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Has listeriosis been considered?: an evaluation of free written dietary educational material for pregnant women in the ACT

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HAS LISTERIOSIS BEEN CONSIDERED?
An evaluation of free written dietary educational material
for pregnant women in the ACT .

A thesis submitted in partial fulfilment of the
requirements for the award of the degree of
MASTER OF SCIENCE (NUTRITION AND DIETETICS)

UNIVERSITY OF WOLLONGONG

by
Rachel Shaw



DEPARTMENT OF PUBLIC HEALTH AND NUTRITION
UNIVERSITY OF WOLLONGONG

1995

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Abstract

Listeriosis is a foodborne disease which, if contracted by a pregnant woman, can result in prenatal death. To minimise the risk of this disease, pregnant women need to avoid refrigerated ready-to-eat foods. Commonly, pregnant women are educated about their increased nutritional requirements by use of written Dietary Education Materials (DEMs). Unfortunately some DEMs may recommend foods which are 'high risk' for listeriosis. The aim of this research is to determine whether pregnant women in the Australian Capital Territory (ACT) have access to written DEMs providing information which, if followed, will help to prevent listeriosis.

A telephone survey of 158 ACT services was used to obtain copies of DEMs given to pregnant women and determine their availability. The inclusion of information about listeriosis, high risk foods and food handling procedures in these DEMs was determined by a content analysis. The readability of DEMs containing information about listeriosis was determined using SMOG scores and the assessment of six design variables. DEMs for pregnant women were provided by 47 percent of services. Of the 42 DEMs obtained from the survey, 7 included information about listeriosis, 20 included high risk foods and 3 included high risk food handling procedures. The mean SMOG score for DEMs containing information about listeriosis was 12.14 ± 2.6 . The majority of DEMs were written in the passive voice, using less than a 12 point font.

DEMs are being provided for pregnant women in the ACT, but this tends to occur late in pregnancy. The large number of DEMs given to pregnant

women which include high risk foods for listeriosis is potentially dangerous. All DEMs containing information about listeriosis are fairly difficult to read with SMOG scores above recommended levels.

Introduction

Listeriosis is a disease contracted by eating food that contains the bacteria *Listeria monocytogenes*. If a pregnant woman is infected by this bacteria she will have few or no symptoms. However, her unborn child may die. The mortality rate for prenatal listeriosis is 30 to 50 percent (Fuchs, 1990; Watson & Ott, 1990).

The current reported case rate for Australia is relatively low, at 0.3 per 100 000 persons (Paul et al, 1994). Yet the true incidence of listeriosis is suspected to be higher. The National Food Authority (1994b) estimates that each year up to 100 cases of listeriosis occur in pregnant women. By avoiding high risk foods and adhering to safe food handling procedures the risk of listeriosis during pregnancy is minimised.

The World Health Organisation (1988, p.426) has advised that health authorities educate all health professionals about listeriosis so they can make appropriate recommendations to pregnant women and other patients at high risk for the disease. Contrary to this direction, it is suspected that some high risk foods actually are being recommended to pregnant women because of their nutritional value.

Written Dietary Education Material (DEM) is commonly used to inform pregnant women about their dietary requirements. Since pregnancy is not an illness, direct counselling with a dietitian can not be justified. Health professionals who are not trained specifically in nutrition can, however, distribute DEMs.

The aim of this research was to determine whether pregnant women in the Australian Capital Territory (ACT) have easy access to written DEMs that provide information which, if followed, will help to prevent listeriosis.

There were three specific objectives of this research:

(1) To determine the availability of free written DEMs to pregnant women in the ACT. Availability was assessed in terms of what information was provided, by whom it was provided and how it was provided.

(2) To evaluate the content of DEMs given to pregnant women in the ACT in terms of whether they aid or hinder the prevention of listeriosis. In particular, the number of DEMs which contained information about listeriosis and how many include foods and food handling procedures which are high risk for listeriosis.

(3) To determine the readability of written DEMs that contained information about listeriosis. In particular, whether readability levels were appropriate for pregnant women in the ACT. Additionally, the readability levels were compared with the readability levels of DEMs that did not contain information about listeriosis.

The information gained from this research could be used by the National Food Authority to aid in the development of a national awareness campaign about listeriosis. The findings also will be available to health professionals for their use in the development and distribution of written nutrition information for pregnant women.

Literature Review

Introduction

The first section of this literature review provides background information about listeriosis. Listeriosis outbreaks and food surveillance studies are included. They identify the high mortality among listeriosis cases and the types of foods likely to cause an infection. Obstacles preventing correct diagnosis of listeriosis and in eradicating listeria from the Australian food supply are reported in the literature. Therefore it is argued that pregnant women need to be educated about listeriosis prevention.

The second section of this review outlines and clarifies the National Food Authority (1994b) recommendations, for pregnant women, about the prevention of listeriosis. Many authors report on the use and advantages of written materials in communicating health messages. The services in the Australian Capital Territory which are expected to provide Dietary Education Materials (DEMs) for pregnant women are identified. Reasons why high risk foods for listeriosis may be included in nutrition material for pregnant women are identified.

A telephone survey is one method that can be used to determine the availability of DEMs for pregnant women in the ACT. General texts and recent studies concerning survey research, and specifically telephone interviews are reviewed. Issues of validity and reliability are discussed with particular reference to the recommendations of Foddy (1993), and Cockburn and De Luise (1992).

The fourth section defines and outlines content analysis as it is a method for evaluating written materials. A lack of model studies using content analysis

is identified. Studies by Glanz and Rudd (1991), and Allen (1994) are outlined as they use content analysis to evaluate nutrition education materials. Issues of reliability and validity are again discussed.

Finally, it is important that pregnant women are able to read dietary information about the prevention of listeriosis. Many authors have reported an inconsistency between the readability of health education materials and the reading level of their intended audience. Readability formulae are one method available to assess the readability of written materials. McLaughlin's (1969) SMOG grading formula is outlined and criticisms are discussed. Most experts argue that readability formulae should not be used alone. An additional criterion to assess readability, proposed by Allensworth and Luther (1986), is therefore outlined.

Listeriosis

Although listeriosis is a relatively uncommon disease it can be fatal to unborn infants. It is contracted by eating foods that contain the bacteria *Listeria monocytogenes* (*L. monocytogenes*). Efforts have been made to reduce the presence of listeria in the Australian food supply. It is not possible, however, to totally eliminate listeria from all foods. Evidence suggests that refrigerated ready-to-eat foods are the most likely source of this infection. Educating pregnant women about the need to avoid these foods is essential in preventing prenatal death due to this disease.

Listeria refers to a related group of bacteria containing five species. Only one of these species, *L. monocytogenes*, is known to cause human disease (Donnelly, 1990). Within this species there is great variation between the virulence of the different serotypes. Serotypes 1/2a, 1/2b and 4b are linked with 96 percent of the cases of human listeriosis (Tappero et al, 1995).

In 1988 the World Health Organisation (WHO) recognised listeriosis as a foodborne disease. Initially, it was thought that this disease was only contracted through contact with infected animals. Now, however, epidemiological and microbiological evidence from sporadic and epidemic outbreaks of listeriosis has linked the disease to the consumption of foods contaminated with *L. monocytogenes* (WHO, 1988).

In the late 1970s a listeriosis outbreak occurred in Boston. Although there was no conclusive evidence, pre-prepared salads were suspected as the most probable source of the listeria infection (Forsyth, 1991). In 1981 an outbreak of 41 cases, resulting in 18 deaths, occurred in Canada. This time epidemiological and microbiological evidence implicated coleslaw as the source of the infection. The cabbage used to make the coleslaw had been contaminated by the manure of a sheep found to be suffering from listeriosis. The cabbage was stored in the refrigerator, allowing the listeria to multiply rapidly (Schlech et al, 1983).

Dairy products also have been implicated in listeriosis outbreaks. In 1983, Massachusetts epidemiological evidence from case controlled studies linked 49 cases of listeriosis to pasteurised milk. Fourteen deaths were reported as a result of this outbreak (Fleming et al, 1985). More recent studies have shown that listeria can not survive pasteurisation. The listeria contamination must have occurred after pasteurisation (ADASC, 1994).

