fat, than the non-nursing students did. They also had significantly more positive attitudes toward healthy eating and better nutrition knowledge and understanding. However, they identified similar benefits to healthy eating, sources of nutrition information and factors that influenced eating habits and food choices. The social aspects of eating were the most important factor and cost and habit were ranked second. The study also indicated a relationship between dietary intake, nutrition knowledge and attitudes toward healthy eating, which may be linked to nutrition education. Further associations were found, between attitudes and stated intention to change to a healthier diet, and between estimated Body Mass Index, fibre intake and nutrition knowledge.

This was a small study with a less than 50% response rate and therefore the findings should be interpreted with caution. However, implications for nursing practice and education were considered.

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Acknowledgements

To God be the Glory.

This is dedicated to Nick, my long-suffering 'thesis-widower' and my children Tom and Will who have seen too little of me in recent times. They have been my constant support and source of inspiration.

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CHAPTER 1

Literature Review

Introduction

Nutrition Education

> *"Every student emerging from a nursing programme should have a clear understanding and in-depth knowledge about healthy eating, a measurable knowledge of nutrition science, and will be able to apply this knowledge to practice."*
>
> English National Board, 1995, p. 19.

This is taken from the document 'Nutrition For Life', which was launched in 1995 by the English National Board for Nursing, Midwifery and Health Visiting, as part of their contribution to achieving 'The Health of the Nation' targets (ENB, 1995). It is clear that there is a responsibility on teachers of nursing students to ensure that they are able to gain this nutrition knowledge and understanding. Responsibility for the co-ordination of all the nutrition education within one School of Nursing and Midwifery lies with the researcher conducting this study.

The aim of this study is therefore to explore the relationships between these factors and the dietary practices of a group of nursing students and to compare them to a similar group of students studying for non-health related degrees. The fundamental research question is:

Do nursing students, who receive education in nutrition, and have been exposed to patients with nutrition-related problems, have different dietary habits and attitudes towards healthy eating than non-nursing students and are their eating habits and food choices influenced by different factors?

The nutrition education at the university in which this study took place is in line with the core curriculum developed by the Nutrition Task Force (DoH, 1994). An outline of this curriculum can be found in Appendix A. The aim of the nutrition teachers is to motivate and inspire students to pay attention to nutrition and to acknowledge the role nutrition plays in the health and illness of individuals throughout their lifespan. If this aim is fulfilled, then nursing students should demonstrate a difference in their dietary intake and in their attitudes to healthy eating, compared to non-nursing students. Unless, that is, that the factors influencing their eating habits and choice of food outweigh their knowledge of nutrition and their attitudes towards healthy eating, in terms of the priority given to each.

Literature Review Methodology

In order that the question posed could be answered, a comprehensive, systematic search of the literature was undertaken, using electronic databases. These were searched at regular intervals using SilverPlatter (WinSpirs) from the commencement of the study in 1998 until completion, at the end of 1999.

The following electronic databases were searched:
CINAHL 1982-1999, RCN Journals Database 1985-1999, EMBASE 1994-99, British Nursing Index 1994-1999, Medline Express 1986-1999.
Search terms were developed from an initial scan of the literature and used each time an electronic search was carried out. The search terms used were:
Nutrition, knowledge, attitude*, behaviour, diet*, food intake, nurse*, student*. A further search term of Healthy eating was added part way through the study as it became clear that there might be a section of literature not being accessed. Additional hand searching was carried out following up references cited in key articles, and serendipitous searching, but this was not done in a systematic way.

The following literature review aims to address the research question posed and identify specific objectives, which will form the substance of this research study.

Importance of nutrition

Nurses' responsibility

Nutrition is of fundamental importance to life. As such, it is directly linked to health and illness, both in individuals and in populations. John Dickerson, a professor of clinical nutrition states that:

> *"It is possible to have good nutritional status in the absence of good health: but optimal health is impossible in the absence of good nutritional status"*
>
> Dickerson, 1995. p.44.

Ensuring that patients have adequate food and drink is a fundamental aspect of nursing, that requires a range of knowledge, skills and positive attitudes. The registrar of the UK Central Council for nursing, midwifery and health visiting (UKCC), in response to the Community Health Council's 'Hungry in Hospital' paper (1997), states, in a letter sent to all UK hospitals, that "nurses have a clear responsibility for ensuring that the nutritional needs of patients are met" (UKCC, 1997).

Nutrition is well recognised as a key factor in the promotion of health and the prevention and management of a range of common diseases, such as coronary heart disease, diabetes mellitus and cancer. However, there is now clear evidence of the effect of malnutrition on health and recovery from illness (Robinson et al, 1987). Poor nutrition not only has clinical consequences, but also biological, psychological, social and economic implications. The link between nutritional intake and the development of ill health and increased morbidity was one of the factors that prompted the Department of Health (DoH) to produce the Health of the Nation White paper (DoH, 1992).

National nutrition-related targets

This paper sets out a number of targets to be achieved by the year 2005. These include two related to nutrition: reducing the amount of fat, especially saturated fatty acids, in the national diet, and reducing the proportion of people who are obese. The basic principles of good nutrition, on which these targets were based, are taken from the 1991 report on Dietary Reference Values from the government's Committee on Medical Aspects of Food Policy (COMA) (DoH, 1991).

Following publication of the Health of the Nation White paper, the DoH published a list of commitments related to nutrition, in an effort to achieve the targets set. These included a commitment to continue research into links between diet and health and influences on consumer choice; national surveillance of diet and health of the population; strategies aimed at a specific nutrition issue, such as obesity; strategies aimed at improving information on nutrition; and guidelines for caterers (DoH 1994). The English National Board commented that nurses, midwives and Health Visitors would play a key role in implementing these commitments (ENB, 1995).

Unfortunately, the nutritional targets set are failing to be reached. For example, the proportion of men and women, aged 16-64, who were obese in 1987 was 8 and 12% respectively. By 1991 these figures had increased to 13 and 15% (White et al, 1993). In addition, the number of patients in hospital suffering from malnutrition remains high, despite an increased awareness of nutritional issues (McWhirter and Pennington, 1994).

Nutrition Task Force

The White Paper (DoH, 1992) proposed the setting up of a Nutrition Task Force to prepare an action programme aimed at helping to achieve the nutrition-related targets. This was set up later in 1992, and brought together expertise from a broad range of areas, which included health professionals, to develop practical strategies aimed at helping the consumer understand the key elements of a healthy diet. Daniels, (1991) asserts that it is the responsibility of those in nutrition education to translate the findings of the COMA panel into plain, consistent and practical advice for the public, in order to clarify misconceptions and to promote a healthy diet. For health professionals to meet this challenge, they need to have a sound knowledge of nutrition and it's links with health and illness, a recognition of the diverse factors which influence what people eat, and a practical understanding of ways in which healthy dietary choices can be made easier.

Definitions of healthy eating

Nutrition Task Force

The Nutrition Task Force (DoH, 1994) developed a teaching model called 'the balance of good health' to help the general public understand the key principles of healthy eating. Previous reports by the Committee on Medical Aspects of food policy (DoH, 1991) and the

National Advisory Committee on Nutrition Education (NACNE, 1983) had emphasised certain aspects of the diet, such as reducing salt or increasing fibre, but were not necessarily in a format that the general public could easily understand and act on.

The Nutrition Task Force therefore tried to develop a model that could be readily understood and applied. This model is represented as a plate, divided into 5 sections, each one representing a different food group. The five groups of food are fruit and vegetables, cereals, bread and potatoes, milk and dairy products, meat, fish and alternatives, and foods containing sugar and fat. The five sections are unequal in size to emphasise the proportion of each type of food to be eaten. Fruit and vegetables, and cereals, bread and potatoes take up a third of the plate each, milk and dairy products, and meat, fish and alternatives occupy a further eighth each, leaving foods containing fat and sugar in the remaining twelfth.

A balanced diet

The Department of Health's guidelines, for the general public, for a balanced diet in adulthood are similar but expand on some of the principles on which the recommendations are based:

- Maintain levels of physical activity
- Eat a variety of different foods
- Eat plenty of vegetables and fruit (5 portions a day)
- Eat plenty of foods rich in starch and fibre (at every meal)
- Include oily fish as a regular part of the diet (at least once a week)
- Eat foods that contain a lot of fat sparingly, especially foods rich in saturates, such as animal fat
- Do not eat too much salt, especially salt added to foods
- Eat sugary foods and drinks high in sugar only occasionally
- If you drink alcohol, keep within the recommended limits
- Enjoy your food

It is important that nurses have a clear understanding of the concept of healthy eating so that they are able to advise patients and clients. Therefore the evidence for understanding and applying these healthy eating guidelines are investigated in this study, by analysing students'

understanding and by comparing their dietary intake with nutrition knowledge and attitudes towards healthy eating.

Objective 1: to explore the understanding that a group of nursing and non-nursing students have about the term 'healthy eating' and it's benefits.

A large, quota-controlled, pan-European study of over 14,000 subjects, over the age of 15 years, using face-to-face interview-assisted questionnaires, was carried out to investigate consumer attitudes and beliefs about food, nutrition and health (Institute of European Food Studies, 1997). This showed that the majority of people (80%) correctly defined healthy eating in terms of eating more fruit and vegetables, or less fat, or balance and variety (Margetts et al. 1997a). This suggests that healthy eating guidelines are having some effect, certainly in terms of knowledge. The UK sample had the highest overall percentage of correct answers (91%). In this study, students' understanding of the term 'healthy eating' is explored, in terms of their ability to provide a definition, compared to the one used by Margetts et al (1997a). What Margett's study does not show is whether or not knowledge is linked to eating behaviour.

This question was addressed in a similar study, also by Margetts et al. (1997b), of over 5000 people in England. He found that respondents who were able to correctly define healthy eating were more likely to be eating a healthy diet, than were those who could not. Healthy eating, in this study, was defined in terms of fat and fibre intake, using an interview-assisted questionnaire. This validated Dietary Instrument for Nutrition Education (DINE) is the one that is used in this study and will be examined in detail in the methodology chapter (Roe et al, 1994).

Understanding of concept of healthy eating

Perceived understanding

However, Booth (1989) challenges our understanding of the term 'eat a variety of foods'. He says that, although this is often the first piece of nutritional advice given, it is also the vaguest and hardest to communicate. He goes on to say that the term 'balance' is often used to help clarify the message, but he states that that term is even less well understood. He advocates

educating the public in the concept of variety or balance. It is key that health professionals understand the terminology. Therefore, in this study, respondents' understanding of the term 'healthy eating' is explored.

Buttriss conducted a series of studies of the nutrition knowledge, attitudes and beliefs of the general public in the UK. She interviewed 1700 members of the public in 1992 and repeated a similar survey, with 1000, in 1995 (Buttriss, 1997). She also interviewed 200 GPs and Practice nurses. She found similar findings to Margetts, that the majority of people (80%) believed that they were well informed about healthy eating. This study went on to investigate people's ability to translate healthy eating messages into food choices.

The respondents were given a list of nutritional terms and asked which of them they had heard of, and of which were they confident about the meaning. This revealed that although the majority (78-95%) had heard of terms such as fibre, starch, saturated and unsaturated fats, the proportion that felt confident about the meaning were much lower (28-70%). Furthermore, even less were able to correctly identify examples of each of the foods. For instance, in the 18-24 age group, 84% were unable to identify half of the starch-containing foods, over 90% failed to identify half the fatty foods and only 65% correctly identified half of the fibre-containing foods. Buttriss concluded that many consumers did not have the necessary knowledge to successfully translate healthy eating messages into food choices.

Perceived benefits of healthy eating

Zunft et al (1997) investigated the perceived benefits associated with healthy eating in the pan-EU study described above. Respondents were given a choice of nine specific benefits and asked 'which one benefit would be the most personally significant for you?' 'To stay healthy' had the highest frequency (31%) with 24% stating 'to prevent disease', and similar numbers choosing 'weight control', 'quality of life' and 'to be fit'. This last benefit had a higher frequency in young people, aged 15-34 years.

In this study, students' understanding of the term 'healthy eating' is explored, in terms of their ability to provide a definition, compared to the one used by Margetts et al (1997a). The benefits perceived from eating a healthy diet are identified and compared with the findings of Zunft et al (1997). 'Healthy eating' is also explored in terms of knowledge about nutrition

and individual nutrients, and attitudes towards healthy eating, and these issues are examined in the following sections.

Nutrition education and knowledge

Impact of nutrition education

In 1993, the Nutrition Task Force was commissioned by the Department of Health to look at developing a core curriculum for nutrition in the education of health professionals (DoH, 1994). Prior to the paper being written, a survey of nurses was conducted, to investigate awareness of nutritional issues. Only just over half the nurses saw responsibility for patients' nutrition as part of their role. Burrows (1994), in an unpublished undergraduate thesis, stated that only 21% of a sample of nurses said that they gained their nutrition knowledge through their training. Johnson and Johnson, in 1985, carried out a meta-analysis of 303 studies of nutrition education. They looked at the impact of nutrition education and found overall improvements of 33% in knowledge, 14% in attitudes and 19% in dietary practices. This seems to indicate that it is easier to make an impact on knowledge than on attitudes or behaviour.

Ten years later, Contento et al (1995) conducted a comprehensive review of 217 nutrition education intervention studies. They found that nutrition education 'works', in that it is a significant factor in improving dietary practices, when behavioural change is set as a goal. Many studies that were based purely on a 'giving information and teaching skills' model were not very effective in bringing about behavioural change. Attention to motivators that had personal meaning for the specific population group involved in the education was found to be essential. Active participation was also found to be important, and the use of personalised self-assessment of dietary status and analysis of diet increased motivation.

Other factors that were found to be useful were the presence of a social support structure, enhancing personal control, and lastly, active participation of leaders was found to be important in improving long-term effectiveness of programmes. This review would suggest that there may well be a relationship between nutrition knowledge and changes in dietary practices, but only if the nutrition education is of a certain kind and specific factors are acknowledged.

Therefore, in this study, knowledge of nutrients and general nutrition knowledge are examined to see if nursing students have a greater level of knowledge than other university students do. This study looks at knowledge rather than what is taught as it is acknowledged that students' knowledge and understanding comes from a variety of sources, such as exposure to patients with nutrition-related health problems, as well as public sources of information, such as the media.

Objective 2: to compare the level of nutrition knowledge in a group of nursing students to that in a group of non-nursing students.

Extent of nutrition knowledge

In the study previously described, Buttriss (1997) found that there were 'worrying gaps' in the personal knowledge of the health professionals in her sample. She found that many of them did not feel confident about explaining the meaning of commonly used nutrition terms such as nonstarch polysaccharides (65%) and extrinsic sugars (61%). 46% stated that they were not confident about explaining the difference between saturated, monounsaturated and polyunsaturated fatty acids, and 25% were unclear about the need for starch in the diet.

Hopper and Barker (1995) also investigated the nutritional knowledge and attitudes of qualified nurses working in the community and General Practitioners, using interviews. They found that nurses gave nutritional advice more often than doctors did, although both groups believed nutrition to be important in disease prevention. However, as in Buttriss' study, there were significant gaps in nutrition knowledge of both groups, despite over 50% of GPs and three-quarters of nurses feeling confident about giving dietary advice. 50% of the Practice nurses correctly answered a nine question knowledge test, compared to 20% of the GPs. GPs, in this study, were confused about current dietary recommendations, food sources of fat and anti-oxidant vitamins. Nearly all respondents in the study expressed a need for more nutrition education.

Nutrition knowledge and related nursing care.

Perry (1997) explored the nutrition knowledge, and nutrition-related nursing care, of qualified nurses working in an acute hospital in the U.K. 110 nurses completed a questionnaire and care plans were examined for evidence of nutrition-related nursing care. Less than half the nurses were thought to demonstrate adequate knowledge of applied nutrition, although the majority felt that nutritional assessment was primarily their responsibility. Perry comments that her results were very similar to previous studies conducted. This study again highlights the need for more nutrition education for health professionals.

Knowledge of nutrients is examined in this study using a pre-validated questionnaire developed by Towler and Shepherd (1990). The tool they developed consists of a forced choice nutrient section, which examines knowledge of specific nutrients, and a multiple-choice test, which looks at general nutrition knowledge. They validated it using two groups of respondents, 27 nutrition professionals and 55 first-year engineering students (Towler and Shepherd, 1990). Using the one-way ANOVA test to compare the two groups, the questionnaire was clearly able to distinguish between the two groups, with the nutritionists scoring significantly more than the engineering students. The details of the knowledge test are discussed later, in the methodology chapter.

Sources of nutrition information

In the general public

Given that the majority of subjects in the pan-EU study (IEFS, 1997) felt that they were eating a healthy diet, Almeida et al. (1997) investigated the sources of information most used and trusted. They found that TV/Radio (29%), magazines/newspapers (27%) and health professionals (26%) were most frequently quoted. In the UK, they found that health professionals were the most trusted sources of information (95%). Government agencies and food packaging were trusted by 70% of the UK sample. This places a certain responsibility on health professionals to have the appropriate sound, reliable nutritional information. In this study the nutrition knowledge and understanding of student nurses is explored and compared with non-nurses.

Buttriss (1997) also explored sources of nutrition information, and found similar results to Almeida et al (1997). However, in this study, she stated that very few respondents found the information useful, especially advice in the media. There was also evidence of concerns being expressed regarding the personal relevance of the information and the inconsistencies of the messages. Health professionals were mentioned less frequently, but over half the respondents felt they were a trusted source of information. These figures were not as high as those in the IEFS study, but this may be due in part to the way the questions were worded and the data was presented.

In the part of the IEFS study conducted by Almeida et al (1997), Relatives and friends were seen to be quite important sources of information, especially among the 15-34 year age group (27%). This may be significant for a student population who has only recently left home. Bull (1995) reported on the findings of a large government survey for MAFF of 15-25 year olds. He similarly found that parents and friends were the most frequently mentioned sources of information in 19-21 year olds, whereas more of the 22-25 year olds mentioned friends. Stafleu et al (1996) studied the food habits of 97 women and their mothers/grandmothers, in The Netherlands, using a self-administered food frequency questionnaire. They concluded that mothers and their daughters resembled each other in their nutrition knowledge and attitudes. This study emphasised the role of the mother in the development of food habits.

Health professionals' sources of information

Both Buttriss (1997) and Rudat (1993), cited in Almeida et al (1997), are reported as finding that health professionals use the media as their source of nutritional information. Buttriss reported that they were critical of the accuracy of the information presented. Seven out of ten thought that information provided by the media was confusing and contradictory. This implies a need for more nutrition education for health professionals. These issues are explored in this study, by investigating whether or not there are differences in the sources of information used by the two groups of students, and whether student nurses still seek information from health professionals.

Objective 3: to explore and compare the sources of nutrition information used by nursing and non-nursing students.

Attitudes toward healthy eating

Attitudes and knowledge

Research by Perron and Endres (1985) demonstrated that there was a positive and significant correlation between nutrition knowledge and attitudes, suggesting that the more nutrition knowledge someone had, the more positive their attitudes towards nutrition were likely to be. However, this research was conducted with a client group of female athletes in whom motivation may have played a significant part.

Camooso et al's study in 1980 found rather different findings. They investigated whether US nursing students applied preventative health practices, which included dietary habits, to their own lives. They compared students at the beginning and end of their training, and found no significant differences between them. This suggested that knowledge about health practices had no effect on their lifestyle. They suggest that other factors, such as their age, health status or not perceiving themselves as role models, may have influenced their behaviour. They cite Haefner and Kirscht (1970) who found that knowledge alone was not sufficient to foster change in attitudes and behaviours, when unhealthy behaviours satisfy a variety of motives. This apparent conflict in findings will therefore be explored in this study, by examining nurses' attitudes toward healthy eating.

Objective 4: to compare the attitudes toward healthy eating in nursing and non-nursing students.

Kearney et al (1997) investigated attitudes toward healthy eating in the IEFS study cited earlier in this chapter. They found that the majority of EU subjects felt that their diet was healthy (71%), and therefore no changes were needed, although they found that agreement levels decreased with higher levels of education and increased with age. This contrasts with the evidence, said Kearney, Kearney and Gibney (1997), in a summary discussion paper of the whole IEFS study. They stated that significant improvements could be made in reducing fat intake, increasing fruit and vegetables intake and reducing the prevalence of obesity. Approximately half of the respondents in Kearney et al (1997) study agreed that they did not usually think about the nutritional aspects of the food they ate although significantly more

females than males disagreed with the statement. These results suggest that there is a mismatch between perceived need to alter food habits, and concerns about nutrition.

Shepherd and Towler (1992) examined nutrition knowledge and attitudes, in 538 subjects, using a validated questionnaire. This included three attitude questions for different food groups. Respondents were asked if they considered that eating a particular food was 'good' or 'beneficial' or 'pleasant', using a seven-point Likert scale. The attitude responses were summed to give a total attitude score. They found that attitudes correlated to both intentions and behaviour. They found significant differences between males and females, with females having more negative attitudes toward meat, meat products and fried foods, but more positive attitudes toward dairy products.

Stafleu et al (1996) also investigated nutrition knowledge and attitudes toward high-fat foods and low-fat alternatives, in a group of 97 families of three generations of women. For each food they asked respondents, using a five-point Likert scale, to respond to two statements: 'I like eating the food' and 'eating the food is very good/very bad'. Scores were summed to give a total attitude score. Overall, women had a more positive attitude toward low-fat alternatives than toward high-fat foods, both in the liking and good/bad attitude scales.

Attitudes and eating habits

Monneuse et al (1997) investigated the eating habits and food-related attitudes and beliefs in 660 French students, using a questionnaire. They found that approximately 30% of the students said that they made an effort to eat fibre and 34% said that they made an effort to avoid fat. They found significant differences between males and females in their attitudes toward fat, fibre, salt and sugar, with females having more positive attitudes toward all these items. They also investigated a wider range of health beliefs associated with nutrition, such as the importance of taking regular exercise, avoiding excessive coffee and alcohol and eating breakfast every day. They found no gender differences for any of these factors.

Attitudes toward healthy eating in general and fibre and fat in particular are pursued in this study, by the use of Likert scales. The research findings available appear to indicate that there is a gender difference in attitudes toward healthy eating, with females having more positive

attitudes and being less content with their diet. There is also the suggestion that those educated to a higher level are also more aware of the need to change their diet. There was very little evidence available about the attitudes of nurses toward nutrition and healthy eating. The relationship between nutrition knowledge and attitudes toward healthy eating is considered after the section on dietary intake, in conjunction with a consideration of the relationship between these two factors and dietary intake.

Intention to change

Shepherd and Towler (1992) predicted an association between behaviour and intention, which in turn is predicted by attitudes. They said that this association was much stronger than that between behaviour and knowledge. This is an adaptation of the theory of reasoned action, first proposed by Ajzen and Fishbein, in 1980:

> *"Intentions represent behavioural dispositions that conceptually are very closely tied to the corresponding behaviour, and human action is found to follow reasonably and consistently from relevant behavioural dispositions".*
> Ajzen and Fishbein, 1980, p.150.

Charny and Lewis (1987), in their study of the general public, found that intention to change to a healthier diet was linked to greater knowledge, but in Shepherd and Towler's study (1992), an association between attitudes toward healthy eating and intention was strongest. This apparent inconsistency will be explored in this study.

Several studies have looked at the most frequently cited reasons for not changing to a more healthy diet. Buttriss (1997) found that lack of knowledge was the greatest barrier to change but cost, time and unwillingness to change were the next most common reasons cited. Similarly, Story and Resnick (1986) in a study of adolescent's views on food and nutrition, found that lack of time, lack of discipline and lack of a sense of urgency were the three most frequently cited barriers to change. They did not identify cost as a key barrier, but this may be because the sample were a little younger and were still living at home with their family.

Kearney et al (1997), in the pan-EU study cited earlier, found that the majority of EU subjects felt that their diet was healthy (71%) and that no changes were needed. They did, however,

find that agreement levels decreased with higher levels of education and increased with age. These factors of 'intention to change' and 'need to change' are explored in this study, both by an open question that is analysed qualitatively and by a Likert-style statement.

Objective 5: to explore the 'intention to change' to a healthier diet in nursing and non-nursing students.

Dietary intake

Measurement of dietary intake

The research question asks if nursing students have a different dietary intake to non-nurses, as a result of increased nutrition knowledge or more positive attitudes toward healthy eating. Firstly, therefore, dietary intake needs to be estimated.

Objective 6: To compare the dietary intake in a group of nursing students to that of a group of non-nursing students.

There are a number of ways in which dietary intake can be estimated. Fehily (1993), in his review of methods of measuring food intake, concluded that none were suitable in all circumstances. Weighed food intakes are the most accurate, but subject compliance is often low as the protocol for data collection is very demanding. Detailed nutrient intake is not needed in this study, as patterns of eating in terms of food habits rather than individual nutrients are under investigation.

Food diaries involve recording all food and drink consumed over a number of days and Karvetti and Knuts (1992) found that their validity was very satisfactory, compared to two-day recorded food and nutrient intakes. Food frequency questionnaires are the third alternative for estimating food intake. These have the advantage of being self-administered, with simple and quick coding, but have been found to be less accurate than other methods. For example, Krall and Dwyer (1987) found that food diaries were more accurate than food frequency questionnaires, but they were also more difficult to carry out. Pollard et al (1998), who used a food choice questionnaire, also cited problems associated with correlating self-report data.

Medlin and Skinner (1988), in a review of dietary intake methodology over the last 50 years, stated that several studies had established reliability and validity of food frequency data, and Salvini et al (1989) whose aim was to validate dietary questionnaires, found that in a study of 173 nurses:

> *"semi-quantitative food frequency questionnaires provide reasonably reproducible and valid measurements of relative consumption for most foods"*
> Salvini et al, 1989, p.866.

Despite the limitation of being potentially less accurate, a food frequency questionnaire is used in this study, as part of the questionnaire, to investigate the dietary intake of nursing and non-nursing students, as there are insufficient resources to carry out either of the other two methods discussed. It is essential to this study that the dietary intake of all respondents can be estimated in order to answer the fundamental research question posed: do nursing students have different dietary intakes to non-nursing students?

Accuracy of methods

Medlin and Skinner (1988), in their review, conclude that, despite refinement of dietary assessment methodologies over the past few decades, which have corrected or reduced some weaknesses, others are still inherent. For instance, in most Western cultures, diet is so variable and complex, it is difficult to get a representative sample of an individuals diet. In this case, food frequency questionnaires may reflect usual diet more accurately than food diaries or even weighed food intake.

Mela and Aaron (1997) carried out a survey of the general public, looking at subjects' perceived likelihood of recording food intake honestly, and whether or not they would alter their food habits during the recording period. Their findings suggest that scores for predicted honesty were high, but that the accuracy of recording dietary intake would be affected by numerous factors such as inconvenience and difficulty. Subjects felt they may alter their dietary behaviour during the period of recording. Subjects thought that food frequency questionnaires would be easier to complete, more convenient and less time-consuming and therefore more likely to be completed. This supports the notion that although food frequency questionnaires may not be as precise as other methods of dietary measurement, respondents may be more honest, and the record may be more accurate.

DINE Food Frequency Questionnaire

Roe et al (1994) devised a validated food frequency questionnaire to be used in Primary Care as a brief diet assessment tool. This Dietary Instrument for Nutrition Education (DINE) was originally developed as an interview-assisted questionnaire but has been adapted by the author to be used as a postal questionnaire. It examines respondents' normal fat and fibre intake, by attributing a numerical score based on national intake data to each food item. Thus the results are generalisable to the population. It was originally used with a sample of 206 factory workers who also completed 4-day diet records, and has been found to be a valid and reliable tool and useful because of its brevity and ease of use.

It does, like all food frequency questionnaires, have limitations. It is limited by respondents' own knowledge of their diet, their honesty, and their ability to recall their diet accurately. Because it does not measure total energy intake, the proportion of energy contributed by fat cannot be assessed. However, it does show the pattern of food intake which is the factor being explored in this study. Respondents in this study are university students who are catering for themselves. An assumption has been made that they have a reasonable understanding of the food they eat, as they buy and prepare it themselves. Relative fat intakes are compared between groups and thus the absolute proportion of energy contribution is not important.

Blundell (2000) highlighted in an editorial, that the validity of most nutrition databases is affected by underreporting, especially of fat intake in obese individuals. He stated that this was true, whatever the method used to record food intake. As this study focuses on the comparison of fat intake between groups, rather than the absolute fat intake, underreporting is assumed to be similar in both groups, but it will depend on the proportion of obese respondents in each group.

Associations between knowledge, attitudes and dietary intake

Knowledge and dietary intake

The aim of this study is to investigate whether nutrition knowledge influences behaviour and attitudes. It is therefore important to consider how these relationships can be examined.

Objective 7: To discover whether, in a group of nursing and non-nursing students, there is a relationship between dietary intake, nutrition knowledge and attitudes towards healthy eating.

In 1987, Charny and Lewis asked the question "does health knowledge affect eating habits?" This was a large, systematic, mainly randomised study using questionnaires with a 71% response rate, and conducted by medical students door-to-door. They surveyed over 4200 people on the electoral register in Cardiff and found the answer to be "Yes": higher levels of knowledge were consistently associated with healthy changes in food consumption, as measured by subjects' claims to have changed their diet. Those intending to change their diet for health reasons also showed greater health knowledge. The researchers claim that the study demonstrated a high level of internal and external consistency, but the level of analysis was rather limited as there were no statistical tests of significance conducted, and results were only displayed in terms of percentages.

In a similar study of over 1000 nurses and dietitians in the US, Holdt et al (1993) used postal questionnaires to investigate levels of knowledge about meat and compared meat consumption patterns in the two groups. There was only a 39% response rate and the study was conducted in a US State where beef farming was prevalent, and thus the results may not reflect health professionals in general. They found that there was a high level of knowledge about meat in both groups, particularly amongst the dietitians. 56% of dietitians and 62% of nurses had altered their meat intake because of a concern that health problems might develop.

Larsson and Lissner (1996) looked at the effect of a nutrition campaign on the dietary practices of 616 randomly selected women in Sweden. They examined fat and fibre intake using 24-hour recalls conducted by trained dietitians and investigated knowledge using a self-administered questionnaire. They found that there were no major differences between the women with less and more knowledge, with respect to their total fat or fibre intake. They did, however, find that the more knowledgeable women had a lower intake of saturated fats. This emphasises the difficulties associated with trying to get healthy eating messages across to the public, using the media and food packaging. In a subsequent study, Larsson et al (1999)

investigated the influence of nutrition knowledge on food selection. They found that intake of low-fat food was significantly higher in those with nutrition knowledge.

Marecaux et al (1998), in a randomised study of 361 French men aged 45-64, found a significant correlation between fat intake and a high nutrition knowledge score. The research studies described here suggest that nutrition knowledge may influence dietary intake. The link between nutrition knowledge and total fat intake, unsaturated fats and fibre intake is explored in this study.

A recent study carried out by Wong et al in 2000 college students in Taiwan (1999), found that nutrition knowledge and attitudes, and dietary practices and attitudes were both positively correlated. They concluded that all college students were in need of more nutrition knowledge and emphasised the importance of nutrition in college curricula.

Knowledge and attitudes

Shepherd and Stockley (1987) reported that several studies had found a relationship between knowledge and attitudes, but in most cases it tended to be general attitudes towards nutrition, such as 'nutrition is important', rather than to the consumption of specific foods (Schwartz . 1975). In their study, they found that nutrition knowledge did not correlate significantly with any of the attitude measures or behavioural intention. They found that a person's own attitudes towards food proved a better predictor of behavioural intention than perceived social pressure. However, the knowledge test used in this study was very short, and not validated, and this may have affected the findings.

Shepherd and Towler later used a nutrition knowledge questionnaire, described in an earlier section, and an attitude questionnaire with 538 subjects recruited from the workforce of a large company (1992). They also examined the dietary intake of a randomly chosen subgroup of 30 respondents, using weighed intakes completed over 3 days. They looked specifically at fat consumption, and investigated behaviour, intentions and beliefs related to four food groups; meat, meat products, dairy and fried food, using a seven-point Likert scale. They found that total scores for nutrition knowledge correlated with attitudes and the sum of the belief-evaluations for meat and meat products, but not for dairy or fried food. The

correlations were significant, but generally not strong. They also found a good relationship between actual fat intake and the behaviour/intention questions. This suggests that it is attitudes and behavioural intentions, rather than knowledge, which are more likely to predict dietary practices.

Body mass index

Thus far, all the comparisons have been between nursing and non-nursing students. There are other factors that may influence dietary intake and attitudes, such as obesity, which may confuse the issue. There are a number of ways of estimating body fatness, which are relatively simple to use and apply. The simplest is probably a measure of weight, corrected for height. Body Mass Index (BMI) is the most common of these and is considered a sufficiently stable and sensitive measure of malnutrition and obesity. Weight, in kilograms, and Height, in metres, are used in the equation to estimate BMI

$$BMI = \frac{\text{weight in kg}}{\text{height in m}^2}$$

In general terms, an individual with a BMI of 20-24 may be said to be within the acceptable range. A BMI of less than 20 reflects underweight and a BMI of 25 or more reflects overweight. A BMI of over 30 reflects increasing severity of obesity. These norms are based on the assumption that lean body mass is proportional to skeletal size and that only fat varies and correlates with fatness. BMI has been found to be more accurate in younger adults, as there is often a decline in lean body mass in the elderly (Lehmann et al, 1991). Categories have been derived from data on long-term health outcomes, such as mortality and morbidity, in adults. The relationship between BMI and later health outcome is curvilinear and J shaped, with the greatest risks of ill health associated with the lowest and highest BMI (Law and Garfinkel, 1979).

Monneuse et al, in 1997, investigated the BMI of 600 French students and found a mean of 20.9 kg /m2, with females having significantly lower BMI. The range in the two groups was similar (14.1 - 31.5 and 14.3 – 27.1). In this study, it was stated that BMI values were lower than the European norm for students (Bellisle et al, 1995). Monneuse et al found fewer respondents were overweight (1.8%) or obese (0.3%) compared to a study by Bellisle et al

(1995) who found that 7.9% of their European sample of students were overweight (BMI >25) and 1% obese (BMI >30). Monneuse et al also found that there was a relationship between meal skipping and BMI, with overweight students less likely to eat breakfast than their non-overweight peers. This study did not investigate associations between BMI and any other factors such as dietary intake, knowledge or attitudes. Thakur and D'Amico (1999) investigated the relationship between nutrition knowledge and obesity in 292 U.S. adolescents, using self-reported weight and height to calculate BMI. They found no difference in nutrition knowledge between obese and non-obese students with the exception that obese students were better able to identify high-fibre foods.

In this study, BMI is calculated from estimated height and weight measurements and compared between the two groups of students. Self-reporting is sometimes associated with inaccuracy, but was considered to be the only option available in this study. Evidence of relationships between BMI and the other factors being investigated are also examined.

Objective 8: to identify differences in BMI between nursing and non-nursing students and to explore the relationship between Body Mass Index and dietary intake, nutrition knowledge and attitudes.

Factors affecting eating habits and food choice

Dietary intake is part of a wider issue of eating habits. In an attempt to understand the food behaviour of people, there needs to be an awareness of factors that affect food selection and habits.

> *"The individual is the ultimate arbiter of his own personal health behaviour, and will choose for himself what to eat and what not to eat. However, this choice will be limited by a number of factors which operate at different stages during the choice process"*
>
> Holmes, 1986, p.260.

Wheeler (1992), writing in the British Nutrition Foundation Bulletin, reviewed several models of food choice, all of which emphasised the multifactorial nature of the process. The themes identified included personal, educational, socio-economic, cultural, biological and psychological. However, they also identified a number of constraints to free choice, some of which were beyond an individual's control. Real food choices do not necessarily arise from

knowledge or enjoyment, but are also linked to factors such as cost, availability and acceptability. The following studies highlight these themes (Buttriss, 1997, Lennernas et al, 1997, Lappalainen et al, 1997).

Barriers to healthy eating

Buttriss (1997), in her study, that has been previously cited, of 1700 members of the UK general public and 200 health professionals, looked at the reasons the consumers (general public) gave for eating more healthily. She found that a desire to improve health generally (60%), personal health (20%) and weight loss (34%) were the chief reasons stated. She found differences between the health professionals' perception of barriers to healthy eating, and those expressed by consumers. The former gave apathy as the chief obstacle to healthy eating (62%), yet only 19% of the public mentioned this. Health professionals also thought that the public's knowledge of nutrition was good, whereas consumers cited lack of nutrition knowledge as an important barrier to healthy eating. Consumers gave cost of food, time to prepare and dietary conservatism as the most important barriers to healthy eating.

In the large, pan-European study of over 14,000 subjects, described earlier, (Institute of European Food Studies, 1997) healthy eating was among the five most frequently mentioned influences on food choice (32%), from a possible list of fifteen (Lennernas et al, 1997). The other frequently mentioned factors were quality/freshness (74%), price (43%), taste (38%), and family preferences (29%). When these data were analysed by demography, it was older subjects and those better educated who were more likely than others to elect 'trying to eat healthily', and 'price' that seemed most important in unemployed and retired subjects.

In the same study, Lappalainen et al (1997) investigated perceived barriers to healthy eating. The study demonstrated great variability, but lack of time was the most frequently mentioned factor. This was most frequently reported by the younger age group (42%), and by those educated to University level (45%). The overall U.K. mean for this factor was above the European mean of 38%. Other factors frequently mentioned by the 15-34 year age group, included self-control (37%) and food preparation (24%). This latter category included cooking skills, lengthy preparation, storage facilities, limited cooking facilities and short shelf

life of healthy foods. Cost of healthy foods was also a frequently mentioned factor in the U.K. sample (23%).

From these studies it is clear that there are a wide range of factors that influence food choice. Cost and lack of time were the most frequently mentioned factors. In this study, the sample consists of university students, who may, in terms of their financial situation, resemble the unemployed subjects mentioned in the study by Lennernas et al (1997), or the more educated subjects, in terms of their education, or the 15-34 year age group, in terms of their age, identified in the study by Lappalainen et al (1997). In this study, therefore, factors affecting eating habits and food choice are investigated.

Objective 9: to examine the factors that influence the eating habits and food choices of a group of nursing students and non-nursing students.

The previous section examined the findings of studies of the general public, and similarities with a student population were highlighted. The next section focuses on the specific population under investigation: students.

Student food choices

Stordy and Cowhig (1972) in a rather dated, but still relevant, study, found that British university students were at risk of eating an inadequate diet for financial reasons. Lack of finance is still a real concern for students today. However, Story and Resnick (1986) conducted a study of 900 high school graduates at an American university and found that the main barriers to healthy eating were stated as lack of time, discipline and a lack of a sense of urgency to change. These differences in outcome may reflect differences in the samples. In the UK study, the sample were university students living away from home, whereas in the US study, they were high school graduates, possibly still living at home.

In a similar study by Guthrie (1984), also in the US, it was found that lack of experience in planning and cooking meals, and a general lack of interest in food were the key factors. This may be particularly important for students living in self-catering halls of residence. Beerman (1991) said that self-catering accommodation made it easier for students to adopt an inferior

diet, compared to traditional halls of residence, where food was provided. The students in this study live in self-catering accommodation.

Bull (1988), reporting on the findings of a large government survey for MAFF, suggested that young people in their late teens and early twenties may adopt different eating patterns to those they grew up with, due to a number of factors that impose constraints on their diet, such as a change of environment or financial situation. 1000 young people, aged 15-25 years, completed a food questionnaire and food diary. Bull found that those young people living alone or with friends recorded the lowest level of food consumption. Most university students have this type of living arrangement. 47% said that their food habits had changed since leaving home, although it was not clear whether they thought they had changed for the better or worse. A commonly held view was that their diet was harmless because they were healthy.

These studies clearly identify similar factors affecting food choice, such as cost, lack of time, and lack of self-control to the earlier studies of the general public. However, it is not just factors affecting food choice that influence what students eat. It also depends on their eating habits.

Eating habits of students

Meal patterns are an important aspect of eating habits that affect nutrition. McDonald et al (1983), in a study of 276 adolescent girls, aged 14-18, found snacking and meal skipping to be prevalent. Breakfast appeared to be the most commonly skipped meal. They also found that breakfast eaters made better food choices through the day than non-breakfast eaters did. Höglund et al (1998), in their study of Swedish 14-15 year olds, found that 30% of girls and 20% of boys skipped breakfast and that an irregular meal pattern and a high level of snacking was again common. These findings are similar to those in other studies.

However, a large study of 600 French students by Monneuse et al, in 1997, found that they showed a low level of snacking and meal skipping. About 84% of the French students reported having breakfast almost every day, compared to 62% in the UK, and the mean number of meals and snacks was 2.8 meals and 0.7 snacks, compared to 1.8 meals in the UK. This strongly indicates a continuity of the traditional French meal pattern by students in

France. This is in sharp contrast to Story and Resnick's study (1986), in the US, who found that, although the vast majority of High School students felt that family meals were important, many stated that hectic work schedules, and extracurricular activities of both students and parents often prevented family meals. This was seen to have had a negative impact on the quality of their diet.

These studies show that eating habits in students affect food intake. In this study, nursing students are compared with non-nursing students. It is important therefore to establish if there are studies that demonstrate that nurses adopt different eating habits.

Eating habits of nursing students

Findings from studies involving nursing students are sparse: Dittmar et al, (1989) studied 1081 female nursing students training in New York. They found considerable variation in the extent to which student nurses engaged in health practices, and overall found that they were not good examples of favourable health practices. Only 40% ate breakfast every day, 88% snacked between meals and less than 50% limited their fat, salt or sugar intake. Only half were reported as eating a varied diet. Similarly, Soeken et al. (1989) studying lifestyle and health-related behaviours in 139 US undergraduate nursing students, found that the behaviours with the lowest compliance were the nutrition related ones. Compliance rates for nursing students were significantly lower than those of a national sample in nine out of eleven nutrition-related behaviours. The exceptions were eating adequate fibre and avoiding cholesterol, where the difference was not significant.

These studies were both set in the US and were conducted over ten years ago and therefore may not be comparable with practices in the UK today. This study addresses this apparent gap in the literature. The factors influencing eating habits and choice of food are explored through the use of focus groups. The findings are then used in the questionnaire in the form of a Likert scale to ascertain those factors perceived to be the most influential.

Nurses as role models

> *"Students should be aware of their positions as role models for colleagues, patients and clients, in relation to healthy eating."*
>
> ENB, 1995. p. 19.

The English National Board clearly expects nurses to act as role models. This statement links to the previous one cited about the level of knowledge anticipated and the ability to apply that knowledge to practice (ENB, 1995, p. 19). The authors in the study outlined in the previous section (Soeken et al, 1989) discuss the implications of their findings for the effectiveness of the nurse as health educator, who they see as required to serve as a role model for positive health behaviours. Their findings suggest that nurses are not well equipped to act as role models as their own health behaviour was no more positive, or even more negative, than the general public. Oliveri and Oulette (1986), who explored the role of education in the teaching of prevention and health promotion in the undergraduate curriculum in the US, state that nursing students need to seek ways of modifying their own behaviour before becoming engaged in health promotion with clients.

Mitchinson (1995), in a small study of student nurses, mentions the concept of being a role model in a review of the health promotion and health beliefs of student nurses. When students were asked how they could improve their health promotion/education skills, a small number (6/39) suggested exploring their own attitudes to health, and an even smaller number (3/39) identified following a healthy lifestyle. This would suggest that student nurses do not see this as an important part of health promotion. However, Dittmar et al (1989), in the study of over 1000 nursing students studying in the US cited earlier, felt that although US nursing students were expected to act as role models for clients, their own health practices were not good, and did not appear to be valued.

No studies could be found that identified nurses as having consistently positive health-related behaviours. However, a study of American High school teachers who taught nutrition found that they did incorporate many of the current dietary recommendations in their personal dietary practices (Skinner and Woodburn. 1986). This was a randomised study of seventy-one teachers, in forty-three schools. Dietary practices were established using 4-day food records and food frequency questionnaires. Study design was flawed, however, as there was no

control group of non-nutrition teachers. These teachers had positive nutrition-related health practices and the researchers concluded that these teachers served as role models to their students. This study will, in the light of the results obtained, consider whether or not nursing students are equipped to be effective role models in relation to healthy eating, in terms of their personal dietary habits, their nutrition knowledge and their attitudes.

Conclusion

This study will look at the nutrition knowledge and understanding of the concept of healthy eating in student nurses, compared to their non-nursing peers and investigate if this knowledge is related to attitudes towards healthy eating, and behaviour in terms of dietary intake. It will also explore the factors that influence the eating habits and food choices of these groups of individuals and the sources of information used.

CHAPTER 2

Methodological considerations for the study as a whole

Aims and objectives of study

This study set out to answer the question:

Do nursing students, who receive education in nutrition, and have been exposed to patients with nutrition-related problems, have different dietary habits and attitudes towards healthy eating than non-nursing students and are their eating habits and food choices influenced by different factors?

In the previous chapter, nine objectives were derived from this question, which drew on the published literature in the field, which is addressed in this study, with the aim of answering the original question. This chapter examines the methodological issues associated with this study as a whole and chapters 3 and 4 explore in detail the different methods employed. The objectives are repeated here to demonstrate the logical progression of this exploration.

Objective 1: to explore the understanding that a group of nursing and non-nursing students have about the term 'healthy eating' and it's benefits.

Objective 2: to compare the level of nutrition knowledge in a group of nursing students to that in a group of non-nursing students.

Objective 3: to explore and compare the sources of nutrition information used by nursing and non-nursing students.

Objective 4: to compare the attitudes toward healthy eating in nursing and non-nursing students.

Objective 5: to explore the 'intention to change' to a healthier diet in nursing and non-nursing students.

Objective 6: to compare the dietary intake in a group of nursing students to that of a group of non-nursing students.

Objective 7: to discover whether, in a group of nursing and non-nursing students, there is a relationship between dietary intake, nutrition knowledge and attitudes towards healthy eating.

Objective 8: to identify differences in BMI between nursing and non-nursing students and to explore the relationship between Body Mass Index and dietary intake, nutrition knowledge and attitudes.

Objective 9: to examine the factors that influence the eating habits and food choices of a group of nursing students and non-nursing students.

These objectives were explored by focusing on two groups of students: nursing students and non-nursing students, studying at the same university, at the same time. The study consisted of 2 phases:

- Small group discussions, using focus groups, to collect data relating to the factors that influence their eating habits and food choices
- A survey of larger numbers of students about their dietary intake, nutrition knowledge and attitudes toward healthy eating, and the factors that influence their eating habits and food choices, using a questionnaire.

The methodology for these two phases will be explored in detail in chapters 3 and 4. This chapter considers the underlying methodological principles for the whole study. The study took place over the course of a year, with the focus groups preceding the development of the questionnaires. All students who took part were studying at a University in the south of England, at the time of the study.

Study design

The study was a cross-sectional study, as it only looked at the variables once, at a particular moment in time, and it did not attempt to follow the subjects over a period of time. Cross-sectional designs have the advantage of being practical, relatively economical and easy to manage (Polit and Hungler, 1999). It was correlational, as it sought to establish links between a number of variables: knowledge of nutrition, attitudes toward healthy eating, dietary intake and factors influencing eating habits and food choice, and it was comparative because it attempted to compare these variables in 2 different samples: student nurses and other university students, who had no formal teaching on nutrition in their courses.

Sampling frame

The sample used was an opportunistic one, rather than random. The ideal sample is one that represents the population being studied, without bias. There are two categories of sampling: probability and non-probability. Probability sampling is where the sample is randomly selected from the target population, and non-probability sampling is where the chance of being selected is unknown. This latter sampling technique is more convenient and economical, and hence often used in pilot studies and small-scale studies, such as this one. However, it is a less accurate sample, as it is less representative, but the level of representativeness is increased if the sample is homogenous (Polit and Hungler, 1999).

If sampling is faulty, then the study's external validity may be in question and the results cannot be generalised to a wider population (Polit and Hungler, 1999). The more heterogeneous the population, or the more variables studied, the larger the sample size that is needed, in order to retain large enough sub-samples for analysis. This is particularly true for some statistical tests that require minimum numbers. However, a large sample cannot correct for faulty sampling design, if the sample is biased.

In this study, a convenience sample was used, which is a type of non-probability sampling, as there was limited time to complete the study and no external funding available. However, the subjects were all university students living in self-catering accommodation, and thus may be considered a fairly homogenous group, which increased the representativeness of the sample used and reduced the overall number of respondents needed. Caution is needed not to infer too much or make generalisations about the study population from this type of data.

This convenience sample was dependent on the number of nursing students in school at the time of the study, which represented approximately a third of all the student nurses in training at that time. A comparative sample of non-nursing students was chosen, which was of a similar size. The smaller the difference between groups in the variable under consideration, the larger the sample needs to be to detect it. A power calculation should have been carried out to find the minimum sample needed. In order to calculate the sample size required, there needs to be some idea of the expected results. This could be based on results from previous studies that showed the magnitude of the difference between groups in the variables under consideration.

Choice of research approach

Quantitative or Qualitative

There is a popular notion that quantitative approaches to research deal with quantity and numbers and qualitative approaches to research with quality and description. This is too simplistic, however, as these two approaches may differ in their philosophical assumptions, their methods of data collection or the ways used to analyse the data. All research is based on an epistemology, which is concerned with the nature and scope of knowledge, although it is not always explicit. If the researcher tries to be objective and unbiased, using methods such as observation or measurement, then they are functioning within the positivist \ empiricist domain. If, however, they are trying to tell it 'as it is', and to capture the reality of situations, not attempting to hold anything constant, then they are functioning within an interpretive \ explanatory domain.

Quantitative approaches tend to reduce complex issues to smaller parts and then observe or survey them in order to quantify them in an objective way. Quantitative research may also be deductive, testing hypotheses, although some is evaluative or descriptive. Deductive reasoning can aid objectivity, as the findings are considered in the light of previous findings. Positivists insist that all claims to knowledge be verified through experimental confirmation. Methods used tend to be structured and standardised. It is often difficult to control human situations, but statistical tests and the use of large samples can provide the power necessary to test the effects of multiple variables, and thus examine the contribution of individual factors. However, this often involves having rigid control of the known variables, which then fails to reflect reality.

To be able to represent reality more closely, many researchers have abandoned the positivist approach and taken on a much more interpretive one. Qualitative research, therefore, is concerned with describing the experience of individuals and identifying themes, using an inductive approach. Inherent in this approach is that phenomena cannot be studied objectively and that the researcher themselves is a factor. Methods tend to be unstructured and often not predetermined.

Polit and Hungler (1999) state that the reasons for choosing one approach rather than another should come from the research question and be in line with the paradigm in which this question is developed. Phillips (1988) claims that the philosophies of quantitative and qualitative paradigms are too opposed to be mixed, whereas Brannen (1992) says it is simplistic to divide researchers on epistemological grounds into positivists and interpretivists, and suggests that many are happy working with methods from either domain. Bryman (1988) agrees, stating that although epistemology and methods are commonly related, in practice researchers select methods on the basis of a variety of technical considerations.

Triangulation

Benefits of using triangulation

In this study, triangulation (Denzin, 1978) was used as a strategy to combine two different methodologies, drawing on both qualitative and quantitative data, in order to try and capture a realistic view of the student perception of nutrition. Triangulation is a useful strategy but not an end in itself. In research parlance, it is used to describe the use of two or more research strategies. Cohen and Manion (1992) say that it is particularly appropriate where the process under investigation is complex, or when one approach gives a limited or distorted perspective.

Some methodologies are more suitable for obtaining one type of data than others. Using a combination of qualitative and quantitative methods, that are carefully selected to complement one another, will ensure a more complete picture. This will not necessarily make the research more valid, but it can give it more range and depth (Fielding and Fielding, 1986). In this study, focus groups yielded in-depth, qualitative data on the factors influencing the eating habits and food choices of students, that was then used to inform the content of the quantitative questionnaire, which was used to gain a broader, but less detailed, perspective of the issue from a much larger sample of students.

Using triangulation to combine qualitative and quantitative research methods has a number of benefits. Morse (1991) suggests that the real issue in triangulation is not incompatibility between paradigms or the unfeasibility of merging different kinds of data. She firmly believes that the blending of data does not occur in the process of analysis, but in the fitting together of the results into a cohesive whole: Fielding and Fielding's 'complete picture'

(1986). Using triangulation in this way raises a number of issues. Bryman (1992) questions whether the results can be compared and whether they address the same issues. Fielding and Fielding (1986) would say that it is not the same thing that is being examined; one provides background and the other foreground detail. Brannen (1992) agrees saying that the findings are complementary, but not the same. This tends to refute Campbell and Fiske's original hypothesis, made in 1959, (cited by Nolan and Behi, 1995) that triangulation is a strategy for confirming findings.

Combining approaches

Morse (1991) describes a number of different ways in which qualitative and quantitative approaches can be combined, so that they can complement one another most effectively. She ignores the conventional categories of methodological triangulation, preferring instead to classify it as simultaneous or sequential. Simultaneous triangulation is the use of qualitative and quantitative methods at the same time, whereas sequential triangulation is used if the results of one method are essential for planning the next method. One method is completed before the other is implemented.

This latter technique, of sequential triangulation, is the one that was used in this study. The need to determine which paradigm drives the research is an essential first step. Most of the literature appears to support this view (Dootsen, 1995). If an inductive process drives the research, then qualitative methods predominate, but if the research is deductive, driven by a theoretical framework, as in this study, then quantitative methods take precedence.

Morse (1991) emphasises that the predominant theoretical stance does not refer to the value placed on either paradigm, or even to the amount of time spent answering each qualitative or quantitative question. The important issue is that each method is complete in itself and could stand alone. All methods used must meet appropriate criteria for rigor. She states that the two aspects cannot be equally weighted, and must be theoretically driven, either by the qualitative methods, incorporating a complementary quantitative component, or by quantitative methods, incorporating a complementary qualitative component. The latter approach was used in this study. In sequential triangulation, qualitative findings may identify factors underlying relationships and provide background information for a quantitative study, or quantitative findings may help with the choice of subjects for a qualitative study. In this study, the qualitative component preceded the quantitative study and provided essential information for the second part of the study.

Validity and reliability

Defining validity and reliability

Validity describes the degree to which a test or instrument measures what it says it intends to measure. Reliability refers to the consistency of a particular method to measure the same phenomena. Woods and Catanzaro (1988) state that a tool can be reliable but not valid, whereas, a valid tool is also reliable. Validity, says Brinberg and McGrath (1985), is not something that can be bought with techniques: it is pursued, but not attained. This suggests that validity is a quality issue, and as such, is equally important in both qualitative and quantitative research designs.

Validity and reliability are important issues in this research study because many of the factors under investigation are studied and compared indirectly. For example, dietary intake in this study is not measured directly, but is estimated using respondents' recall of the frequency with which they consume various foods. Neither are eating habits observed directly, but respondents are asked to agree or disagree with statements about their eating habits. The extent to which claims can be made from the findings of this study rely on it's validity and reliability.

Internal validity

Many researchers have identified different aspects of validity. Claims about the validity of a research study are usually considered under two main headings: internal validity and external validity. The former generally refers to how confident we are that changes observed in some measured attribute, the dependent variable, are caused by changes made deliberately, the independent variable, rather than as a result of other changes in the environment which are not controlled by the researcher, the intervening variable. (Newell, 1996)

The more control there is of the intervening variables, the more confident we can be that the changes in the dependent variables are caused by the independent variable; that is, there is high internal validity. In this study, the dependent variable was the dietary intake of students, and the independent variables were nutrition knowledge, attitudes toward healthy eating, the

factors influencing eating habits and food choice, body mass index, understanding about healthy eating, sources of information and intention to change. The intervening variables were age, gender, type of accommodation and lifestyle/context.

The two groups of respondents involved in the study, nursing students and non-nursing students, had similar profiles for age, type of accommodation and lifestyle/context, i.e. they were all students at the same university. Thus the effect of the independent variables on the dependent variable could be clearly observed. However, gender profiles were different in the two groups and this clouded the effect of the independent variables. Two of the sections in the questionnaire, dietary intake and nutrition knowledge, consisted of previously validated tools, which increased the validity of the questionnaire.

External validity

External validity is concerned with the relevance of the results in a wider context, in other words, how much can the findings from this study be applied to all students in the U.K. External validity relies in part on the size and representativeness of the sample. However, the distinction between internal and external validity has been challenged by Hammersley (1992), who argues that it is misleading to argue that a research study could be valid in one respect, but not in another. This study is not sufficiently large or representative to have high external validity, and therefore the findings may not be generalisable.

Every type of research methodology has its strengths and weaknesses. Experimental research often gives high internal validity, but the sample size, the context, and the effects of the artificiality of many experiments, all raise questions about the external validity. Survey research can provide a balance of internal and external validity, due to large samples and lack of manipulation of the environment, but the randomness of the sample, due to self-selection or some other bias, can raise serious questions about internal validity. This is a potential problem in this study, where convenience sampling was used. This is another argument for the use of triangulation, in an attempt to reduce the weaknesses of individual methods.

Concept of 'self'

McCall and Simmons (1969) consider that a valid evaluation of data must include an understanding of the social dimensions of the situation in which data were collected. They identify the concept of 'self', saying that the researcher must be sceptical of themselves and recognise their influence on the data. However, Marshall (1981) has a slightly different perspective, and discusses bias and validity in the context of research as a personal process. Reason and Rowan (1981) also recognise the impact of the researcher:

> *"My bias is a part of me as a researcher, and while it is important to recognise my bias, it really is what I can give as a researcher, -my contribution. I work from a particular position: I appreciate other positions and I feel each has it's own integrity and it's own validity."*
>
> Reason and Rowan, 1981, p.399

The potential influence of the researcher themselves on the data is often not even considered in research conducted within a positivist framework. However, these factors are considered when discussing the findings of this study.

Summary

Having considered the overall methodological principles of this study, chapters 3 and 4 will examine the methods used in the two phases of the study in detail. The focus group study will be addressed first, exploring not only the methods but also the results and the data analysis. The results from this part of the study were integrated into the second phase, which was the questionnaire study. Chapter 4 then follows, with an examination of the use of questionnaires as a data collection method.

CHAPTER 3

Focus group study

Rationale for using focus groups to address objectives

It is clear from the literature already explored in chapter 1 that there are a number of factors which may influence eating habits (Monneuse et al, 1997, Dittmar, 1989, Soeken et al, 1989) and food choices (Buttriss, 1997, Lappalainen et al, 1997, Story and Resnick, 1986, Bull, 1988) in different populations. However, there is very little evidence on the eating habits and food choices of students in the UK, and nursing students in particular. The focus group study was therefore set up to explore objective 8, identified in the rationale chapter.

Objective 8: to examine the factors that influence the eating habits and food choices of a group of nursing students and non-nursing students.

The findings from this study were then used in the second part of this research, which went on to investigate these factors in a larger population of students.

Methodology

Advantages and limitations of focus groups

Focus groups are a form of group interview that has been widely used in social science research. This methodology has been applied in a number of areas of health care, especially in health promotion and consumer satisfaction. First described by Bogardus in 1926, focus groups fuse the principles of qualitative research and group process theory.

> *" The explicit use of group interaction is to produce data and insights that would be less accessible without the interaction found in a group."*
>
> Morgan, 1988, p.12

The advantages to using focus groups, according to Kreuger (1988) and Morgan (1988) are that they are flexible, give wide views, are low-cost, and are relatively easy to conduct. Jarrett (1993) suggests that in a relatively short time, focus groups can identify a diversity of themes, based on views and behaviours associated with particular issues. Fern (1983), in his review of focus groups, has challenged the notion that wider views are obtained, but other researchers, such as Stewart and Shamdasani (1990), suggest that comments from one participant may trigger a chain of responses from others, and that the group may provide a stimulus for views to be shared.

Morgan considers that the main advantage to the use of focus groups is the opportunity to observe a large amount of interaction about a topic in a short period of time. He sees the key to this as the setting up of a conducive, non-threatening environment and skilled facilitation of the group by the moderator. Macleod Clark et al (1996) agrees, stating that it is important that the moderator, or facilitator, is seen to be impartial and objective, with no vested interest in the outcome. The focus groups in this study were conducted in an environment familiar to the participants, using the researcher as facilitator, who attempted to remain unbiased.

The disadvantages of focus groups include being less in control than in individual interviewing, and using the technique inappropriately. For example, focus groups should not be used for a topic that is unsuitable for discussion, or for a topic about which the participants have little knowledge or experience. Focus groups are no different from other research method, having strengths and weaknesses. Jackson (1998) states that:

> *"the art is to select to use them when they are the most appropriate method available, and not use them merely for convenience"*
>
> Jackson, 1998, p.80.

In this study, focus groups were very appropriate, as the aim was to illicit students' perceptions of the factors that influenced their eating habits and food choices. The context of a group discussion encouraged them to respond not only to the facilitator's questions but also to react to each other's comments. In this way, focus groups offered more data than individual interviews would have done.

Optimum size of focus groups

Commonly, focus groups are small, relatively homogenous groups that meet with a moderator who facilitates a 30-90 minute discussion in a neutral and relaxed environment

(Stewart et al, 1994). O'Brien (1993) states that a setting familiar to the participants is more likely to maximise the extent to which participants see the researcher as accessible and minimise the extent to which they feel 'studied'.

Kreuger (1988) suggests that the ideal size for a focus group is between 7 and 10: groups smaller than 5 or larger than 12 may limit participants' expression of experiences and, in some cases, may lead to splits or cliques appearing within the group. The number of groups required should be determined by the amount of new information being obtained: it may be sufficient to have only four or five groups, if little new data is being gained after that. In this study, groups of between six and ten were used. Four groups were used, and the data collected was similar in all of them.

Validity and reliability of focus groups

Criteria for validity

Whilst there is a broad consensus on the criteria to be used to establish the validity and reliability of quantitative research studies in the positivist paradigm, this is not true for qualitative research. A number of nurse researchers (Morse, 1991; Clarke, 1995) hold to the view that qualitative studies should be judged using the same or modified criteria as quantitative studies. Nolan and Behi (1995) comment that this perspective presumes that the criteria of the positivist approach are the *only* acceptable criteria.

Avis (1995) contends that it is those who subscribe to the merits of triangulation as a research strategy who accept that there can be common criteria for assessing validity. This is certainly a commonly held belief. Nolan and Behi (1995), Cohen and Manion (1992), and Denzin (1970) all state that methodological triangulation increases validity, but as discussed earlier in the previous chapter, Fielding and Fielding (1986) and Morse (1991) both urge caution. Nyamathi and Shuler state that:

> *"Focus groups have high face validity, due to the credibility of the comments from participants"*
>
> Nyamathi and Shuler, 1990, p.1284.

This is particularly useful, if the data from the group is being used to aid in the construction of questionnaires, as in this study. The data from this study should also have external

validity, as the participants involved in the focus groups were selected from the same sample, i.e. students studying at the same university at the same time and living in similar accommodation, as the respondents used in the survey.

Reliability or auditability of data

Reliability can be defined as the absence of errors of measurement (Woods and Catanzaro, 1988). In qualitative research, Behi and Nolan (1995) identify the effects of the observer, selective perception, and personal limitations of the observer as frequent sources of error. These potential areas for error can be reduced by the use of tape recordings in the focus group interviews, from which the transcripts will be made, and by structuring the role of the observer. Nyamathi and Shuler (1990) state that the criterion of rigour in qualitative research should be auditability, rather than reliability. McDaniel (1996) argues that auditability is just one of several criteria that should be used. The others are credibility, dependability and transferability. These, she claims, constitute trustworthiness. She describes how documentation of each step of the analysis provides evidence of a decision trail, which is the basis for this trustworthiness. Thus, in this focus group study, the steps taken, from interview to final statements, are clearly documented.

Authenticity of data

The authenticity of data collected in focus groups is debated in the literature. Few studies appear to have compared the data from individual interviews with data from focus groups, where the same participants have been used. Macleod Clark et al (1996) cite one study, by Hoijer (1990), which seems to suggest that data from individual interviews appear to be more 'authentic' than focus group data. However, Jackson (98) suggests that it may be more helpful to consider that data obtained from the two sources is actually different rather than inferior or superior to one another.

Saint-Germain et al (1993) contrasted the findings from two studies looking at the same issues; one used a survey technique, the other used focus group interviews. While the two approaches tended to produce similar findings, the focus groups revealed some important differences. The authors conclude that surveys are more suited to documenting individual levels of knowledge and practice, whereas focus groups are more suited to reproducing attitudes and patterns of practice and explaining the reasons behind the survey findings. The use of focus groups in this study is entirely congruent with previous research in this field. In

this study, the focus groups examined patterns of eating and provided reality to the statements used in the larger survey.

Use of focus groups in questionnaire construction

Morgan, (1988), recommended that focus groups could be used to construct questionnaires, but pointed out that there was little published evidence that this was practised. In the last ten years, this omission has been addressed. The most obvious way that focus groups can assist is in item and scale construction, through providing evidence of how the respondents typically talk about the topic in question. Using 'real' statements enhance respondents' understanding and, hence, enhance the quality of the data. This is the way data from the focus group was used in this study.

Data collection

Composition of the focus group

In this study, four focus groups were convened in places familiar to the students taking part. There were two groups of nursing students and two groups of non-nursing students, with between six and ten in each group. All of the students lived in self-catering accommodation and were undergraduate students. There were more females than males that took part, but there was at least one male in each of the groups interviewed. Nursing and non-nursing students were not mixed, as it was considered better to have homogenous groups to facilitate discussion.

There are potential advantages, both with using a group of strangers and using a group of peers. Participants in the former are less likely to feel pressured or fear honest disclosure, but participants that are known to each other can be encouraged to validate data. Kitzinger (1994) found that, by using pre-existing groups as focus groups, that participants often challenged each other when a statement was made that did not reflect current practice. She also highlighted a further potential advantage, that by using pre-existing groups, the data sometimes reflected 'naturally occurring' interactions, such as might occur during participant observation.

Conduct of the focus group

The researcher took the part of the facilitator in all the focus groups. The observer was a colleague who did not participate in the discussion but made notes of group interactions. These notes can be useful, when analysing the data, to comment on group dynamics, as the tape-recorder only records verbal interactions. The facilitator introduced herself and the observer and explained how the interview would run. During this introduction, ground rules were discussed and agreed. These included the issue of confidentiality: 'what is heard in the group, remains in the group'. In order that validity is enhanced, Macleod Clark et al (1996) suggest that the principle of confidentiality is highlighted in the introductory comments made by the facilitator, and an attempt is made to encourage the group collectively to guarantee confidentiality.

Group pressure may inhibit or censure deviation from the group norm. Macleod Clark et al (1996) state that this should not invalidate the data, as knowing what is and what is not expressed in a group context may be just as important as knowing what is and what is not expressed in a confidential interview. Similarly, participants may present an idealised version of their views. Again, she suggests that others in the group may challenge this view, and disclose a more candid view of their lives. Some authors highlight the potentially supportive aspects of groups (Nyamathi and Shuler, 1990), where some may find it easier to disclose behaviour or attitudes than in a one-to-one interview. This is sometimes in direct response to another's shared experience.

Participants were reassured that there are no right or wrong answers, and that each person's experience and views are equally valued and important. The conversation was allowed to flow, and if it moved on naturally to another of the topics, the facilitator did not intervene, but merely ensured that, by the end of the discussion, all of the topics had been raised. They were encouraged to speak openly and to feel free to disagree with other members of the group. Each group lasted between 45-65 minutes.

Recording of the focus group discussions

Each focus group interview was tape recorded so that there was an accurate record of the event that could be transcribed. The destiny of the tapes used to record the interviews and any notes taken, was discussed: that normally they would be destroyed at the end of the

study. The issue of respect was also explored: there was no need to talk over one another, as there was time for all to share their views.

Transcription of the tapes

Carey (1995) states that, of all the aspects of using the focus group technique, the process of analysis is the least agreed on and the least well developed. Krueger (1995) suggests that there are three options for analysis: making a full transcript of the tapes; making an abridged transcript of the tapes, that contains the most pertinent data; and real-time transcripts, where there is a typist with a laptop in with the group. It depends partly on what the data is being collected for, as to which option is the most appropriate. The tapes in this study were transcribed, making an abridged transcript. A full transcript was not considered necessary, as the data collected was converted into a quantitative questionnaire, rather than the sole data for a qualitative study.

Recruitment for the focus groups

Posters were displayed in a Hall of Residence and the School of Nursing and Midwifery, inviting students to take part in the focus groups (see Appendix B). Groups were convened at times suitable for the students, and met in familiar surroundings. Refreshments were provided following the group discussions. The focus group study took place at the end of the academic year.

Content of the focus group discussions

Each of the focus groups were conducted using a similar protocol.

The following questions were discussed in each focus group:

- What sorts of foods do you eat?
- What factors influence what you eat?
- Do you generally eat on your own or in groups?
- Do you think your diet has changed since coming to university?
- Do you consider yourselves to eat a healthy diet?
- What would motivate you to change your diet?

The initial topic was used to allow all participants to comment and for the group to feel comfortable with one another. During the conduct of the discussions a variety of triggers were used as prompts, when necessary: cost; shopping and cooking; food labelling; peer pressure; social aspects of eating; meal skipping; health issues.

Method of Analysis

Conversion of qualitative data

There is a lack of documented evidence or guidelines on how to convert qualitative data from focus groups into a quantitative instrument. The method of conversion employed in this study is that described by Stewart et al in 1994. They provide a detailed description of how to convert focus group data into a questionnaire. In their study, 57 focus group sessions were conducted and the data converted into a quantitative instrument. They state that using qualitative data in this way ensures a greater level of construct validity for the instrument developed than would be possible with researcher generated factors or factors identified through the literature. These latter two are the methods traditionally used in the construction of quantitative instruments.

In this study, the concepts expressed by participants were identified for each transcript. McDaniel (1996) advocates calculating a composite frequency for each concept. In this way, the most common ones can be identified and used, either in the development of a questionnaire, or grouped into categories. This technique was employed in this study, to ensure that the most common concepts were the ones used in the development of the statements given in the questionnaire.

Development of codewords

Codewords were generated and used to categorise the data. These codewords were based on a grounded approach. Stewart et al (1994) stress that producing a list of codewords that clearly and completely represents the data is of key importance. In this study, one transcript was analysed, initially, to develop a list of codewords, for all appropriate themes. All the comments or phrases that represented a particular theme were underlined in the transcript, using the same coloured pen. A different colour was used for each codeword. The researcher then used this list of codewords to code the other transcripts.

Other codewords were added/adapted to include additional themes identified in other transcripts and to further refine the list of codewords. A final codeword list was eventually produced. All transcripts were then reanalysed, by the researcher, after one week, to ensure intra-rater reliability. A high level of agreement was found. It is acknowledged that this is not the ideal way of ensuring validity, as it is best to use another researcher who is blinded from the first researcher's analysis. This is often an expert in the field.

Development of categories

The codewords were organised into general categories. For example, if cost was a general category, then price and personal finances might be the individual codewords. The codewords were neutral and assigned to both positive and negative comments. No coding was given if, either, the text was too vague to assign an influence on food choice, without speculation on the part of the transcriber, or if the participant generalised about influences on food choice, without referring to their own eating. If data reflected more than one category, the text was coded with more than one codeword.

Results of focus group discussions

Factors that affect food choice

The first question that was asked was 'What sorts of foods do you eat?' In all groups this led naturally into a discussion about factors influencing eating habits and food choices. In some groups, where the focus appeared rather narrow, a prompt of 'what other factors influence what you eat?' was made. Other prompts included 'is cost an issue?' 'what about shopping?' 'do you ever read the labels on food?' 'do you ever think about the nutritional aspects of the food you eat?' A summary of the categories and codewords developed from participants' responses and frequencies of their occurrence is given in **Table 1**. Examples of student comments on this topic are given below.

In response to the prompt: 'is cost an issue?'

- 'sandwiches are expensive-easier to buy crisps and Mars'
- 'it comes down to cost'
- 'if you want to eat healthily, it costs more in the end'
- 'no time to make sandwiches'

- 'I eat mainly vegetarian –its cheaper'

In response to the prompt: 'what about shopping?'

- 'takes time and it's a hassle to get the bus' (to go to a supermarket)
- 'tend not to eat vegetables: they go out of date so quickly, and it's a hassle going to the shops'
- 'storage is a problem – theft too'
- 'its difficult to keep fresh food'

In response to prompt: 'do you ever think about the nutritional aspects of the food you eat?'

- 'its mainly what you've been brought up to eat'
- 'I know if I've been eating too much junk food: my exercise performance is down'
- 'so much of what we do is about health education- we know what's good for us'
- 'I think there are so many conflicting messages: I just think whatever you eat is bad for you, so what's the point of worrying? You might just as well eat it'
- ' I feel very self-conscious about eating unhealthy stuff'
- 'other people influence what I eat'
- 'I tend to go for something cheap, rather than nutritious'

In response to the prompt: 'do you ever read the labels on food?'

- 'I look at the fat content and compare brands'
- 'my mum does it – so I do it'

Meal patterns and eating habits

The next area explored was eating habits and meal patterns. Participants were asked if they generally ate on their own or in groups. Where necessary, the prompts 'does that influence your eating patterns?' or 'do you ever skip meals?' were made. Again, a summary of the findings, analysed by codeword and category, is given in **Table 1**. Examples of participants' comments on this topic are given below.

- 'its complicated to shop and cook in groups'
- 'meals are timed around the TV, rather than when hungry'
- ' shifts mess me up- I eat sandwiches all day'
- ' I have to eat breakfast- otherwise I feel so hungry'

- 'its nice to eat as a group –it's a social event'
- 'I tend to have a set routine'
- 'I might not eat if you're hungry but its too crowded in the kitchen'
- 'I tend to snack – to graze during the day'

Changes to eating patterns

The next topic explored was whether or not students felt that their diet had changed since leaving home. Groups were asked 'do you think your diet has changed since coming to university?' See **Table 1** for details of the analysis of these responses. Examples of responses are given below.

- 'I didn't tend to eat between meals at home, but at university, I tend to eat more rubbish - it's easier, quicker, more convenient'
- 'living at home, I ate healthily as meals were prepared'
- 'I think my lifestyle has improved since coming to university'
- 'I eat for comfort at times of stress'
- 'my diet hasn't changed (since coming to university) but its become a lot less varied'
- 'I eat at different times of day – it depends what else is happening'

Links between diet and health

The next topic raised was about health and diet. Participants were asked if they considered themselves to eat a healthy diet. The prompt 'do you ever think about health issues when considering what to eat?' was given, if needed. **Table 1** gives details of the analysis of this data. Examples of comments made are identified below.

- 'I look for iron and things'
- 'I prefer to go for low-fat varieties but its sometimes more expensive'
- 'conflicting advice about what you should eat-its confusing'
- 'I think fitness comes into it-I feel fitter at a certain weight'
- 'If I had more money I would eat more healthily-definitely!'

Motivating factors to change

The final topic was related to motivation: participants were asked 'what would motivate you to change to a healthier diet?' Details of the analysis of this data are shown in **Table** . The following statements are examples of responses given.

- 'when you see patients on the ward, you can't help but think about the future, but it only lasts a few days'
- 'I've got cholesterol in the family –I start term trying to be careful'
- 'I tend to ignore leaflets, because you see so many'
- 'I know I should eat better, but I can't be bothered'

Analysis of findings from focus group discussions

Using the method described earlier in this chapter, a total of nineteen different codewords were generated from the focus group data. A composite frequency, for each codeword, was calculated, of the number of times a topic was mentioned by participants, from all transcripts. The number of statements used in the questionnaire reflects the frequency of codewords found (See **Table 1**).