Epidemiological evidence with supporting microbiological evidence has implicated soft-cheeses in two listeriosis outbreaks. The first occurred in 1985 in Los Angeles and resulted in 36 deaths. Mexican style cheese was identified as the source of the listeria infection (James et al, 1985). The

second occurred in Canton of Vaud, Switzerland between 1983 and 1987.

Thirty deaths out of a total of 111 cases were reported. Locally produced soft cheese was blamed for the outbreak (Fuchs, 1990). Sporadic cases have also been linked to soft cheeses (Pinner et al, 1992).

Paté was implicated in two recent listeriosis outbreaks. The first was in Britain between 1988-89 (Health & Welfare Canada, 1993) and the second in Western Australia in 1990 (Watson & Ott, 1990). The Western Australian outbreak caused six prenatal deaths. Paté was also the suspected vehicle of a listeriosis outbreak in the North Coast region of NSW (Arnold & Coble, 1995). No conclusive evidence is available to implicate the source of the infection. Most recently, in France in 1992 jellied pork tongue was associated with an outbreak of 279 cases of listeriosis. This major outbreak caused 86 deaths (Bader, 1993).

Finally, raw and smoked seafood have been linked to several cases of listeriosis. Smoked mussels were implicated in a food poisoning outbreak in Tasmania and in the deaths of twin babies in New Zealand (Tan, 1995). In 1993 two sporadic cases of listeriosis in NSW and Victoria, resulting in miscarriage, were linked to listeria contaminated smoked salmon (Arnold & Coble, 1995).

It is not always possible to determine the food source responsible for each case of listeriosis. This is due to the long incubation period, up to 90 days, of *L. monocytogenes* (Riedo, et al, 1994) and the uneven distribution of listeria in food. In cheese, for example, listeria is found primarily in the rind (Hof et al, 1994).

Yet, despite these difficulties in identifying the food source, all the reported cases of listeriosis have been linked to the consumption of ready-to-eat foods. Recently, Pinner et al (1992) found that refrigerated ready-to-eat foods were five times more likely than other contaminated foods to contain serotypes of *L. monocytogenes* that matched the patient's strain.

Arnold & Coble (1995) have recently published a paper on the incidence of listeria in foods in New South Wales (NSW) during 1988 to 1993. They examined 1,606 samples comprising dairy products, seafoods, ready-to-eat vegetables and salads, smallgoods and miscellaneous foods. The paper concluded that *L. monocytogenes* was widely distributed in foods and its presence, particularly in ready-to-eat foods, was of concern. The foods identified as high risk included soft cheese, pâté, small goods (meat and meat products), poultry, smoked fish and delicatessen foods.

In the ACT, the Public and Environmental Health Service does in some instances test foods for listeria contamination. Here again high levels of *L. monocytogenes* have been found in refrigerated ready-to-eat foods. Meat salad, chicken, devon, smoked salmon and herring fillets have all been found to be contaminated with unsafe levels of *L. monocytogenes* (see Table 1).

Table 1: The presence of *L.monocytogenes* in food samples collected in the ACT

Food Sample	Presence of <i>L.monocytogenes</i> (No. of cells per 100g)*
Deli meat	23
Meat salad	43
Chicken	43
Smoked salmon (1)	1100
Herrings fillets	23
Devon	23
Smoked salmon (2)	1101

(ACT Health and Environmental Health Service (1993) Unpublished data.)

*At present the amount of *L.monocytogenes* that needs to be ingested to cause listeriosis is unknown.

The reported incidence of listeriosis is low, yet in western countries it has been increasing. In the United States 1 859 cases are estimated to occur annually (Arnold and Coble, 1995). A proportional incidence of listeriosis cases occurs in Australia. Victoria was the first Australian state to make listeriosis a notifiable disease, in 1990 (Carnie, 1991). It is now a notifiable disease in all States and Territories except the Northern Territory (Paul et al, 1994). The current reported Australian case rate for listeriosis is 0.3 cases per 100 000 people (Paul et al, 1994). It is likely that many cases of listeriosis are still not reported due to lack of public awareness and variable interest in investigating probable cases (Forsyth, 1991).

At present little is known about how much *L. monocytogenes* needs to be ingested to cause an infection. Nor is there reliable quantitative information on the amount of contaminated foodstuffs ingested in relation

to the risk of acquiring the disease. It is likely that the infectious dose may be related to host susceptibility (WHO, 1988).

A healthy individual is able to overcome a listeria invasion suffering no symptoms or only minor influenza type symptoms (Donnelly, 1990). Fatal listeriosis cases have, however, been reported in AIDS and cancer patients, persons with a history of alcohol abuse, patients taking immunosuppressant drugs, the elderly, and unborn infants (Schuchat et al, 1992; Kent et al, 1994; Paul et al, 1994). Listeriosis has been identified as possibly the major foodborne cause of death in Western countries (Paul et al, 1994).

If a *L. monocytogenes* invasion occurs in a pregnant woman it is likely that her unborn baby will be affected. During pregnancy widespread immunosuppression occurs that prevents the woman's body from rejecting the foetus. This immunosuppression provides *L. monocytogenes* with an opportunity to pass through the woman's blood stream and colonise the placenta. The bacteria is then easily transmitted through the placenta to the foetus (Moscola et al, 1994). The National Food Authority (NFA, 1994a) estimates that each year in Australia up to 100 cases of listeriosis occur in pregnant women.

Once infected by *L. monocytogenes* the unborn infant's prognosis is poor. Thirty to fifty percent of unborn infants infected by listeriosis will die (Fuchs, 1990; Watson & Ott, 1990). Prenatal listeriosis can result in spontaneous abortion, stillbirth, premature birth or neonates with meningitis or septicaemia (Enocksson, 1990). Since 1989 prenatal death due to listeriosis has been reported in New South Wales, Victoria, Tasmania and Western Australia (Watson & Ott, 1990; Arnold & Coble, 1995, Tan 1995).

If diagnosed early listeriosis can be treated with the antibiotics penicillin or ampicillin (Isaacs et al, 1994). Listeriosis is diagnosed by culturing the organism from blood and cerebrospinal fluid. Infection in the foetus also can be identified by histological examination of the placenta (Paul et al, 1994).

For two reasons it is suspected that the diagnosis of listeriosis cases may be missed. Firstly, a *L. monocytogenes* infection does not cause typical food poisoning symptoms. In unborn infants, early diagnosis is particularly difficult as pregnant women show none or only minor influenza-like symptoms (Pinner et al, 1992). Secondly, even when specimens are sent to pathology, *L. monocytogenes* is sometimes mistaken for contaminants in the specimen (Paul et al, 1994).

Ideally listeriosis should be preventable. Unfortunately, it is impossible to eradicate *L. monocytogenes* from all foods. *L. monocytogenes* is present everywhere so contamination can occur easily. It is found in soil, sewage, fertiliser, plants and animals (Donnelly, 1990). Five percent of healthy asymptomatic individuals also are known to be carriers of *L. monocytogenes* (Donnelly, 1990).

L. monocytogenes is also resistant to adverse environmental conditions, enabling it to survive and multiply in many food products. It grows in temperatures between -0.5 to 45 °C, at a pH of 5 to 9.5, and can tolerate high salt concentrations equal to 10 percent sodium chloride (Tan, 1995). Of greatest significance is the fact that *L. monocytogenes* is capable of rapid growth during refrigeration (Arnold & Coble, 1995).

Recently, efforts have been made to eliminate *L. monocytogenes* from foods which carry a high risk of listeria growth. In March 1994 the National Food Standards Council approved a nil tolerance standard at the manufacturing level for listeria in paté, soft cheese, smoked fish and smoked marinated mussels. These foods were selected after consideration of the foods implicated in listeriosis outbreaks. The amendment was implemented on September 25, 1994 (NFA, 1994a).