These nineteen codewords were then organised into general categories, in the way described earlier in the chapter, and ten categories were identified. These were

1. Cost
2. Time /convenience
3. Change in eating pattern
4. Background /culture
5. Social aspects of eating
6. Environment
7. Peer pressure
8. Knowledge
9. Routine /habit
10. Motivation.

Each of these categories reflects themes identified in previous research in this field, which

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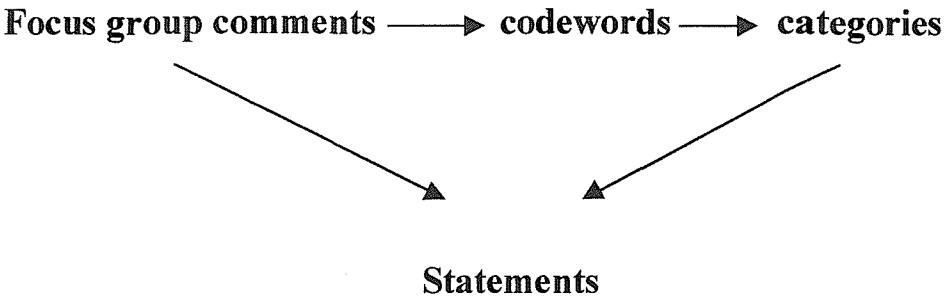
Table 1: Analysis of data from focus group discussions

Category	Codeword	Frequency of comments
Cost	price of food	21
	personal finances	29
	cooking for one	19
Environment	resources: storage, hygiene, space	10
Social aspects of eating	group eating/alone	33
Peer pressure	to eat unhealthily	21
	to eat healthily	10
Culture / background	family norms	23
	influence of mum	14
Change in eating patterns	improved diet	12
	worse diet	24
Time / convenience	hassle of shopping /cooking, busyness	34
Routine / habit	skipping meals	17
	effect of shift work	16
Knowledge or lack of knowledge	healthy eating messages	35
	food labelling	6
	about calories	6
Motivation	being bothered	4
	concern for future	12

A total of 20 statements were developed from these 10 categories, using the participants' own language where possible (see **Table 2**). Each statement reflected a codeword. Where there was a high frequency of comments for that codeword, two statements were chosen, to reflect different aspects of the codeword. **Figure 1** shows how the final statements used in the questionnaire were developed, by using verbatim comments made in the focus group discussions, which had been categorised into codewords. These codewords were then sorted into themes, or categories. The statements reflected the categories.

Figure 1: Flow diagram of development of statements for questionnaire



Discussion

The findings from this focus group study were used directly in the second part of this research study, in the questionnaire design. The twenty statements identified in **Table 2** form the content of the section of the questionnaire: 'Factors that influence food choice and eating habits'. The statements were used with a 5-point Likert-type scale, from 'strongly agree' to 'strongly disagree', and respondents were asked to give the answer that best reflected how they felt about each statement. Details of the questionnaire design are given in chapter 4. A discussion of the factors that influenced the eating habits and food choices of the respondents, drawn from the findings of both the focus group work and the questionnaire, are presented in Chapter 6, Discussion.

Table 2: Statements taken from the categories and codewords, which were used in the questionnaire study

Category	Codeword	Statement
Cost	**Price of food**	I tend to go for something cheap, rather than nutritious
	Personal finances	If I had more money, I would eat more healthily
		I eat mainly vegetarian food because it cheaper
	Cooking for one	It's more expensive to cater for one
Environment	**Resources**	I might not eat, even if I'm hungry, if it's too crowded in the kitchen
Social aspects of eating	**Group eating/alone**	Its nice to eat as a group-it becomes a social event
Peer pressure	**To eat unhealthily**	Other people influence what I eat
	To eat healthily	I feel self-conscious eating unhealthy stuff
Culture/background	**Family norms**	I was brought up to have family meals together: its important
	Influence of mum	What mum cooks influences what I eat now
Change in eating pattern	**Improved diet**	I eat more healthily at University, than at home
	Worse diet	I eat more healthily at home where meals are prepared
		I eat more junk food away from home: it's comfort food
Time/convenience	**Hassle of shopping/cooking**	No time to go out and buy fresh vegetables to cook
		I tend to eat more rubbish at University: it's quick and convenient
Routine/habit	**Skipping meals**	I have to eat breakfast, otherwise I feel so hungry
	Effect of shift work	Its difficult to have a regular eating pattern at University
Knowledge or lack of knowledge	**Healthy eating messages**	There are so many contradictory messages; listen to everything, and you wouldn't eat anything
	Food labelling	I tend to go for something cheap, rather than nutritious
	About calories	I try to eat low fat varieties to control my weight not because of heart disease
Motivation	**Being bothered**	I know I should eat better, but I can't be bothered
	Concern for future	

CHAPTER 4

Questionnaire Methodology

Study objectives

The second phase of the study was the self-completion questionnaire. This was designed to meet the aim of the study, through an examination of the objectives derived in chapter 1.

Objective 1: to explore the understanding that a group of nursing and non-nursing students have about the term 'healthy eating' and it's benefits.
Objective 2: to compare the level of nutrition knowledge in a group of nursing students to that in a group of non-nursing students.
Objective 3: to explore and compare the sources of nutrition information used by nursing and non-nursing students.
Objective 4: to compare the attitudes toward healthy eating in nursing and non-nursing students.
Objective 5: to explore the 'intention to change' to a healthier diet in nursing and non-nursing students.
Objective 6: To compare the dietary intake in a group of nursing students to that of a group of non-nursing students.
Objective 7: To discover whether, in a group of nursing and non-nursing students, there is a relationship between dietary intake, nutrition knowledge and attitudes towards healthy eating.
Objective 8: to identify differences in BMI between nursing and non-nursing students and to explore the relationship between Body Mass Index and dietary intake, nutrition knowledge and attitudes.
Objective 9: to examine the factors that influence the eating habits and food choices of a group of nursing students and non-nursing students.

The questionnaire utilises the findings from the focus group study discussed in the previous chapter, to explore respondents' perception of the factors that influence their eating habits and food choices. It also examines dietary intake, nutrition knowledge and attitudes toward healthy eating. Details of all of these are given later in this chapter. The first part of this chapter examines the advantages and disadvantages of using questionnaires as a research tool for collecting quantitative data, including an analysis of the issues of validity and reliability.

Benefits and limitations of using questionnaires

Questionnaires are one of the most commonly used research methods in nursing and there are a wide range of advantages to their use. Robson (1993) suggests that the biggest advantage is that questionnaires are an efficient way of providing large amounts of data, at relatively low cost, in a limited period of time. Other advantages identified in the literature are that they are a relatively simple and straightforward way of obtaining data, and indeed, may be the only way of retrieving historical or prospective information about people. Robson also states that, if highly structured, the use of questionnaires can yield large amounts of standardised data. They also allow for anonymity, which is more likely to facilitate openness and honesty, as well as avoiding interviewer bias.

Unfortunately, they are not always the most effective and there are an equally large number of disadvantages associated with the use of questionnaires. Oppenheim (1979) identifies a poor response rate, which is likely to affect the representativeness, and hence the possibility of bias, as an important disadvantage. Non-response is not a random process, and the characteristics of the responders may be very different from those of the non-responders, and therefore the results may be seriously skewed. This issue is discussed in chapter six, the discussion.

Questionnaires may lack the personal touch, unless they are hand-delivered or completed on a one-to-one basis. This strategy may increase the response rate, but may reduce anonymity and introduce an interviewer effect. The questionnaires in this study were delivered personally. A letter of explanation, emphasising confidentiality, to encourage students to respond, accompanied each questionnaire (see appendix C).

The questions asked have to be simple and straightforward, as no additional material will be available to respondents, and ambiguities may go undetected. By using the data from the focus group work, which draws on the students' own words for part of the questionnaire, it was hoped that misunderstandings or ambiguities would be avoided. The data was limited to the responses given, as there was no opportunity to ask further questions, to clarify, amplify or illustrate answers. Neither was there any possibility of collecting data about the context; for instance, non-verbal cues. Another disadvantage was that the respondents may not necessarily have been telling the truth, as there may have been an element of giving the answers the respondents thought the researcher wanted to receive: this is known as the social

desirability response bias. By ensuring anonymity of respondents, this limitation may have been minimised.

Sample Frame

The study took place in semester 1 of the academic year 1998-1999. All forms of sampling require a sampling frame. The sample frame, or target population, in this study, were all students studying nursing at a University School of Nursing and Midwifery at the time of the study, who were in their second, third or fourth year, and who lived in self-catering accommodation, plus all non-nursing students living in self-catering accommodation, who were studying at the same University. In this study, a non-probability sample was used, which was a subset of the target population.

The following exclusion criteria were applied:

- Students, who lived at home, with their families. This is because it was thought that catering for a family or being catered for by family would alter the factors that influenced choice of food and eating habits. This was done to try and increase the homogeneity of the sample, and thus strengthen the sample design.
- In the student nurse sample, all classes of first year students. This was because they would have received little of the nutrition education and would have had little exposure to patients with nutritional problems in clinical areas.
- In the student nurse sample, all those who were not in school in the weeks when data was being collected. This was an opportunistic sample.
- In the non-nursing sample, all students who were not living in self-catering accommodation in a certain complex of University Halls of Residence were excluded.

An assumption was made that there were no known differences between the sample characteristics and the population characteristics. A total of 95 student nurses were eligible to complete the questionnaire. A similar number of non-nurses in the Halls of Residence were approached to complete the questionnaire.

Distribution and collection of questionnaires

Nursing students were approached at the end of lectures, to take part in the study, and questionnaires handed out as they left. A reminder was given at the end of lectures a week later, and all students were sent an e-mail reminder, 2 weeks later. Students were asked to place the completed questionnaires in a labelled box in the School of Nursing and Midwifery Reception. Students from a range of cohorts in years 2, 3, and 4 were invited to participate.

Non-nursing students were approached through their Halls of Residence. Only students living in self-catering accommodation were invited, as few of the nursing students live in catered Halls after their first year. Also, many of the non-nursing students would be continuing students, i.e. not in their first year. The Warden of a complex of University Halls of Residence was approached, for permission to access students. Students were asked at a Hall meeting for their permission, and sub-wardens involved in the distribution of questionnaires to student flats. Again, a reminder was given to all those invited to take part. Questionnaires were collected from the student flats. Questionnaires were distributed to the first 100 students at home at the time of the questionnaire distribution.

Validity and reliability of questionnaires

Validity

Benefits and limitations of questionnaires are not the only issue. It is important to consider the issues of validity and reliability, in relation to the design and analysis of questionnaires. Robson (1993) says that surveys are " *Falsely prestigious, because of their quantitative nature* " (Robson, 1993, p.125).

Internal validity depends on the trustworthiness of the data, which, in turn, depends on the expertise of the researcher carrying out the survey. There are a number of ways in which the validity can be affected: if the questions are ambiguous or incomprehensible; if they are leading or loaded; if there is no clear response and the respondent is forced to make a choice; or if the questions do not adequately represent the different facets of the issues under investigation. The questionnaire was carefully devised to minimise these factors and thus increase internal validity.

Reliability

Woods and Catanzaro (1988) define reliability as the absence of errors of measurement. The higher the level of reliability, the greater the confidence one has in the results. Errors occurring during measurement may arise from various sources. Behi and Nolan (1995) identify faulty instruments, coding errors, and response set bias, where respondents give what they consider to be socially acceptable answers, as common areas of error in quantitative research. Errors were minimised in this study in a number of ways. In the first two sections of the questionnaire, tools that had already been found to be reliable were used, to reduce error from faulty instruments (Roe et al, 1994, Towler and Shepherd 1990). Maintaining anonymity and asking very specific questions helped to reduce response set bias and using a computer for scanning and analysis of data helped to reduce coding error.

Robson (1993) states that high reliability should be possible, because every respondent is asked the same set of questions in the same way. However, if the questions or the instructions are not clear, different respondents may interpret them in different ways and this will reduce the reliability of the data. Factors such as frequency of events or amounts are difficult to word: words like 'often', 'sometimes', 'a little' or 'moderate' can mean different things to different people. The wording of questions in this questionnaire was as precise as possible.

Respondents can suffer from questionnaire fatigue if it is too long or boring, but if they are interested in the topic or motivated to complete the questionnaire, then the length is not an issue. It was anticipated that as this study was about a topical health issue, respondents would be motivated to reply.

The validity and reliability of a questionnaire can be improved by conducting a series of pilots, prior to the main survey. Oppenheim (1979) says that comprehensive pilot work pays off, by reducing the risk of errors. Pilot studies were used in this study. (see p.62)

Structure of the questionnaire

There do not appear to be any rules about the order of questions, beyond the suggestion that general questions should precede specific ones, although Oppenheim (1979) points out that

the ordinal position of multiple questions may need to be considered, as respondents are more likely to pick first and last responses. It is also important that the topic has been thoroughly researched, to ensure that the content of the questions is relevant and appropriate. Deriving part of the questionnaire from focus groups, ensured that the content and the wording of questions was as relevant and appropriate as possible.

In order to keep the number of open questions to a minimum, pilot work is useful to suggest alternatives. Again, the focus group work helped with this. Open-ended questions are better suited to interview-style surveys, as they give the respondent an opportunity to interact with the researcher, but they can be useful in questionnaires. They give the respondent freedom of choice in the words they use, and allow for spontaneity, but some of the richness of the response may be lost in the coding, unless they are analysed using a qualitative framework, such as content analysis. There were a limited number of open questions used in this questionnaire, which were analysed by content analysis. For example, *"how would you describe the term 'healthy eating'?"*

Closed questions are easier and quicker to answer, but lose the expressiveness of open questions, and are often less subtle. One of the problems with closed questions is that responses are often squeezed to fit pre-determined boxes. Where appropriate, a *no-opinion \ not applicable \ other option,* was offered in this questionnaire, or an open section at the end of the boxes included. For example, following the pilot study, a '*none*' category was added to the frequency choices for each of the food types in the section on dietary intake. The use of specific questions, rather than general ones, can reduce the amount of subjective interpretation of answers, but need to be carefully piloted, to ensure that the best questions are posed, to address the issue in focus. For example, questions in the nutrition knowledge section such as *'which **one** of the following is the main source of calcium in the diet? Meat / dairy products / fruit and vegetables / cereals'.*

Content of the questionnaire

The final questionnaire was composed of six sections: personal details, dietary intake, nutrition knowledge, factors influencing eating habits and food choices, attitudes toward healthy eating and concepts of healthy eating.

Personal details

In which faculty are you studying? This identified nurses from non-nurses.
Year of study, Age, Type of accommodation, Age, Gender, and reported ***Height and Weight.*** The influence of each of these factors was explored, within, and between, the two groups. Reported height and weight were used to establish Body Mass Index. Weight, in kilograms, and Height, in metres, were used in the following equation to estimate BMI.

$$BMI = \frac{\text{weight in kg}}{\text{height in m}^2}$$

The relationship between BMI and other factors was explored. External validity of the responses to weight and height have not been verified, but they appear to be consistent with epidemiological data from European sources (Bellisle et al, 1995). Therefore the body mass index results must be viewed with caution. Assurance of confidentiality may have helped ensure accuracy.

Dietary intake

Use of DINE questionnaire

This study was not aimed at analysing the diets of university students, in terms of absolute nutrient intakes, but rather to identify the eating patterns, in terms of the balance of nutrients. This section of the questionnaire was derived from the DINE (dietary instrument for nutrition education) questionnaire, mentioned in Chapter 1, which was designed by Roe et al. in 1994, to provide a quick estimate of fat and dietary fibre intake in typical UK diets. Validity of this tool was demonstrated by Roe et al. by comparing results from this questionnaire with a detailed 4-day diet record of 206 subjects. There was exact agreement of categorisation for 53% of fat intakes and 52% of fibre intakes. Pearson correlation coefficients between the two methods were 0.51 for fat, 0.46 for fibre and 0.43 for the unsaturated : saturated fat ratio. These were all significant at $P<0.001$ (Roe et al. 1994).

This food frequency questionnaire was chosen because it is a British tool that is relatively brief, has been used in a number of studies and it has been previously validated. The tool was designed to be administered by an interviewer, but has been adapted for self-completion.

The author helped in the adaptation of the questionnaire, and has given her permission for the tool to be used in this study (Personal communication from Roe). Most of the adaptations related to ensuring that the instructions for use were clearer and the layout easier to follow, as there was no interviewer involved.

The word 'serving' was emphasised to ensure that respondents understood what was being measured and a 'none' option added so that respondents did not omit a question if they did not eat a particular food. The section on vegetable consumption was expanded to include the option 'twice a day or more', which was given a score of double the 'once a day' score. This was to get a closer estimate of vegetable consumption. These alterations introduced minimal changes to the scoring from the validated version, but were borne in mind when comparing the results of the proposed study with those from Roe et al's.

Completion of DINE questionnaire

Subjects were asked about their usual consumption of a wide range of foods. They were required to identify the amount of each food they ate in a day or week (depending on the type of food) and the type of fat they used in cooking. Most options ranged from 'none' or 'never' through 'less than once a day/week' to 'twice a day or more/5 or more' depending on the question. In question 4, the options related to fractions of a pint, and in question 5, respondents were asked to specify the number of rounded teaspoons of fat they used in a day.

1. ***About how many pieces or slices of the following types of bread or rolls or equivalent do you eat on a usual day?***
2. ***About how many times a week do you have a bowl of the following types of cereal or porridge?***
3. ***About how many times a week do you eat a serving of the following foods? This was followed by a list of foods such as pasta/rice, beans/lentils, other vegetables, fruit, beef/pork/lamb, fish, burgers/sausages, cheese, any fried food, and biscuits/chocolate/crisps.***
4. ***Approximately how much of the following types of milk do you use, each day?***
5. ***Approximately how much butter/margarine or other spread do you use in a day?***
6. ***What sort of fat do you use – on bread/vegetables? For frying? For baking/cooking?***
7. ***Are you currently following a special diet of any kind?***

Analysis of DINE results

The data was analysed, using predetermined figures for each individual item, to produce a total score or rating for fibre, total fat and unsaturated fat intake, from low to high (see Appendix D for details). Thus, groups could be directly compared.

Categorisation of DINE scores: this method of analysis does not estimate energy intake, merely the total fat or fibre intake. The low fat category (fat score less than 30) is designed to represent a fat intake of 83g/day or less, which corresponds to 35% of the energy Recommended Daily Allowance (RDA) for moderately active adults. This is the level recommended in the Health of the Nation paper (DoH, 1992). The high fat category (fat score more than 40) represents a fat intake greater than 122g/day, which is 40% of the energy RDA. The low fibre category (fibre score less than 30) corresponds to a dietary fibre intake of 20g/day or less, which is approximately equal to the national average. The high fibre category (fibre score more than 40) corresponds to more than 30g/day, the amount recommended by the National Advisory Committee on Nutrition Education (NACNE). Unsaturated fat scores denote the amount contributed by fat added to the diet, and are classified, empirically, into low, medium and high. The higher the score, the more unsaturated fat contributes to the diet.

Nutrition knowledge

Examining knowledge

There are a number of ways in which knowledge of nutrition could be examined, and many different types of information that could be assessed. The focus of this study was the relationship between dietary intake and nutrition knowledge, attitudes and food choices. The literature suggests that it is not an understanding of what constitutes healthy eating that is lacking, but rather an ability to translate that understanding into a working knowledge of different foods (Buttriss, 1997). It was therefore decided to assess subjects' ability to identify foods that were high in certain nutrients, in addition to their understanding of general nutritional issues related to healthy eating. In this way, it was hoped that any link between knowledge, attitudes and behaviour could be determined.

Specific nutrient knowledge

This section was therefore adapted from Towler and Shepherd's nutritional knowledge questionnaire (1990) mentioned in Chapter 1. Again, this is a validated tool, capable of discriminating between groups. It was first used as a self-completion questionnaire, to compare engineering students with nutrition professionals. Thus, the context is quite similar to this study. There were two parts to the nutrition knowledge questionnaire- a forced choice nutrient density section and a multiple-choice section. The first section has been taken directly from Towler and Shepherd's paper (1990). Respondents were instructed to choose ten foods from each list of twenty, that they considered to be high in each of the particular nutrients: either protein, carbohydrate, fat or fibre. Respondents were instructed: ***Assuming equal weights of the following food types, please choose 10 foods that you think are high in protein / carbohydrate / fat / fibre.***

This instruction was followed by a list of twenty foods, which differed depending on the nutrient being asked for (The list of foods is given in the questionnaire, in Appendix E).

In the process of validation, Towler and Shepherd excluded all foods where there was a high level of agreement, from the lists, leaving only those items that were considered to be good discriminators. Items were scored as +1 for a correct response, and –1 for an incorrect response. The reliability of this tool was tested using Cronbach's alpha (Cronbach, 1984). A score of 0.82 was achieved, which demonstrates an adequate internal reliability. Validity was demonstrated, by conducting a one-way analysis of variance between the two group scores, for each of the four main nutrients. These were all significant at 'p'<0.001. This shows that the tool is capable of distinguishing between groups with different characteristics. Permission was given by the authors for this tool to be used in this study, and the food lists used were the same as in the original study.

General nutrition knowledge

Towler and Shepherd (1990) included a multiple-choice section in their nutrition knowledge questionnaire. The concept was applied here, but different questions were used, that reflected more fully an understanding of issues related to healthy eating. Seven multiple-choice nutrition knowledge questions were included. These were taken from a number of published studies (Hooper and Barker, 1995, Charney and Lewis, 1987, Shepherd and Towler, 1990) and attempted to test more general areas of knowledge related to healthy eating.

An understanding of the nature and role of fats in the diet were tested, using 3-point multiple-choice questions:

5. ***Which of the following is high in monounsaturates?*** *Sunflower / animal fat / olive oil*
6. ***Which sort of fat is bad for your heart?*** *Saturated / polyunsaturated / monounsaturated*
7. ***Fat is an important source of energy:*** *True / false / don't know*
8. ***What is the current recommended percentage of fat in the diet?*** *20-25% / 30-35% / 40-45% / 50-55%*

Knowledge about sources of the micronutrients calcium, iron and anti-oxidant vitamins, were tested, using 4-point, multiple-choice questions:

9. ***Which of the following are the main sources of iron in the UK diet?*** *Meat / dairy/ vegetables / cereals*
10. ***Which of the following are the main sources of anti-oxidant vitamins in the diet?*** *Meat / dairy / vegetables / fish*
11. ***Which of the following are the main sources of calcium in the diet?*** *Meat / dairy / vegetables / cereals*

Shepherd and Towler (1990) provided the question on the value of fat in the diet. Questions about foods high in iron and anti-oxidant vitamins, types of fat and recommended intakes of fat were adapted from Hooper and Barker (1995), and the question on the link between fat and heart disease was adapted from Charny and Lewis (1987). Shepherd and Towler (1990) generated a total score, from the sum of the nutrient density and multiple-choice sections of the questionnaire. This pattern was followed in this study.

To summarise, two different types of questionnaire were used to assess level of nutrition knowledge. Food knowledge was tested using lists of foods containing high and low levels of certain nutrients, and general nutrition knowledge was tested using a seven-item multiple choice questionnaire. A score for each of the main four food groups, fat, fibre, carbohydrate and protein was computed, as well as a total nutrient score. A total score for the general nutrition knowledge MCQ was calculated, and the sum total of the two parts computed (total knowledge score). The results were then compared between groups.

Factors influencing eating habits and food choice

This was the section derived from the focus group data, and consisted entirely of 5-point Likert-type statements, from strongly agree to strongly disagree. There were ten factors that were the ones mentioned most frequently by students when discussing the factors that influenced eating habits and food choices. These 10 factors were presented as 20 statements, with which respondents were asked to agree or disagree. Some of the factors were represented by one statement, some by up to four statements. The statements are coded into the 10 categories that they represented. Levels of agreement for each of the statements were recorded as a percentage, according to whether it was a positive or negative statement about healthy eating and a composite percentage score was calculated, taking account of the number of statements making up each category.

1. ***If I had more money, I would eat more healthily***
2. ***No time to go out and buy fresh vegetables to cook***
3. ***Other people influence what I eat***
4. ***I eat more healthily at University, than at home***
5. ***What mum cooks influences what I eat now***
6. ***Its nice to eat as a group-it becomes a social event***
7. ***I have to eat breakfast, otherwise I feel so hungry***
8. ***I might not eat, even if I'm hungry, if it's too crowded in the kitchen***
9. ***I tend to go for something cheap, rather than nutritious***
10. ***I feel self-conscious eating unhealthy stuff***
11. ***I eat more healthily at home where meals are prepared***
12. ***There are so many contradictory messages; listen to everything, and you wouldn't eat anything***
13. ***I tend to eat more rubbish at University: it's quick and convenient***
14. ***I try to eat low fat varieties to control my weight not because of heart disease***
15. ***I eat mainly vegetarian food because it cheaper***
16. ***I was brought up to have family meals together: its important***
17. ***It's more expensive to cater for one***
18. ***I eat more junk food away from home: it's comfort food***
19. ***Its difficult to have a regular eating pattern at University***
20. ***I know I should eat better, but I can't be bothered***

Attitudes toward healthy eating

Nine attitudinal statements were also included in this scale, derived from the literature (Monneuse et al, 1997, Kearney et al, 1997, Shepherd and Towler, 1992, Stafleu et al, 1996). These statements reflected attitudes towards fat, fibre, healthy eating and a healthy lifestyle. In each case, respondents were again asked to agree or disagree, using a 5-point Likert scale, to the statement. The first four statements, taken from Monneuse et al's study (1997) reflected personal behavioural attitudes:

'***I make an effort to…. eat fibre, avoid fat, exercise regularly, avoid snacking'***.

The next two, taken from Kearney et al (1997) reflected personal perceptions of healthy eating:

'I do not need to make changes to the food I eat, as it is healthy enough' and ***'I do not usually think about the nutritional aspects of the food I eat'.***

The final three statements were taken from Shepherd and Towler (1992) and reflected knowledge attitudes of the benefits of eating a healthy diet:

'eating fibre and fat is beneficial' and ***'healthy eating is important'***.

Concepts of healthy eating

The three final questions explored the respondents' concepts of healthy eating. Firstly, respondents were asked:

How would you describe the term 'healthy eating'?

The responses to this open question were subjected to a content analysis. The codes were largely pre-classified, using a similar classification to that used by Margetts et al (1997) in the pan-EU study. This consisted of eight broad categories: 'balance and variety'; 'more fruit and vegetables'; 'less fat'; 'less sugar'; 'more fibre/starch'; 'fresh, natural foods'; 'less red meat/more white meat/fish'; 'nutrients, including vitamins and minerals'. One further category was added to this, following a preliminary analysis: 'foods that are good for you / keep you healthy'. A category for 'no response' was also added. Finally, a composite category of 'either more fruit/vegetables or less fat or balance/variety' was scored. This is in line both with Margetts' study and with dietary guidelines available in the UK.

Respondents were then asked:

Do you consider that there are benefits from eating a healthy diet? *Yes / no*

If the answer was 'yes', they were asked to ***rank, in order of importance to them personally, the following six benefits of eating a healthy diet***:

Stay healthy / prevention of disease / improved quality of life / weight control / be fit / other.

This was taken from the study by Zunft et al. (1997).

In the final question, respondents were asked to ***identify up to 3 sources of information on healthy eating, from a list of twelve, that they had found the most helpful.*** (Almeida et al. 1997):

Advertising / government agencies / TV or radio / magazines or newspapers / supermarkets / friends or relatives / food packaging / health professionals / books / healthfood shops / school or university / consumer organisations.

Intention to change eating patterns

At the end of the questionnaire, subjects were asked:

Do you intend to change your eating patterns? *Yes / no / don't know*, giving reasons.

These were subjected to content analysis and themes identified. This question was added because Shepherd and Towler (1992) predicted an association between behaviour and intention, which in turn is predicted by attitudes. They said that this association was much stronger than that between behaviour and knowledge. This prediction was explored in this study.

Pilot study

The validity and reliability of this questionnaire was improved by conducting a series of pilots, prior to the main survey. It was important to get the format of the questions, the wording and the content right, and to pilot the questionnaire on a similar sample to the 'real' sample. Oppenheim (1979) urges the researcher to keep the aims of the study in mind at all times, by asking themselves the questions *"why do I need this answer?"* and *"what will I do with the answer?"* These questions were taken into consideration during the pilot work.

Changes made to pilot study questionnaire

The questionnaire was piloted on nine nursing and non-nursing students, who were not involved in the final study. A number of minor changes were made, to the content of questions and to the wording, in order to enhance clarity, reduce ambiguity and to increase the analysability of questions. For example, in the section on understanding of healthy eating, there was a question in the pilot study that asked respondents to choose which of four options best described their understanding of the term 'healthy eating'. This was answered correctly by almost all respondents and was therefore a poor discriminator. It was replaced in the final questionnaire with an open question that asked respondents to describe the term 'healthy eating'.

In the same section in the pilot study, respondents were asked to identify the most significant benefit of healthy eating from a list of six options. This was replaced in the final version by a question, which asked respondents to rank order a list of benefits. This yielded far more data and allowed respondents more scope. The final question included an 'other' category, so that respondents were not forced to make a choice from limited alternatives.

Several sections of the questionnaire were taken from previously validated research tools. The content and wording in these sections were not changed, so that the validity of the tool was not compromised, and direct comparisons could be made between the results of this study and the original research. For example, in the pilot study, an additional question was formulated in the nutrition knowledge section, that examined knowledge of foods high in calcium. This was replaced in the final version by a multiple-choice question on calcium so that the food knowledge scores could be directly compared to the scores from the original set of questions devised by Towler and Shepherd (1990).

The final questionnaire was piloted again, using colleagues, to ensure maximum user-friendliness, and a few final adjustments were made, such as allowing height and weight measurements to be given in either metric or imperial units. As the questionnaire was computer generated, the amount of handwriting was kept to a minimum, by maximum use of options. Subjects were asked to write in capital letters, to optimise readability. The responses to these open questions were analysed by hand, using a content analysis approach.

Analysis of questionnaire

Descriptive statistics

Most of the questions asked in this study were closed questions. There are a number of different ways in which closed questions can be written, and the structure may affect the way in which the responses can be analysed. If the questions require a yes \ no answer, such as the final question ***'do you intend to change your eating pattern?'*** then the data can only be analysed using descriptive statistics.

Descriptive statistics give information about the level of distribution (e.g. mean, median) and the variability or spread (e.g. range and standard deviation). The mean is used to denote the average of a range of figures (sum of figures divided by the number of figures) where the data is continuous, e.g. weight or knowledge score. There are a number of ways in which the spread of the data can be shown. The range indicates the entire sample; i.e. the highest and the lowest values.

It may be that these values are atypical of the majority of the data and a common way of showing the dispersion of data is by using the standard deviation (S.D.). This indicates the deviation around the mean, and therefore it needs to be quoted with the mean. This shows if the data is close or spread out. If the data is normally distributed, it can be stated that 68.3% of the sample will lie within one S.D. of the mean, and 95.4% within 2 S.D. 3 S.D. takes it to almost 100% (99.7). The smaller the standard deviation, the more homogenous the sample is, and the more meaningful the mean. Means and standard deviations were used frequently in this study; for example, food intake scores, nutrition knowledge scores and total attitude scores.

Inferential statistics

On the other hand, inferential statistics allow inferences to be made about the data. If respondents are asked to complete a checklist, then the data is nominal; if asked to rank in order, or complete a Likert style scale, then the data is ordinal. In this study respondents were asked to rank the benefits of healthy eating and a Likert style scale was used in both the factors influencing food choices and eating habits, and in the attitude sections.

If the responses can be aggregated to form a total score, for instance, food intake score or nutrition knowledge score, then they can be compared with other scores and interval data statistics can be used. There are four levels of measurement: nominal, which purely categorises data, ordinal, which ranks the data, but does not assume an equal spacing between two points on the scale, and interval and ratio, which allow comparisons between the data. It was therefore important that the correct amount of data be collected, that the appropriate statistical tests chosen, and that the data was collected in a format that could be analysed. For example, t-test and correlations require continuous data, such as nutrition knowledge scores.

Probability or 'p' value

The probability of an event happening, or of a particular piece of data being within certain limits is referred to as the 'p' value. Probability values are commonly quoted in relation to statistical significance of results. They are linked to the normal distribution curve and standard deviation. The probability of a result being within two standard deviations of the mean has been shown to be 95.4%. Conversely, there is less than a 5% probability of it falling outside these limits (2 S.D.). This can be restated as a 0.05 probability.

Many different statistical tests use 'p' values to demonstrate significance. The accepted 'p' value, to which statistical significance is attached, varies, depending on factors such as type of research methodology and comparable size of samples. Therefore it is important to state what 'p' value is being used to demonstrate statistical significance. In general terms, the smaller the 'p' value, the greater the significance that can be attached to the result. 'p' values were determined for many of the results in this study, as an indication of the level of significance. In this study, most of the significance levels reported were exact, with a minimum criterion for statistical significance of 'p' equal to or less than 0.05.

Parametric and non-parametric tests

There are two types of statistical test: parametric and non-parametric. Parametric tests are more 'powerful' (i.e. more robust and can use smaller samples) than non-parametric ones, but assume both a normal distribution and that the spread of scores in the sets of data are roughly equal, i.e. have similar variance or scatter. In practice, if the sample is large and the data are at interval or ratio level, then parametric statistical tests are used, even if these

assumptions are not true. Data from the knowledge tests and food frequency questionnaires were all at interval level and had a similar spread in each of the two groups, and therefore could be analysed using the parametric test, Pearson's correlation coefficient, to test for associations. The data was analysed to see if it had a normal distribution.

Non-parametric tests use data in the form of ranks, and therefore can use ordinal data as well as interval and ratio data. However, if higher level data are used, some of the information is wasted. These tests make no assumptions, and therefore non-parametric tests are used when the sample is small, or the nature of the distribution is unknown. Non-parametric tests were used to analyse the results of the Likert scales, as this was ordinal data.

Most of the parametric tests are matched with a non-parametric equivalent. For instance, the Mann Whitney U test, which is used for independent samples, is the non-parametric equivalent to the t-test, and is one of the most powerful of the non-parametric tests. The Spearman rank correlation coefficient, which is used to test the strength of association between values of two variables measured on a continuous scale, is the non-parametric equivalent to Pearson's test, and was used to analyse the results of the Likert scales.

Correlation coefficients

An important element in this research was to investigate the possible relationship, or correlation, between variables: for example, between the score for total fibre intake and the score for attitudes toward healthy eating. A statistic known as the correlation coefficient, or 'r', whose value can range from +1 to -1, provides a quantifiable representation of the size and direction of the relationship between 2 variables. The closer this value is to +1 or -1, the more perfect the relationship. A positive relationship (+) indicates that the two variables change in the same direction and a negative relationship (-) indicates that they change in opposite directions. A correlation coefficient of 0 represents no relationship at all between the variables. The strength of this 'r' value can be tested for significance, and a 'p' value obtained, but just looking at the magnitude of the 'r' value may give an approximation of the strength of the correlation.

The amount that two variables have in common is indicated by their co-variance, which is the square of the correlation coefficient (r). Thus a correlation coefficient of 0.5 means that

the amount they have in common is $r^2 = (0.5)^2 = 0.25$ or 25%, not 50% as might be supposed. A strong 'p' value, such as 0.001, obtained for this correlation, would indicate that, in this study, although the two variables only had 25% of the variance in common, that 25% was extremely unlikely to be due to chance, and thus was a significant relationship. A correlation coefficient does not indicate a causal relationship, merely an association. It is justifiable to call it a predictor, but one does not necessarily cause the other. Thus, in this study, attitudes to healthy eating might be identified as a predictor of dietary intake.

An 'r' value of less than 0.5 is not normally considered to represent a 'strong' correlation, especially in biological research, but the variables being measured in this study are not necessarily concrete concepts that can be measured directly. It is acceptable in this case, to consider lower 'r' values as significant. Polit and Hungler (1999) even go as far as to say:

> *"correlations between variables of a psychosocial nature are typically in the 0.1 to 0.4 range."*
>
> Polit and Hungler, 1999, p.459.

Analysis of variance (ANOVA)

Groups can be compared using an unpaired student t-test, which is a suitable test to be used for data sets of differing sizes, where both independent variables contain interval data. This test demonstrates if there is a significant difference between the two groups that cannot be accounted for by chance. Analysis of variance (ANOVA) is rather like a t-test; it compares means. However, unlike the t-test, ANOVA can be used to compare the means of more than two unrelated samples. In essence, it is a test in which the variance between samples is compared with the variance within the samples.

The use of ANOVA assumes that the number in each group is the same or nearly the same. One-way ANOVA compares one variable at a time. Two-way ANOVA compares two different variables at the same time. One-way ANOVA tests were used frequently in this study to compare the findings from the nursing students with those of the non-nursing students. For example, comparing food intake scores or nutrition knowledge scores. Two-way ANOVA tests were used when a second variable was present, such as gender.

Most statistical tests are based on probability sampling, and therefore it is inappropriate to apply inferential statistics to non-probability samples. In practice, most researchers seem to

ignore this. This may have reduced the validity of the results from this study, as the sample used was not a probability sample.

Summary of analysis

The results of the questionnaires were analysed statistically, using the Statistical Package for the Social Sciences, version 8, (SPSS Inc. 1998), where appropriate. Descriptive statistics were used to show means, standard deviations and ranges. Inferential statistics were used where appropriate, to analyse ordinal and interval data. ANOVA (one-way and 2-way analysis of variance) and 't'-tests were used to compare the results of the two groups, nursing and non-nursing students, in the different sections of the questionnaire. Pearson and Spearman tests (depending on whether the data was ordinal or interval in nature) were used to determine the correlation coefficients.

Responses to open questions were subjected to content analysis, carried out by hand. The findings were displayed in a variety of formats: Tables, Box Plots, Bar charts and Line graphs were drawn to show differences in means and standard deviations between the two groups. Box Plots were used to help to visualise the distribution of the data, where the black line represented the mean and the shaded box the spread. The error bars showed the confidence intervals. Tables and scatter diagrams were used to show correlation coefficients and to indicate levels of significance.

CHAPTER 5

Results of the questionnaire

Respondent details

Sampling Frame

195 questionnaires were distributed (100 to non-nursing students and 95 to nursing students) and 90 were returned. This gave a response rate of 46%. The possible effects of this low response rate are discussed in the following chapter. There were 49 respondents from the Medicine, Health and Biological Sciences faculty, of which 38 were nursing students and 11 others, such as biological science students. There were 41 respondents from other faculties. For the purposes of this study, the data from the 11 non-nursing students in the Faculty of Medicine, Health and Biological Sciences were collated with the data from students in other faculties. This group are referred to as non-nurses, and the nursing students as nurses.

The two subsamples were not equally sized (nurses = 38, non-nurses = 52) and this may have affected the results. However, appropriate statistical tests were chosen that did not require equally sized samples and the spread of data were similar in both groups. Each subsample was large enough for statistical tests to be performed and thus any effects of uneven-sized groups should be minimal.

Year of study

There were 37 respondents in year 1, 27 in year 2, and 25 in years 3 and 4. There was one postgraduate student. Year 3 /4 students were grouped together as they represented final year nursing students from diploma and degree programmes. **Table 0.1** shows a breakdown of these figures by group. This Table shows that the majority of nurses (55%) were in year 2, whereas most of the non-nurses were in year 1 (71%).

Table 0.1. Respondents by year of study and group

Group	Year	Number	Percentage
Nurses	2	21	55
	3 / 4	17	45
Non-nurses	1	37	71
	2	6	11
	3 / 4	8	15
	Postgraduate	1	2

Figure 0.1: Respondents by year of study

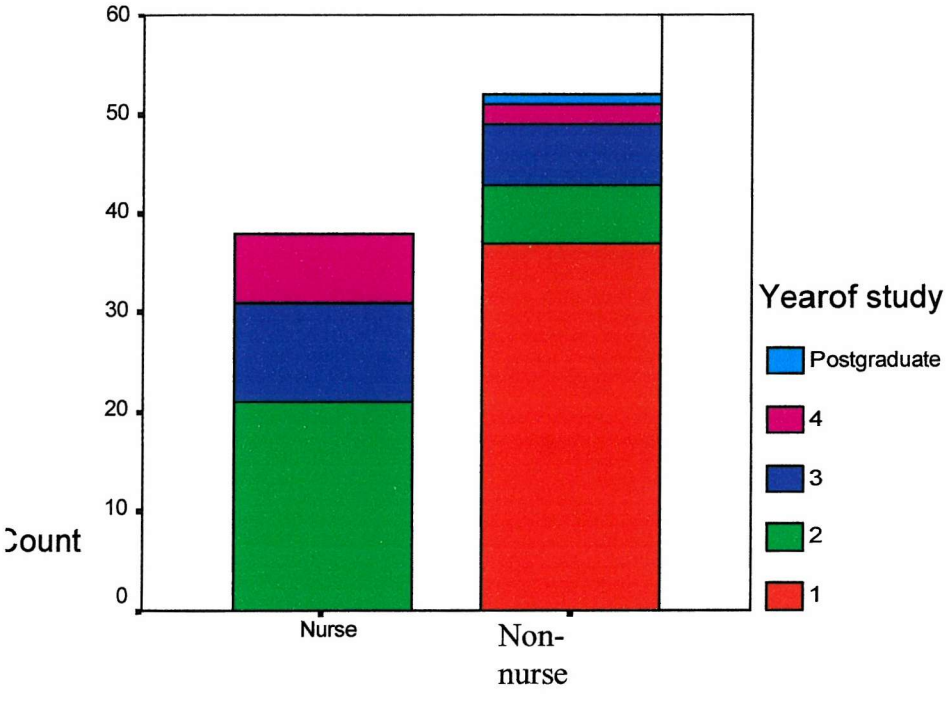


Figure 0.1 shows students, by year of study. Overall, the spread of respondents was fairly even, across year groups, but very uneven when analysed by faculty group: i.e. Nurses/non-nurses. The majority of non-nurses were in year 1 (71%) as compared to nurses, who were all in years 2, 3 and 4. This may have had an effect on the results, as Year 1 students may have been less experienced at shopping and cooking for themselves, and this may have influenced their eating habits and food choice.

Age of sample

91% of the respondents were aged between 18 – 23 years, 8% aged 24-30 and the remaining 1%, 31 years or over. **Table 0.2** gives the details. There was no difference in age distribution, between the two groups.

Table 0.2: respondents by age group

Age	Nurses		Non-nurses	
18-23	34	90%	48	92%
24-30	4	10%	3	7%
31 or over	0	0%	1	1%

Accommodation

97% of the sample lived in self-catering accommodation, either in a flat or house or in self-catering halls. 2% lived at home and 1% in a catered Hall. Details are in **Table 0.3.** This means the two groups were very similar, in terms of their catering needs.

Table 0.3: Respondents by type of accommodation

Accommodation	Nurses		Non-nurses	
Self-catering hall	3	8%	46	88%
Flat/house	33	87%	5	10%
Catered hall	0	0%	1	2%
Living at home	2	5%	0	0%

Body Mass Index

Body Mass Index was calculated using the reported height and weight measurements in the following equation:

$$BMI = \frac{\text{weight in kg}}{\text{height in m}^2}$$

The following classification of scores was used:

Table 0.4: Respondents classified by reported Body Mass Index
Key: F = female, M = male

BMI Score Kg/m^2	Classification	Number	Percentage
Less than 20	Underweight	26 (F=20, M=6)	30.2
20 – 24	Normal	42 (F=31, M=11)	48.8
25 – 29	Overweight	16 (F=9, M=7)	18.6
30 – 40	Obese	2 (F=1, M=1)	2.3
41 or over	Grossly obese	0	0

Table 0.4 shows that nearly half of all respondents (48.8%) were normal weight, with a further 30.2% underweight and 18.6% overweight. The range of BMI was from 13.6 – 30.6 kg/m^2, indicating that no subjects were classified as grossly obese and only two as obese. The Mean BMI of this sample was 22.22kg/m^2, with a standard deviation of 4.53. A breakdown, by group, is shown in **Table 0.5**. Using one-way analysis of variance, there were no significant differences in BMI between the nursing and non-nursing groups.

Table 0.5: mean reported Body Mass Index, by group

Group	Body Mass Index Kg/m^2
Nurses	22.02 (S.D. = 2.96)
Non-nurses	22.38 (S.D. = 5.48)
Total	22.22 (S.D. = 4.53)

Figures 0.2 and **0.3** are histograms, showing the distribution curves, means and standard deviations for Body Mass Index for the nurses and non-nurses. Mean BMI for the nurses was 22.02kg/m^2 (S.D. = 2.96), and for the non-nurses 22.38kg/m^2 (S.D. = 5.48). This means that there were no significant differences in Body Mass Index between the nurses and non-nurses.

Figure 0.2: Distribution curve of BMI for nurses

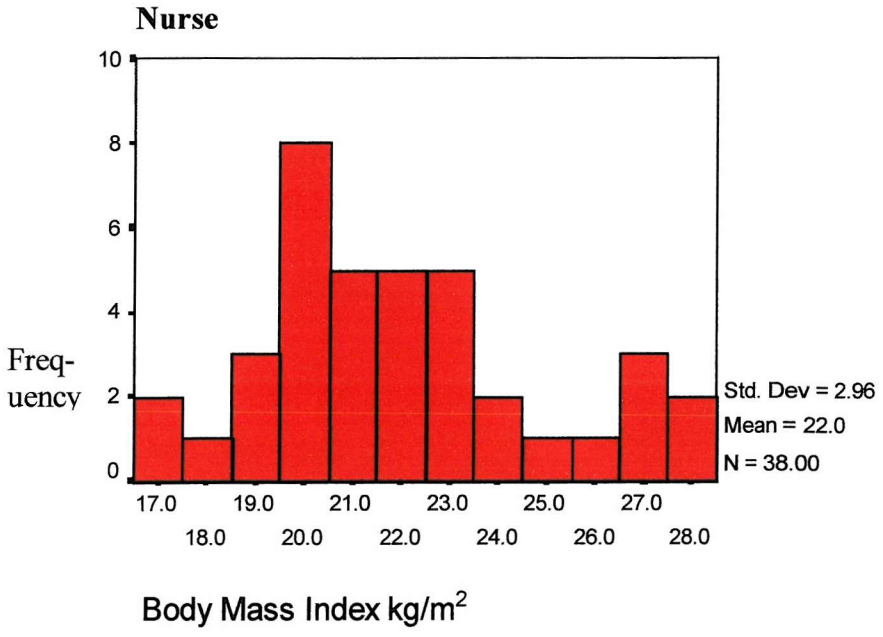
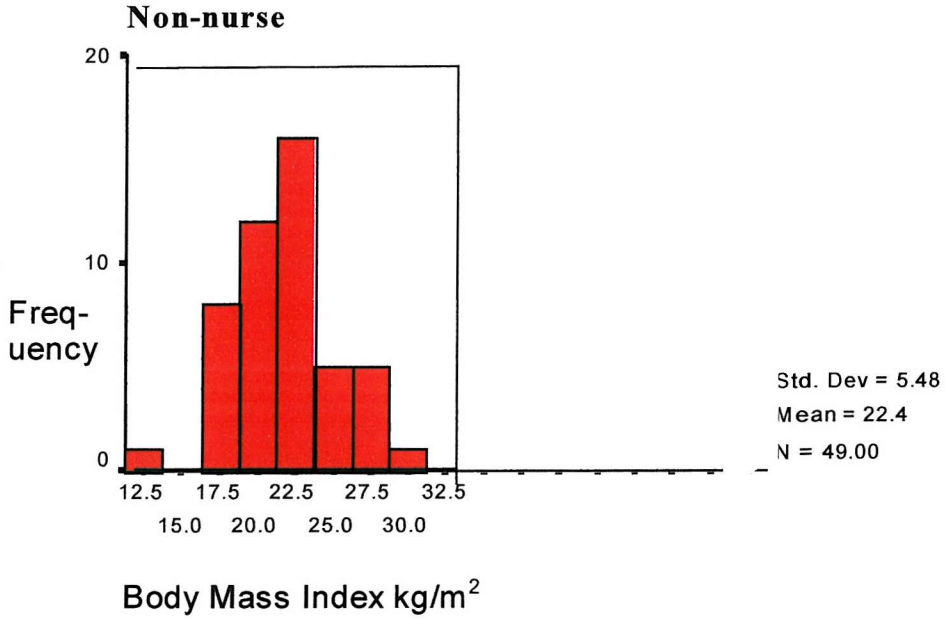


Figure 0.3: Distribution curve of BMI for non-nurses



Gender

27 of the sample were male (29%) and 63 female (71%). These were not evenly distributed between the nurses and non-nurses. 87% of the nurse group were female, compared to 58% of the non-nurse group. There was a significant difference in the distribution of the sexes between the two groups ($p = 0.001$). This was taken into account in the statistical tests performed, by using a two-way anova test, to ensure that any association demonstrated was credited to the correct factor. **Table 0.6** shows the details, by group.

Table 0.6. Respondents by gender

Group.	Gender.	Frequency	Percentage
Nurses	Male	5	13
	Female	33	87
Non-nurses	Male	22	42
	Female	30	58

Summary

Although the sample was not evenly divided between the two groups of students and unevenly spread across year groups, the majority (91%) were of a similar age (18-23 years) and living in similar accommodation (97% in self-catering accommodation). This has the advantage of considerably reducing those variables associated with age and accommodation within the two subgroups, so that comparisons can be more meaningful.

However, there was a significant difference in the distribution by gender in the two groups, with the majority of the nurses being female (87%) and a more even distribution in the non-nurse group (F=58%, M=42%). These differences reflect the gender distribution in the faculties concerned, with the School of Nursing having predominantly female students, whereas the University as a whole has an equal distribution of the sexes.

Although these differences reflect real differences in the ratio of males to females in the university, it was imperative to take account of these differences in the data analysis, so that findings predominantly due to gender differences were not attributed to group differences. Using the 2-way analysis of variance statistical test (ANOVA) it allowed two variables, such

as gender and group, to be taken account of in the same test, and thus differences could clearly be attributed to one or both variables.

Main findings

This study set out to achieve a number of objectives, with the overall aim of answering the following question: '***Do nursing students, who receive education in nutrition, and have been exposed to patients with nutrition-related problems, have different dietary habits and attitudes towards healthy eating than non-nursing students and are their eating habits and food choices influenced by different factors?'***

Each of the following sections will address one of the study objectives set out in the first chapter.

Objective 1: to explore the understanding that a group of nursing and non-nursing students have about the term 'healthy eating' and it's benefits.

Understanding

Nearly all (97%) of the student nurse sample defined healthy eating in terms of 'balance and variety', or 'less fat' or 'more fruit and vegetables', which was the composite category used in Margetts' study (1997). However, only 61.5% of the non-nursing students gave such a description. **Table 1.1** gives the details and a comparison between the nurses and non-nurses.

The second most frequent definition for both groups was in terms of 'nutrients, vitamins and minerals' (36.8% and 19.2%). 'Low fat' was included in 23.7% of the nurses' definitions but only 13.5% of the non-nurses'. 18.4% of the nurses and 9.6% of the non-nurses mentioned 'More fibre/starch'. None of the nurses defined healthy eating in terms of 'fresh/natural foods' or 'healthy/good for you', whereas these phrases were mentioned by 9.6% of the non-nurses in each case. 17.3% of the non-nurses did not give a definition for healthy eating; none of the nurses failed to give a definition.

Table 1.1: Understanding of healthy eating: definitions

Definition	Nurses	Non-nurses
Balance and variety	94.7%	57.6%
More fruit and vegetables	10.5%	9.6%
Low fat	23.7%	13.5%
Less sugar	2.6%	1.9%
More fibre/starch	18.4%	9.6%
Fresh/natural food	0%	9.6%
Less red meat/more white meat and fish	2.6%	0%
Nutrients/vitamins/minerals	36.8%	19.2%
Good for you/healthy	0%	9.6%
Nothing/no response	0%	17.3%
Balance / less fat / more fruit & vegetables	**97%**	**61.5%**

Summary

These findings suggest that the nurses had a much clearer understanding of the term 'healthy eating', in terms of the types of food or nutrients that would be included in a healthy diet than the non-nurses.

Benefits from eating a healthy diet

95% of the sample said that they thought there were benefits from eating a healthy diet. Both the nurses and the non-nurses ranked most of the categories similarly. 'Staying healthy' was the highest ranked benefit cited (46%), followed by 'Prevention of disease' (23%), 'Weight control' (16%), 'Improved quality of life' (7%) and 'Being fit' (6%). 2% suggested 'other reasons' were the most important benefit. It is perhaps interesting to note that the only significant difference between the two groups in this study was the number who cited 'weight control' as the main reason for eating a healthy diet. The nurses perceived it as a much more important benefit (24%) than the non-nurses did (9%). The large proportion of females in the nurse group may have influenced this finding. **Table 1.2** shows the detailed results for each group.

Table 1.2: Perceived benefits from eating a healthy diet

Benefit	Nurses (%)	Non-nurses (%)	Total (%)
Stay healthy	41	50	46
Prevent disease	22	24	23
Improved quality of life	5	9	7
Weight control	24	9	16
Be fit	8	4	6
Other	0	4	2

Summary

These findings show that the majority of respondents thought that there were benefits from eating a healthy diet. 'Staying healthy' was ranked number one by twice as many respondents as the second highest ranked benefit 'To prevent disease'.

Objective 2: To compare the level of nutrition knowledge in a group of nursing students and non-nursing students

There were two components to this section: nutrient knowledge and general nutrition knowledge. This is similar to Shepherd and Towler's study (1990) from which these questions were taken.

Nutrient knowledge

For each nutrient, respondents were asked to choose 10 foods, from a list of 20, which were high in a particular nutrient: protein, carbohydrate, fat or fibre.

Assuming equal weights of the following food types, please choose 10 foods that you think are high in protein / carbohydrate / fat / fibre.

It was emphasised that 10 choices must be made. However, a number of subjects chose less than 10. In the original research, by Shepherd and Towler (1990), items were scored as +1 for a correct answer and –1 for an incorrect answer. Thus the possible score range was from –10 to +10. To test if the fact that several subjects failing to choose 10 items made any significant difference to the results, the raw scores (+1 for a correct answer, 0 for an incorrect answer) were also computed.

A comparison between the two mean scores was made, using Pearson's correlation. **Table 2.1** shows that the correlation coefficient (r) value was 0.703, which indicated a high level of agreement between the two scores, and was highly significant (p = 0.001). The two nutrient scores were entitled nutrition subscore, for the positively marked, and negative knowledge score, for the negatively marked. The two summed scores were entitled total knowledge score and total knowledge, negative. Appendix 4 contains a list of all the correct answers to the food questionnaire and to the MCQ.

Table 2.1: Correlation between food knowledge scores, using 2 different scoring systems

Correlations

		nutrition subscore	negative knowledge score
nutrition subscore	Pearson Correlation	1.000	.703**
	Sig. (2-tailed)	.	.000
	N	90	90
negative knowledge score	Pearson Correlation	.703**	1.000
	Sig. (2-tailed)	.000	.
	N	90	90

**. Correlation is significant at the 0.01 level (2-tailed).

Appendix 2a and **2b** show the results for each nutrient separately and the MCQ results, as well as the total knowledge scores. All of the individual nutrient scores were out of a possible ten. **Figures 2.1** and **2.2** show the same results as bar charts. In **Figure 2.1**, it can be seen that the highest individual mean score was 5.98, which was for protein, with the other three scores for carbohydrate, fat and fibre being very similar (5.56, 5.40, and 5.33). The mean nutrition subscore, representing knowledge of nutrients, was thus 22.27 out of 40, or 56% (range = 10-30). Using frequency tables, it was found that 83% of the respondents scored more than 20, or 50% in the nutrient knowledge test. 75% scored 5 or more out of 10, for fibre and fat and over 80% scored 5 or more for carbohydrate and protein.

Figure 2.1: individual nutrients, MCQ scores and nutrition knowledge scores for the nurses and non-nurses (positive marking)

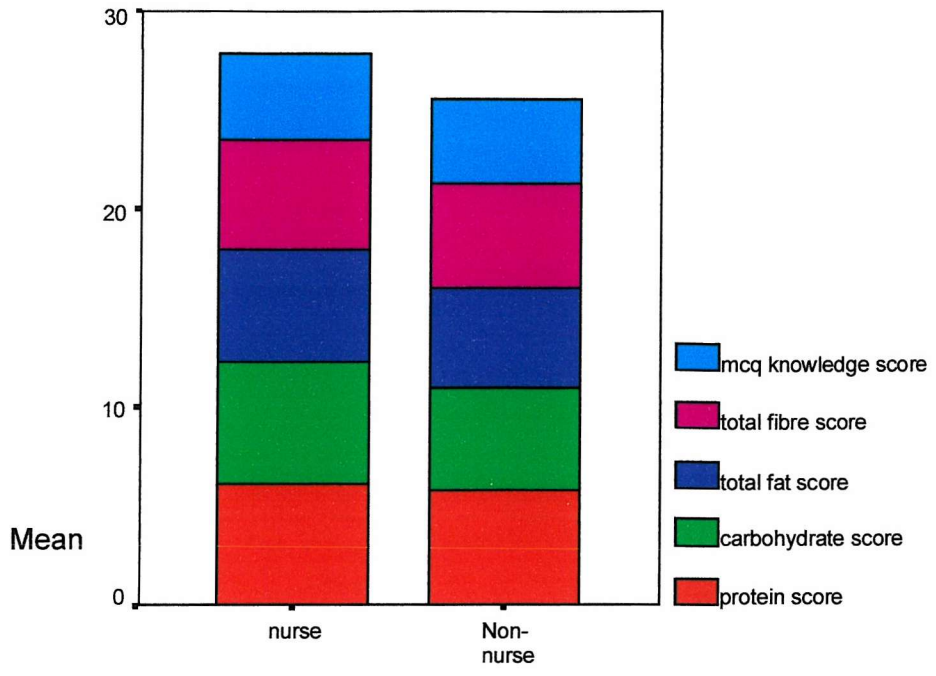
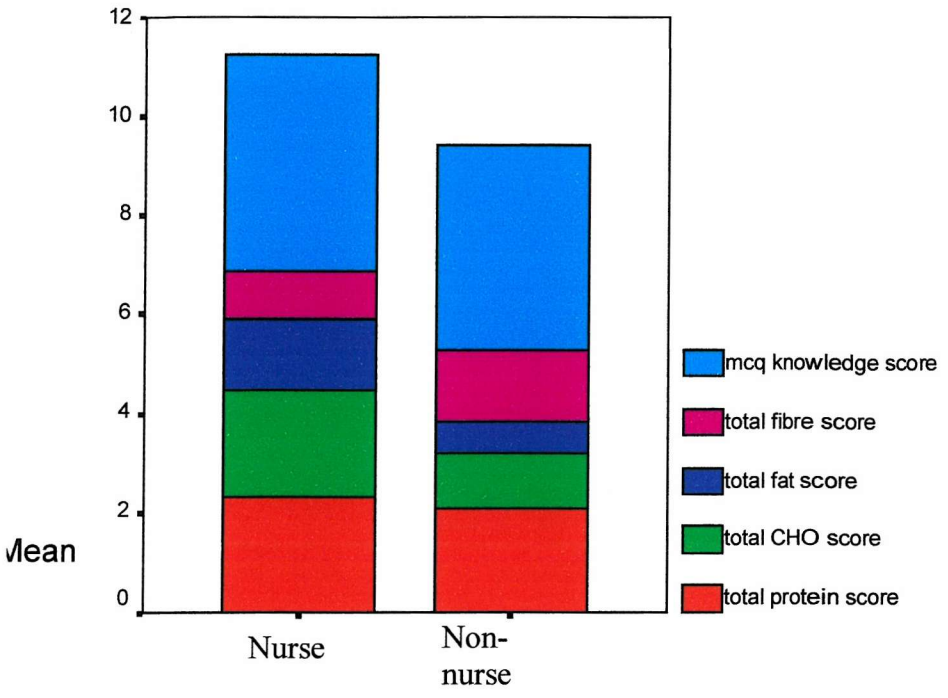


Figure 2.2 gives the same results using negative marking. Again, the protein scores were the highest (2.20), followed by carbohydrate (1.54), fibre (1.23) and fat (0.98). This gave a mean negative knowledge score of only 5.96 (range = -7 to +20), which was a quarter of the nutrition subscore. The difference between the scores for individual nutrients in the two Tables demonstrates the proportion of incorrect answers.

Figure 2.2: individual nutrients, MCQ scores and total nutrition knowledge scores for the nurses and non-nurses (negative marking)



One-way analysis of variance (ANOVA) was performed to test for significant differences between scores. Nursing students were significantly better informed than non-nursing students were about carbohydrates (p=0.05), but not about fats, proteins or fibre. Using 2-way ANOVA, it was found that fat knowledge scores were significantly influenced by gender (p = 0.04) with the males having a lower fat score (0.46) than the females (1.20). The results of the negatively marked knowledge scores by gender are shown in **Table 2.2**.

Males had consistently lower scores for all nutrients and for the MCQ. Details of the ANOVA tests can be found in **Appendix 2c and 2d**. The nutrient knowledge of the nurses and non-nurses were compared, using one-way ANOVA. The nurses had a mean score of 23.5 and the non-nurses a mean score of 21.3. This was significantly different (p = 0.002) (see **Figure 2.1**).

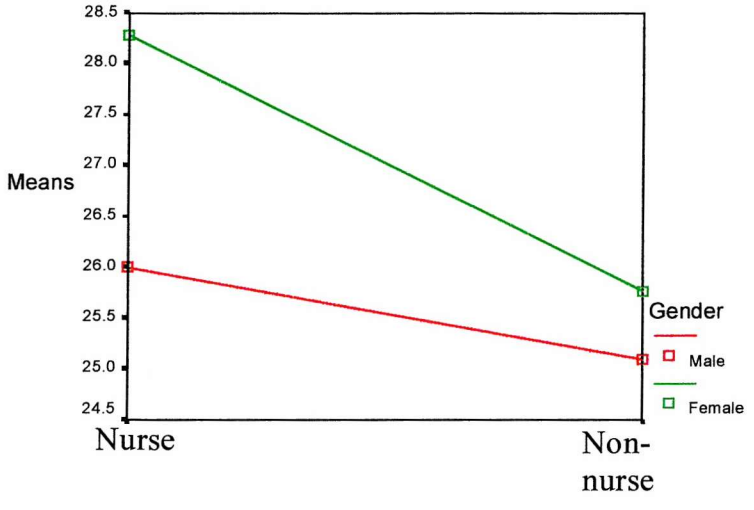
Table 2.2: Comparison between the males and females for individual nutrient scores, MCQ scores and total knowledge scores (using negative marking)

total protein score total CHO score total fat score total fibre score negative knowledge score mcq knowledge score total knowledge,negative * Gender

Gender		total protein score	total CHO score	total fat score	total fibre score	negative knowledge score	mcq knowledge score	total knowledge,negative
Male	Mean	1.8846	1.1154	.4615	1.0385	4.5000	3.9231	8.4231
	N	26	26	26	26	26	26	26
	Std. Deviation	2.6280	2.7470	2.2491	2.5843	5.4424	1.1635	5.4419
Female	Mean	2.3333	1.7143	1.2063	1.3651	6.6190	4.3968	11.0159
	N	63	63	63	63	63	63	63
	Std. Deviation	1.8751	2.3101	2.1565	2.2740	4.7364	1.0245	4.7705
Total	Mean	2.2022	1.5393	.9888	1.2697	6.0000	4.2584	10.2584
	N	89	89	89	89	89	89	89
	Std. Deviation	2.1169	2.4451	2.1976	2.3586	5.0159	1.0822	5.0846

Figure 2.3 is a line graph of total knowledge scores (nutrition subscore + MCQ), analysed by gender and group. It shows that there were no significant differences between males in the two groups, but females in the nurse group scored significantly higher than females in the non-nurse group. Overall, the difference in scores between the two groups was significant (p = 0.001), with the nurses having a mean score of 27.9 and non-nurses a mean score of 25.5.

Figure 2.3: Total knowledge score, by group and gender



General nutrition knowledge MCQ

The following seven questions were asked, to ascertain respondents' general nutrition knowledge (correct answers underlined)

1. ***Which of the following is high in monounsaturates?*** *Sunflower / animal fat / olive oil*

2. ***Which sort of fat is bad for your heart?*** *Saturated / polyunsaturated / monounsaturated*

3. ***Fat is an important source of energy:*** *True / false / don't know*

4. ***What is the current recommended percentage of fat in the diet?*** *20-25% / 30-35% / 40-45% / 50-55%*

5. ***Which of the following are the main sources of iron in the UK diet?*** *Meat / dairy/ vegetables / cereals*

6. ***Which of the following are the main sources of anti-oxidant vitamins in the diet?*** *Meat / dairy / vegetables and fruit / fish*

7. ***Which of the following are the main sources of calcium in the diet?*** *Meat / dairy / vegetables / cereals*

Table 2.3 lists all the multiple choice questions and the percentage of each group correct. It indicates any significant differences in the individual scores between nurses and non-nurses.

Table 2.3: Comparison of correct answers to Multiple-choice questions, between nurses and non-nurses

Multiple choice question	Nurses	Non-nurses	P value *Significance
Which is high in monounsaturates?	16 (42%)	14 (27%)	0.15
Which sort of fat is bad for your heart?	38 (100%)	47 (90%)	0.05*
Which is current recommended % of fat in diet?	10 (26%)	21 (40%)	0.16
Fat is important source of energy	27 (71%)	43 (83%)	0.19
Which is main source of iron in diet?	8 (21%)	5 (10%)	0.13
Main sources of anti-oxidant vitamins	33 (87%)	37 (71%)	0.10
Main source of calcium in diet?	36 (95%)	48 (92%)	0.65
Multiple choice knowledge score	4.4 (63%)	4.1 (59%)	0.26

There was no significant difference in general nutrition knowledge (MCQ) scores between the two groups. The mean general nutrition knowledge score (MCQ) was 4.24 (S.D. = 1.08) out of a possible 7, with a range of 2 - 6. The only question where there was a significant, although fairly weak, difference (p=0.05) was question 2: 'which sort of fat is bad for the heart?' Nurses scored higher than non-nurses did in this question. These results suggest that there was no difference in the level of general nutrition knowledge between the nurses and non-nurses.

Summary

There was a significant difference in knowledge levels between the nurse and non-nurse samples (p = 0.001) when a one-way ANOVA test was used. These results show that the nurses in this study had a greater nutrient knowledge than the non-nurses, and that the difference in scores was particularly in the female nurses.

In terms of knowledge of individual nutrients, there were two significant scores. The nurses scored significantly higher in their knowledge of carbohydrates (p = 0.05) and the females scored significantly higher in their knowledge of fats (p = 0.04). There was no difference in the MCQ scores, which tests general nutrition knowledge, although question 2 was answered

slightly better by the nurses than the non-nurses (p=0.05). The majority of respondents (83%) achieved at least half the correct answers in the nutrient knowledge test.

Objective 3: to explore and compare the sources of nutrition information used by nursing and non-nursing students

Friends and relatives were clearly identified as the most frequent source of information by both the nurses and non-nurses (53%), and school/university as the second most frequent (42%). Other sources mentioned fairly frequently were magazines/newspapers (31%), TV/radio (29%) and advertising (27%). Health Professionals were only mentioned by 23%, although the nursing students mentioned them nearly twice as frequently (32%) as the non-nursing students (17%). Twice as many non-nurses (25%) as nurses (12%) mentioned books as a source of information. **Table 3.1** gives the details.

Table 3.1: Sources of information on healthy eating that nurses and non-nurses found helpful

Information source	Nurses (%)	Non-nurses(%)	Total (%)
Friends/relatives	55	52	53
University/school	45	40	42
Newspapers/magazines	34	29	31
TV/Radio	29	29	29
Advertising	26	27	27
Health professionals	32	17	23
Food labelling	26	21	23
Books	12	25	20
Supermarkets	10	15	13
Health food shops	8	4	5
Consumer groups	3	8	5
Government agencies	5	2	3

Summary

These findings show that the sources of information on healthy eating found to be the most helpful by the nurses and non-nurses were very similar, with more than half citing friends and relatives as their most frequent source of information.

Objective 4: To compare the Attitudes towards healthy eating in nurses and non-nurses

Individual attitudes toward healthy eating

Most respondents agreed that healthy eating was important (96.7%) and eating fibre was beneficial (93.3%). The majority of respondents felt that changes were needed in their diet (63.3%) and that they often thought about the nutritional aspects of the food they ate (64.5%). However, there was a significant difference in the level of agreement with this latter statement between the nurses and non-nurses ($p = 0.001$). Only approximately 50% of the sample thought that regular exercise or avoiding snacking was important.

However, there were significant differences ($p = 0.001$) in the results from questions C21 and C22; 'I make an effort to eat fibre and avoid fat', with the nurses strongly agreeing with the statements (82% and 84%) and the non-nurses disagreeing or uncertain (27% and 38.5% agree). Table 4.1 shows the results for each statement. Statements where there was a significant difference between the nurse and non-nurse groups are marked with an asterisk (* significant at 0.05 level, *** significant at 0.001 level).

Table 4.1. Attitudes toward healthy eating

	Strongly agree		Agree		Unsure		Disagree		Strongly disagree	
	Nurse	non-N	Nurse	non-N	Nurse	non-N	Nurse	non-N	Nurse	non-N
C21 I make an effort to eat fibre ***	18.4	3.8	63.2	23.1	10.5	28.8	7.9	34.6	0	9.6
C22 I make an effort to avoid fat ***	18.4	7.6	65.8	30.8	13.2	19.2	2.6	32.7	0	9.6
C23 I make an effort to exercise regularly	10.5	9.6	47.4	34.6	13.2	15.4	28.9	32.7	0	7.7
C24 I make an effort to avoid snacking	10.5	15.4	36.8	38.5	18.4	7.7	34.2	30.8	0	7.7
C25 I don't need to make changes in my diet	2.6	1.9	13.2	13.5	13.2	26.9	65.8	42.3	5.3	15.4
C26 I don't think about nutritional aspects of food I eat ***	0	7.7	7.9	30.8	7.9	11.5	57.9	31.5	26.3	11.5
C27 Eating fibre is beneficial	50.0	36.5	47.4	53.8	0	5.8	0	1.9	2.6	0
C28 Eating fat is beneficial	2.6	7.7	42.1	38.5	15.8	23.1	26.3	25.0	13.2	5.8
C29 Healthy eating is important*	78.9	61.5	21.1	32.7	0	1.9	0	1.9	0	1.9

Individual attitudes and their relationship with dietary intake and knowledge

It is interesting that the nurses agreed much more strongly than the non-nurses did with the behavioural attitudes, 'I make an effort to eat fibre and avoid fat' (C21 and C22), and yet had similar scores for the last three factors which were knowledge attitudes (e.g. eating fibre is beneficial). This suggests that there may be a difference in the relationship between behavioural attitudes and dietary intake and that between knowledge, attitudes and intake.

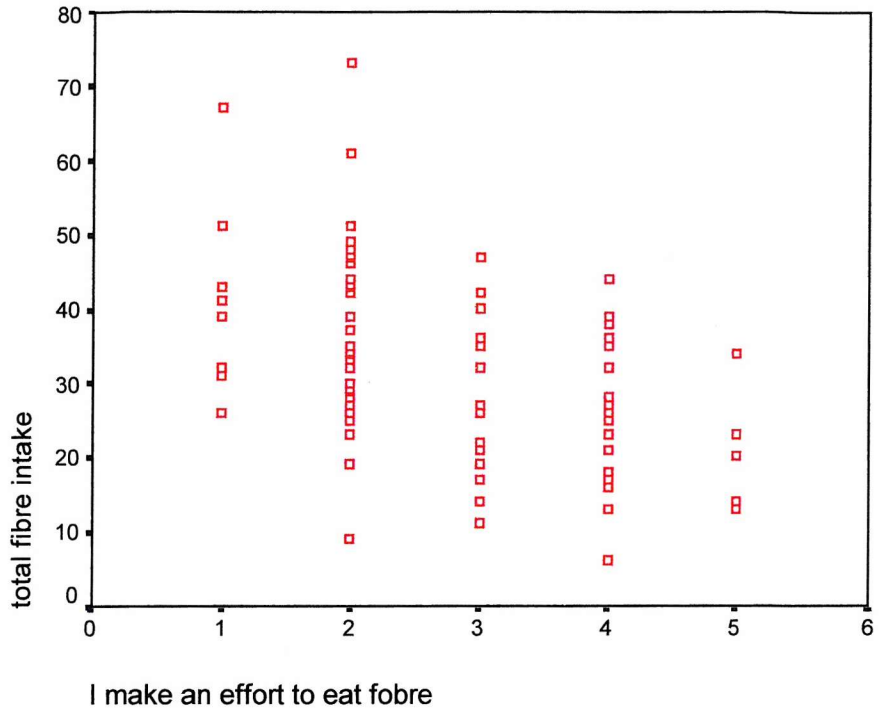
To test out this suggestion, a Spearman correlation was performed on fat and fibre intake, compared to fat and fibre knowledge and responses to attitude statements about fat and fibre. (See **Table 4.2**)

Table 4.2: Correlations between attitudes toward fat and fibre, nutrition knowledge and dietary intake

Attitude	Factor	Correlation coefficient 'r'	Probability 'p'
c21 'I make an effort to eat fibre'	Fibre intake	-0.472	0.001
c22 'I make an effort to avoid fat'	Fat intake	0.198	0.06
c27 'eating fibre is beneficial'	Fibre intake	-0.025	Not Significant
c28 'eating fat is beneficial'	Fat intake	0.072	NS
c27 'eating fibre is beneficial'	Fibre knowledge	0.018	NS
c28 'eating fat is beneficial'	Fibre knowledge	0.291	0.005
c28 'eating fat is beneficial'	Fat knowledge	0.320	0.002
c21 'I make an effort to eat fibre'	Fibre knowledge	-0.013	NS
c22 'I make an effort to avoid fat'	Fat knowledge	0.104	NS
c22 'I make an effort to avoid fat'	c21 'I make an effort to eat fibre'	0.495	0.001
c21 'I make an effort to eat fibre'	c27 'eating fibre is beneficial'	0.297	0.005
c22 'I make an effort to avoid fat'	c28 'eating fat is beneficial'	-0.255	0.015

There was a negative correlation between fibre intake and the behavioural attitude, 'I make an effort to eat fibre' ($p = 0.001$) which means that the more positive the agreement with the statement the higher the fibre intake score (see **figure 4.1**). There was a weak positive correlation between fat intake and the behavioural attitude, 'I make an effort to avoid fat' ($p = 0.06$) which suggests that the more positive the agreement with the statement the lower the total fat intake. There were also positive correlations between fat and fibre knowledge and the knowledge attitude, 'eating fat is beneficial' ($p = 0.002$ and 0.005) but no significant correlation between fibre knowledge and the knowledge attitude 'eating fibre is beneficial'. **Figure 4.1** is a scatter diagram of the correlation between the attitude 'I make an effort to eat fibre' and total fibre intake. It shows that there is a trend that the lower the attitude score, i.e. the higher the level of agreement, the higher the fibre intake score.