Evidence now suggests that listeria contamination is most likely to occur at the retail and domestic levels. In July/August 1994 Tan (1995) conducted a survey of 433 food samples (wholesale and retail). Of these 391 were directly affected by the amendment. The other 42 were considered "at risk" of listeria contamination. Interestingly, only one contaminated wholesale sample was found but six food retail samples were positive for *L. monocytogenes*. It is therefore suspected that most listeria contamination is occurring after food products leave the manufacturers.

Since contaminated food samples will continue to occur despite this new amendment, Tan (1995) recommends that greater emphasis be placed on the education of at-risk consumers. Due to the high mortality rate among unborn infants, pregnant women primarily should be targeted. Education campaigns to at-risk groups, including pregnant women, appear to be effective in reducing the risk of listeriosis in other Western countries (Jones et al, 1994; Tappero et al, 1995).

Education of pregnant women

Much of health and patient education in Australia and the United States relies on the dissemination of written information. Information about dietary requirements is no exception (Bussellman & Holcomb, 1994).

Recently, written dietary advice about listeriosis has been distributed to pregnant women. In addition pregnant women should be receiving written nutrition information. There is potential for these two sources of dietary advice to contradict. This is because some high risk foods for listeriosis are also sources of certain nutrients required during pregnancy.

In October 1994 the NFA released a pamphlet targeting pregnant women about the risk and prevention of listeriosis (NFA, 1994b). In addition, dietary advice about listeriosis has been issued by the National Health & Medical Research Council (NH&MRC) and some State Health Departments.

The NFA(1994b) pamphlet is a source of expert advice about the prevention of listeriosis. It contains information about what listeriosis is and the risk of disease to the unborn infant. The minor symptoms that may occur in the mother as well as possible treatment are outlined.

The NFA (1994b) brochure also contains specific details about safe food preparation. It provides instructions on how to prevent cross-contamination, at what temperatures foods should be stored and cooked, the need to wash vegetables, check use-by dates and observe microwave standing times. These recommendations are important in preventing listeriosis. *L. monocytogenes* has frequently been found in raw foods (Arnold and Coble, 1995). These foods can cause a listeria infection if not heated sufficiently to destroy the bacteria (Pinner et al, 1992). They also can contaminate ready-to-eat foods. Yet these recommendations are not specific for listeria. They are relevant to preventing all potential causes of foodborne disease.

The major concern with listeria is that it is capable of rapid growth during refrigeration (Arnold and Coble, 1995). Foods which are stored and eaten at refrigerator temperatures are most likely to cause listeriosis. Not surprisingly, these are the foods which have been implicated in sporadic and epidemic cases of the disease.

The NFA (1994b) recommends that pregnant women avoid pre-prepared foods. According to the NFA (1994b) freshly prepared foods including salads can be safely stored in the refrigerator provided they are eaten within 12 hours of preparation. This is stricter than the NH&MRC (1992) recommendations which claim these foods are safe provided they are eaten within 24 hours.

At present the relationship between the infective dose and the host's susceptibility is not fully understood (WHO, 1988). It is therefore not possible to say with certainty at what point a food stored in the refrigerator will contain unsafe levels of listeria contamination. It is because listeria multiplies rapidly in the refrigerator and can move easily from one food to another that the NFA (1994a) has proposed the more conservative time frame of 12 hours.

Food surveillance surveys have found on numerous occasions cold meat products to be contaminated with *L. monocytogenes*. Listeria has been isolated from shredded ham, sliced deli meat (Tan, 1995), chorizos, csabai, cabanossi (Arnold & Coble, 1995), chicken, ham, corned beef and strasbourg (Forsyth, 1991). The NFA (1994b) recommends that pregnant women avoid all commercial cold meat products and cooked diced chicken, as used in chicken sandwiches.

Arnold and Coble (1995) found the presence of *L. monocytogenes* in 18 paté samples. This situation is potentially dangerous as commercial paté has a shelf life of six to twelve weeks at refrigeration temperatures, which provides an ideal situation for listeria to multiply. The NFA (1994b) recommends that pregnant women avoid all commercial paté.

Although listeria has been found in some surveillance studies to be present in ice-cream and flavoured milk made from pasteurised milk, the levels have been considered sufficiently low not to be a concern (Arnold and Coble, 1995). According to the NFA (1994b) fresh pasteurised milk and milk products, and UHT milk are safe for pregnant women.

The incidence of *L. monocytogenes* in soft cheese in Australia is low although it does occur on occasion. Arnold and Coble (1995) found that 15 out of 437 samples of soft cheese were positive for *L. monocytogenes*. Other studies have revealed similar results (Venables, 1989; Tan, 1995). During the later stage of ripening, the pH of some soft cheeses is high. These cheeses are most likely to contain high levels of listeriosis. The NFA (1994b) recommends that pregnant women avoid soft cheeses such as brie, camembert and ricotta. Hard and processed cheeses have so far been free of listeria and are considered safe for pregnant women by the NFA (1994b).

Finally, the NFA (1994b) recommends that pregnant women avoid raw seafood or products containing raw seafood, such as oysters, sashimi and all chilled or frozen smoked seafood products.

The NFA's recommendations (1994b) identify only the types of foods that are likely to cause a *L. monocytogenes* infection. Although it provides some examples the lists are not exhaustive. To those unfamiliar with food

processing practices and the characteristics of listeria it is difficult to determine all the foods that are safe from listeria contamination. Additional clarification is therefore helpful.

When considering soft white cheese it has been found that *L. monocytogenes* will grow in ricotta but is unlikely to appear in cottage cheese. This is due to the acidity treatment used in the preparation of cottage cheese (WHO, 1988). Unsafe cheeses are those with a moisture content equal to or greater than 40 percent and a pH equal to or greater than 5.0 (Tan, 1995).

There is some controversy regarding the safety of feta cheese. To date no listeria contamination has occurred in feta cheese in Australia (ADASC, 1994). Feta cheese has, however, been recorded as a high risk food for listeria growth in America (Schuchat et al, 1992).

Cheese spreads and cream cheese are considered safe (Carr & Rothburn, 1989). There is some concern that cheese dips that have been exposed to raw vegetables may carry *L. monocytogenes*. The NH&MRC (1992) recommend that they also should be avoided by pregnant women.

According to Processed Food Inspection Operations (1994) the following raw/smoked seafood products are safe for pregnant women: whole crustaceans where the entire shell is intact, for example, lobster and whole crab; sashimi in the form of whole, or gilled and gutted fish; and live shellfish. All products which have been given listeriocidal treatment inside hermetically sealed packaging also are safe. This means that all products packaged in tins, cans or jars are safe.

The NFA (1994b) pamphlet has been distributed throughout Australia through pharmacies, dietitians, general practitioners and Family Planning Clinics. In order to evaluate the effectiveness of this education strategy only one pamphlet was distributed to each contact point. The back of the pamphlet contains details of how to order more. It was intended that the number and distribution of repeat orders be used as a measure of the success of the education strategy. The reordering of the pamphlets has been coordinated by State and Territory Area Health Offices (1994a).

In addition to receiving dietary information specifically about listeriosis, pregnant women also should receive information about their nutritional requirements. The nutrition information they receive should be consistent with the information they receive about diet and listeriosis.

It is well known that poor maternal nutritional status has a negative effect on maternal health, and on foetal growth and development. The severity of the impact largely depends on the timing, duration and intensity of nutritional insults. Associations have been found between poor maternal nutritional status and low birth weights, premature birth, birthing complications and sickly infants (Frankle & Owen, 1993). The nutritional status of a pregnant woman is affected by her diet prior to conception as well as her diet during pregnancy (Luke, 1994).

The NH&MRC (1991) recommends that pregnant women require an additional 850 to 1100KJ/day (averaged over 40 weeks of pregnancy). Requirements for protein, vitamins and minerals also substantially increase during pregnancy. The increase in energy needs is not large in comparison to increased requirements for other nutrients. Consequently, the quality of the diet must be very high (Zeman & Ney, 1988). Increased needs for

protein (+6g/day), folate (+200ug/day), calcium (+300mg/day) and iron (+10-20mg/day) deserve special attention in the pregnant woman's diet (NH&MRC, 1991).