Figure 4.1: Scatter diagram of total fibre intake and attitude toward fibre
Correlation coefficient = -0.472, p = 0.001



There was a strong correlation between the two behavioural attitudes, 'I make an effort to eat fibre and avoid fat' (p = 0.001), demonstrating consistency of attitudes. There was also a positive correlation between the attitudes towards fibre (C21 and C27) (p = 0.005) and a negative correlation between the attitudes toward fat (C22 and C28) (p = 0.015). There were no significant correlations between knowledge attitudes (C27, C28) and dietary intake or between behavioural attitudes (C21, C22) and knowledge. These results appear to support the hypothesis that it is behavioural attitudes, rather than attitudes related to knowledge of benefits, that are associated with dietary intake.

Gender and attitudes

The effect of gender on attitudes toward healthy eating was investigated, using 2-way ANOVA. Each statement was tested for differences. **Table 4.3** gives the results. The only statement where gender was a factor was for the statement 'I make an effort to avoid fat', where the females had more positive attitudes. These results demonstrate that it was the

group, rather than gender, that accounted for the differences in attitude found. There was no difference in total attitude scores between the males and females (see **Appendix 4b**).

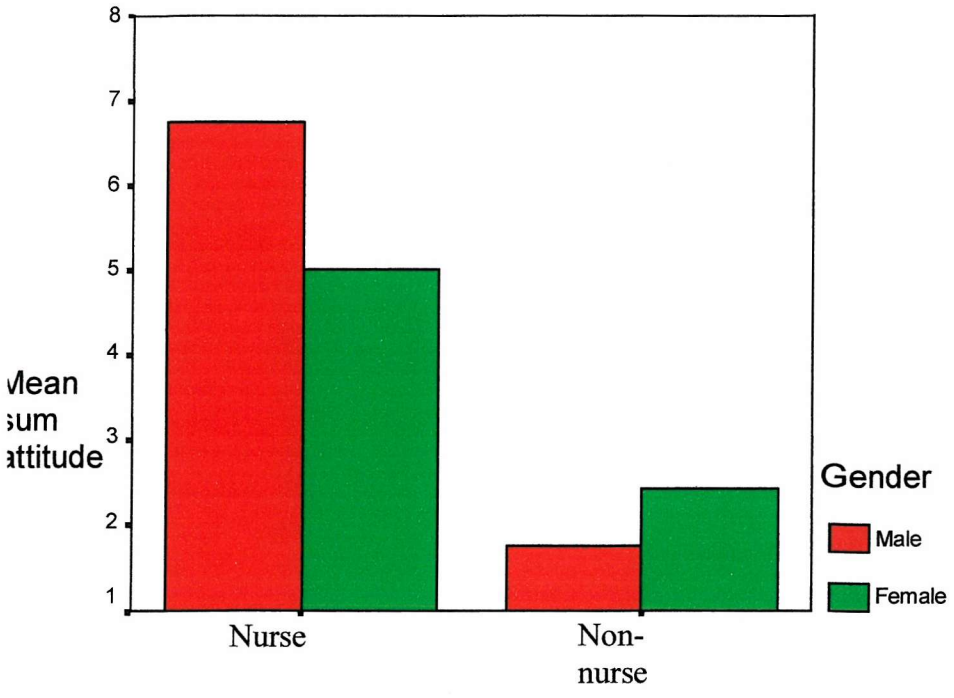
Table 4.3: Effect of gender on attitudes toward healthy eating

Attitude	Variable	'p' value
C21 I make an effort to eat fibre	Gender	NS
C22 I make an effort to avoid fat	Gender / group	0.02
C23 I make an effort to exercise regularly	Gender	NS
C24 I make an effort to avoid snacking	Gender	NS
C25 I don't need to make changes in my diet	Gender	NS
C26 I don't think about nutritional aspects of food I eat	Gender	NS
C27 Eating fibre is beneficial	Gender	NS
C28 Eating fat is beneficial	Gender	NS
C29 Healthy eating is important	Gender	NS

Total attitude scores

A total attitude score, out of 9, was calculated for each group, to give an overall impression of attitudes toward healthy eating. Factors C25, 26 and 28 were reversed, so that they became positive factors in line with the rest. A score of +1 was given for a positive response and –1 for a negative response. The range of scores was from –4 to +9. **Figure 4.2** shows the difference between nurses and non-nurses, and males and females. This shows that the nurses had a significantly higher attitude score (5.19) than non-nurses (2.15) ($p = 0.001$) and the females had a slightly, but not significantly, higher score (3.78) than the males (2.54), although the male nurses scored higher (6.75) than the female nurses (5.0). This means that the nursing students had significantly more positive attitudes towards healthy eating than the non-nursing students ($p = 0.001$). **Appendix 4.a** gives the details of these scores, by group and by gender.

Figure 4.2: Total attitude scores, by group and gender



Summary

The nursing students clearly had a more positive attitude overall toward healthy eating than the non-nursing students, with a highly significant difference in total attitude score ($p = 0.001$). The difference remained significant even when gender was identified as a variable, using 2-way ANOVA. There were very high levels of agreement with the statements 'healthy eating is important' (96.7%) and 'eating fibre is beneficial' (93.3%). However, there were significant differences in levels of agreement with the statements 'I make an effort to eat fibre and avoid fat' with the nurses agreeing more strongly (82% / 84%) than the non-nurses (44% / 42%).

There were also significantly higher levels of disagreement with the statement C26 'I don't usually think about the nutritional aspects of the food I eat', with the nurses disagreeing more strongly than the non-nurses. The results strongly suggest that it is behavioural attitudes, such as 'I make an effort to eat fibre/avoid fat', rather than nutrition knowledge or awareness of the benefits of healthy eating, such as 'eating fibre is beneficial', that are associated with dietary intake.

Objective 5: To explore the intention of nurses and non-nurses to change their eating pattern

Intention to change

The final question in the questionnaire asked whether or not respondents intended to change their eating pattern. 30% said they did, and 44% said they did not. The remainder were undecided. There were similar numbers of nurses (32%) and non-nurses (29%) that said 'yes', but many more non-nurses (52%) than nurses (34%) that said 'no'. The results for each group are shown in **Table 5**.1. There was no significant difference in intention to change in the males and females.

Table 5.1: Analysis of response to the question: do you intend to change your eating pattern?

Intention to change	Nurses (%)	Non-nurses (%)	Total (%)
Yes	32	29	30
No	34	52	44
Undecided	32	17	23

A one-way ANOVA was performed to compare attitudes between those who said they intended to change and those who did not. There was a significant difference between the groups ($p = 0.01$) with those who intended to change their eating pattern having more positive attitudes toward healthy eating. Respondents were asked to give reasons for their answer and the following seven themes emerged:

- Already eat a healthy, balanced diet
- Lack of money or time to eat healthily
- Need to lose weight
- Need to eat better
- Happy as I am
- Do not care or too lazy to change
- Difficult to change or will change in the future

For those intending to change, the most frequently cited reason was because they recognised the need to eat a healthier diet (52%), and for those not intending to change, the most frequent reason given was because they felt that they already had a healthy, balanced diet (59%). For those who remained undecided, there were two chief reasons: lack of time or money to eat healthily (31%) and difficulties associated with change (37%). These reflect some of the factors influencing food choice that arose from the focus group work, earlier in the study. These results are displayed in **Table 5.2**.

Table 5.2: Reasons given for wanting / not wanting to change eating habits

Intention to change	Yes (%)	No (%)	Undecided (%)
Eat a healthy diet	0 (0)	19 (59)	3 (19)
Lack of money/time	5 (22)	3 (9)	5 (31)
Need to lose weight	4 (17)	0 (0)	1 (6)
Need to eat better	12 (52)	0 (0)	0 (0)
Happy as I am	0 (0)	5 (16)	1 (6)
Do not care	0 (0)	3 (9)	0 (0)
Difficult to change	2 (9)	2 (6)	6 (37)

Intention to change was compared with the results from the attitude statement: 'I do not need to make changes to the food I eat, as it is already healthy enough', using a student t-test. There was a significant difference between those who said that they intended to change, and those who did not ($p=0.001$). Respondents answering 'No' to intention to change agreed with the statement that they 'do not need to change their diet, as it is already healthy enough'. Details of these results are in **Appendix 5a**.

Summary

Approximately a third of both nursing and non-nursing students said that they intended to change to a healthier diet, and a third of the nursing students said they did not. However, over half of the non-nursing students said they did not intend to change. The findings suggest that there is a positive association between attitudes to healthy eating and intention to change. Those with more positive attitudes were more likely to change their eating habits than those

with less positive attitudes. Reasons for change were strongly linked to eating a healthy diet. Those who intended to change gave the reason that they needed to eat better and they also disagreed with the statement that they 'do not need to change because their diet is healthy enough'.

Objective 6: To compare the dietary intake in a group of nursing students and a group of non-nursing students.

Fat and fibre score

This section examined the dietary practices of the two groups of students. The fat and fibre content of their food was recorded, using the DINE questionnaire (Roe et al, 1994). The following questions were asked and scored according to the Table shown in **Appendix C**.

1. ***About how many pieces or slices of the following types of bread or rolls or equivalent do you eat on a usual day?*** *White bread/brown or granary/wholemeal or crispbread*

2. ***About how many times a week do you have a bowl of the following types of cereal or porridge?*** *sugar type / rice or corn type / porridge / wheat type / muesli / bran type*

3. ***About how many times a week do you eat a serving of the following foods?*** *pasta/rice, potatoes, peas, beans/lentils, other vegetables, fruit,*

4. ***About how many times a week do you eat a serving of the following foods?*** *Beef/pork/lamb, chicken/turkey, fish, processed meat/pies/bacon, burgers/sausages, cheese, any fried food, cakes/puddings/pastries, and biscuits/chocolate/crisps.*

5. ***Approximately how much of the following types of milk do you use, each day****? full cream / semi-skimmed / skimmed*

6. ***Approximately how much butter/margarine or other spread do you use in a day?*** *Number of rounded teaspoons*

7. ***What sort of fat do you use – on bread/vegetables? For frying? For baking/cooking?*** *Butter/lard/dripping, hard or soft margarine, polyunsaturated sunflower margarine or low fat spread, vegetable oil*

Fibre scores were calculated by summating each of the individual scores for questions 1-3, total fat scores from questions 4-6 and unsaturated scores from question 7, using the grid in **Appendix D.** the scores were classified according to the following **Table.**

Table 6.1: Classification of intake scores.

Fibre score	**Fat score**	**Unsaturated fat score**
Less than 30 = low	Less than 30 = low	Less than 6 = low
30 – 40 = medium	30 – 40 = medium	6 – 9 = low
41 or over = high	41 or over = high	10 or over = high

Reported fibre intake was low in 50% of the total sample, although there was a marked difference between nurses and non-nurses. The majority of nurses appeared to have a high fibre diet (45%), whereas the majority of non-nurses appeared to have a low fibre diet (60%). Reported total fat intake was low in 56% of the sample, with similar figures for both nurses (58%) and non-nurses (54%). However, there were a greater percentage of non-nurses in the high fat category (19%) compared to nurses (10.5%). 46% of the sample reported a high unsaturated fat intake, with similar results for both nurses (50%) and non-nurses (43%). However, very few nurses had a low unsaturated fat intake (5%) compared to non-nurses (18%). **Table 6.2** gives the details of the distribution of intake scores.

Table 6.2: Distribution of intake scores, by group

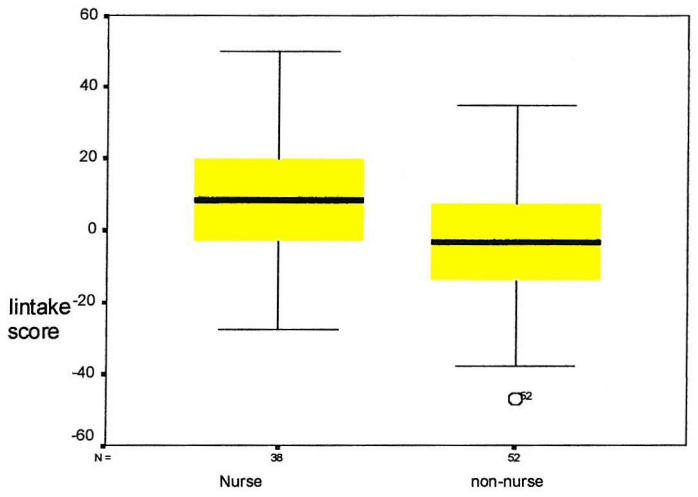
	Nurses	Non-nurses	Total
Fibre intake: low	37%	60%	50%
medium	18%	30.4%	25%
high	45%	9.6%	25%
Fat intake: low	58%	54%	56%
medium	31.5%	27%	29%
high	10.5%	19%	15%
Unsat. fat intake: low	5%	18%	12%
medium	45%	39%	42%
high	50%	43%	46%

The proportion of the sample who had a high fibre / low fat intake was 30%, and a similar number (27%) had a low fibre / high fat intake, which could be considered to be an unhealthy diet. The evidence for an association between the amount of fat and fibre in the diet was investigated, but there was no significant correlation found. These findings suggest that the nurses ate a healthier diet than the non-nurses did, where a healthy diet is defined as one that is high in fibre and low in fat, with a high proportion of the fat taken as unsaturated fat.

Dietary Intake score

An intake score was therefore computed, that consisted of the individual total fibre scores minus the total fat scores. This could be considered as an indirect measure of the 'healthiness' of the diet. The box plot in **figure 6.1** shows a comparison between the intake scores for nurses and for non-nurses. Nurses had a mean dietary intake score of 7.3, which shows that their fibre score was greater than their fat score. Non-nurses had a mean dietary intake score of –3.8, indicating that their fibre score was less than their fat score. This indicates that nurses appear to have a healthier diet, in respect to fat and fibre intake, than non-nurses do. The dietary intake scores were significantly different when compared using a one-way analysis of variance, ANOVA ($p=0.001$). The coloured box indicates the spread of scores and the 'whisker' indicates the confidence intervals.

Figure 6.1: Box and whisker plot to show Dietary Intake score by group



Fat intake

The score for the reported total fat intake for the whole sample was 30.4 with a standard deviation (S.D.) of 12.1, which was just within the medium category (see **Table 6.1**). This corresponds to the 35% of total energy recommended for this age group. Scores between groups were compared using the ANOVA test. Total fat intake in the two groups was not significantly different: mean fat score for nurses was 30.0 (S.D. = 9.8, range = 19 - 61) and for non-nurses it was 30.8 (S.D. = 13.5, range = 10 - 83). The ranges, however, indicated that there were a number of subjects who had a considerably higher or lower intake of fat than the mean.

Using two-way ANOVA, which takes account of 2 variables, group and gender were analysed with respect to fat intake. The fat scores were significantly different according to gender. The males scored a mean of 36.5 (S.D. = 14.2), whilst the females only scored a mean of 27.9 (S.D. = 10.2). This showed that the male respondents ate more fat than the female respondents did. This difference was very significant (p = 0.001).

These results are shown graphically, using a bar chart to compare nurses and non-nurses and males and females in **Figure 6.2**. This shows that the difference in total fat intake between males and females was consistent in the two groups, and that the nurses had a slightly, but not

significantly, higher mean fat intake than the non-nurses. **Appendix 6a** gives details of each group's fat intake, by group and gender.

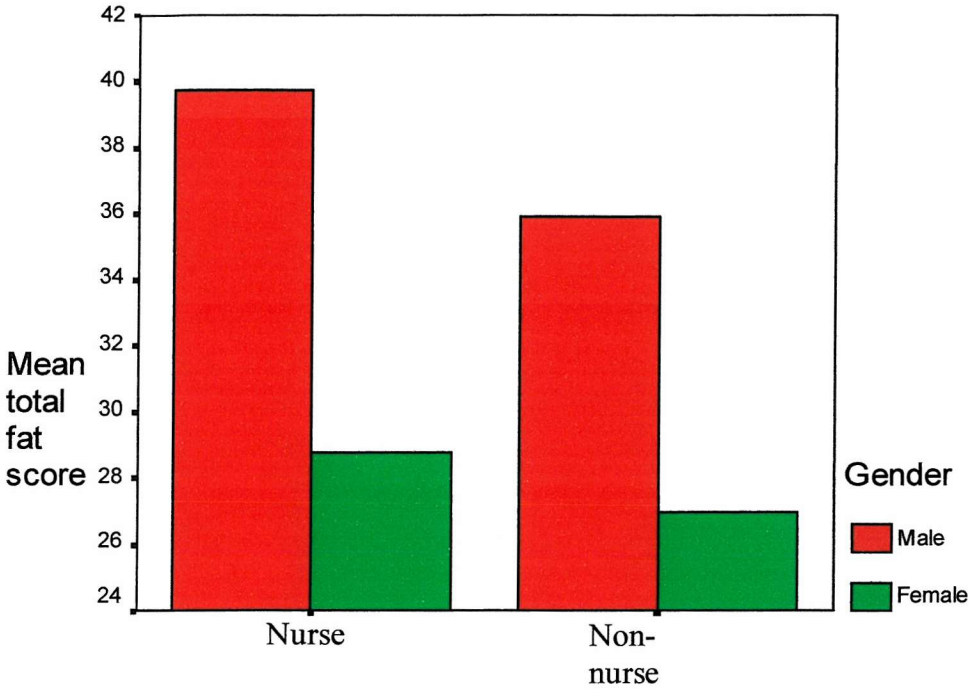


Figure 6.2: Total fat score, by group and gender

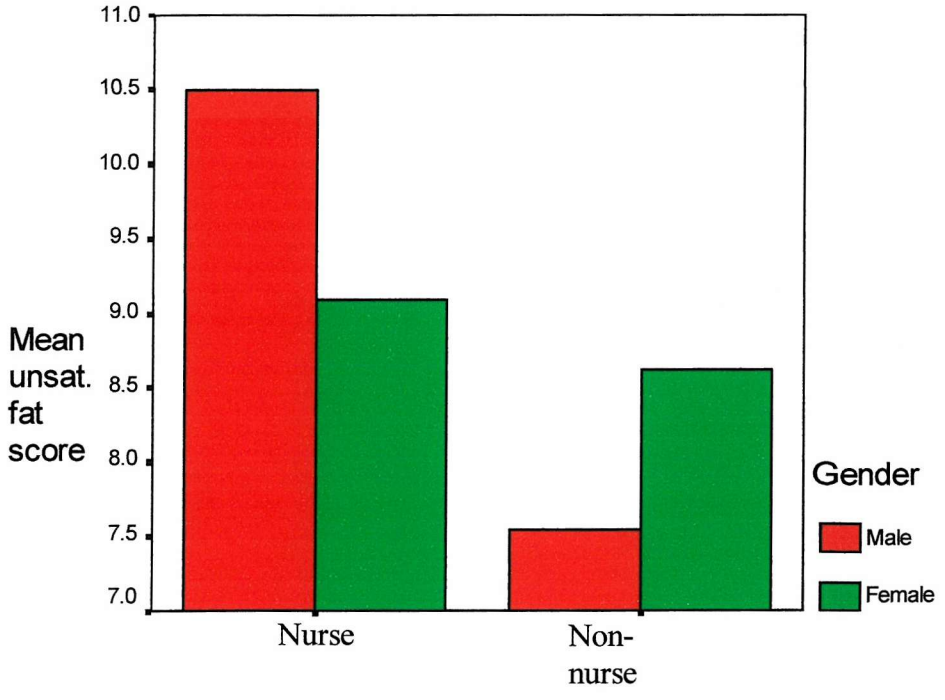
Unsaturated fat intake

The mean reported unsaturated fat score for the whole group was 8.6 (S.D. = 2.7). Both nurses and non-nurses had a mean score within the medium category for unsaturated fat, although 46% of the sample had a high unsaturated fat intake. The nurses scored 9.2 (S.D. = 1.9) and the non-nurses score was 8.1 (S.D. = 3.0). This is a weakly significant difference (p =0.05). The males scored 8.0 (S.D. = 3.2) and females scored 8.8 (S.D. = 2.4). This is not significantly different. These results suggest that although the nurses did not eat a significantly different total amount of fat in their diet, they did have a higher proportion of it as unsaturated fat. **Appendix 6b** gives details of each groups unsaturated fat scores.

Figure 6.3 shows a comparison of the nurses and non-nurses unsaturated fat intake, and the males with females intake. This graph shows that there were wide differences in unsaturated fat intake score in the males, depending on whether they were nurses or not, with male nurses eating a diet significantly higher in unsaturated fat than non-nurses. However, there were only 5 male nursing students in the sample, and these results cannot be taken as representative of

male nurses. The scores in the females in the two groups were very similar. In summary, then, there was a significant difference in unsaturated fat score between the nurses and non-nurses ($p = 0.05$) but no significant difference between the males and females.

Figure 6.3: Unsaturated fat score, by group and gender



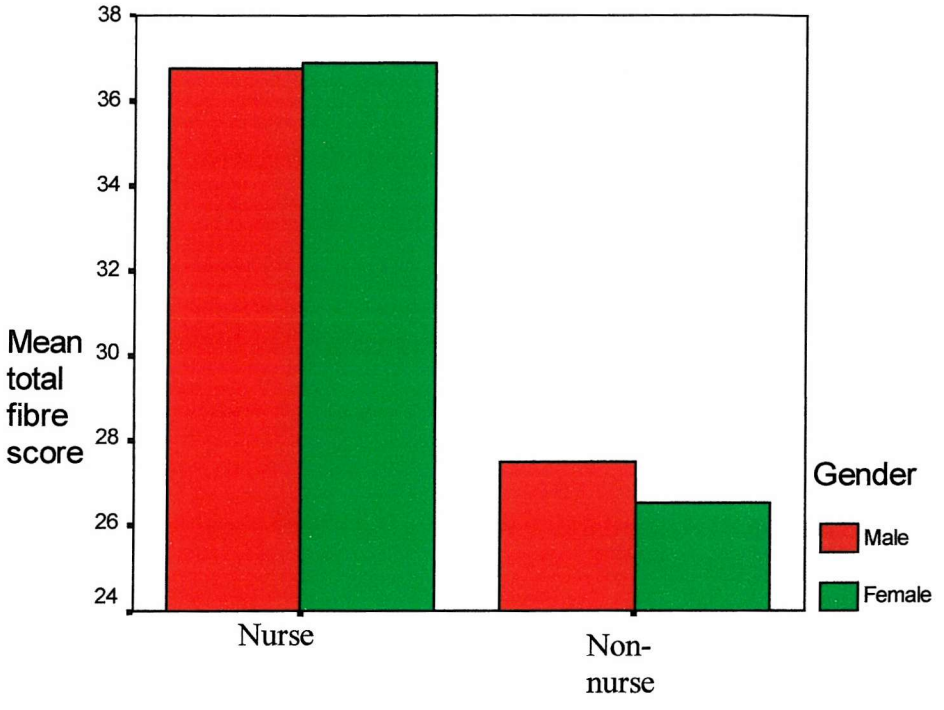
Fibre intake

The mean of the reported total fibre intake score for the whole sample was 31.1 (S.D. = 12.9), with a range of 17-73 for the nurses and 6-61 for the non-nurses. The nurses had a score of 36.9 (S.D. = 13.0), which was in the medium fibre category and non-nurses a score of 27.0 (S.D. = 11.1) which was in the low fibre category. The males had a lower score (29.0, S.D. = 12.3) than the females (32.0, S.D. = 13.1), but the results were not significantly different.

Using one-way ANOVA, the nurses had a significantly higher fibre intake than the non-nurses ($p = 0.001$). This was considerably higher than the national average, although it is still less than the Recommended Daily Allowance (RDA) for fibre, which would be equivalent to a score of greater than 40. **Appendix 6c** gives the details of total fibre intake for each group, by gender. **Figure 6.4** shows a comparison between the nurses and non-nurses and the males

with females, using a bar chart. It shows that the males and females in each group were remarkably similar in their mean fibre intake but there was a marked difference between the nurses and non-nurses.

Figure 6.4: Total fibre score, by group and gender



Summary

Overall, all of the students in this study appeared to eat less fat than the national average, with 56% consuming the equivalent of 83g. /day or less, which is the recommended daily allowance (see **Table 6.1a**). There was no significant difference between groups but this finding was clearly linked to gender: the men scored, on average, 9 points more than the women, with a mean of 36.5 compared to 27.9 (see **Fig. 6.2**). However, this still indicated a relatively healthy intake of fat.

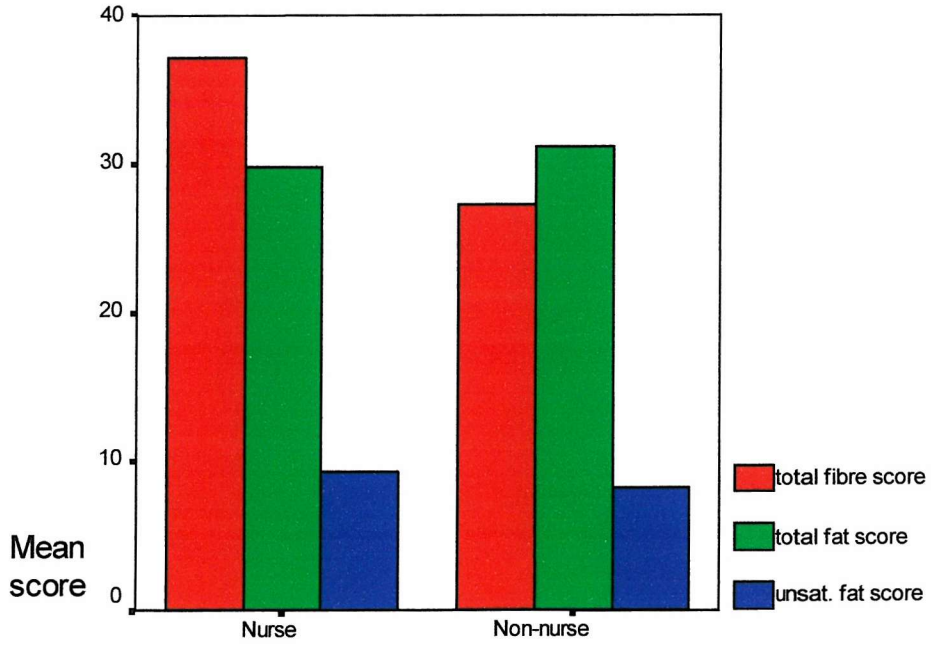
In terms of the contribution made by unsaturated fat to the total fat intake, a mean score for the group of 8.6 represented a moderate intake. The higher the ratio of unsaturated fat to saturated fat, the healthier the fat component of the diet. The nursing students had a marginally higher intake than non-nursing students, (significant at $p = 0.05$) with only 5% in

the low unsaturated fat category. This suggests that although the nurses ate a similar amount of fat in their diet to the non-nurses, the proportion of unsaturated fat was higher. There were no overall gender differences.

The nursing students had a significantly higher fibre intake than non-nurses with a mean score difference of 10 (see **Fig. 6.4**). However, overall, these figures reflected the national average and only 25% consumed a fibre intake sufficient to meet the recommendations made by NACNE. **Figure 6.5** provides a summary of all three intakes, for each group.

Dietary intake, which was computed from the fat and fibre scores, was significantly higher in the nursing students, suggesting that they had a healthier diet than the non-nursing students.

Figure 6.5: Comparison of dietary intake scores between nurses and non-nurses



Special Diets

Are you currently following a special diet of any kind? If yes, please say what it is.

A quarter (26%) of the sample said they were following a special diet of some description. Most of these were vegetarian: 16% of the nurses were vegetarian / vegan (n=6) and 19% of the non-nurses (n=10). 5% of the nurses were following a reducing diet (n=2), and 8% of the

non-nurses (n=4). No further questions were asked to investigate if the vegetarians/vegans had a different diet to the omnivores, in terms of their reported fat and fibre intake.

Table 6.3: Proportion of respondents taking a special diet

Special diet	Nurses	Non-nurses
Vegetarian/vegan	6 (16%)	10 (19%)
Reducing	2 (5%)	4 (8%)

Objective 7: To discover whether, in a group of nursing and non-nursing students, there is a relationship between dietary intake, nutrition knowledge and attitudes towards healthy eating.

The seventh objective of this study was to look for relationships between dietary intake and nutrition knowledge, dietary intake and attitudes to healthy eating and nutrition knowledge and attitudes to healthy eating.

Nutrition knowledge and dietary intake

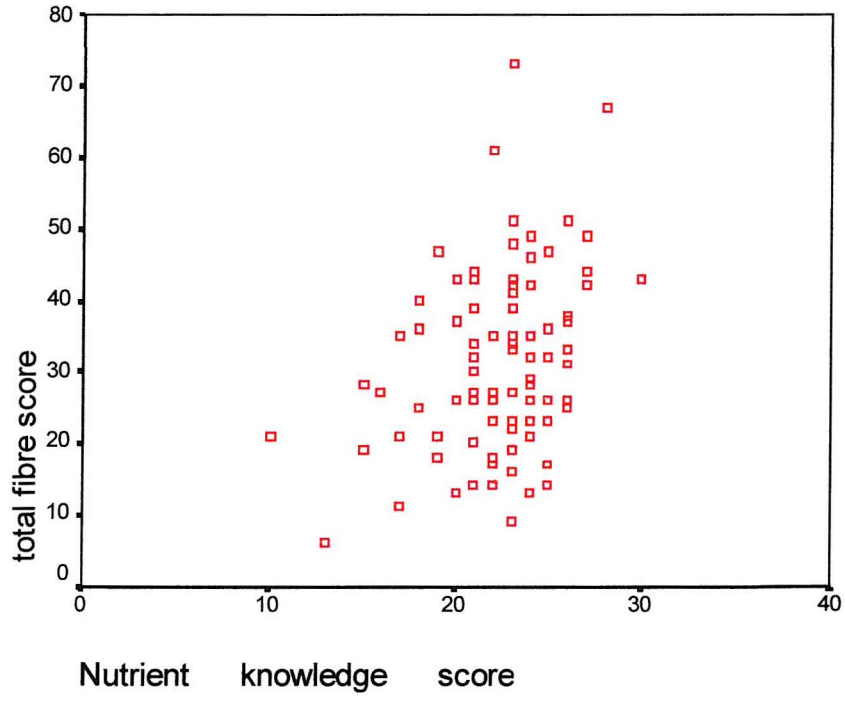
Using Pearson's correlation coefficient test, a significant correlation between fibre intake and total knowledge score (p=0.005) was found, and a less strong correlation between intake score and knowledge (p = 0.03). This means that those respondents with a higher score for nutrition knowledge, which included both the test of specific nutrients and the general nutrition knowledge test (MCQ), ate a higher fibre diet than those with lower nutrition knowledge. There were no significant relationships between total fat intake or unsaturated fat intake and knowledge. Similar relationships were found between the knowledge subscore, which did not include the MCQ score, and dietary intake. These results suggest that nutrition knowledge may influence fibre intake but does not appear to have an effect on fat intake. Detailed results are shown in **Table 7.1**.

Table 7.1: correlations between nutrition knowledge and dietary intake

Knowledge	Variable	'r' value	'p' value
Total knowledge score	Fibre intake score	0.291	0.005
(nutrients +MCQ)	Fat intake score	-0.018	Not Significant
	Unsaturated fat score	0.171	NS
	Intake score	0.227	0.031
Knowledge subscore	Fibre intake score	0.331	0.001
(nutrients)	Fat intake score	0.037	NS
	Unsaturated fat score	0.238	0.024
	Intake score	0.219	0.038

Figure 7.1 is a scatter diagram of the correlation between nutrient knowledge subscore and total fibre score, showing the trend that the higher the nutrient knowledge score, the higher the fibre intake score.

Figure 7.1: Scatter diagram of total fibre score and nutrients subscore
Correlation coefficient = 0.33, p = 0.001



Fat and fibre intake scores

There was a significant correlation between fat intake score and the statement 'I eat low fat varieties because...' ($p = 0.001$). This suggests that there was an association between attitudes toward fat and dietary behaviour, i.e. fat intake. This was the only significant correlation between fat intake and any other factor. There were no significant correlations between intake of individual nutrients, i.e. fat and fibre, and knowledge of those nutrients, or between the intake of fat and fibre. **Table 7.2** shows the details.

Table 7.2: correlations between dietary intake scores and other factors

Intake score	Variable	'r' value	'p' value
Fat intake	eat low fat varieties	0.374	0.001
Fat intake	Fat knowledge	0.080	Not Significant
Fibre intake	Fibre knowledge	0.186	NS
Fat intake	Fibre intake	0.022	NS

Attitudes toward healthy eating

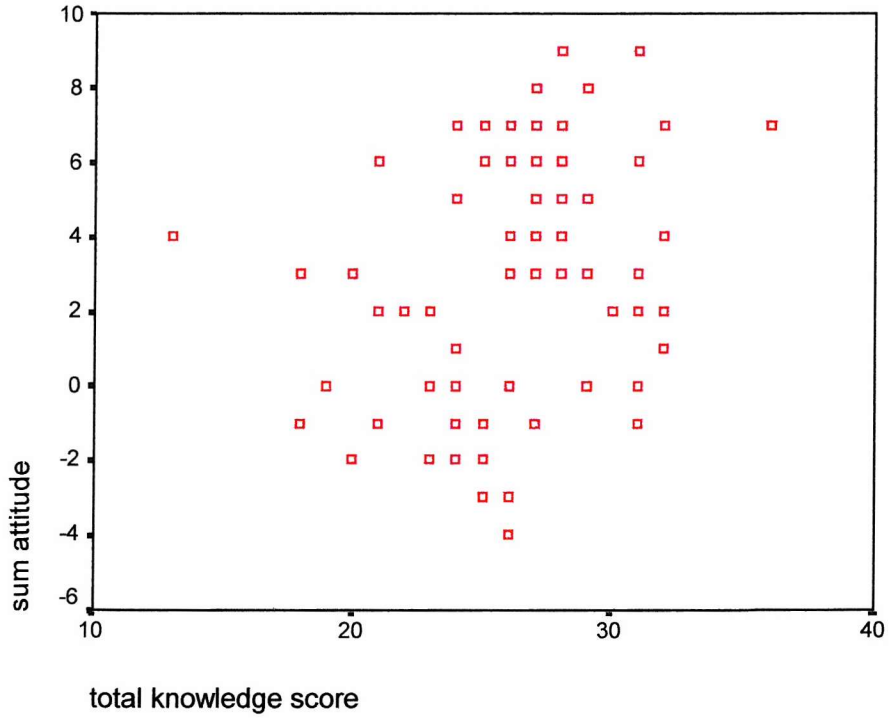
Spearman's correlations were carried out to identify any relationships between attitudes toward healthy eating and other factors. There was a significant correlation between total scores for attitudes to healthy eating and nutrition knowledge ($p = 0.009$), and there were weak correlations between attitude score and fibre intake ($p = 0.04$), and between attitude score and intake score ($p = 0.016$). The more positive the attitudes, the higher the nutrition knowledge score and the higher the fibre intake. There was no relationship between fat intake and total attitude score. **Table 7.3** gives the details.

Table 7.3: Correlations between total attitude toward healthy eating score and nutrition knowledge and dietary intake scores

Attitudes to healthy eating	Variable	'r' value	'p' value
Attitude score	Total nutrition knowledge score	0.275	0.009
	Nutrient knowledge subscore	0.256	0.015
	Fibre intake score	0.212	0.045
	Intake score	0.253	0.016
	Fat intake score	-0.127	NS

Figure 7.2 is a scatter diagram of the correlation between total knowledge score and total attitude score. It shows that there was an upward trend of increasing attitude score in line with increasing knowledge score.

Figure 7.2: Scatter diagram of total attitude score and total nutrition knowledge score Correlation coefficient = 0.28, p = 0.009



Summary

These results suggest that there was an association between attitudes toward healthy eating, dietary intake and nutrition knowledge. The total attitude to healthy eating score was compared with other results, using Spearman's correlation, and there were significant correlations with overall dietary intake score ($p = 0.016$), fibre intake score ($p = 0.04$) and total nutrition knowledge score ($p = 0.009$). This suggests that there was an association between attitudes and knowledge and reinforces the result found earlier, that attitudes were associated with dietary intake. There was no significant relationship between attitudes and total fat intake score, but fat intake score did appear to be related to specific attitudes toward fat. Fibre intake score ($p = 0.005$) and total intake score ($p = 0.03$) were both positively related to knowledge of nutrition. This suggests that knowledge does have some influence on dietary intake, particularly fibre intake.

Objective 8: To explore the relationship between Body Mass Index and dietary intake, nutrition knowledge and attitudes

Overall size of an individual is usually related to dietary intake, and therefore an analysis of Body Mass Index and food intake was carried out, using one-way ANOVA, to explore if those respondents with a high BMI (obese/overweight categories) ate a significantly different diet from those with a lower BMI. The results suggest that there were differences, not in fat intake, but in fibre intake ($p = 0.03$).

BMI and fibre intake

Appendix 8a gives details of total fibre intake for nurses and non-nurses, analysed by Body Mass Index. **Figure 8.3** shows total fibre intake, by group and BMI category. It shows that the nurses had a high level of fibre intake regardless of BMI, whereas the non-nurses' fibre intake decreased steadily as Body Mass Index increased. This was particularly evident in the non-nurse group, in the overweight and obese categories. However, there were only 9 respondents in those categories and thus conclusions should only be drawn with caution. A

Pearson's correlation coefficient test confirmed these findings, showing that there was a significant negative relationship between BMI and fibre intake in the non-nurses, but not in the nurses (**Table 8.1**).

Figure 8.3: Total fibre intake, analysed by Body Mass Index and group

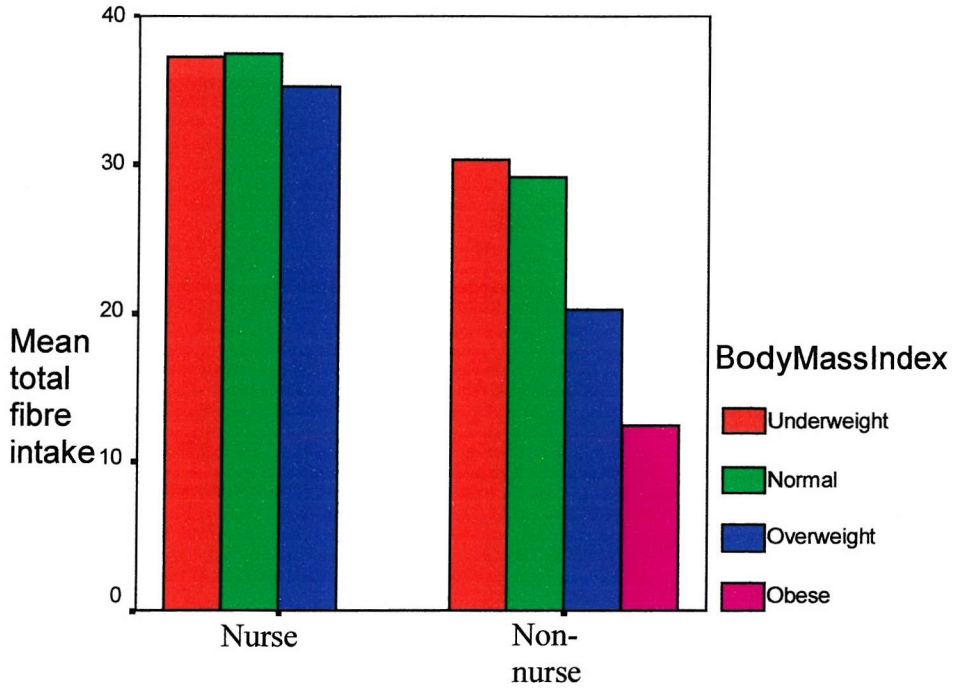


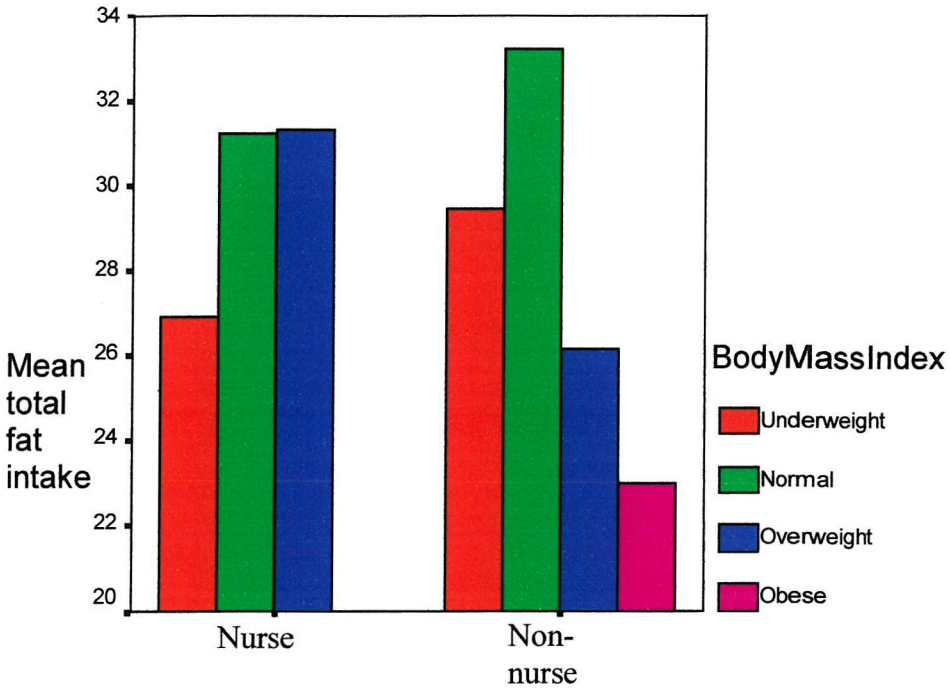
Table 8.1: correlations between BMI and fibre intake, in nurses and non-nurses

Group	Variable	Variable	'r' value	'p' value
Nurses	BMI	Fibre intake	0.021	NS
Non-nurses	BMI	Fibre intake	-0.381	0.007

BMI and fat intake

There were no significant correlations between total fat intake and Body Mass Index. Fat intake appeared to be lower in the underweight group, but it was also lower in the overweight and obese groups. Respondents who were within the normal weight range had the highest fat intake. This was an unexpected result. **Appendix 8b** gives an analysis of these results, by group and by BMI. These results are shown graphically in **Figure 8.4**.

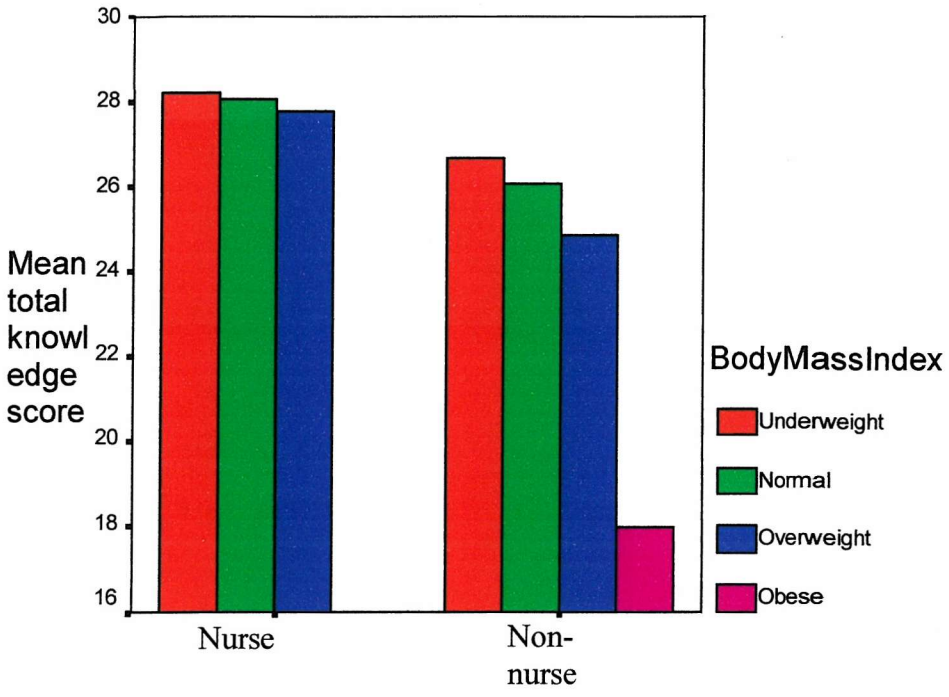
Figure 8.4: Total fat intake, analysed by group and Body Mass Index



BMI and knowledge

The relationship between Body Mass Index and knowledge was investigated. Total knowledge scores were analysed, according to BMI category. **Appendix 8c** and **Figure 8.5** show that mean scores were similar for respondents in the underweight, normal and overweight categories (26.5-27.3), but those in the obese category scored less well than other groups (18.0). However, there were only 2 respondents in this category. The difference in both fibre intake and knowledge score of the 2 students in the obese category is striking, although obviously the sample size is too small to draw any conclusions. Using 2-way ANOVA, with BMI as the second variable as well as group (see **Appendix 8d**), total knowledge scores were found to be significantly different between BMI categories ($p = 0.003$) and between the nurses and non-nurses ($p = 0.003$).

Figure 8.5: Total knowledge scores, analysed by group and BMI category



The association between Body Mass Index, nutrition knowledge, dietary intake and attitudes toward healthy eating was also explored (see **Table 8.2**). Nutrition knowledge in the non-nurses, but not the nurses, was significantly, but negatively correlated to Body Mass Index ($p = 0.003$). This shows that, in the non-nurse group, the higher the Body Mass Index, the lower the nutrition knowledge score. There was also a significant negative correlation in the non-nurses between fibre intake and BMI ($p = 0.007$), but not between fat intake and BMI. This means that those non-nurses with a higher Body Mass Index ate a diet lower in fibre, but not necessarily higher in fat, than those with a lower BMI. A high BMI is indicative of being overweight/obese, and a low BMI of being underweight. These results support the findings reported above, using one-way ANOVA. There was no significant association between attitudes toward healthy eating and BMI, in either group.

Table 8.2: Correlations between Body Mass Index, nutrition knowledge and dietary intake in nurses and non-nurses

Knowledge	Variable	Group	'r' value	'p' value
Total knowledge	BMI	Nurse	0.024	NS
(nutrients +MCQ)		Non-nurse	-0.391	0.006
Knowledge subscore	BMI	Nurse	0.073	NS
(nutrients)		Non-nurse	-0.418	0.003
Fibre intake	BMI	Nurse	0.021	NS
		Non-nurse	-0.381	0.007
Fat intake	BMI	Nurse	0.174	NS
		Non-nurse	-0.157	NS
Attitudes	BMI	Nurse	0.014	NS
		Non-nurse	-0.099	NS

Summary

There were no significant differences in Body Mass Index between groups. However, in the non-nurse group, there appeared to be a significant difference in fibre intake between respondents in each of the BMI categories, and a significant negative relationship between BMI and total nutrition knowledge. These results suggest that the overweight respondents in the non-nurse group consumed a diet that was significantly lower in fibre ($p = 0.03$), but similar to, or even lower in fat than, their non-overweight peers and that they had a lower level of nutrition knowledge than those who were of normal / underweight.

Objective 9: To examine the factors that influence the eating habits and food choices of a group of nursing and non-nursing students

Factors

The results of the individual Likert–style statements, related to eating habits and food choices, are shown in **Table 9.1**. The figures represent percentages. The statements where there were significant differences between the nursing and non-nursing groups are indicated with an asterisk (*significant at 0.05 level, ** significant at 0.01 level). There were four factors, where the levels of agreement were significantly different:

1. I have to eat breakfast, otherwise I feel so hungry ($p = 0.01$)
2. I eat mainly vegetarian food because it's cheaper ($p = 0.01$)
3. Other people influence what I eat ($p = 0.05$)
4. It's difficult to have a regular eating pattern at university ($p = 0.05$)

In all cases it was the nurses who agreed more strongly with the statements than the non-nurses. Levels of agreement in all other statements were not significantly different.

Table 9.1: Factors influencing eating habits and food choices.

Factor	Strongly agree		Agree		Unsure		Disagree		Strongly disagree	
	Nurse	non-N	Nurse	non-N	Nurse	non-N	Nurse	non-N	Nurse	non-N
If I had more money, I would eat more healthily	31.6	30.8	26.3	23.1	7.9	17.3	26.3	19.2	7.9	7.7
No time to go out and buy fresh vegetables to cook	15.8	23.1	36.8	30.8	2.6	3.8	34.2	21.1	10.5	21.1
Other people influence what I eat *	2.6	13.5	55.3	21.1	10.5	7.7	26.3	32.7	5.3	25.0
I eat more healthily at University, than at home	2.6	3.8	28.9	21.1	18.4	21.1	31.6	21.1	18.4	30.8
What mum cooks influences what I eat now	21.1	13.5	36.8	34.6	18.4	13.5	21.1	26.9	2.6	9.6
Its nice to eat as a group-it becomes a social event	42.1	34.6	39.5	50.0	13.2	3.8	5.3	3.8	0	5.8
I have to eat breakfast, otherwise I feel so hungry **	42.1	34.6	31.6	11.5	10.5	13.5	15.8	19.2	0	21.1
I might not eat, even if I'm hungry, if it's too crowded in the kitchen	5.3	17.3	21.1	23.1	2.6	5.8	44.7	21.1	23.7	32.7
I tend to go for something cheap, rather than nutritious	2.6	15.4	36.8	17.3	7.9	13.5	42.1	40.4	7.9	13.5
I feel self-conscious eating unhealthy stuff	15.8	13.5	39.5	25.0	10.5	17.3	31.6	23.1	2.6	19.2
I eat more healthily at home where meals are prepared	21.1	21.1	23.7	28.8	18.4	13.5	34.2	25.0	2.6	9.6
Many contradictory messages; listen to everything, and you wouldn't eat anything	15.8	21.1	44.7	32.7	26.3	21.1	7.9	11.5	5.3	9.6
I tend to eat more rubbish at Univ. it's quick and convenient	7.9	21.1	26.3	30.8	23.7	9.6	31.6	32.7	10.5	5.8
I try to eat low fat varieties to control weight not because of heart disease	18.4	13.5	42.1	28.8	7.9	11.5	26.3	30.8	5.3	15.4
I eat mainly vegetarian food because it cheaper**	5.3	3.8	23.7	7.7	15.8	15.4	42.1	30.8	13.2	42.3
I was brought up to have family meals together;itsimportant	23.7	26.9	47.4	34.6	23.7	7.7	5.3	23.1	0	5.8
It's more expensive to cater for one	23.7	28.8	50.0	38.5	15.8	19.9	7.9	11.5	2.6	1.9
I eat more junk food away from home; it's comfort food	0	15.4	28.9	21.1	18.4	15.4	47.4	30.8	5.3	15.4
Difficult to have a regular eating pattern at Univ.*	31.6	30.8	50.0	26.9	5.3	7.7	13.2	26.9	0	7.7
I know I should eat better, but I can't be bothered	5.3	19.9	34.2	28.8	10.5	5.8	36.8	32.7	10.5	13.5

Ranking of factors

The objective, however, was to identify the factors that had the most influence on eating habits. To achieve this, statements have been ranked in terms of the influence each had on eating habits. This was based on the individual scores for agreement (either strongly agrees or agrees) with each statement. **Table 9.2** shows the results of this ranking.

Table 9.2: Rank ordering of factors influencing eating habits and food choices
N = nurse, NN = non-nurse

1. Its nice to eat as a group-it becomes a social event (N=82%, NN = 85%)
2. It's more expensive to cater for one (N=74%, NN = 67%)
3. It's difficult to have a regular eating pattern at University (N=82%, NN = 58%)
4. We were brought up to have family meals together; that's important **(N=71%, NN =61%)**
5. There are so many contradictory messages; if you listen to everything, you wouldn't eat anything (N=60%, NN = 58%)
6. If I had more money, I would eat more healthily (N=58%, NN = 55%)
7. I have to eat breakfast, otherwise I feel so hungry (N=74%, NN = 46%)
8. What my mum cooks influences what I eat now (N=58%, NN = 48%)
9. I eat more healthily at home where meals are prepared (N=45%, NN = 50%)
10. I tend to eat more rubbish at University; it's quick and convenient (N=34%, NN = 52%)
11. I try to eat low fat varieties to control my weight not because of heart disease (N=60%, NN = 42%)
12. I haven't got time to go out and buy fresh vegetables to cook (N=53%, NN = 54%)
13. I feel self-conscious eating unhealthy stuff (N=55%, NN = 38%)
14. I know I should eat better, but I can't be bothered (N=40%, NN = 48%)
15. Other people influence what I eat (N=58%, NN = 35%)
16. I tend to go for something cheap, rather than nutritious (N=40%, NN = 33%)
17. I eat more junk food away from home; it's comfort food (N=29%, NN = 36%)
18. I might not eat, even if I'm hungry, if it's too crowded in the kitchen (N=27%, NN =40%)
19. I eat more healthily at University, than at home (N=32%, NN = 25%)
20. I eat mainly vegetarian food because it's cheaper (N=29%, NN = 11%)

This ranking clearly identified the factors that the respondents felt were the most important or influential. The highest ranked item was "it's nice to eat as a group-it becomes a social event". This was agreed with strongly by 37.8% of the sample and a further 45.6% agreed with it. The second highest ranked item was "it's more expensive to cater for one". 26.7% strongly agreed with this and a further 43.3% agreed. Third ranked was "it's difficult to have a regular eating pattern at university" with 31.1% strongly agreeing and a further 36.7% agreeing. This has already been identified as a factor where the nursing students had a high level of agreement (82%) and non-nursing students did not rank it so highly (58%). "We were brought up to have family meals together; that's important" was ranked fourth overall, with 25.6% agreeing strongly and 40.0% more agreeing. Fifth ranked was "There are so many contradictory messages; if you listen to everything, you wouldn't eat anything" with 59% agreeing.

At the bottom of the ranking, statements had less than a third of respondents' agreement. The statement that attracted the least agreement was "I eat mainly vegetarian food because it's cheaper" with which only 19% of respondents agreed. However, this was one of the factors where there was a significant difference in the level of agreement between groups. 29% of nurses agreed with the statement, whereas only 11% of the non-nurses did. Even taking these differences into account, it was clear that it was still not an important influencing factor.

The second lowest ranked statement was "I eat more healthily at university than at home", with only 28% agreeing with the statement. There was an item that stated the opposite to this; " I eat more healthily at home where meals are prepared". This did not appear near the top of the ranking and was placed 9th with 48% agreement. Thus, there was consistency between responses. Many of the scores were less than 50%, indicating that they were not considered important factors.

Factor categories

The category in which there was most agreement appeared to be the 'social' category, with 83% agreement, followed by 'cost' and 'habit' with 63% agreement. These are shown in **Table 9.3**. Using ANOVA, there was only one significant difference between the nurses and

non-nurses: habit (p=0.5). Again a number of factors appeared to have little influence, having an overall percentage level of agreement of less than 50%.

Table 9.3: Analysis of influencing factor categories

Category (number of statements)	Nurse score (%)	Non-nurse score (%)	Mean Score (%)
Cost (4)	60	62	63
Time (2)	47	46	46
Change (3)	41	46	44
Culture (2)	65	50	59
Social (1)	82	85	83
Environment (1)	68	54	60
Peer pressure (2)	43	48	46
Knowledge (2)	60	48	54
Habit (2)	78	52	63
Motivation (1)	47	46	47

Gender differences

To establish if gender had any effect on choice, each statement was also subjected to two-way analysis of variance. There were three factors where the level of agreement was significantly different. **Table 9.4** gives the details.

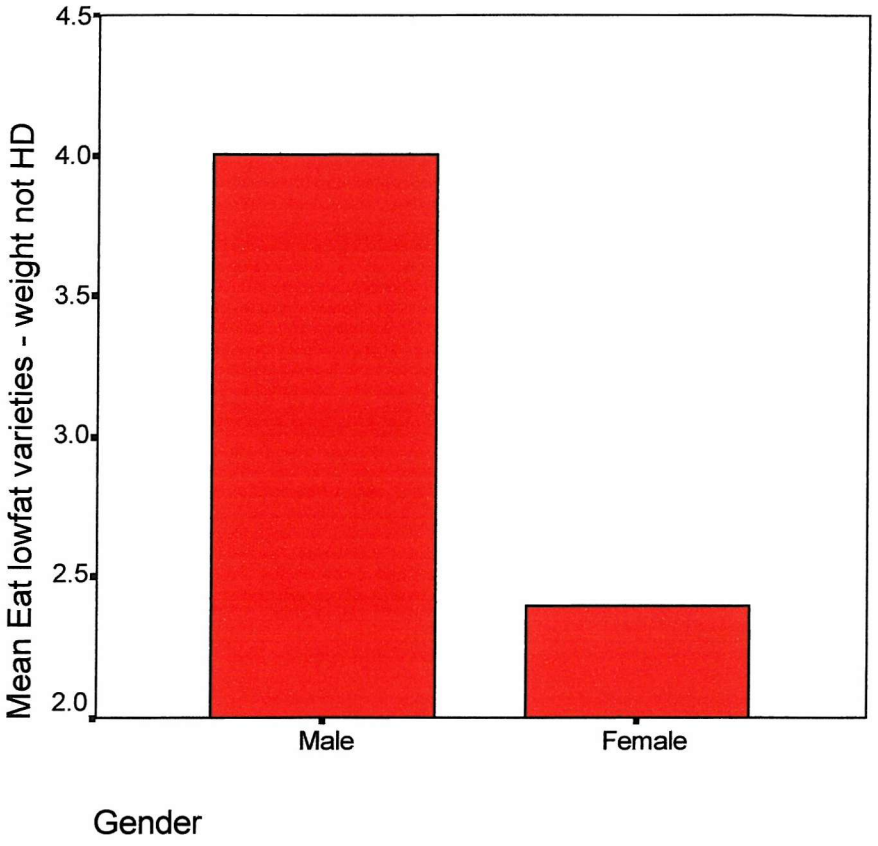
Table 9.4: Factors that influenced eating habits and food choices, where there were significant gender differences

Factor	variable	'p' value
If I had more money, I would eat more healthily	Gender /group	0.012
No time to go out and buy fresh vegetables to cook	Gender	NS
Other people influence what I eat	Gender	NS
I eat more healthily at University, than at home	Gender	NS
What mum cooks influences what I eat now	Gender	NS
Its nice to eat as a group-it becomes a social event	Gender	NS
I have to eat breakfast, otherwise I feel so hungry	Gender	NS
I might not eat, even if I'm hungry, if it's too crowded in the kitchen	Gender	NS
I tend to go for something cheap, rather than nutritious	Gender	NS
I feel self-conscious eating unhealthy stuff	Gender	NS
I eat more healthily at home where meals are prepared	Gender	NS
Many contradictory messages; listen to everything, and you wouldn't eat anything	Gender	NS
I tend to eat more rubbish at University. it's quick and convenient	Gender	NS
I try to eat low fat varieties to control weight not because of heart disease	Gender	0.001
I eat mainly vegetarian food because it cheaper	Gender	NS
I was brought up to have family meals together: its important	Gender	NS
It's more expensive to cater for one	Gender	0.054
I eat more junk food away from home; it's comfort food	Gender	NS
Difficult to have a regular eating pattern at University.	Gender	NS
I know I should eat better, but I can't be bothered	Gender	NS

The females had a significantly higher level of agreement with the statement "I try to eat low fat varieties to control my weight, not because of heart disease" ($p = 0.001$). This is clearly seen in **figure 9.1**, where the mean score in the females was 2.3, indicating a fairly high level of agreement, and the mean score in the males was 4, indicating a high level of disagreement.

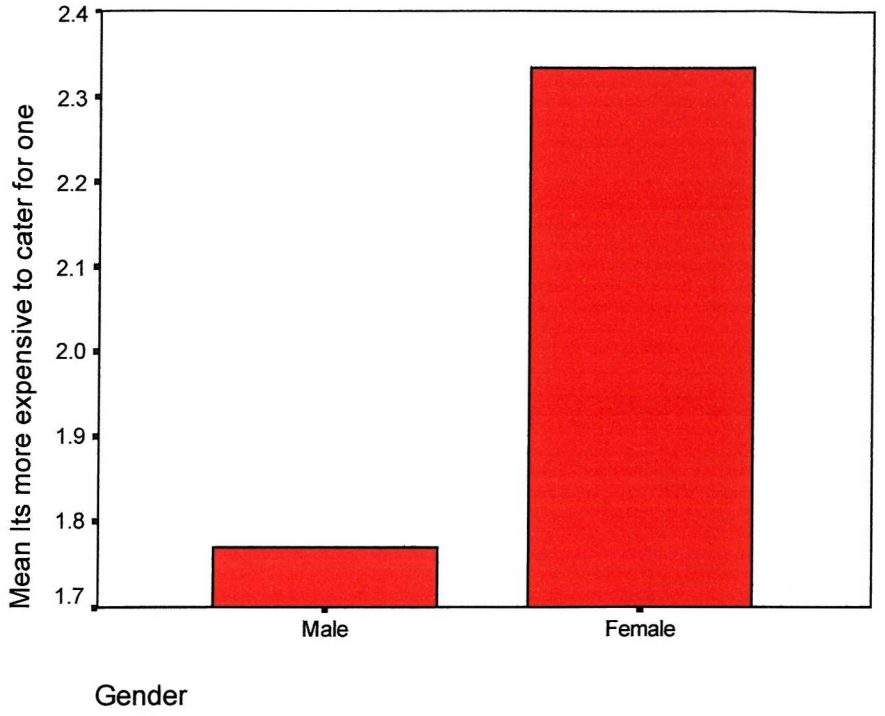
Figure 9.1: level of agreement with statement ' I eat low fat varieties to control weight, not heart disease', between males and females

Key: 1 = strongly agree, 5 = strongly disagree



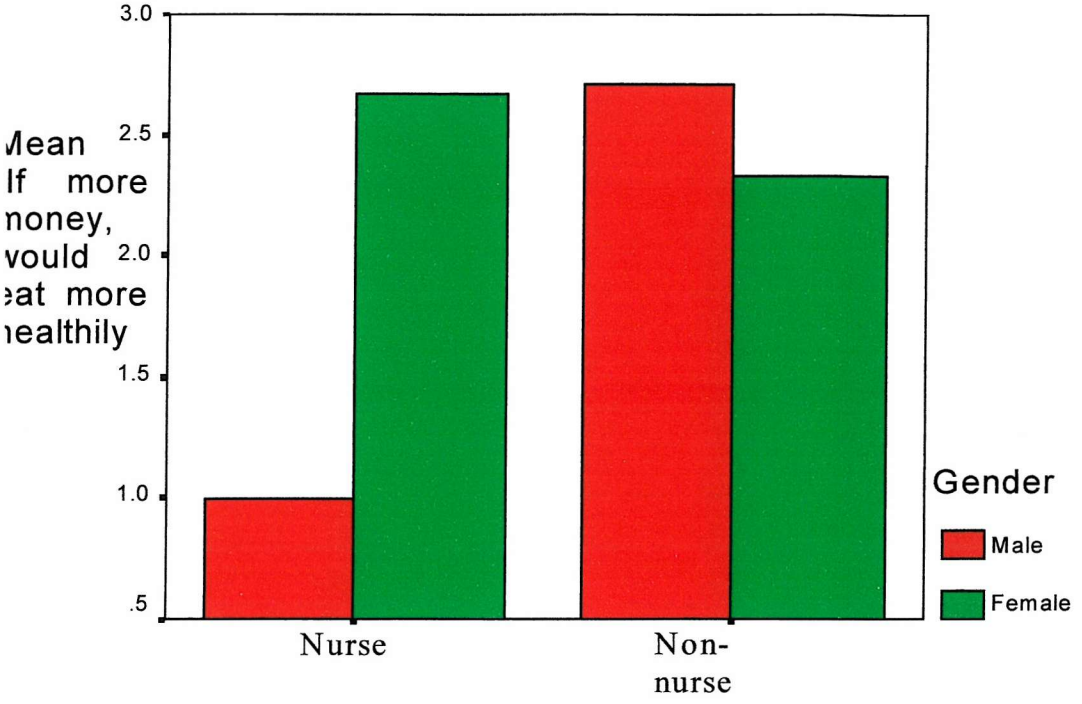
The males had a small, but significantly higher, level of agreement with the statement "it's more expensive to cater for one" ($p = 0.05$). This factor was identified by the whole sample as being an important influencing factor, ranking second highest. It was clear that the male respondents felt it had even more significance. **Figure 9.2** shows that the mean score for the males was 1.75, indicating a high level of agreement, whereas the females were slightly more neutral in their response, with a mean score of 2.35.

Figure 9.2: Analysis of level of agreement with statement 'its more expensive to cater for one', between males and females
Key: 1 = strongly agree, 5 = strongly disagree



The third statement where there was a significantly different response between groups was "if I had more money I would eat more healthily" ($p = 0.01$). It can be seen from **Figure 9.3** that the male nurses strongly agreed with this statement (1.0) but the male non-nurses scored similarly to the females and were not strongly for or against the statement. Nurses had a slightly, but not significantly, higher level of agreement with this statement (58%) than non-nurses did (54%).

Figure 9.3: Analysis of level of agreement with statement 'if I had more money, I would eat more healthily', by group and gender



Summary

Overall, the category that was the most influential was the 'social' category, with 83% agreement, with the factors of cost and habit ranked second with 63%. When the 20 statements of factors influencing eating habits and food choices were rank ordered, in terms of their overall score, seven factors were found to be significantly more important to one particular group:

I have to eat breakfast, else I feel so hungry (nurses)

It's difficult to have a regular eating pattern (nurses)

Other people influence what I eat (nurses)

If I had more money, I would eat more healthily (nurses/females)

I try to eat low fat varieties to lose weight, not because of heart disease (females)

I mainly eat vegetarian food as it's cheaper (males strongly disagree)

It's more expensive to cater for one (males)

The following factors appeared to be of more influence than the others to all the students:

It's nice to eat as a group – it becomes a social event (83%)

It's more expensive to cater for one (70%)

It's difficult to have a regular eating pattern at university (68%)

We were brought up to have family meals together; that's important (66%)

There are so many contradictory messages; if you listen to everything, you wouldn't eat anything (59%)

Overall summary of questionnaire findings

Respondents

The majority (91%) of respondents were of a similar age (18-23 years) and living in similar accommodation (97% self-catering) although the sample was unevenly divided between the nursing and non-nursing groups and across year groups. The similarity of age and accommodation has the advantage of reducing those variables within the two subgroups, so that comparisons can be more meaningful.

Gender

There was a significant difference in the gender distribution in the two groups, with the majority of the nurses being female (87%) and the non-nurse group having a more even distribution (F=58%, M=42%). Although these differences reflect real differences in the ratio of males to females in the faculties concerned, it was important to take account of them in the data analysis, so that findings predominantly due to gender differences were not attributed to group differences. 2-way analysis of variance statistical test (ANOVA) was used as it allowed more than one variable to be taken account of in the same test, and thus differences could clearly be attributed to one or both variables.

Objective 1: to explore the understanding that a group of nursing and non-nursing students have about the term 'healthy eating' and it's benefits

The majority of respondents thought that there were benefits from eating a healthy diet. 'Staying healthy' was perceived to be the most important benefit and was ranked number one

by twice as many respondents as the second highest ranked benefit 'To prevent disease'. The nursing students had a much clearer, and more accurate, understanding of the meaning of healthy eating in terms of the types of food or nutrients that would be included in a healthy diet than the non-nurses.

Objective 2: to compare the level of nutrition knowledge in a group of nursing students to that in a group of non-nursing students

There was no difference in the MCQ scores, which tests general nutrition knowledge, between the nursing and non-nursing groups. However, there was a clear and significant difference in nutrient knowledge and overall knowledge levels between the nursing and non-nursing groups ($p = 0.001$). These results show that the nurses in this study had a greater nutrition knowledge than the non-nurses, and that the difference in scores was particularly in the female nurses.

Objective 3: to explore and compare the sources of nutrition information used by nursing and non-nursing students

Friends and relatives were seen as the most important source of information on healthy eating by both groups, with university and school cited as the second most important source. The nursing students identified health professionals twice as often as the non-nursing students.

Objective 4: to compare the attitudes toward healthy eating in nursing and non-nursing students

There were very high levels of agreement with the statements 'healthy eating is important' (96.7%) and 'eating fibre is beneficial' (93.3%) in both the nursing and the non-nursing groups. However, there were significant differences in levels of agreement with the statements 'I make an effort to eat fibre and avoid fat' with the nurses agreeing more strongly (82% / 84%) than the non-nurses (44% / 42%). The nursing students also had significantly higher levels of disagreement with the statement 'I don't usually think about the nutritional aspects of the food I eat', than the non-nurses. The nursing students clearly had a more positive attitude toward healthy eating overall than the non-nursing students, with a highly significant difference in total attitude score ($p = 0.001$). The difference remained significant even when gender was identified as a variable.

Objective 5: To explore the Intention of nursing and non-nursing students to change their eating pattern

Approximately a third of both groups of the students said that they intended to change their diet, but many more non-nurses than nurses said that they did not intend to change. Reasons for change were strongly linked to eating a healthy diet. Those who intended to change gave the reason that they needed to eat better and they also disagreed with the statement that they 'do not need to change because their diet is healthy enough'. This suggests that there is a positive association between attitudes to healthy eating and intention to change, with those with more positive attitudes more likely to change their eating habits than those with less positive attitudes.

Objective 6: To compare the dietary intake in a group of nursing students to that of a group of non-nursing students

The whole group appeared to eat less fat than the national average, although the males ate significantly more fat than the females. The nursing students had a marginally, but significantly, higher intake of unsaturated fat than non-nursing students, ($p=0.05$). This suggests that although the nurses ate a similar amount of fat in their diet to the non-nurses, the proportion of unsaturated fat was higher. The mean fibre intake score was similar to the national average, but the nursing students had a significantly higher fibre intake score than non-nurses. However, overall, these figures only reflected the national average and only 25% consumed a fibre intake sufficient to meet the recommendations made by NACNE. Overall, the nursing students appeared to have a healthier diet, in terms of their fibre and unsaturated fat intake, than the non-nursing students did.

Objective 7: To discover whether, in a group of nursing and non-nursing students, there is a relationship between dietary intake, nutrition knowledge and attitudes towards healthy eating

The three key variables, food intake, nutrition knowledge and attitudes to healthy eating appeared to be significantly related to one another. The strongest correlation was between fibre intake and nutrient knowledge subscore ($p = 0.001$). Dietary intake score ($p = 0.03$) and unsaturated fat intake score ($p=0.02$) were also positively related to knowledge of nutrition. This suggests that knowledge does have some influence on dietary intake, particularly fibre intake.

Attitudes to healthy eating were significantly correlated to fibre intake score ($p = 0.04$), dietary intake score ($p = 0.016$), nutrition knowledge ($p = 0.009$) and to intention to change to a healthier diet ($p = 0.01$) suggesting that attitudes toward healthy eating influence diet, knowledge and intention to change. There was no significant relationship between attitudes and total fat intake score, but fat intake score did appear to be related to specific attitudes toward fat. Fibre intake ($p = 0.001$)

This final association was clearly seen in the strong correlations between individual attitude statements and the other variables. These correlations strongly suggest an association between behavioural attitudes such as 'I make an effort to eat fibre/avoid fat' and 'I eat low fat varieties', and fat and fibre intake, and between knowledge attitudes such as 'eating fibre is beneficial', and nutrition knowledge.

Objective 8: to identify differences in BMI between nursing and non-nursing students and to explore the relationship between Body Mass Index and dietary intake, nutrition knowledge and attitudes

There were no differences in estimated Body Mass Index between the nursing students and the non-nursing students. There were, however, significant relationships between Body Mass Index and both knowledge and dietary fibre intake in the non-nursing group, but no association with fat intake. It was found that the higher the BMI the lower the knowledge score and the lower the fibre intake. These results suggest that the overweight respondents in the non-nursing group, consumed a diet that was significantly lower in fibre but similar to, or even lower in fat than, their non-overweight peers and that they had less nutrition knowledge than those who were of normal / underweight.

Objective 9: to examine the factors that influence the eating habits and food choices of a group of nursing students and non-nursing students

There were few factors identified that appeared to strongly influence their eating habits. The social aspects of eating, such as eating as a group and the importance of family meals, had the highest level of agreement, both as a single statement and as a category. This had a far greater level of agreement than the next highest categories, which were 'cost' and 'habit'.

Influencing factors were largely the same in the two groups, although the nursing students identified factors in the 'habit' category, such as the need for breakfast and the difficulty of having regular meals, as more important than the non-nursing students did. Females said they would eat more healthily if they had more money, and tried to eat low fat varieties to lose weight and the males found catering for one more expensive than the females did.

In summary, the nursing students in this study appeared to eat a healthier diet, with more fibre and less saturated fat than the non-nursing students did. They appeared to have greater nutrition knowledge, better understanding about what constitutes a healthy diet, and they had more positive attitudes toward healthy eating.

CHAPTER 6

Discussion

Introduction

The aim of this study was to explore the relationships between nutrition knowledge, understanding and attitudes toward healthy eating and the dietary practices of a group of nursing students and compare them to a similar group of non-nursing students. This study attempted to provide an insight into the nutritional awareness of a group of university students. Two different approaches were used in an effort to gain a broad picture. Using qualitative and quantitative approaches in tandem has a number of well-documented advantages (Morse, 1991). Focus groups with small groups of self-selected students were used in the first part of the study to try to identify and explore factors that were perceived to influence eating habits and food choice. These were followed by self-completion questionnaires to a much wider sample of students.

The results clearly showed differences between the two groups of respondents: nursing students and non-nursing students. They also indicated relationships between nutrition knowledge and attitudes and dietary intake. In this chapter, the findings from this study are compared to previous work and similarities and differences are discussed. This chapter also discusses the limitations of this study and highlights the implications the findings might have for nutrition education.

Due to the overall small sample size (90), poor response rate (46%) and the possible response bias (see discussion on p 145ff for detail) these results should all be read with caution.

Sampling frame

Sample size and power

In this study, the sample used was a convenience sample, which is a very weak form of sampling. This reduces the impact of the findings that cannot easily be generalised. The smaller the difference between groups in the variable under consideration, the larger the sample needs to be to detect it. A power calculation should have been carried out to find the minimum sample needed.

A significance test is used to decide whether or not there is a difference between groups. Probability or 'p' values do not relate to the importance of a finding and depend largely on the size of the sample; when the difference is small, there is a danger of missing it. This means that a study like this one, with a small sample size, may fail to detect an important difference between groups. It is important to know how big the risk of failing to detect a difference between groups is, and this determines the sample size.

There are a number of factors that affect power.

- Sample size: When the sample is small, the statistical tests used may have inadequate power to detect a particular effect.
- Standard deviation: Power increases as variability decreases
- Significance level: power is greater, if the significance level is larger
- Size of difference: power is greater for larger effects

Power calculations were carried out, retrospectively, on the data, using computer software. This used the variables of mean, difference in means, common standard deviation, size of sample and significance level. All those results that had shown significant differences between the two groups were found to have a large enough sample size, and those results that were non-significant had sample sizes that were not large enough.

The power calculations were derived using a two-group t-test, with a 0.05 two-sided significance level, and powers of over 80% were considered acceptable. Examples of significant and non-significant results are shown in the Table below.