Some foods, because of their nutritional value, may be recommended to pregnant women even though they are high risk foods for listeriosis. Paté carries a high risk of listeria growth but it is also a particularly high iron food containing 3.3mg of haem iron per 35g serve (DCS&H, 1991). Haem iron is the most easily absorbed form of iron (Whitney et al, 1989).

Pregnant women require an additional portion of meat, or a meat alternative, each day to meet their protein and iron requirements. Leaner luncheon meats such as skinless chicken, corned beef and ham may be recommended. These cold meat products are high risk foods for listeriosis.

Raw and smoked seafood are sources of iron and protein. Some seafood also contains considerable amounts of calcium. Six raw oysters, for example, contain 134mg of calcium (DCS&H, 1989). These foods are more expensive so they are less likely to be included regularly in the diet but may be recommended as occasional foods. Both raw and smoked seafood carry a high risk of listeria growth.

Soft cheeses such as camembert and brie provide significant amounts of calcium but they are expensive and high in fat. Ricotta cheese, however, is a fair source of calcium and when made with skim milk has only 8.7g of fat per 100g serve (DCS&H, 1989). This is lower than most reduced fat hard cheese products. Ricotta, brie and camembert are all potential carriers of listeria.

Recently, there has been an increase in the number of ready-to-eat foods available. For example, stands of refrigerated pre-prepared salads are now available in most large supermarkets. Delicatessens are also more common (Bates & Ware, 1993). Pregnant women often find they have less energy, particularly towards the later stages of their pregnancy. If not informed of the risks of listeriosis associated with consuming these foods, pregnant women are likely to opt for these easier food choices at some stage during their pregnancy.

Although women are nutritionally vulnerable during pregnancy, pregnancy itself does not put them at nutritional risk. For this reason direct counselling with nutritional experts can not be justified. One method commonly used to provide dietary education material to pregnant women is through free written material (Glanz & Rudd, 1990).

It is important to note that printed education materials are not the only method that can be used to convey dietary information, nor should they be. Studies suggest that information is best accepted when it is received from at least three sources (Feldman et al, 1994). Written information can be very effective when it is used as one of these sources.

Allensworth (1986, p.18) states that printed education materials are the most effective channel for communicating health messages to the public.

Although this is a very bold statement it has been demonstrated that printed education materials do increase the knowledge, compliance and satisfaction of care provided to clients (Glanz & Rudd, 1990).

Printed education materials have many advantages. They are economical, portable, easily distributed, reusable and can be retained by clients for further

reference (Bernier, 1993). This is particularly important when providing pregnant women with dietary advice as it is likely that they also will be provided with large amounts of other health information. When only verbal information is provided it can be misunderstood, distorted or forgotten (Glanz & Rudd, 1990). Studies have shown that written education material used together with personalised reinforcement achieve the best outcomes (Bernier, 1993).

If written education materials are to be used to educate pregnant women about listeriosis they need to be accessible to them. Ideally the information should be distributed by services that pregnant women routinely use. Also, the providers, rather than the pregnant women, should take the initiative in distributing the information.

In the ACT there are a number of antenatal health care services, community organisations and retail outlets which could be expected to provide dietary information to pregnant women. Some services are more difficult to access than others. All pregnant women, however, will attend at least one of the antenatal health care services.

In the ACT an average of 400 live babies are born each month (ABS, 1995). Ewton (1993) reports that fifteen to twenty percent of all pregnancies end in miscarriage, one percent are stillborn and one percent end in neonatal death. It can be roughly estimated therefore that in excess of 475 new pregnant women will require antenatal care in the ACT each month.

The earlier in pregnancy women receive information about nutrition and the dietary prevention of listeriosis the better. The general practitioner will be the first point of contact for most women (McGregor, 1994) and as such is

in the best position to provide this information. In the ACT there are approximately 300 private general practitioners, 85 of these provide antenatal care (ACT Division of General Practitioners, personal communication). General practitioners also are located at the Women's Health Service, Aboriginal Health Clinic, Family Planning Clinic and Community Health Centres (Kelly, 1991).

Most women will use more than one antenatal health care service during their pregnancy. In the ACT a small number of women, less than 25 percent, will continue to have their general practitioner provide all their antenatal care and deliver their baby (McGregor, 1991). The majority of women will transfer all or part of their care to an obstetrician, the antenatal clinic or a homebirth midwife. When antenatal care is provided by two services it is referred to as 'shared care' (Kelly, 1991). The ACT is unusual in that obstetricians attend the majority of births (McGregor, 1991)

At their own initiative pregnant women can choose to attend antenatal classes. These are held at the three Canberra hospitals and at the Birth Centre. When women are between 12 to 18 weeks pregnant they can begin by attending "Early Bird" classes. Most women start classes when they are six months pregnant and then attend weekly for six to seven weeks (Kelly, 1991).

A recent review of maternity services found that for some women these classes are difficult to access. Heavy bookings, inflexible times, a lack of transport and a lack of childcare were identified as barriers to attendance (McGregor, 1994) .

In most cases dietitians see pregnant women for personal counselling only if they are referred because of an additional nutritional risk. They will, however, provide dietary information on request and have input into some antenatal classes. Dietitians are located at most community health centres, at all Canberra hospitals and in private practice (Kelly, 1991).

There are additional places where pregnant women may access nutritional information. In the ACT there are a number of community organisations which provide support and information to pregnant women. These include the O'Connor Family Centre, the Pregnancy Support Service, the Women's Referral and Information Centre and the Canberra Homebirth Association. The YWCA Young Parents program and Red Cross Youth Health provide antenatal advice and support specifically to teenage mothers (Citizens Advice Bureau of the ACT, 1994). Listeriosis information has been distributed through pharmacies (NFA, 1994a). Health food shops also may provide dietary advice.

In a recent review of maternity services in the ACT, consumers and community groups identified the need for more information. Among other things, information was requested about food and nutrition during pregnancy (McGregor, 1994).

Telephone survey

Survey research is one method to determine the availability of dietary education materials (DEMs) for pregnant women and to collect copies of these materials. In this section the appropriateness of the telephone interview is identified. The possible sources of data error are discussed in terms of how they threaten precision, reliability and validity. Strategies to minimise these errors are identified.

There are three methods of conducting a survey: by self-administered mail questionnaire, by personal interview or by telephone interview. The telephone interview is most appropriate when time and resources are limited. A telephone survey can be conducted and analysed from a single location, making it faster than both the personal interview or the mailed questionnaire. Fewer resources are required compared with the personal interview (Anastas, 1994).

Results will only be useful if the total error is minimised. In survey research three factors contribute to total error. These are sampling bias, non-sampling bias and measurement error (Henry, 1990). Error results from data that lacks precision, reliability and validity. Precision is concerned with the accuracy of the measurements. Reliability is concerned with the extent to which the same results are obtained when the measurement task is repeated. Validity is concerned with the extent to which the measurements taken are relevant to the study undertaken (Welizer and Wierir, 1979).

Due to resource and time constraints it is not possible to interview all services that could be expected to provide DEMs to pregnant women. A sample of expected providers should be selected. For the result to be valid (ie. to avoid sampling bias) the sample must be representative of the entire population. This can be achieved by selecting a probability sample (Floyd & Fowler, 1993).

The services that have been identified as expected providers of DEMs to pregnant women in the ACT do not form one homogeneous population. For this reason more useful information may be obtained if the services are divided into subpopulations.

A stratified random sample is one type of probability sample that allows for subpopulation analysis. This is when the population is first divided into subpopulations (strata) and then from each stratum a random sample is selected (Henry,1990).

The subpopulations of expected providers of DEMs to pregnant women vary considerably in size. Disproportional stratification can overcome the problem of having some groups that are considerably smaller than others. It allows a larger sampling fraction to be used for some populations without increasing the entire sample size. For small subpopulations, sampling can undermine the reliability and validity of the data. Henry (1990) recommends that in such situations the entire subpopulation be studied.