	Nutrition Knowledge	Attitudes	Fat intake score	Male/Female Fat intake score	Fibre intake score	Protein score
Sig. level	0.05	0.05	0.05	0.05	0.05	0.05
Nurse mean	23.53	5.19	29.97	36.50(m)	36.89	6.18
Non-nurse mean	21.35	2.15	30.75	27.92(f)	26.98	5.83
Diff. In means	2.18	3.04	0.78	8.58	9.91	0.25
Std. Dev.	3.29	3.22	12.09	12.09	12.88	1.21
Power (%)	86	99	5	85	94	80
n_1	38	38	38	26	38	189
n_2	52	52	52	63	52	189
Significance observed	Yes	Yes	No	Yes	Yes	N/a

These results clearly indicate that the sample was large enough to show significant differences between the two groups in nutrition knowledge scores, attitudes toward healthy eating, and fibre intake scores (i.e. Power of 86%, 99% and 94%). It was not large enough to show a difference in fat intake scores, although the sample was large enough to detect a significant difference between males and females in their fat intake scores. The final column shows a non-significant result (protein knowledge score) and calculates the size of sample required (189) to gain a significant result, with a power of 80%. One of the objectives of this study was to identify differences in overall nutrition knowledge, rather than individual nutrients and therefore the sample size was sufficient to detect a difference. Using the same formula, a sample size of over 4000 would have been required to detect a significant difference in fat intake scores between nurses and non-nurses. This suggests that there really is no difference between the two groups.

Year of study

The two subsamples, nursing students and non-nursing students, were similar in some characteristics, such as age, type of living accommodation and body mass index, which allowed for more meaningful comparisons. However, there were dissimilarities in terms of year of study and gender, which reduce the reliability of the findings. Year 1 students may have been less experienced at shopping and cooking for themselves, than continuing year students, and this may have influenced their eating habits and dietary choices. However, none of the factors identified in the focus groups appeared to be linked to year of study.

Gender

There was an unequal and very uneven distribution of males in the sample. The small number of males in the nursing student group made it impossible to derive any meaningful results for this subgroup, although the total male sample could be used. Gender was identified as a factor in several contexts. By using 2-way ANOVA tests, the influence of gender could be quantified.

Most of the factors where gender was an issue related to fat: the males had a significantly higher fat intake and lower nutrient knowledge of fats and did not agree with the statement 'I try to eat low fat varieties'. Overall, the males had lower nutrition knowledge scores and found it more expensive to cater for one, but there was no difference in the attitudes toward healthy eating scores between the males and the females. This means that the significant difference in attitude scores between the nurses and non-nurses was a real difference between those two groups and not one due to gender. These findings support Shepherd and Towler (1992) who found that females had a higher level of nutrition knowledge than males, and more negative views toward fat.

Pollard et al (1998), in a study of motives underlying healthy eating, found that weight control was the most important factor in ensuring that women ate a healthier diet than men. They found that concerns about fat content were more strongly associated with ideas about weight control than with the concept of healthy eating. If these findings are applied to this study, it may help explain why males had a higher fat intake than females.

Barker et al, in 1995, found that 'antifat', 'profibre' feelings (author's words) were more prevalent in women than in men. They concluded that the existence of antifat attitudes did not translate into lower fat intake in men, but it did in women. In this study, attitudes were not significantly different in men and women, but men had a higher fat intake. Barker et al. ascribed the ambivalence in men to tension between attitudes toward healthy food and the taste and convenience of less healthy foods, and not wanting to change. This study found no gender differences in intention to change.

Objective 1: to explore the understanding that a group of nursing and non-nursing students have about the term 'healthy eating' and it's benefits.

Understanding of the concept of healthy eating

Nearly all (97%) of the student nurse sample defined healthy eating in terms of 'balance and variety', or 'less fat' or 'more fruit and vegetables', which was the composite category used to identify the concept of healthy eating, but only 61.5% of the non-nursing students gave such a description. It is clear from these results that the nursing students had a significantly better understanding of the term 'healthy eating' than the non-nursing students did. This was not unexpected, as they would most likely have been exposed to the concept, both in class and in their clinical placements.

The non-nursing students were perhaps more representative of the general public. However, in the pan-EU study reported by Margetts et al. (1997a) 91% of respondents in the UK mentioned either 'more fruit and vegetables', or 'less fatty foods' or 'balance and variety' in their definition of healthy eating. This is significantly higher than the proportion in this study, of 61.5%. This may have been due to questionnaire fatigue in this study, as this question was towards the end of the questionnaire. This explanation may also have been the reason why over 17% of non-nurses failed to respond at all to this question and a further 9.6% just described healthy eating as 'food that is healthy' or 'food that is good for you'.

Link with healthy eating

In this study, the nursing students appeared to eat a healthier diet than the non-nursing students and were significantly more able to define healthy eating. This supports the findings of Margetts et al (1997b), in his study of 5000 people, that respondents who were able to define healthy eating were also more likely to be eating a healthy diet, as defined by the DINE questionnaire. In this study, 94% of nursing students mentioned the concepts of balance and variety when defining healthy eating, but over half (55%) mentioned specific foods, such as 'more fruit and vegetables' and 'less fat'. Only 34.6% of non-nursing students mentioned specific foods.

Booth (1989) challenged the use of the concepts of 'balance' and 'variety', which he believed to have a *'theoretically solid abstract basis'* (Booth, 1989, p. 348), wondering how well understood those terms were. These findings indicate that there was only a fair level of understanding, in specific terms, of what constituted a healthy diet, especially in the non-nurse group. However, these results may not have reflected respondents' true level of understanding, as they were not asked to write a list of characteristics, but simply to describe the term 'healthy eating'.

Benefits from eating a healthy diet

Staying healthy and preventing disease

Results from both groups of students were very similar: staying healthy (46%) was cited twice as frequently as the next highest reason, to prevent disease (23%). This may have reflected the youth of the population studied where the incidence of chronic illness was likely to be low and the likelihood of severe disease remote. The third highest benefit mentioned was 'weight control' (16%). A similar question posed in the pan-EU study yielded similar results, but the difference in magnitude between reasons was smaller (Zunft et al. 1997). 'To stay healthy' was cited by 31%, 'to prevent disease' by 24% and 'weight control', 'quality of life' and 'to be fit' each gained 10% of the votes. In this pan-EU study, 'to be fit' was a more important benefit in the age group 15-34 years. Thus the respondents in this study did not correspond that closely to the larger study of the general public, although the two chief reasons given were the same. This may have been due to the difference in age range of respondents in the two studies.

Improving health and losing weight

In Buttriss' study (1997) the most significant reasons for eating more healthily were a desire to improve health generally (60%), and weight loss (34%). Personal health was third (20%). Again, the three primary reasons were the same as in this study. Figures in Buttriss' study were higher because respondents could choose more than one category, whereas in this study, respondents were asked to rank a list of benefits in order of priority. 'To be fit' was the lowest ranked benefit in this study, whereas in the pan-EU study, it was ranked more highly (Zunft et al, 1997). It was not mentioned at all in Buttriss' study. This may have been because healthy eating was not perceived to be strongly associated with fitness, and other benefits

were seen as more important. These findings have implications in terms of the emphasis placed on nutrition education: if 'staying healthy' was the most important perceived benefit of healthy eating then this should be highlighted in any education programme.

Objective 2: to compare the level of nutrition knowledge in a group of nursing students to that in a group of non-nursing students

There was a small, but significant difference in knowledge levels between the nurse and non-nurse samples ($p = 0.001$). These results indicate that the nursing students in this study had greater nutrition knowledge than the non-nursing students. These results support the findings of Johnson and Johnson's meta-analysis, in 1985, which found that nutrition education was most likely to lead to an improvement in knowledge, with lesser changes in attitudes and dietary habits. The difference in knowledge was only in the specific nutrients test and not in the general knowledge test. It is not possible, from the findings of this study, to say whether the nursing students increased nutrition knowledge was a result of the nutrition teaching or exposure to patients in clinical practice, who had nutrition-related problems, or whether those students with an interest in nutrition chose to study nursing.

Comparison of knowledge scores with original study

In the original study in 1992, Shepherd and Towler compared two groups: nutrition professionals and engineering students. Using negative scoring, in the way previously described, the results were as shown in the Table below, compared to the scores obtained in this study.

Table 1: comparison of knowledge scores from Shepherd and Towler's study (1992) and this study.

Nutrient	Nutrition professional (Shepherd and Towler)	Engineer students (Shepherd and Towler)	Nursing students (current study)	Non-nursing students (current study)
protein	6.8	1.4	2.3	2.1
carbohydrate	4.3	1.8	2.1	1.1
fat	4.4	1.1	1.5	0.6
fibre	3.7	1.6	1.0	1.4
knowledge sub-score	19.2	5.9	6.9	5.3

This clearly shows that the students in this study have similar knowledge levels to the students in Shepherd and Towler's study, as opposed to the nutritionists. However, out of the three groups of students, the nurses had a marginally higher score. The nurses' lowest score was for fibre; this is interesting, considering that they had a high fibre intake and had very positive attitudes towards fibre. It was also the lowest score for the nutrition professionals, in Shepherd and Towler's study.

No reason for this was offered, in their paper, and I can offer no explanation either, other than it being a resultant of the way in which the questionnaire was constructed, by Towler and Shepherd (1990). The final lists of foods were compiled from food tables from which foods where all respondents had agreed on composition had been excluded. This had deliberately been done in order that the items that remained were seen as good discriminators between respondents. Fibre was the nutrient for which the most foods were agreed upon, which meant that the remaining items were perhaps slightly more obscure or unlikely than items in other lists.

In Towler and Shepherd's study (1990), scores for nutrient knowledge and general nutrition knowledge were simply summated to give a total knowledge score. The two types of test require different types of knowledge and understanding and the rationale for summating them (Chapter 4, p.58) was perhaps flawed. However, given that there were only significant differences in the nutrient section and not in the general knowledge, the total score reflects differences in nutrient knowledge.

Since completion of the data collection for this study, further nutrition knowledge questionnaires have been published. In particular, one by Parmenter and Wardle (1999). This may have been a better choice of questionnaire, if available at the planning stage of this study. It appears to provide a comprehensive measure of the nutrition knowledge of U.K. adults. The authors claim that the tool has content and construct validity, as well as reliability. It is similar in format to Towler and Shepherd's tool (1990), consisting of a nutrient density section and a multiple-choice questionnaire of current nutritional recommendations.

Level of nutrition knowledge

Buttriss examined food knowledge in her study, reported in 1997. She was interested in the ability of individuals to translate nutrition information into practical information, about which foods contain which nutrients. She found that, in the 18-24 year age group, 65% were able to identify at least half of the foods high in fibre, 16% were able to identify half the foods high in starch, but only 8% could identify foods high in saturated fat.

In this study, taking the raw scores; i.e. not negatively marked, 75% scored 5 or more (half the total) for fibre and fat and over 80% scored 5 or more for carbohydrate and protein. This would suggest that respondents in this study were far better informed than the sample of the general population investigated by Buttriss. However, the lists of foods used in the questionnaire would have been different. Also, Buttriss' findings relate to a study of the general population, completed in 1992, compared to this study, of university students, completed in 1999. There may also be a difference in public awareness, as there have been a number of nutrition campaigns and reports, in the intervening years (for example, the Nutrition Task Force, 1994).

General nutrition knowledge in health professionals

In Hopper and Barker's study, in 1995, 50% of practice nurses and 2% of GPs correctly answered nine general nutrition knowledge questions in an MCQ. In this study, there were seven questions in an MCQ, of which four were taken from Hopper and Barker's study. The results of the MCQ tests in the two studies should not be directly compared as only four of the questions were the same and three were different. The mean score for the MCQ was 4.2,

with nursing students scoring 4.4 or 63%. No one scored 100%. This is not surprising, as the sample in this study were student nurses and in Hopper and Barker's study, the sample were experienced qualified nurses and doctors.

However, there is no room for complacency, as the non-nursing students had similar scores in the MCQ test to the nursing students. This is interesting, as these results suggest that both groups had a similar level of general knowledge of nutrition, which they have obtained from sources other than nutrition lectures. Alternative explanations are that the questions in the MCQ test were not sufficiently good discriminators and therefore were not able to differentiate between the groups, or that the sample size was inadequate to find any difference in MCQ scores.

The general nutrition knowledge section of the questionnaire was comprised of questions from several different previous studies. It was therefore not possible to claim that it was a valid tool. It was constructed in a rather ad hoc way, and did not ensure that there was comprehensive coverage of healthy eating issues. Again, the more recently published study by Parmenter and Wardle (1999) claims to have developed a general nutrition knowledge tool that systematically questions current nutrition recommendations.

Adequacy of nutrition knowledge

From the findings in her study, Buttriss (1997) concluded that the nutritional knowledge of most health professionals, who had received little/no formal nutrition education, was inadequate as a foundation for providing satisfactory dietary advice to patients/clients. Perry (1997), too, highlighted the lack of adequate knowledge of applied nutrition, in her study of qualified nurses. In this study, the nursing students appeared to be better informed and thus may be better prepared to take on the role of health professional.

The Core Curriculum for Health Professionals, published in 1994, recommended a broader nutrition education than many schools of nursing had previously provided. The School of Nursing and Midwifery under investigation has used this curriculum since 1995. Nurses in the Perry study (1997) would not have had the benefit of this nutrition education.

Objective 3: to explore and compare the sources of nutrition information used by nursing and non-nursing students

Friends and relatives

More than half the respondents in this study cited friends and relatives as the most important source of information about healthy eating (53%) and school/university as the second most frequent (42%). These results were quite different from those found in the pan-EU study by Almeida et al (1997). They found TV and radio (29%), magazines and newspapers (27%) and health professionals (26%) were the most frequently selected sources of information, with relatives and friends and food labels in fourth place, cited by only 22%.

The discrepancy may have been due to the age of the respondents in this study, where the views of friends and relatives may still have been very important, and the influence of educational experiences may have been far greater than it might be in an older population. This latter finding, that school/university were second most cited source, may also have been an indication of the value of the knowledge obtained, or a product of the healthy eating promotions that have taken place in many schools in the last few years. Buttriss (1997) found that the health professionals in her studies were critical of the media as an accurate source of information. This may have been one of the reasons that the nurses only ranked them fourth.

Bull (1995) in his study of 15-25 year olds, found that parents and friends were the most frequently mentioned sources of information in 19-25 year olds. This supports the findings in this study. The pan-EU study population had a much wider age range (15-65 years) but it, too, found that a higher percentage (27%) of the younger respondents used friends and relatives as an important source of information.

Influence of media

The role of the media, in providing health education, through TV / radio / magazines / newspapers and advertising should not however be overlooked and could still be seen to influence healthy eating. Rudat (1993), cited in Almeida et al (1997), and Buttriss (1997) both reported that health professionals used the popular media as their source of nutritional information, which implied that they did not receive adequate education.

Influence of health professionals

Many young people do not access health professionals on a regular basis and this may have been a reason why they were not seen as an important source of health information. This was not true, however, for the nursing students, who were working alongside health professionals. This may have accounted for health professionals appearing higher on their list of sources of information, ranked just above the various media. Alternatively, they may have perceived health professionals as more important because they were more aware of them. Almeida et al (1997) and Buttriss (1997) both differentiated between sources that were 'used' and those that were 'trusted', and found that health professionals were the most trusted. This study did not ask respondents to do that, but the nursing sample may have identified health professionals because they trusted them as a source of information.

Objective 4: to compare the attitudes toward healthy eating in nursing and non-nursing students.

Positive attitudes of nursing students

The nursing students in this study had very positive attitudes toward healthy eating, which were significantly more positive than those of the non-nursing students. This difference was not due to gender differences. The differences in attitude were most marked in the two behavioural attitudes related to fibre and fat intake, rather than the knowledge-based attitudes. This suggests that the nurses were trying to put their knowledge about the benefits of healthy eating into practice, whereas the non-nurses appeared to have the knowledge but were not necessarily trying to translate it into action. The results support the hypothesis that it is behavioural attitudes, rather than knowledge or knowledge of benefits that are associated with diet. If these results could be generalised, this would have important consequences for nutrition education: that encouraging positive attitudes to healthy eating is more likely to be associated with changes in eating habits than increasing knowledge alone.

Perception of healthy diet

Kearney et al (1997), in their study of attitudes toward healthy eating, found that the majority of subjects felt that their diet was healthy (71%), compared to this study, where 63% disagreed that their diet was healthy. Kearney et al found that agreement levels decreased with higher levels of education and increased with age. This may account for the wide difference in results. In this study, there was a significant difference in the levels of agreement with this statement, depending on whether respondents were intending to change their diet or not. Kearney et al did not investigate intention to change.

In Kearney et al's study, half the respondents (49%) agreed that they did not usually think about the nutritional aspects of the food they ate, and in Guthrie's study of young adults (1984), it was found that there was a general lack of interest in food, whereas in this study, 64% disagreed with the statement. However, Kearney et al did find that females were significantly more likely to disagree with the statement than males.

In this study, there was no difference in response between the males and females, but the nursing students were significantly more likely to disagree (84%) compared to non-nursing students (40%). This finding may explain the wide difference in results between the two studies: the non-nurses were much closer in attitudes to the general public surveyed by Kearney et al than to the nursing students. This suggests that the nursing students may have perceived nutrition education and dietary information as more relevant than the non-nursing students did.

Trying to eat healthily

Monneuse et al (1997), in their investigation of the eating and health behaviour of 600 French students, found that approximately 30% said that they made an effort to eat fibre and 34% to avoid fat. These figures were very similar to the non-nurse sample in this study (27 and 38%). However, the vast majority of the nurse group in this study (82% and 84%) said that they made an effort to eat fibre and avoid fat. This again suggests that there is a real difference in attitudes between the two groups. Lennernas et al (1997) found that those who were better educated were more likely to elect 'trying to eat healthily'.

The attitudes of the non-nursing students appear to correspond quite closely to other research studies of the general public, in a number of cases, whereas the nursing students appear to be consistently different. Again, the question arises of whether this is due to the teaching they have received or to their exposure to clinical practice and patients, or whether students with more positive attitudes toward nutrition and health are attracted to professions such as nursing.

Objective 5: To explore the Intention of nurses and non-nurses to change their eating pattern

There were equal numbers of nursing students who said they intended to change their diet, those not intending to change and those who were undecided. The number of non-nursing students who said 'No' was far greater than those who said 'Yes'. Those who said they intended to change had significantly more positive attitudes to healthy eating than those who said they did not intend to change. This supports Ajzen and Fishbein's theory (1980) that stated that intention could be predicted by attitudes and perceived social pressure, and Shepherd and Towler (1992) who found strong correlations between attitudes toward healthy eating and intention to change.

Knowledge and intention to change

Intention to change did not appear to be linked to any other factors, such as dietary intake or knowledge level. This conflicts with the findings in Charny and Lewis' study (1987) who found that those intending to change their diet for health reasons showed greater health knowledge. However, they could not state if this relationship was causal and, though consistent, was not strong. The knowledge test in their study consisted of ten general nutrition knowledge questions on fat and fibre. It was thus a rather different knowledge test to that used in this study and was more akin to the MCQ part of the knowledge test used here.

Lack of association with dietary intake also conflicted with findings by Shepherd and Towler (1992) who found a strong correlation between fat intake and intention to change. In this

study, of those who said they had no intention to change, the majority (59%) claimed that they already ate a healthy diet and a further 16% were happy with their diet. Buttriss found similar findings, with 50% of her sample happy with their diet and with no intention to change.

One of the limitations of this part of the study was the inability to distinguish between those respondents who did have a healthy diet and therefore did not need to change their diet, and those who thought they had a healthy diet, but did not. From the data collected, it was not possible to examine if this reason, given for not intending to change, was justified. However, there was close agreement between the responses to the attitude statement about the need to change and those to the question about intention to change, which demonstrated consistency of response.

Reasons for not wanting to change

In this study, lack of time and money, and difficulties associated with change were cited frequently, as reasons why respondents did not intend to change their diet. Lack of time, lack of self-control and cost were cited as the three most frequently reported barriers to healthy eating, by Lappalainen et al in the pan-EU study in 1997. Buttriss (1997) found that lack of knowledge was the greatest obstacle to change, but cost, time and unwillingness to change were the next most common reasons cited.

Similarly, Story and Resnick (1986) in a study of adolescent's views on food and nutrition, found that lack of time, lack of discipline and lack of a sense of urgency were the three most frequently cited barriers to change. They did not identify cost as a key barrier, but this may be because the sample were a little younger and were still living at home with their family. It therefore appears that the findings from this study were largely in line with previous research.

Objective 6: To compare the dietary intake in a group of nursing students to that of a group of non-nursing students.

Fat and fibre intake

Overall, the students in this study appeared to eat less fat than the national average. This finding was clearly linked to gender, with the males eating more fat than the females. However, this still indicated a relatively healthy intake of fat. Although the nurses ate a similar amount of fat in their diet to the non-nurses, the proportion of unsaturated fat was higher, indicating a healthier diet. There were no overall gender differences in the amount of unsaturated fat eaten.

The nursing students appeared to have a significantly higher fibre intake than non-nurses. However, overall, these figures reflected the national average and only 25% consumed a fibre intake sufficient to meet the recommendations made by NACNE. It would appear, from the results of this study, overall, that health messages about increasing fibre intake have not been incorporated into changes in food intake as much as changes in fat intake, although the diet of the nurse sample was significantly closer to NACNE recommendations than the non-nurse sample.

Beerman (1991) said that self-catering accommodation made it easier for students to adopt an inferior diet, compared to traditional halls of residence, where food was provided. The findings from this study do not appear to uphold this view. Both groups of students appeared to eat a diet with a low fat intake, which corresponds to the Recommended Daily Allowance. This may simply reflect the under-reporting of fat intake highlighted by Blundell (2000). Alternatively, it may reflect the nature of the sample: i.e. 71% female, who tend to have lower fat intakes, and all university students, who are more educated than the general public, and therefore may have been more aware of the health risks associated with a high fat intake.

The difference in the proportion of fat taken as unsaturated fat in the nurses and non-nurses was particularly noticeable in the males. This may reflect a greater understanding in male nurses compared to their non-nursing peers, of the difference between saturated and unsaturated fats, but is more likely to be due to the small number of male nursing students in the sample. Thus, the nursing students appeared to consume a slightly, but significantly,

healthier diet, in terms of more fibre and a higher proportion of their fat intake as unsaturated fat.

The food frequency questionnaire used in this study (adapted from Roe et al, 1994) has a number of flaws. It relies on accurate recall of food intake, it generates a score, rather than an estimate of nutrient intake and it relies on respondents being honest and knowledgeable about their own diet.

Comparison with Roe et al's original study

The figures obtained in this study compare quite closely to those from the original study of Roe et al (1994). Fat intake scores were very similar, with men scoring 36.5 compared to 34 and women scoring 27.9 compared to 28, with a range of 10-83 compared to 12-71. Unsaturated fat intake scores were also similar. Fibre intake scores differed slightly, in that, in Roe's study, men scored higher than women (35 and 31) whereas in this study, women scored higher than men (32 and 29). The range of scores were similar, 6-73 in this study compared to 13-72 in Roe's study.

However, the classification of intake scores (Table 6.2) were quite different. In this study, 56% were classified as low fat, compared to only 41% in Roe's study and 15% as high fat, compared to 25%. Similarly, 50% were classified as low fibre in this study, compared to 39% in Roes' and 25% as high fibre, compared to 21%. This implies that there was greater diversity in dietary intake in this study. Also, there were more men in Roes' study (m=62%, f=38%) compared to this study (m=29%, f=71%). This would imply that overall means, such as in the classification of intakes, were likely to be different, reflecting the weighting of gender in each sample.

If Roes' study results are compared to the nurse sample alone, the differences reflect those between nurses and non-nurses previously identified in this study. Fibre intake scores were higher, in the nurse sample, with 45% in the high fibre category (21%) and only 37% in the low fibre category (39%). Fat intake scores were similar, but again, a much greater proportion classified as low fat: 58% (41%) and far fewer as high fat: 10% (25%). This would again suggest that the diet consumed by the nurse sample was closer to that

recommended by NACNE than the general population. (Roe claimed that her sample had similar nutrient intakes to a nationally representative sample.)

The findings from this study were in contrast to those of Soeken et al (1989) who found that nursing students in the US were significantly less compliant with health behaviours than a national sample of females. In their study, nursing students did not eat any more fibre and avoided less fat than the national sample. The differences between the two studies may have been due to differences in methodology, they may reflect changes over the past decade or they may reflect genuine differences in health behaviour due to contrasting cultures (US versus UK) or levels of motivation. Nursing students in the UK are exposed to ill patients earlier in their training than those in the US, and this may have affected personal health behaviours. The positive attitudes toward healthy eating of the nursing students in this study would support this conclusion.

Objective 7: To discover whether, in a group of nursing and non-nursing students, there is a relationship between dietary intake, nutrition knowledge and attitudes towards healthy eating.

Intake

The three key variables, food intake, nutrition knowledge and attitudes to healthy eating appear to be significantly related to one another in this study. The strongest correlation was between fibre intake and nutrition knowledge subscore ($p = 0.001$) suggesting that nutrient knowledge influences intake. Nutrient knowledge also had weak links with unsaturated fat intake ($p = 0.02$) and intake score ($p = 0.03$). Attitudes to healthy eating were significantly correlated to fibre intake ($p = 0.045$), intake score ($p = 0.016$), nutrition knowledge ($p = 0.009$) and to intention to change to a healthier diet ($p = 0.01$) suggesting that attitudes toward nutrition may influence diet, knowledge and intention to change.

This final association was clearly seen in the strong correlations between individual attitude statements and the other variables. 'I make an effort to eat fibre' strongly correlated to fibre intake ($p = 0.001$) and 'I make an effort to avoid fat' correlated to fat intake ($p = 0.06$) and 'I make an effort to eat fibre' ($p = 0.001$). The attitude 'Eating fat is beneficial' strongly

correlated to fat knowledge ($p = 0.002$) and to fibre knowledge ($p = 0.005$). There were also correlations between the attitudes toward fibre ($p = 0.005$) and the attitudes toward fat ($p = 0.015$). Fat intake was also strongly correlated to the factor 'I eat low fat varieties' ($p = 0.001$). These correlations strongly suggest an association between behavioural attitudes and dietary intake and between knowledge attitudes and nutrition knowledge.

Attitudes

The finding that there appeared to be significant relationships between attitudes toward healthy eating, nutrition knowledge and dietary intake is encouraging. Shepherd and Stockley (1987) found similar results, that a person's own attitudes toward healthy eating were a better predictor of behavioural intention (dietary intake) than the subjective norm. However, they failed to find a significant relationship between knowledge and attitudes or between knowledge and behaviour. This may have been because of the brevity of the knowledge test used. In a later study, Shepherd and Towler (1992) found that there was a significant, but not particularly strong correlation between attitudes and nutrition knowledge. This time a much longer knowledge test, similar to that used in this study, was used.

Perron and Endres (1985), in their study of female athletes, found a strong association between nutrition knowledge and attitudes. Motivation may have been a factor in this. This study also revealed a strong relationship between knowledge and attitudes, especially among nursing students. It could be argued that they are similarly motivated. The recent study carried out by Wong et al in 2000 college students in Taiwan (1999), also found that nutrition knowledge and attitudes, and dietary practices and attitudes were both positively correlated. These results again support the findings from this study.

Knowledge

Charny and Lewis (1987), in their study of the general population, found a clear association between change in eating habits and knowledge, with higher levels of knowledge consistently linked with healthy changes in food intake. This, too, supports the findings in this study. In this study, fibre intake was significantly related to knowledge, but no association was found between fat intake and knowledge score and only a weak correlation with unsaturated fat intake. Larsson and Lissner (1996) in their study of women in Sweden, found similar results,

that fibre intake was higher and saturated fat intake lower, in women with a higher level of nutrition knowledge.

Camooso et al (1979) failed to find any significant relationships between knowledge and behaviour, in a group of nursing students. This may have been due to the general nature of the study, where a large number of preventative health practices were investigated, or it may have been a factor of the age of the study, which was carried out before 1979. Dietary practices have been frequently highlighted in the public media and in professional journals in the last 20 years. Contento et al (1995), in their extensive review of research in nutrition education, found that nutrition education could successfully improve dietary practices when behavioural change was set as a goal.

Nurses as role models

A number of studies investigated the nurse as a role model. Soeken et al, 1989, and Dittmar et al (1989) findings both suggested that nurses were not well equipped to act as role models as their own health behaviour was no more positive than the general public. Oliveri and Oulette (1986) stated that nursing students needed to seek ways of modifying their own behaviour before becoming engaged in health promotion, and Mitchinson (1995) found that, in a small study of student nurses, they did not see the concept of being a role model as an important part of health promotion. The findings in this study, that suggest a relationship between dietary intake, nutrition knowledge and attitudes toward healthy eating, therefore have important implications for the teaching of nutrition.

Objective 8: to identify differences in BMI between nursing and non-nursing students and to explore the relationship between Body Mass Index and dietary intake, nutrition knowledge and attitudes.

Body Mass Index

Mean reported Body Mass Index of respondents in this study was 22.2. This was slightly higher than the BMI reported by Monneuse et al in 1997 for French students (20.9), but the ranges in the two studies were very similar (13.6 – 30.6 and 14.1 – 31.5). In the French study,

it was stated that BMI values in that study were lower than the European norm for students and thus the findings in this study are likely to reflect European levels (Bellisle et al, 1995). Bellisle et al found that only 7.9% of their European sample of students were overweight (BMI >25) and 1% obese (BMI >30) compared to 18.6% and 2.3% in this study. There is no obvious explanation for this difference, other than the subjects in this study were all studying in England, whereas Bellisle et al's subjects came from a variety of European countries.

In this study, BMI was calculated from reported height and weight, rather than actual measurements. The similarity of ranges between this and previous studies using actual measurements and the finding that prevalence of reported overweight and obesity were higher in this study, give support to the reliability of these results. However, the very low BMI reported by one respondent suggests that not all the calculated BMI are accurate, and therefore these findings should be read with caution.

Knowledge and dietary intake

In this study, Body Mass Index had a strong correlation to Nutrition knowledge ($p = 0.004$), and was also correlated to fibre intake score ($p = 0.03$). Thus, respondents in this study, who had a high BMI, appeared to have a diet lower in fibre and lower in fat than those who were not overweight. This would suggest that they were either getting their energy from a high sugar intake or that they had not recorded their intake accurately. It appears, from dietary studies (National Dairy Council, 1993), and Blundell's editorial (2000) that overweight people are more likely to underestimate their intake and therefore the fat intakes recorded here may be less than they should be.

The findings in this study suggest that obesity was associated with a low fibre intake score, rather than a high fat intake score, and to a lack of nutrition knowledge. This might suggest that there may have been an awareness of the link between fatty foods and obesity, but a lack of awareness of the role of fibre in the diet. This is in line with current health education, which encourages a high complex carbohydrate/fibre intake as the preferred way of providing the energy requirement. This conclusion appears to be supported by the finding that respondents who had a high BMI (overweight/obese) had a lower level of nutrition knowledge than those who were of normal or underweight.

This appears to contradict the findings of Thakur and D'Amico (1999) who found an association between obesity and knowledge of foods high in fibre, although they found no difference in overall nutrition knowledge, between obese and non-obese students. In this study, the number of obese students is very small and may not be sufficient to demonstrate a difference.

Objective 9: to examine the factors that influence the eating habits and food choices of a group of nursing students and non-nursing students.

Social element of eating

It appears from these results that the social element of eating was the most important factor, and that catering and eating alone were associated with factors such as expense and irregular eating patterns. It is, perhaps, encouraging to note that, in the current social climate, the statement 'brought up to have family meals together' was the fourth highest ranked item. In their study of 900 US adolescents, Story and Resnick (1986) found that the vast majority of students felt it was important to eat meals with the family, on a regular basis, although many stated that this was not always a reality.

Inconsistency of nutrition messages

A weaker factor that was identified appeared to be the lack of consistency in the messages being conveyed about nutrition. Buttriss (1997) found, in her study of the general public, that there was evidence of concerns related to inconsistency of nutrition messages and lack of available information. In the same paper, she also reported findings of the nutrition knowledge of more than 200 GPs and Practice nurses. They exhibited *'confusion and contradiction'*, particularly related to their understanding of different types of fat and the need for starch. These findings may well have affected their ability to give clear, unambiguous nutritional advice and thus lead to inconsistent messages. Thus, there is support for this finding from other studies.

Nursing students more positive

The nursing students appeared to have more positive attitudes toward healthy eating patterns, as they agreed more strongly with the statements that they would eat more healthily if they had more money, and that eating breakfast was important. This, and the statement 'its difficult to have a regular eating pattern at university', may have reflected the fact that the nursing students worked shifts.

Social category

When the 10 categories of influence on eating habits and food choices were examined, it was again the 'Social' element that was strongest in both groups, but there were differences in the subsequent factors. Eating habits of the nursing students were more influenced by factors concerning habit and routine, whereas those of the non-nursing students were more influenced by cost.

Cost and time

This is very interesting, as, in the focus groups, it was the factors of 'Cost' and 'Time' that appeared to be most influential. This may have been due to the statements chosen to represent the factors of 'Cost' and 'Time', rather than the factors themselves. Alternatively, it may have been a quirk of the group discussion, where issues and difficulties tended to dominate the conversation, rather than the positive aspects of eating habits.

Stordy's study of university students, in 1972, identified cost as a major influence on diet. She found that students that were self-catering ate a diet lower in energy and nutrients than those in Halls of residence. Lennernas et al, 1997, in the pan-EU study of influences on food choice, also found that price was a frequently mentioned factor, especially in the unemployed, as students are. In the same study, Lappalainen et al (1997) investigated perceived barriers to healthy eating and found that lack of time was the most frequently mentioned factor. This was most frequently reported by the younger age group (42%), and by those educated to University level (45%). Cost of healthy foods was also a frequently mentioned factor in the U.K. sample. Pollard et al (1998) also found that price of food was an important concern for students, in their study of variations in dietary intake in students and non-students.

Meal skipping and snacking

A number of studies have been conducted that investigated factors affecting eating habits. Meal skipping and snacking were common in previous studies (McDonald and Faulkner, 1983, Dittmar et al, 1989, Höglund et al, 1998), whereas, in contrast, Monneuse et al (1997) found that 62% of French students ate breakfast regularly. In this study, 58% agreed that they ate breakfast and 51% said they made an effort to avoid snacking, although 68% said they found it difficult to have a regular eating pattern. The actual methodology was different in this study, where students were asked to agree/disagree with a series of statements, whereas in the other studies they were asked directly whether they had skipped meals or snacked. However, the results are still encouraging and may reflect the impact of health messages or the influences of shift work in the nursing students.

Home influences

In Stafleu et al's study (1996) there was a strong resemblance in food habits, nutritional knowledge and attitudes toward food between mothers and daughters and a transfer of these habits from mother to daughter. In this study, 52% agreed that 'what their mum cooked influences what they eat now' and 66% said that family meals were important, thus supporting Stafleu et al's findings. Bull's study of dietary habits of young adults (1985) found that, in 47%, food habits changed on leaving home. In this study, 48% agreed that they ate more healthily at home and only 28% said they ate better at university. This is probably linked to other factors already identified, such as time, cost and convenience.

Influence on healthy eating

It is not clear, from the findings in this study, how much influence the factors discussed here had on dietary intake or attitudes toward healthy eating. The social aspects of eating, and the converse, eating and cooking alone, with the attendant issues of cost and irregular meals, emerged as key factors for the respondents in this study. This suggests that healthy eating may have been affected by these factors.

Reflections on the limitations of the methods used in this study

Sample size

The sample was not large enough to detect all the possible differences between the two groups. When the sample is small, tests may have had inadequate power to detect a particular effect. The discussion on page 130 addresses this issue in detail.

Response rate

The response rate to the questionnaire was 46%: this is not dissimilar from figures suggested in research texts, but was disappointing, given the personal contact with the groups. Given the poor response rate, results are unlikely to be representative of the student nurse population. This poor response rate is also likely to have affected the validity of the results, and therefore it is important to explore possible reasons for it not being higher. There may well have been a motivation bias in the sample, in which students who were more interested in nutrition or were more motivated to respond for any other reason completed the questionnaires. This would have skewed the results toward the positive: for example, the sample may have been more motivated to eat a healthy diet than the population they represented. This poor response rate may have been caused by factors such as:

- Timing: questionnaires were handed out in the two weeks preceding the end of the Autumn term, when students may have been focused on completing coursework, or tired and contemplating Christmas.
- Length: the questionnaire was very long (8 pages) and consisted of several different sections. The second section, in particular, may have been rather taxing, as it required respondents to differentiate between lists of foods.
- Return of questionnaires: questionnaires were handed out to nursing students at the end of lectures, and returned via a box in the School of Nursing and Midwifery. Some questionnaires may have been inadvertently lost, if they were not returned to the correct box, as there was at least one other box at Reception at the same time, for return of evaluation forms.
- Students either not interested, not confident in their nutrition knowledge or not bothered

There may also have been a bias in the sample, toward students with a higher perceived level of knowledge or students without any dietary problems. This type of bias may have been caused by factors such as:

- Sensitivity: although the content of the questionnaire was relevant to all respondents, some may have found it too sensitive to analyse their diet in detail: For example, for those with an eating disorder or a weight problem. It was noted that only 2 out of 90 students in the final sample had a Body Mass Index of over 30(obese) and those were at the lower end of this category. This compares with the national average of 8% of 16-24 year olds that are obese (Bennett et al, 1995).
- Nature of researcher: students may have been too embarrassed to return questionnaires, if they perceived their answers to reflect inadequate knowledge or behaviour related to nutrition. The researcher was known to nursing students as a lecturer and the Senior Warden of the Halls used for distribution of non-nursing questionnaires was a senior lecturer in nutrition. This issue should have been minimal, as all respondents were assured of complete anonymity.
- 'Captive' population: volunteers may have a felt a moral obligation to complete the questionnaire-they may have felt obliged to 'help' the researcher, or they may have felt the need to conform; conformists may not reflect the sample.