Weighting is required to adjust for the selection bias that occurs when disproportional analysis is used (Henry, 1990). Weighting is calculated by dividing the population proportion by the sample proportion.

The second factor that contributes to total error in survey research is non-sampling bias. Non-sampling bias is the difference between the true population and the population actually studied. Non-sampling bias is affected by the sampling frame and non-response error.

The sampling frame is a list of the study population. Omissions, duplications and the presence of ineligible members in the sampling frame all contribute to non-sampling error (Henry, 1990).

Telephone surveys are often criticised as having incomplete sampling frames, as telephones are not owned by all members of the population

(Floyd & Fowler, 1993). This is unlikely to be the case, however, when surveying expected providers of DEMs to pregnant women.

There are omissions in telephone directories because silent numbers and new listings are not included. Multiple listings also frequently occur (Lavrakos, 1993). To minimise the potential for these errors Henry (1990) recommends that more than one source should be used to compile the sampling frame.

Non response error is the inability to obtain responses from all members of the survey population or sample. This may be due to an inability to contact a respondent or a respondent's refusal to participate (Henry, 1990). To provide an indication of the non-response error, the response rate should be calculated. The response rate is the percentage of respondents interviewed out of the total number of eligible respondents (Floyd and Flower, 1993).

Telephone surveys tend to have lower response rates than personal interviews but higher response rates than self-administered questionnaires. Hox and De Leeuw (1994, p. 329) analysed forty-five studies and found that with all other factors equal the response rate for face-to-face interviews was 70.3 percent, for telephone surveys was 67.2 percent and for mail surveys was 61.3 percent.

The salience of the survey topic and the authority of the research body also affect the response rate. Since there is variable interest about reporting cases of listeriosis and a lack of public awareness about the disease (WHO, 1988) there may be resistance to participating in the research project. Conducting the research from within a university should increase the response rate (Groves, 1992) .

Since the characteristics of the population members that refuse to participate or can not be contacted are unknown, it is difficult to adjust for non-response error. Therefore non-response error should be minimised as much as possible. The best way to reduce non-response error is to have follow-up attempts and to use methods to enlist the co-operation of respondents (Henry, 1990; Floyd & Fowler, 1993; and Hox & Leeuw, 1994).

In telephone surveys it is relatively easy to make follow-up calls provided an organised system is used. Lavarakas (1993) recommends the use of call sheets to record the outcome of each call attempt. The recent increase in the use of answering machines has increased the need for follow-ups in telephone survey research (Oldendick & Link, 1994). A study conducted by Oldendick & Link (1994) showed that answering machines at present do not threaten the representativeness of telephone surveys.

Groves et al (1992) states that sending an information letter prior to conducting the telephone interview can increase the respondent's co-operation. The letter pre-warns the respondent about the coming interview and provides tangible evidence that the interview is legitimate (Floyd & Fowler, 1993). The letter should show respondents that their help is important and also tell them how the information they provide will be used (Dillman, 1987) Mowen and Cialdini (1980, p.257) report that by including the words; "It would really help us" on their advanced letter their response rate was increased by 19 percent.

The third factor that contributes to total error in survey research is measurement error. Measurement error can occur in the questionnaire

design, the interview process, the recording, coding and analysis of the results.

Survey research relies on questions to determine the characteristics or attitudes of a population group. The construction of the questions is therefore paramount in achieving accurate, reliable and valid results.

To achieve valid data the researcher must have a clear idea of the reason for the research and the nature of the information that is required. Only then will the researcher be able to formulate relevant questions (McPherson, 1990). Consideration also should be given to whether the informants are able to provide the information that the researcher wants. Studies show that respondents will answer questions even when it is not relevant to them (Belson, 1981; Smith, 1984). Filter questions help to establish the relevance of questions to individual informants (Foddy, 1993).

For results to be meaningfully compared, all respondents need to interpret questions the same way. Foddy (1993) has suggested a number of ways to maximise the researcher's control over the interpretation of survey questions. Firstly, clear explanations about the reasons for the research and the type of information required should be given to the respondents. This can be done through an introductory letter or immediately prior to specific questions. Secondly, specific, concrete and universally understood words should be used. Ambiguous questions lead to invalid results. General terms also are open to wider interpretations. Finally, questions should be as brief as possible without lessening the clarity of the definitions of key concepts. Double-barrelled and negative questions should be avoided as they are more difficult to interpret.

The rule of standardisation has been followed in quantitative survey research since the 1950s (Lavrakas, 1993). This rule states that the interview introduction and all survey questions should be entirely scripted (Floyd & Fowler, 1993). It is generally agreed among quantitative researchers that standardisation is imperative if reliable data are to be obtained. Foddy (1993) points out that this fact has never been empirically tested, although, it has been found that slight changes in wording can affect respondents' answers to survey questions (Cockburn & De Luise, 1992).

Closed questions produce more reliable results as there are a finite number of options (Cockburn & De Luise, 1992). Yet closed questions are only valid when all possible response options are included. It is extremely difficult to provide an exhaustive list of possible responses (Foddy, 1993). The reliability of open-ended questions can be increased if the researcher's response expectation is communicated in the survey questions (Floyd & Fowler, 1993)

Telephone surveys rely on the respondents' ability to hear and retain information. This limits the use of questions with multiple response options. Dillman (1987) suggests that in telephone questionnaires each response option should be made into an individual question.

All questions are biased to some extent. Effort should be made to minimise question bias by avoiding leading questions that include names or examples. Foddy (1993) suggests that another way to reduce question bias is to use balanced questions. For example: Do you or do you not provide dietary education material for pregnant women? The problem with this type of question in telephone surveys is that the questions can become too long for the respondent to retain (Floyd & Fowler, 1993).

Question order can affect the validity of survey results. Answers to previous questions are used by respondents to answer later questions. Respondents also have a need to appear consistent. The answers given to previous questions will affect their subsequent responses (Foddy, 1993). Most researchers agree that if questions are properly defined the most valid protocol is to progress from general to specific questions (Dillman, 1987; Floyd & Fowler, 1993; Foddy, 1993).

The format of the questionnaire is an area that has been somewhat neglected in survey research. In a recent study Sanchez (1992) found that inadequate layout and graphics can lead to recording and coding errors. In telephone survey design, Frey (1989) suggests that the layout should be designed primarily with the needs of the interviewer in mind.

The reliability of survey research can be affected as a result of the interview process. Some respondents may modify their behaviour as a result of participating in the survey. Many respondents also may give answers that they think are "correct" rather than the truth (Cockburn & De Luise, 1992). To minimise this problem respondents should be reminded that their answers are confidential and only useful to the researcher when they are honest. This should be done prior to conducting the interview. Finally, questions should be non-threatening to the respondent (Cockburn & De Luise, 1992).

Data obtained using a different research technique can be used to test the reliability of the survey instrument (Walizer & Wienir, 1978). For example, in the case of determining the availability of DEMs, a comparison can be

made between what materials respondents said they provided and what DEMs were actually collected from their services.

A pilot study can be used to test the face validity of the questionnaire design. Face validity is the extent to which the questions appear to be measuring what they are intended to measure (Cookburn & De Luise, 1992). A pilot study also can test the survey process (Foddy, 1993). It will help to identify problems for the interviewer, the average time it takes to complete each survey, the response rate and the proposed sampling plan (Floyd & Fowler, 1993).

In telephone surveys it is essential that the questionnaire is piloted over the telephone (Lavrakos, 1993). During the piloting process the interviewer should note when questions need to be repeated, when clarification or probing is required, when the respondent wants to say more and when inadequate answers are given (Foddy, 1993).

A reliable and valid survey based on these principles can help to clarify the provision of DEMs to pregnant women in the ACT. Copies of the DEMs also can be requested during the survey and collection arranged. These DEMs then can be analysed in terms of content and readability.

Assessment of Dietary Education Materials (DEMs)

Since DEMs are used to educate pregnant women about their dietary needs it is important to ask the following questions "How many DEMs that are given to pregnant women include information about listeriosis?" and, "How many DEMs recommend foods and food preparation practices that are high risk for listeriosis?". A content analysis with categories based on the NFA (1994b) recommendations can be used to answer these questions. The

other factor which needs to be considered is whether the materials that educate about listeriosis are easy for pregnant women to read. The SMOG formula is one tool that has been developed to assess readability. Most experts recommend that it should be used together with other readability assessment tools.

A number of ways have been developed to assess the accuracy and consistency of written education material. One way is to conduct a content analysis. 'Content analysis' is difficult to define as it is used in so many different ways (Carney, 1961). Early definitions define content analysis as a research technique for the objective, systematic and quantitative description of the manifest content of communication (Berelson, 1952, cited in Carney, 1961).

Content analysis was first used in the 19th century to detect heresy in a collection of hymns called the "Songs of Zion" (Woodrum, 1984). Since then it has been used primarily as a sociological technique to evaluate propaganda and to identify stereotypes, nationalism, racism, sociopolitical changes and female visibility in newspapers, magazines (Woodrum, 1984) and more recently television (Olson, 1994). Content analysis however, has been applied to many other areas including the evaluation of printed education material (For example: Glanz & Rudd, 1990; Allen, 1995). As Carney (1961) concludes, content analysis is constructed so that it can analyse any form of communication.

Content analysis has many advantages as a research method. Firstly, it uses techniques which are already commonly used, such as coding answers to open-ended questions. Secondly, it is low cost. Thirdly, as discussed earlier, it has a very broad range of applications (Woodrum, 1984). Fourthly, it

provides an empirical basis for drawing conclusions from written materials, reducing ambiguity (Carney, 1961). And finally, as it is an unobtrusive research method, the results are not affected by the research process (Kellehear, 1989).

The major obstacle in content analysis is that there are few model studies providing detailed illustrations of procedures and techniques (Woodrum, 1984). The methodology therefore is not well understood and there is uncertainty regarding the appropriateness of general methodological principles. Woodrum (1984) suggests that procedures developed for use in other research methods should be applied to content analysis studies whenever they advance the study's objectives.

According to Carney (1961) there is no one all-purpose variety of content analysis. Each instance of its use is unique and as such a form of the method needs to be evolved to meet the individual peculiarities of each study. The basic principles of content analysis, however, are always the same. Written material is divided into content units which define the material to be assessed. Each content unit is analysed using preset categories (Carney, 1961). The categories should be developed through a thorough literature review and a pilot study on a small number of the materials (Woodrum, 1984). Categories should be inclusive enough to hold all items pertinent to the study. Each item should fall into only one category and all categories should relate to a uniform system of classification (Carney, 1961).

For the content analysis method to be reliable and valid all relevant sources should be examined, categories should be specific and clear and the categories should be subject to clear definitions. According to Scott (1990) the clearer the definitions the better and stronger the reliability. The

analysis of the data for manifest content, such as the appearance of high risk foods for listeriosis in DEMs for pregnant women, is the most reliable use of content analysis (Woodrum, 1984).

Carney (1961) states that for content analysis to be valid there must be an expert standard against which the data are assessed. The NFA (1994b) pamphlet about listeriosis provides an expert standard for the analysis of DEMs given to pregnant women. By forming categories based on an expert standard the researcher simply has to establish the presence or absence of an item in the material. This ensures an objective method of assessment (Carney, 1961).

One example of using content analysis to evaluate nutrition education material was a study conducted by Allen (1995). She examined the presence of new food labels in the printed media over a specific time period. A coding instrument was developed to identify such factors as the benefits and limitations associated with the labels, definitions of terms and the credentials of persons quoted in the article.

A study by Glanz & Davis (1990) used content analysis to assess the coverage of 38 education materials written for patients with high cholesterol. This study recorded the presence or absence of messages in each of nine key areas. Four were related to the diagnosis of high cholesterol and related risk factors and five were concerned with instructional information about dietary behaviour and food choice. Each education material item also was categorised according to its intended audience, date of publication, length and size. Only materials that were directly accessible to the author were analysed. This study also considered the readability of materials.

For written DEMs about listeriosis to be effective, pregnant women must be able to read and comprehend what is written. If instructions can not be understood then learning and resultant behaviour change can not be expected. Written material that can not be understood can cause confusion and unnecessary stress to the client (Patterson, 1994). For example, pregnant women may understand from the DEM that listeriosis could kill their unborn baby but may be unable to discern which foods they should avoid.

Many studies (Siminerio & Frith, 1993; Yasenchak & Bridle, 1993; Felman et al, 1994) have shown that much of the available education material is written at a level which can not be understood by its intended audience. Siminerioi & Frith (1993) suggest that most readers are at or below an eighth grade level. Yasenchak & Bride (1993) report that 60 to 90 percent of printed education material is written above the eighth grade level. A recent study (Swanson and Birkliid, 1992) of 32 printed nutrition education materials found that they had a mean readability grade level of 11.8.

Many factors have been found to affect the readability of printed education material. The most commonly identified factors include sentence length and the use of multi-syllabic words. Design variables such as format, typeface, style of print and use of illustrations also can affect readability. The characteristics of the target audience such as education level, ethnic background and anxiety levels have been found to affect comprehension (Estey et al, 1993).

There are no data available specifically about the reading or education levels of women in the ACT. In Australia, 44 percent of all women do not complete high school (ABS, 1993). In the ACT, secondary school retention rates are considerably higher than in other states, but 19.7 percent of the

population has not completed year 12 (ABS, 1994). In the ACT the median age of first time mothers is 28.2 years. Four percent of ACT mothers are teenagers (ABS, 1994).

A discrepancy has been found between reported education levels and actual reading level (Busselman & Holcomb, 1994). Jubelirer (1991) reports that it is generally agreed that patients overestimate their reading skills by one to two education levels.

Most authors (Allensworth & Luther, 1986) agree that all patient education material should be set below the eighth grade level. Allensworth and Luther (1986) state that this would allow 75 percent of the population to be able to comprehend the material. One author even suggests that printed patient education material should be set below the fifth grade reading level (Vivian and Robertson, 1980).

The readability level of health related material can be assessed using reading formulae (Murphy, 1994). Jubelirer (1991) identified more than 40 different readability formulae. One such formula is the SMOG index.

Harry McLaughlin developed the SMOG index in 1969. It is based on the square root of the number of polysyllabic words within 30 selected sentences of the reading material. The procedure for applying the SMOG Grading formula is as follows: Firstly, a total of 30 sentences are examined in the written material under review. Ten consecutive sentences are selected from the beginning of the piece, ten from the middle, and ten from near the end. Secondly, the number of syllables for each word in the 30 sentences are determined. Thirdly, the number of words containing three or more syllables are counted (including repetitions). Finally, the nearest perfect

square root of the total number of words with three or more syllables is determined and the number three is added to the square root to obtain the grade level. The number 3 is a constant in the formula.

The SMOG index tends to predict a higher reading grade than other readability formulae (Allensworth & Luther, 1986). McLaughlin (1969) argues that this is appropriate as the SMOG index predicts 90 to 100 percent comprehensions, whereas the level of comprehension from other readability formulae is much lower. The United States Department of Health and Human Services, Public Health Service (1981, p.94) has proposed a useful key to interpreting the SMOG index as displayed in Table 2.

Table 2 The SMOG Score and Degree of Difficulty of Certain Publications

SMOG Score	Typical Magazine	Degree of Difficulty
6-7	Comics	Very easy
8	Pulp-fiction	Easy
9-10	Reader's Digest	Average
11-13	Atlantic Monthly	Fairly difficult
14-16	Academic Magazines	Difficult
17+	Scientific Professional Magazines	Very difficult

US Department of Health and Human Services, Public Health Service
(1981, p. 94)

The SMOG grading formula is a useful tool to assess the overall ease with which written material can be read. It is an objective comparison and can be applied across different writing styles. The SMOG index is simpler and easier to apply than most reading formulae. Zion & Aiman (1989) report

that it takes 15 minutes to apply per paper. The SMOG grading formula also has been extensively applied to health oriented literature.