It is impossible to know the reasons, and thus it must be assumed that there was a bias in the results, and therefore the generalisability of the findings would have been affected.

Steptoe et al, (1996) used the DINE questionnaire as a self-completion postal survey, in the UK. They had a 46% response rate, which was the same as that obtained in this study. Their study contained questions concerning diet, attitudes and response to change and a food choice questionnaire. It could thus be seen as similar in nature and size to the questionnaire used in this study. Other studies were cited by Steptoe et al, with similar or worse response rates. It thus seems likely that surveys of this size and complexity commonly have low response rates, and, in this sense, this study was no different from many others. However, this does not alter its possible bias and lack of representativeness of the population under investigation.

Questionnaire study

Questionnaires can be very useful for surveying a large sample and gaining information about trends and themes. However, there is frequently a poor response rate, which reduces the generalisability of the results and therefore the usability of the findings as evidence for practice. In this study, the possible reasons for the poor response rate have been discussed. If this study were repeated, a number of changes would be made. The questionnaire was extremely long, which probably deterred many potential respondents from completing it. The key areas of investigation were dietary intake, knowledge and attitudes. These three foci would have provided more than enough data for analysis. This would have meant that the questionnaire could have been shorter. Self-reported height and weight was not sufficiently accurate to be able to confidently use the data to inform Body Mass Index.

Questionnaires were distributed in such a way that it was impossible to follow up non-responders individually. If the study were to be repeated, delivery of questionnaires would be more closely tagged and monitored so that non-responders could be identified and reminder letters sent to try and maximise return rate.

Although some of the content of the questionnaire came from previously validated studies (Roe et al, 1994, Towler and Shepherd, 1990) or from the focus group study, other sections did not. In the nutrition knowledge section, the validated nutrient density test was combined with a general nutrition knowledge test. Although the questions were all derived from previous studies, the total MCQ was not previously validated and scores from this were simply added to scores from the nutrient density section, as Towler and Shepherd had previously done, with their questions. This meant that the total nutrition knowledge scores computed were not necessarily valid.

The DINE questionnaire (Roe et al, 1994) used to ascertain dietary intake, was amended in line with suggestions made by Roe herself, but there is no published validation evidence for these amendments and therefore it cannot be stated with certainty that the tool used was entirely valid.

Data from the questionnaire study were analysed using a statistical computer package. This was extremely helpful and the results obtained were subjected to a number of tests that demonstrated relationships between factors. However, learning to use such a package was very challenging, both in terms of the data analysis and data presentation.

Focus group analysis

Consistency

The section in the questionnaire on factors influencing eating habits and food choices, that was derived from the focus group interviews, consisted of 20 verbatim comments made by students and were meant to represent 10 different categories of factors. The number of statements for each category was meant to reflect the frequency of responses made by students related to that category. Thus some categories were represented by three statements, some two and some only one. On reflection, this made it difficult to analyse, as students responded to the statement rather than the concept, and where there was only one statement, it was that particular aspect of that concept to which they responded.

On closer examination, the number of statements representing each category was not entirely consistent (see Table 3.1, in chapter 3). For example, category 3, 'social aspects of eating', was the sum of 34 separate comments and therefore should have been represented by two statements, but was only represented by one. Category 6, 'changes in eating patterns', was the sum of 36 separate comments and again should have been represented by two statements, rather than three. Category 9, 'knowledge' or lack of knowledge, was the result of 48 comments, which should have been represented by three statements, rather than two. Category 10, 'motivation', was the sum of four comments related to 'being bothered' and twelve related to 'concern for the future'. It was correctly represented by one statement, but that should have reflected the larger subcategory rather than the smaller.

Due to these anomalies, the results were unlikely to be as accurate as they might have been. It certainly would have been better to have two statements related to 'social aspects of eating' in order to say with more certainty, that this was the category gaining most agreement.

Ambiguity

Also, a few of the statements actually consisted of two parts: for example, 'I eat more junk food away from home; it's comfort food' or 'I try to eat low fat varieties to control my weight, not because of heart disease'. It was not possible to identify to which part of the question each student responded.

A few issues, such as cooking/shopping for one, occurred as frequent themes in the focus group discussions. However, because this was a complex factor, consisting of a number of elements: expense, time, social aspects and environment, the most common theme, that of 'cost', was identified and used as a statement. A secondary analysis was carried out, separating statement 17, related to cooking for one, and adding it to statement 8, about environmental issues, to form an alternative category of 'cooking for one'. This would have ranked as the second highest category, above 'cost' or 'habit'.

All these issues highlight the researcher's inexperience in conducting qualitative research. The Focus groups went well but the researcher's inexperience at carrying out content analysis meant that the statements identified for inclusion in the questionnaire study were not always the most appropriate, which would certainly have detracted from the findings.

This study was significantly flawed in a number of ways that have been discussed in the previous section

- Small sample size
- Uneven gender distribution within groups
- Poor response rate
- Inconsistency in the analysis of the focus group study

These limitations mean that the findings cannot be generalised beyond this study and do not necessarily reflect the dietary habits, nutrition knowledge and attitudes of all nursing and non-nursing students and therefore should be read with caution. However, it is a useful study, as it suggests trends and directions that can be explored further in future studies. The most significant findings were related to

- Understanding of the term healthy eating
- Attitudes toward healthy eating and intention to change to a healthier diet

- Attitudes and their influence on dietary intake
- 'Social aspects of eating' was an influential factor in eating habits and food choices.

Chapter 7

Summary and conclusions

Meeting the objectives

This study attempted to answer the question posed in chapter 1:

Do nursing students, who receive education in nutrition, and have been exposed to patients with nutrition-related problems, have different dietary habits and attitudes towards healthy eating than non-nursing students and are their eating habits and food choices influenced by different factors?

The nine objectives identified from this question have been investigated and the following conclusions have been drawn from the findings about the students who took part:

Objective 1: to explore the understanding that a group of nursing and non-nursing students have about the term 'healthy eating' and it's benefits.

The nursing students had a much clearer, and more accurate, understanding of the meaning of healthy eating than the non-nursing students. However, the majority of students perceived 'staying healthy' to be the most important benefit of healthy eating.

Objective 2: to compare the level of nutrition knowledge in a group of nursing students to that in a group of non-nursing students.

Overall nutrition knowledge in the two groups appeared to be significantly different, with nursing students having a higher knowledge score than non-nursing students. Both groups scored similarly in the general nutrition knowledge test, but the nursing students scored higher in the individual nutrients test.

Objective 3: to explore and compare the sources of nutrition information used by nursing and non-nursing students.

Friends and relatives were seen as the most important source of information, with university and school as the second most important source. These were the same for both groups. The nursing students identified health professionals twice as often as the non-nursing students.

Objective 4: to compare the attitudes toward healthy eating in nursing and non-nursing students.

The nursing students had significantly more positive attitudes toward healthy eating than the non-nursing students, and were significantly different in their attitudes to behavioural aspects, such as making an effort to eat fibre and avoid fat. The results strongly suggested that it was these behavioural attitudes, rather than nutrition knowledge or awareness of the benefits of healthy eating that were associated with dietary behaviour.

Objective 5: To explore the Intention of nurses and non-nurses to change their eating pattern

Approximately a third of both groups of the students said that they intended to change their diet, but many more non-nurses than nurses said that they did not intend to change. There was a clear relationship between attitudes toward healthy eating and intention to change, with those with more positive attitudes more likely to change.

Objective 6: To compare the dietary intake in a group of nursing students to that of a group of non-nursing students.

The nursing students had a healthier diet, in terms of their fibre and unsaturated fat intake, than the non-nursing students did. The whole group appeared to eat less fat than the national average, although the males ate significantly more fat than the females. Mean fibre intake was similar to the national average, but the nursing students ate significantly more fibre than the non-nursing students did, and were significantly closer to the NACNE recommendations.

Objective 7: To discover whether, in a group of nursing and non-nursing students, there is a relationship between dietary intake, nutrition knowledge and attitudes towards healthy eating.

There were significant relationships between attitudes and knowledge, dietary intake and knowledge and attitudes and dietary intake. These results suggested that dietary intake was influenced by attitudes toward healthy eating and nutrition knowledge. The results also suggest that these associations are between behavioural attitudes and dietary intake and between knowledge attitudes and nutrition knowledge.

Objective 8: to identify differences in BMI between nursing and non-nursing students and to explore the relationship between Body Mass Index and dietary intake, nutrition knowledge and attitudes.

There were no differences in estimated BMI between the nursing students and the non-nursing students. There were, however, significant relationships between Body Mass Index and both knowledge and dietary fibre intake, but no association with fat intake. It was found that the higher the BMI the lower the knowledge score and the lower the fibre intake.

Objective 9: to examine the factors that influence the eating habits and food choices of a group of nursing students and non-nursing students.

The social aspects of eating, such as eating as a group and the importance of family meals, appeared to be the most important factor to influence eating habits and food choices, with the factors of 'cost' and 'habit' ranked second. Influencing factors were largely the same in the two groups, although the nursing students identified factors in the 'habit' category, such as the need for breakfast and the difficulty of having regular meals, as more important than the non-nursing students did and the males found catering for one more expensive than the females did.

Implications for practice

It appears from the findings of this study that the nursing students who took part in this study were significantly different from the non-nursing students, in terms of their dietary intake, their attitudes toward healthy eating, their knowledge of nutrition and their understanding of the concept healthy eating. This is likely to be due, in part, to the education they have

received in their nursing programme on nutritional issues and to the influence that patients/clients, for whom they have cared, may have had, where nutrition was a significant factor.

Nutrition education

The nutrition input in the curriculum delivered to the nursing students was designed to motivate them to be interested in nutrition and to demonstrate its application to clinical practice. Contento et al (1995) concluded that the most effective nutrition education programmes, in terms of changing eating habits, were those that were behaviourally focused, and based on relevant theory and research. The findings in this study, as evidenced by the healthier diet, greater knowledge and more positive attitudes, in the nursing students as compared to the non-nursing students, imply that the recent emphasis placed on nutrition education in the curricula of health professionals may be effective in helping to prepare them for practice. This reinforces the need to promote this curriculum in the education of all health professionals.

Health promotion

The results of this study highlight the apparent weaker nutrition knowledge, the lack of positive attitudes toward healthy eating and the lower fibre intake in the diet of the students not following a nutrition-related course. There is some evidence here to suggest that nutrition education does influence dietary practice and attitudes and thus might be beneficial to all students. Wong et al (1999) concluded that all Taiwan college students were in need of more nutrition knowledge and emphasised the importance of nutrition in college curricula. In the UK, universities do not normally include nutrition in the curricula unless it is relevant to the course being studied.

There does appear, however, to be scope for nutrition education, which focuses on changing attitudes toward healthy eating more than just giving information about nutrition. The finding of a clear relationship between attitudes and intention to change to a healthier diet supports this suggestion.

The results also indicated a relationship between being overweight and having a lack of nutrition knowledge and a low fibre intake, but not with taking a high fat intake. This suggests that those respondents were aware of the links between fat and obesity but not with fibre. Similarly, non-nursing students appeared to be less well informed about the concept of healthy eating. These apparent deficits of knowledge and understanding about healthy eating and the benefits of a diet high in fibre could be addressed by health professionals or with a media campaign.

Factors that influence eating habits

The social aspects of eating, and the converse, eating and cooking alone, with the attendant issues of cost and irregular meals, emerged as the key factors in the influence of eating habits and food choice for the respondents in this study. This suggests that healthy eating may be affected by these factors, and therefore they should be taken into consideration when planning nutrition education programmes for student nurses. They could also be taken into account when planning catering facilities and new residences for students. The issue of student finances is not new and its influence on diet is well documented. The importance of a healthy diet should be acknowledged when discussing pricing of food in student catering outlets.

Nurses as role models

The findings in this study, that suggest a relationship between dietary intake, nutrition knowledge and attitudes toward healthy eating, have important implications for the teaching of nutrition. The results support the hypothesis that it is behavioural attitudes, more than knowledge, that are more strongly associated with diet. If these results could be generalised, this would have important consequences for nutrition education: that encouraging positive attitudes to healthy eating is more likely to be associated with changes in eating habits than increasing knowledge alone.

Thus, the aim of nutrition education to nurses should be to not only increase their knowledge of nutrition, but also to challenge their concept of a healthy diet and to help them to develop more positive attitudes toward healthy eating, so that they can act as role models for their clients / patients.

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Appendix A

Nutrition curriculum

Advanced Diploma in Nursing / BN(Hons)

Content based on Nutrition Task Force core curriculum for nutrition in the education of health professionals (1994). It includes public health nutrition, nutrition science and clinical nutrition.

- Nutrition Matters: overview of the importance of nutrition throughout the lifespan
- Nutrition in pregnancy and lactation
- Nutrition and growth and development
- Nutritional requirements in health
- Healthy eating
- Public health nutrition
- Metabolism: supply and demand
- Metabolic response to injury, infection and stress
- Screening and Assessment of nutritional status
- malnutrition in hospital
- Altered nutritional requirements in disease states
- Nutrition and coronary heart disease
- Nutrition and surgery
- Nutrition and cancer
- Therapeutic diets
- Nutritional support: Enteral and parenteral nutrition
- Drug-nutrient interactions
- Management of dysphagia

APPENDIX B

FOCUS GROUP POSTER

FOOD

- Do you enjoy eating?
- Do you like talking about what you eat?
- Then come and take part in a focus group discussion on eating (light refreshments and drinks included)
- Sign up below.

APPENDIX C

NUTRITION QUESTIONNAIRE

NUTRITION QUESTIONNAIRE

The following questionnaire includes questions about how often you eat different types of food, on your understanding of what is in different foods, and on the factors that influence what you eat. It will take approximately 15 minutes to complete; please do so, without reference to any external source.

I have included a comments section at the end, for any comments you may have.

Please use CAPITAL LETTERS when writing any comments.

Shade circles like this: ●
Not like this: ⊗ ✓

Personal details

In which faculty are you studying?

○ Medicine, Health and Biological Sciences

○ Other

Year of study

○ 1 ○ 2 ○ 3 ○ 4 ○ Postgraduate

Age:

○ 18-23 ○ 24-30 ○ 31 or over

Accommodation:

○ Catered Hall ○ Self-catering Hall ○ Flat/House ○ Living at home ○ Other

Height

☐☐☐ cm **OR** ☐ feet ☐☐ inches

Weight

☐☐☐ kg **OR** ☐☐ stones ☐☐ pounds

Gender

○ Male ○ Female

A. Eating patterns

1. About how many pieces or slices of the following types of bread or rolls or equivalent do you eat on a usual **day**? Please fill in a circle for each one.

	None	Less than once a day	1-2 times a day	3-4 times a day	5 or more
White bread	○	○	○	○	○
Brown/granary/ soft grain	○	○	○	○	○
Wholemeal or 2 x crispbread	○	○	○	○	○

2. About how many times a **week** do you have a bowl of the following types of cereal or porridge? Please fill in a circle for each one.

	Never	Less than once a week	1-2 times a week	3-5 times a week	6 or more
Sugar type: *Frosties, Sugar Puffs, Cocopops*	○	○	○	○	○
Rice/Corn type: *Corn Flakes, Rice Krispies, Special k*	○	○	○	○	○
Porridge/Ready Brek	○	○	○	○	○
Wheat type: *Shreddies, Puffed Wheat, Weetabix, Start, Nutrigrain*	○	○	○	○	○
Muesli	○	○	○	○	○
Bran type: *All-Bran, Bran Flakes, Sultana Bran, Team*	○	○	○	○	○

3. About how many times a **week** do you eat a **serving** of the following foods? Please fill in a circle for each one.

	Less than once a week	1-2 times a week	3-5 times a week	About once a day	Twice a day or more
Pasta/Rice	○	○	○	○	○
Potatoes	○	○	○	○	○
Peas	○	○	○	○	○
Beans/Lentils (baked, tinned, dried)	○	○	○	○	○
Other vegetables (fresh, tinned, frozen)	○	○	○	○	○
Fruit (fresh, tinned, frozen)	○	○	○	○	○
Beef, pork or lamb (or nuts if vegetarian)	○	○	○	○	○
Chicken or turkey	○	○	○	○	○
Fish (not fried)	○	○	○	○	○
Processed meat, pies, bacon	○	○	○	○	○
Burgers or sausages	○	○	○	○	○
Cheese (not cottage cheese)	○	○	○	○	○
Any fried food	○	○	○	○	○
Cakes, puddings, pastries	○	○	○	○	○
Biscuits, chocolate, crisps	○	○	○	○	○

4. Approximately how much of the following types of milk do you use, each **day**, for example on cereals and in drinks?
Please fill in a circle for each one.

	None	Less than 1/4 pint	About 1/4 pint	About 1/2 pint	1 pint or more
Full Cream	○	○	○	○	○
Semi-Skimmed	○	○	○	○	○
Skimmed	○	○	○	○	○

5. Approximately how much butter/margarine or other spread do you use in a **day**?
Please enter number of rounded teaspoons for each one.

Butter/margarine: *Flora, Vitalite, sunflower types, Olivio, Stork* ☐☐

Low-fat spread: *Gold, Outline, Shape, Flora extra light, Delight* ☐☐

6. What sort of fat do you use?
Please fill in a circle for each one.

	Butter, lard, dripping	Hard or soft margarine (*Stork, Clover, Supermarket own brands*)	Polyunsaturated Sunflower marg. or low fat spread (*eg Flora Gold, Outline*)	Vegetable oil (*sunflower, soya, olive, corn*)
on bread/vegetables?	○	○	○	○
for frying?	○	○	○	○
for baking/cooking?	○	○	○	○

7. Are you currently following a special diet of any kind? (slimming, vegetarian etc.)

○ No ○ Yes

If yes, please say what it is. Please write in the box using CAPITAL LETTERS.

B. Food Knowledge

It is important to choose 10 foods, and only 10 foods, within each category.

1. Assuming equal weights of the following food types, please choose 10 foods that you think are high in **protein**. Please fill in **10** circles from the following choices.

O Yoghurt	O Cream
O Porridge	O Low fat spread
O Green vegetables	O Cereals
O Brown bread	O Fresh fruit
O Soup	O Nuts
O Custard	O Sausage roll
O Lasagne	O Chips
O Peas	O Butter
O Crisps	O Banana
O Mixed salad	O Sausage

2. Assuming equal weights of the following food types, please choose 10 foods that you think are high in **carbohydrate**. Please fill in **10** circles from the following choices.

O Yoghurt	O Cottage cheese
O Bran	O Green vegetables
O Fresh fruit	O Scambled eggs
O Custard	O Quiche
O Muesli	O Root vegetables
O Pickle	O Fruit cake
O Crispbread	O Tinned fruit
O Tinned meat	O Sausage
O Nuts	O Soup
O Liver	O Meat pie

3. Assuming equal weights of the following food types, please choose 10 foods that you think are high in **fat**. Please fill in **10** circles from the following choices.

O Roast potatoes	O White bread
O Low fat spread	O Cottage cheese
O Yoghurt	O Instant mash
O Pickle	O Fruit cake
O Fig roll	O White fish
O Crumble	O Boiled eggs
O Tinned meat	O Lasagne
O Fish pie	O Tinned salmon
O Nuts	O Soup
O Gravy	O Liver

4. Assuming equal weights of the following food types, please choose 10 foods that you think are high in **fibre**. Please fill in **10** circles from the following choices.

O Peas	O Green salad
O Instant mash	O Pickle
O Crumble	O White bread
O Crispbread	O Fresh fruit
O Banana	O Nuts
O Roast potatoes	O Chips
O Quiche	O Lasagne
O Beef	O Chocolate biscuits
O Meat pie	O Hotpot
O Sausage roll	O Fruit cake

5. Which of the following is high in monounsaturates? Please fill in **one** circle.

O Sunflower margarine
O Animal fat
O Olive oil

6. Which sort of fat is bad for your heart?

O Saturated
O Polyunsaturated
O Monunsaturated

7. What is the current recommended percentage of fat in the diet?

O 20-25%
O 30-35%
O 40-45%
O 50-55%

8. Fat is an important source of energy.

O True
O False
O Don't know

9. Which **one** of the following are the main sources of iron in the UK diet?

O Meat
O Dairy products
O Vegetables
O Cereals

10. Which **one** of the following are the main sources of anti-oxidant vitamins in the diet?

- ○ Meat
- ○ Dairy products
- ○ Vegetables and Fruit
- ○ Fish

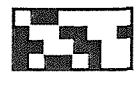
11. Which **one** of the following are the main source of calcium in the diet?

- ○ Meat
- ○ Dairy products
- ○ Vegetables and fruit
- ○ Cereals

C. Food Influences

Please respond to the following statements by filling in the circle that best reflects how you feel.

		Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
1.	If I had more money, I would eat more healthily	○	○	○	○	○
2.	I haven't got time to go out and buy fresh vegetables to cook	○	○	○	○	○
3.	Other people influence what I eat	○	○	○	○	○
4.	I eat more healthily at University, than at home	○	○	○	○	○
5.	What my Mum cooks influences what I eat now	○	○	○	○	○
6.	Its nice to eat as a group - it becomes a social event	○	○	○	○	○
7.	I have to eat breakfast, otherwise I feel so hungry	○	○	○	○	○
8.	I might not eat, even if I'm hungry, if it's too crowded in the kitchen	○	○	○	○	○
9.	I tend to go for something cheap, rather than nutritious	○	○	○	○	○
10.	I feel self-conscious eating unhealthy stuff	○	○	○	○	○
11.	I eat more healthily at home where meals are prepared	○	○	○	○	○
12.	There are so many contradictory messages; if you listen to everything, you wouldn't eat anything	○	○	○	○	○
13.	I tend to eat more rubbish at University; it's quick and convenient	○	○	○	○	○
14.	I try to eat low fat varieties to control my weight not because of heart disease	○	○	○	○	○
15.	I eat mainly vegetarian food because it's cheaper	○	○	○	○	○



	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
16. We were brought up to have family meals together; that's important	○	○	○	○	○
17. It's more expensive to cater for one	○	○	○	○	○
18. I eat more junk food away from home; it's comfort food	○	○	○	○	○
19. It's difficult to have a regular eating pattern at University	○	○	○	○	○
20. I know I should eat better, but I can't be bothered	○	○	○	○	○
21. I make an effort to eat fibre	○	○	○	○	○
22. I make an effort to avoid fat	○	○	○	○	○
23. I make an effort to exercise regularly	○	○	○	○	○
24. I make an effort to avoid snacking between meals	○	○	○	○	○
25. I do not need to make changes to the food I eat, as it is already healthy enough	○	○	○	○	○
26. I don't usually think about the nutritional aspects of the food I eat	○	○	○	○	○
27. Eating fibre is beneficial	○	○	○	○	○
28. Eating fat is beneficial	○	○	○	○	○
29. Healthy eating is important	○	○	○	○	○

30. How would you describe the term 'healthy eating'? Please write in the box using CAPITAL LETTERS.

31. Do you consider that there are benefits from eating a healthy diet?

○ Yes

○ No

31A If yes, rank, in order of importance to you, the following benefits of eating a healthy diet.
1 = most important 6 = least important

☐ Stay Healthy

☐ Prevention of disease eg., heart disease

☐ Improved quality of life

☐ Weight control

☐ Be fit

☐ Other. Please say

32. Which sources of information on healthy eating have you found the most helpful?
Please fill in **no more than 3** circles.

O Advertising	O Food packaging
O Government agencies (H.E.C/D.o.H)	O Health professionals
O TV/radio	O Books
O Magazines/newspapers	O Healthfood shops
O Supermarkets	O School/university
O Friends/relatives	O Consumer organisations

33. Do you intend to change your eating pattern?

O Yes

O No

O Don't know

Give reasons for your answer (using CAPITAL LETTERS)

Do you have any comments? (using CAPITAL LETTERS)

Thank you very much for taking the time to complete this questionnaire

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Official use only

O Nurses

O Non-Nurses

APPENDIX D

FOOD FREQUENCY QUESTIONNAIRE (DINE)

FIBRE SCORE

1. About how many pieces or slices of the following types of bread or rolls or equivalent do you eat on a usual day?

Bread	None	Less than 1 a day	1 – 2 a day	3 – 4 a day	5 or more
White bread	0	1	4	9	13
Brown/granary Soft grain	0	2	7	15	22
Wholemeal or 2 x crispbread	0	3	8	18	26

2. About how many times a week do you have a bowl of the following types of cereal or porridge?

	Never	Less than 1 a week	1 – 2 a week	3 – 5 a week	6 or more
Sugar type: Frosties,Cocopops, sugar puffs	0	0	0	1	2
Rice/Corn type: Cornflakes, Rice Krispies, Special K	0	0	0	1	2
Porridge/Ready Brek	0	1	2	5	7
Wheat type: Shreddies, Weetabix, Puffed Wheat, Nutrigrain, Start	0	1	2	5	7
Muesli	0	1	2	5	7
Bran type: All-bran, Bran Flakes, Sultana Bran, Team	0	2	5	12	18

3. About how many times a week do you eat a serving of the following foods?

	Less than 1 a week	1 – 2 a week	3 – 5 a week	About once a day	Twice a day or more
Pasta/Rice	0	1	3	4	4
Potatoes	0	1	3	5	5
Peas	1	3	8	12	12
Beans/Lentils (baked, tinned, dried)	1	4	10	15	15
Other vegetables (fresh, tinned, frozen)	0	1	2	3	7
Fruit (Fresh, tinned, frozen)	0	1	3	5	10

FIBRE RATING:

Less than	30	=	low fibre intake
	30 – 40	=	medium fibre intake
More than	40	=	high fibre intake

FAT SCORE

	Less than 1 a week	1 – 2 a week	3 – 5 a week	About once a day	Twice a day or more
Beef, Pork or Lamb (or nuts if vegetarian)	1	2	6	9	12
Chicken or Turkey	0	1	3	5	7
Fish (NOT fried)	0	0	1	2	3
Processed meat, pies, bacon	1	2	5	6	9
Burgers or sausages	1	2	4	5	10
Cheese (not cottage cheese)	1	2	6	9	12
ANY fried food	1	2	6	9	12
Cakes, puddings, pastries	1	2	5	8	11
Biscuits, chocolate, crisps	1	2	4	6	8

3. Approximately how much of the following types of milk do you use, each day, for example, on cereals and in drinks?

	None	Less than ¼ pint	About ¼ pint	About ½ pint	1 pint or more
Full Cream	0	1	3	6	12
Semi-skimmed	0	1	1	3	6
Skimmed	0	0	0	0	0

4. Approximately how much butter/margarine or other spread do you use in a day?

	Number of rounded teaspoons
Butter/margarine (Flora, Vitalite, sunflower types, olivio, stork)	Tsp. X 4
Low fat spread (Gold, Outline, Shape, Flora extra light, Delight)	Tsp. x 2

FAT RATING:

Less than 30 = Low fat intake
30 – 40 = Medium fat intake
More than 40 = High fat intake

UNSATURATED FAT SCORE

	Butter, Lard, Dripping	Hard or soft margarine (Stork, Clover, Supermarket own brands)	Polyunsaturated	Vegetable Oil (sunflower, soya, olive, corn)
On bread/ vegetables?	1	2	3	4
For frying?	1	2	3	4
For baking/ cooking?	1	2	3	4

UNSATURATED FAT RATING:

5 or less = Low unsaturated fat
6 to 9 = Medium unsaturated fat
10 or more = High unsaturated fat

Roe et al, 1994

APPENDIX E

FOOD KNOWLEDGE SCORES

1. Assuming equal weights of the following food types, please choose 10 foods that you think are high in protein: ✓ = correct.

✓	Yoghurt		Cream
	Porridge		Low fat spread
	Green vegetables	✓	Cereals
✓	Brown bread		Fresh fruit
	Soup	✓	Nuts
✓	Custard	✓	Sausage roll
✓	Lasagne		Chips
✓	Peas		Butter
✓	Crisps		Banana
	Mixed salad	✓	Sausage

2. Assuming equal weights of the following food types, choose 10 foods that you think are high in carbohydrate:

✓	Yoghurt		Cottage cheese
✓	Bran		Green vegetables
	Fresh fruit		Scrambled eggs
✓	Custard	✓	Quiche
✓	Muesli		Root vegetables
✓	Pickle	✓	Fruit cake
✓	Crispbread	✓	Tinned fruit
	Tinned meat		Sausage
	Nuts		Soup
	Liver	✓	Meat pie

3. Assuming equal weights of the following food types, choose 10 foods that you think are high in fat:

	Roast potatoes		White bread
✓	Low fat spread		Cottage cheese
	Yoghurt		Instant mash
	Pickle	✓	Fruit cake
✓	Fig roll		White fish
	Crumble	✓	Boiled eggs
✓	Tinned meat	✓	Lasagne
✓	Fish pie	✓	Tinned salmon
✓	Nuts		Soup
	Gravy	✓	Liver

4. Assuming equal weights of the following food types, choose 10 foods that you think are high in fibre:

✓	Peas	✓	Green salad
✓	Instant mash		Pickle
✓	Crumble	✓	White bread
✓	Crispbread		Fresh fruit
✓	Banana	✓	Nuts
	Roast potatoes		Crisps
	Quiche		Lasagne
	Beef	✓	Chocolate biscuits
	Meat pie		Hotpot
	Sausage roll	✓	Fruit cake

Towler and Shepherd, 1990

APPENDIX F

Results

Appendix 2a: comparison between groups, for individual nutrients and total knowledge scores (using positive marking)

		Protein score	Carbo-hydrate score	Total fat score	Total fibre score	Nutrition subscore	Total knowledge score
Nurses	Mean	6.18	6.10	5.74	5.50	23.53	27.92
	N	38	38	38	38	38	38
	Std. Deviation	1.01	1.11	1.15	1.20	2.18	2.16
Non-nurses	Mean	5.83	5.15	5.15	5.21	21.35	25.48
	N	52	52	52	52	52	52
	Std. Deviation	1.32	1.54	1.14	1.73	3.67	4.10
Total	Mean	5.98	5.55	5.40	5.33	22.27	26.51
	N	90	90	90	90	90	90
	Std. Deviation	1.21	1.45	1.18	1.53	3.29	3.61

Appendix 2b: comparisons between groups, for individual nutrients (using negative marking), multiple-choice questions and total knowledge scores

		Total protein score	Carbo-hydrate score	Total fat score	Total fibre score	Negative knowledge score	Mcq knowledge	Total knowledge negative
Nurses	Mean	2.34	2.13	1.45	.95	6.87	4.39	11.26
	N	38	38	38	38	38	38	38
	Std. Deviation	1.93	2.26	2.27	2.25	4.07	.94	3.98
Non-nurses	Mean	2.10	1.11	.63	1.44	5.29	4.13	9.42
	N	52	52	52	52	52	52	52
	Std. Deviation	2.23	2.49	2.08	2.45	5.53	1.17	5.67
Total	Mean	2.20	1.54	.98	1.23	5.95	4.24	10.20
	N	90	90	90	90	90	90	90
	Std. Deviation	2.10	2.43	2.19	2.37	5.01	1.08	5.09

Appendix 2c: example of a one-way ANOVA test of food knowledge scores, by group.
This shows that there was a significant difference between the nurses and non-nurses in their carbohydrate score ($p = 0.05$) and in total knowledge score ($p = 0.001$)

		Degrees freedom	F	Sig.
Total protein score	Between Groups	1	.297	.58
	Within Groups	88		
	Total	89		
Total carbohydrate score	Between Groups	1	3.961	.05
	Within Groups	88		
	Total	89		
Total fat score	Between Groups	1	3.102	.08
	Within Groups	88		
	Total	89		
Total fibre score	Between Groups	1	.957	.33
	Within Groups	88		
	Total	89		
MCQ knowledge score	Between Groups	1	1.268	.26
	Within Groups	88		
	Total	89		
Total knowledge score	Between Groups	1	11.173	.001
	Within Groups	88		
	Total	89		
Total knowledge, negative	Between Groups	1	2.936	.09
	Within Groups	88		
	Total	89		

Appendix 2d: example of a 2-way ANOVA test, of fat scores analysed by group and gender.

This shows that there is a small, but significant difference in total fat scores ($p = 0.06$), when analysed by gender, but not when analysed by group.

Source	df	F	Sig.
Sex	1	3.60	.06
Nursenon	1	.046	.83
Sex *Nursenon	1	4.10	.046
Total	89		

Appendix 4a: total attitude score, by group and gender

This shows that there is a large difference between the scores for nurses and non-nurses, rather than between the males and females in the groups.

Gender		Mean	Std. Deviation	N
Nurses	Male	6.75	.50	4
	Female	5.00	2.38	33
	Total	5.19	2.32	37
Non-nurses	Male	1.77	3.04	22
	Female	2.43	3.32	30
	Total	2.15	3.20	52
Total	Male	2.54	3.34	26
	Female	3.78	3.13	63
	Total	3.42	3.22	89

Appendix 4b: 2-way anova of total attitudes, by group and gender

This shows that there was no difference in total attitude scores between males and females, but there was a significant difference between nurses and non-nurses (p = 0.001)

Source	df	F	Sig.
Nursenon	1	19.30	.001
Sex	1	.40	.52
Nursenon *Sex	1	1.97	.16
Total	89		

Appendix 5: Intention to change compared to attitude toward need for change

This shows that there was a significant difference (p = 0.001) between those who said that they intended to change their diet and those who said they did not in the way they responded to the statement 'I don't need to make changes to my diet as it is healthy enough'

		t-test for Equality of Means				
		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
No changes needed – healthy enough	Equal variances assumed	3.40	65	.001	.79	.23
	Equal variances not assumed	3.62	64.58	.001	.79	.22

Appendix 6a: Total fat intake, by group and gender

Gender	Nursenon	Mean	Std. Deviation	N
Male	Nurses	39.75	16.64	4
	Non-nurses	35.91	14.11	22
	Total	36.50	14.23	26
Female	Nurses	28.79	8.31	33
	Non-nurses	26.97	12.00	30
	Total	27.92	10.19	63
Total	Nurses	29.97	9.81	37
	Non-nurses	30.75	13.56	52
	Total	30.43	12.09	89

Appendix 6b: Unsaturated fat intake, by group and gender

Gender	Nursenon	Mean	Std. Deviation	N
Male	Nurses	10.50	1.73	4
	Non-nurses	7.55	3.23	22
	Total	8.00	3.21	26
Female	Nurses	9.09	1.97	333
	Non-nurses	8.62	2.83	29
	Total	8.87	2.41	62
Total	Nurses	9.24	1.98	37
	Non-nurses	8.16	3.03	51
	Total	8.61	2.68	88

Appendix 6c: Analysis of total fibre intake, by group and gender

Gender	Nursenon	Mean	Std. Deviation	N
Male	Nurse	36.75	7.54	4
	Non-nurse	27.55	12.53	22
	Total	28.96	12.26	26
Female	Nurse	36.91	13.65	33
	Non-nurse	26.57	10.21	30
	Total	31.98	13.12	63
Total	Nurse	36.89	13.05	37
	Non-nurse	26.98	11.15	52
	Total	31.10	12.88	89

Appendix 8a: Analysis of total fibre intake, by BMI and group

This shows that fibre intake is related to BMI and to group.

Nursenon	Body Mass Index	Mean	Std. Deviation	N
Nurses	Underweight	37.27	12.05	11
	Normal	37.52	15.30	17
	Overweight	35.22	10.62	9
	Total	36.89	13.05	37
Non-nurses	Underweight	30.27	12.83	15
	Normal	29.08	9.64	25
	Overweight	20.29	8.77	7
	Obese	12.50	9.19	2
	Total	27.51	11.25	49
Total	Underweight	33.23	12.75	26
	Normal	32.50	12.78	42
	Overweight	28.69	12.22	16
	Obese	12.50	9.19	2
		31.55	12.86	86

Appendix 8b: Analysis of total fat intake, by group and BMI

This shows that fat intake is not related to BMI and is not significantly different between the two groups.

Nursenon	Body Mass Index	Mean	Std. Deviation	N
Nurses	Underweight	26.91	7.11	11
	Normal	31.24	8.81	17
	Overweight	31.33	14.03	9
	Total	29.97	9.81	37
Non-nurses	Underweight	29.47	12.18	15
	Normal	33.20	15.70	25
	Overweight	26.14	8.63	7
	Obese	23.00	16.97	2
	Total	30.63	13.82	49
Total	Underweight	28.38	10.24	26
	Normal	32.40	13.25	42
	Overweight	29.06	11.91	16
	Obese	23.00	16.97	2
	Total	30.35	12.20	86

Appendix 8c: Analysis of total knowledge score, by group and BMI

This shows that total knowledge scores are higher in nurses than non-nurses, and slightly lower in overweight and obese respondents.

Nursenon	Nursenon	Mean	Std. Deviation	N
Underweight	Nurse	28.18	1.83	11
	Non-nurse	26.67	4.08	15
	Total	27.31	3.36	26
Normal	Nurse	28.06	2.38	17
	Non-nurse	26.04	3.01	25
	Total	26.86	2.92	42
Overweight	Nurse	27.78	1.99	9
	Non-nurse	24.86	3.98	7
	Total	26.50	3.27	16
Obese	Non-nurse	18.00	.00	2
	Total	18.00	.00	2
Total	Nurse	28.03	2.09	37
	Non-nurse	25.73	3.78	49
	Total	26.72	3.35	86

Appendix 8d: 2-way anova of total knowledge scores, by group and BMI

This shows that there is a significant relationship between knowledge and BMI ($p = 0.003$) and group ($p = 0.003$)

Source	df	F	Sig.
BMICAT	3	5.03	.003
NURSENON	1	9.20	.003
BMICAT * NURSENON	2	.27	.76
Total	86		