For example, Zion and Aiman (1989) assessed the readability of 74 pamphlets developed by the American College of Obstetricians and Gynecologists using the SMOG grading formula. The SMOG grades obtained from the 21 pamphlets concerned with pregnancy can be seen in Table 3.

Table 3 Reading Difficulty of Each English-Language American College of Obstetricians and Gynecologists Patients Education Pamphlet, Using the SMOG Formula.

Pamphlet Title: Pregnancy	SMOG grade	Interpretation
Food, Pregnancy and Health	10	Average
Pregnancy and Daily Living	12	Fairly difficult
Neural Tube Defects	11	Fairly difficult
Seat Belt use During Pregnancy	11	Fairly difficult
Amniocentesis for Prenatal Diagnosis of Genetic Disorders	12	Fairly difficult
Genetic Disorders	12	Fairly difficult
Ultrasound Exams in Ob/Gyn	11	Fairly difficult
The Rh Factor: How it Can Affect Your Pregnancy	12	Fairly difficult
Alcohol and Your Unborn Baby	11	Fairly difficult
Ectopic Pregnancy	11	Fairly difficult
Especially for Fathers	11	Fairly difficult
High Blood Pressure During Pregnancy	11	Fairly difficult
Bleeding During Pregnancy: A Warning Sign	13	Fairly difficult
Pregnancy and the Working Woman	12	Fairly difficult
Diabetes in Pregnancy	11	Fairly difficult
Travel during Pregnancy	9	Average
Planning for Your Pregnancy	12	Fairly difficult
Pregnancy After 30	10	Average
High-Risk Pregnancy	10	Average
Postdate Pregnancy	12	Fairly difficult
If Your Baby is Breech	12	Fairly difficult
Zion and Aiman (1989, p.957)		

An apparent match in readability between reader and material does not guarantee comprehension (McCabe et al, 1989). All reading formulae are limited in that they do not assess the other factors of readability such as design variables, client retention, general cohesiveness and organisation (Nitzke, 1992). Additionally, readability formulae can cause a negative bias in health printed education materials as some medical and technical terms can not be totally eliminated (Feldman et al, 1991).

To overcome some of these difficulties Allensworth and Luther (1986) has suggested criteria which can be used in addition to the SMOG index to assess the design variables of printed education material. Materials should be written in a 12 point font or larger, upper and lower-case should be used, spacing of greater than 1/3 inches should be between columns, plain text should be used, material should be written in the active voice and illustrations that complement the text should be included. This type of assessment has been used in other studies in the assessment of readability (Glanz & Rudd, 1990; Bernier, 1993; Petterson, 1994). Unfortunately there are limited objective procedures to assess retention, organisation and cohesiveness that can be easily applied.

Conclusion

Listeriosis is an uncommon but serious disease. A listeria infection is potentially fatal to an unborn infant. Therefore it is important that pregnant women do not eat foods that carry a high risk of listeria growth. The NFA (1994b) recommends that pregnant women avoid paté, pre-prepared salads, cold meat products, cooked diced chicken, and raw and smoked seafood. It is suspected that some of these foods are currently recommended to pregnant women because of their nutritional value.

Dietary education materials (DEMs) are routinely used to educate women about nutrition and pregnancy. DEMs about listeriosis also have been distributed by the NFA, the NH&MRC and some state health departments. DEMs that are given with personal reinforcement are likely to be most effective. The earlier in their pregnancy women receive this information the better.

A telephone survey can be used to identify the availability of DEMs for pregnant women and to obtain copies of this material. It is difficult to identify all the services that may distribute DEMs to pregnant women. Services that women use as part of their antenatal care are in an ideal position to provide this material. Nutrition services and health food shops are also likely providers. Since the NFA (1994b) pamphlet about listeriosis was intended to be distributed through pharmacies these outlets should be surveyed.

A telephone survey is an appropriate method. All of the identified services have telephones. Data also can be collected and coded efficiently. Effort must be made to collect data that is precise, valid and reliable. To achieve this, sampling and nonsampling bias should be minimised. Standardised questions using clear, concrete and universally understood words should be used. Foddy (1993) has provided guidelines that can be used to edit the questionnaire. Piloting can help to increase face validity and refine the survey process.

Once the DEMs have been obtained, they can be assessed to determine how many include information about listeriosis and how many actually recommend foods that are likely to carry high levels of listeriosis. This can be done using content analysis.

Content analysis is a systematic and objective technique which can be used to determine the presence or absence of manifest content in written communication. Valid content analysis categories are based on an expert standard. In this situation the NFA (1994b) pamphlet provides an appropriate standard to assess DEMs.

DEMs that warn about how to prevent listeriosis will be effective only if they can be read by pregnant women. The SMOG grading formula can be used to determine the reading level of DEMs given to pregnant women in the ACT. Studies have found that most DEMs and education material for pregnant women have SMOG gradings above ten. Most authors agree that all patient education material should be set below the eighth grade reading level.

Readability formulae have limitations and are most useful when other readability assessments are used as well. Allensworth and Luther (1986) outlined eight criteria to assess design variables of DEMs that can be applied in addition to the SMOG grading formula.

Materials and Methods

Telephone survey

To determine the availability of free, written dietary information for pregnant women in the ACT a telephone survey of 158 informants was conducted.

Sampling method

The sampling frame was constructed in two stages. The purpose of the first stage was to identify all services that could be expected to provide DEMs to pregnant women. This was achieved by consulting a number of pregnant women and health professionals in the ACT. Services also were identified from three publications. These were: a pamphlet entitled "Having a Baby in Canberra" (Kelly, 1994), a recent review of maternity services in the ACT (McGregor, 1994) and a community service directory called CONTACT (Citizens Advice Bureau of the ACT, 1994).

The second stage involved identifying all the members within each type of service. The Royal College of Obstetricians and Gynaecologists, the Dietetics Association of Australia, and the ACT Division of General Practice were informed of the research project and were asked for lists of ACT obstetricians, dietitians and general practitioners respectively. The request for a list of general practitioners was declined but a list of general practitioners with an interest in obstetrics was provided. These lists, together with relevant listings in the ACT 1995 telephone book (white and yellow pages) and the directory CONTACT, were used to identify all population members. To overcome multiple listings one single list was constructed.

The informants were categorised into six subpopulations. These were: private general medical practitioners (N=300), obstetricians (N=13), health food shops (N=19), pharmacies (N=69), hospital services (N=5) and optional community services (N=21). Hospital services include antenatal classes, the antenatal clinic, the birthing unit, and hospital nutrition departments. Optional community services include home birth midwives, the midwife pilot program, private dietitians, and community organisations.

Difficulties in obtaining a complete list of all general practitioners meant that only general practitioners in private practice were directly contacted. The Women's Health Service, the Aboriginal Health Clinic, Family Planning, and Community Health Centres were surveyed as organisations and as such were included in the optional community services subpopulation.

All informants on the sampling frame were selected to participate in the survey as the size of the subpopulations were small. Two exceptions to this were the selection of private general medical practitioners and pharmacies. These were the two largest subpopulations. A random sample of 26 out of 69 pharmacies (38 percent) and 75 out of 300 private general practitioners (25 percent) was selected. Weighting was applied to overcome this disproportional stratification.

The survey instrument

The survey instrument (see Appendix A) was a five minute, standardised, structured questionnaire containing 16 open-ended questions. A standardised introduction also was used (see Appendix B). The questions covered four areas: firstly, the number of women seen by respondents;

secondly, whether written dietary information was provided to pregnant women; thirdly, what DEMs were provided; and finally, how this information was accessed by pregnant women. Copies of DEMs provided to pregnant women were requested and collection was arranged. All informants also were offered a summary of the findings of the study.

To maximise the relevance of the survey both the questionnaire and the introduction were written in two formats: one for organisations and one for sole practitioners. Filter questions and questions to aid memory recall also were included.

The survey questions progressed from general to specific and were arranged into topic areas. To aid interpretation, an explanation of the type of information required was given for each set of questions. The questionnaire was edited thoroughly, based on the recommendations of Foddy (1993, pp.184-185).

The survey procedure

When an organisation was interviewed one respondent was selected. If there was a dietitian in the organisation they were automatically selected to be interviewed. The manager was interviewed when surveying health food shops and pharmacies. For all other services the organisation selected one representative.

Obstetricians and private general practitioners were contacted directly. If the general practitioner did not provide antenatal care, information was requested as to where pregnant women would be referred. These doctors/services were then contacted in place of the respondent.

To minimise non-response error, up to five call backs were made to each informant. A record sheet (see Appendix C) was used to record the outcome of each call. An information letter was sent to all informants prior to contacting them by telephone (see Appendix D). To reduce recording error, each interview was conducted from the same location. The questionnaire format was designed with the needs of the interviewer in mind.

The collection of DEMs was conducted in the following manner.

Respondents were asked the titles of the DEMs that they provided for pregnant women. If the researcher did not have copies of these materials, copies were requested and collection arranged. If services offered to post materials and they had not been received within three weeks the researcher personally visited the service to collect the materials.

The pilot study

The questionnaire was piloted on 32 respondents from the Queanbeyan and Yass areas. These respondents had similar characteristics to the study population. Participants were informed in their introductory letter that their involvement was to aid in the development of a telephone questionnaire (see Appendix E).

The telephone interview was conducted in the same way as it was to be conducted in the actual study. Questions that needed to be repeated or clarified, and questions to which respondents gave inadequate answers or which required probing, were identified. In addition respondents were asked; "Did you find any of the questions confusing?", "Did you find any of the questions difficult to answer?" and "Is there any other information you would like to add regarding the provision of dietary education materials for pregnant women?"

As in the actual study, printed education materials were collected from respondents and respondents were offered a summary of the results of the study. A response rate of 86 percent was achieved in the pilot study. The survey instrument and procedure were modified as required.

Content analysis

To determine whether the DEMs available to pregnant women in the ACT provided accurate and/or consistent information about the risks and prevention of listeriosis, a content analysis was conducted.

Sampling method

The sample was obtained from the DEMs received as a result of the telephone survey. To be included in the content analysis, the materials had to contain information about diet and be specifically relevant to pregnant women. Materials that contained information only about vitamin supplements, alcohol or caffeine were not included. Printed education materials specifically about iron, calcium and folate were included as these nutrients are particularly important during pregnancy and may be found in foods containing listeria.

Units of analysis

Materials were categorised into different types of DEMs based on their coverage. The following categories were used: (1) DEMs specifically about listeriosis and diet; (2) general pregnancy information containing dietary components (only pages specifically about diet were analysed); (3) DEMs about nutrition during pregnancy; (4) information about specific nutrients relevant to pregnancy; and finally, (5) general dietary information. This

categorisation was considered important as the coverage of the material affects the extent to which they should contain information about listeriosis.

The size and length of the DEM was recorded. Size was determined by measuring the unopened dimensions of the brochure or pamphlet. Length was assessed by the number of pages. Data were reported in terms of A4 equivalent pages.

Coding instrument

A coding instrument was developed for purposes of evaluation. The instrument was based on the NFA (1994b) recommendations. The form addressed general information about listeriosis, high risk foods for listeriosis and food hygiene.

Six categories were related to general information about listeriosis. The purpose of these categories was to determine the extent and the accuracy of the information covered about listeriosis. Inclusion or exclusion of this material was recorded.

Seven categories were related to foods which carry a high risk of listeria growth. The foods included pate, soft cheese, smoked seafood, raw seafood, pre-prepared salad and cold meat products. The appearance of these foods was noted. The context also was recorded: were they included as part of a recommended diet or was it recommended that these foods be avoided by pregnant women?

Detailed definitions of the specific items included in the food categories were compiled, based on an extensive literature review. Illustrations and recipes containing these foods were counted as appearances.

Twelve categories were related to food hygiene. These came directly from the NFA (1994b) recommendations. The inclusion of directions in opposition to recommendations were noted. (For details of the coding instrument see Appendix F)

The coding instrument was tested on the DEMs obtained as a result of the pilot survey. The coding scheme was then finalised. One individual was responsible for all classification and coding, thus eliminating any inter coder reliability problems.

Readability analysis

In order to determine whether the DEMs containing information about listeriosis were written at an appropriate level for pregnant women in the ACT, various assessments were employed to determine their readability.

Sampling method

All materials included in the content analysis were assessed for readability. The sample was divided into three categories: one, those that contained information about listeriosis; two, those that contained high risk foods; and three, those that contained no information relevant to the prevention of listeriosis.

Readability analysis

Readability was determined using the SMOG grading formula. The procedure for applying the SMOG formula is outlined by McLaughlin (1969). Some of the DEMs contained less than 30 sentences. When this occurred, all the sentences in the DEM were included and the result was weighted as if 30 sentences were present.

Six design variables were assessed. These included the size of print (whether 12 point font or less), the type of letter case (whether both upper and lower case), the type of print (whether plain text), the use of white space (whether 1/3 inches between columns), the colours (whether contrasting) and the illustrations (whether complementary to the text). Finally the materials were assessed to see whether primarily the active or passive voice was used.

Analysis

Descriptive analysis was conducted on the data from all three stages of the research. Data reporting on the survey sample as a whole was weighted to adjust for the disproportional stratification that occurred in the sampling. The data reported within service groups was weighted.

When means were calculated they were reported as the 90 percent confidence interval of the population mean. The t-score was used for all samples as the sample size was small ($n < 30$). For private general practitioners ($N=38$) z-scores were used.

The following comparisons were made:

(1) Are the SMOG scores of DEMs containing information about listeriosis significantly higher than the SMOG scores of DEMs recommending high risk foods or the DEMs with no information relevant to listeriosis prevention? A two-tailed Kruskal-Wallis test ($p < 0.05$) was first used to determine whether all samples came from the same population. If required, pairwise comparisons were then made using a one-tailed Mann Whitney U-test ($p < 0.05$).

(2) Are DEMs containing information about listeriosis significantly more likely to conform to the recommended design variables than the DEMs recommending high risk foods or the DEMs with no information relevant to listeriosis prevention? A two tailed Chi-square test ($p. < 0.05$) was first used to determine whether all samples came from the same population. If required, pairwise comparisons were made using a one-tailed Chi-squared test ($p. < 0.05$).

Results

Survey response rate and adjustments to sample

A response rate of 83.7 percent was achieved in the telephone survey. The non-response was caused by 14 refusals and 7 respondents who could not be contacted. The non-respondents consisted of 14 private general practitioners, 2 pharmacies, 2 health food shops and 3 obstetricians.

Of the private general practitioners who were contacted thirty did not provide antenatal care. Eight additional private general practitioners were subsequently included as a result of referrals. One of these could not be contacted. Other referral services identified by private general practitioners included obstetricians and the antenatal clinic. These services were already included in the original sample.

Description of services

Table 5 shows the average number of pregnant women using each service within one month. Only initial consultations are counted. The data are based on respondents' estimates. This information was not obtained from health food shops and pharmacies.

Table 4 The number of additional women receiving antenatal care each month by type of service.

Type of Service	No. of Pregnant Women	
	μ	Total
Private General Practitioners providing antenatal care (N=85, n=38)	6.00 \pm 1.3	*400--621
Obstetricians (N=13, n=10)	17.0 \pm 4.5	*163--280
Hospital Services (N=5, n=10)	60.2 \pm 16.4	301
Community Services (N=21, n=21)	11.4 \pm 4.6	215

* These figures have been extrapolated by multiplying the 90% confidence interval by the number of respondents in the subpopulation.

This table indicates that as a group, private general practitioners see the largest number of pregnant women. As individual services, hospital services see the most pregnant women each month. The total number of pregnant women using these services for the first time is greater than 160 each month for all service groups. Most women will attend more than one service.

The availability of DEMs

Forty seven percent of services provide free, written DEMs for pregnant women. Thirty percent of these provide DEMs about listeriosis. The provision of DEMs for pregnant women in the ACT by different types of services can be seen in Figure 1.1.

Figure 1.1 The provision of DEMs to pregnant women by type of service.

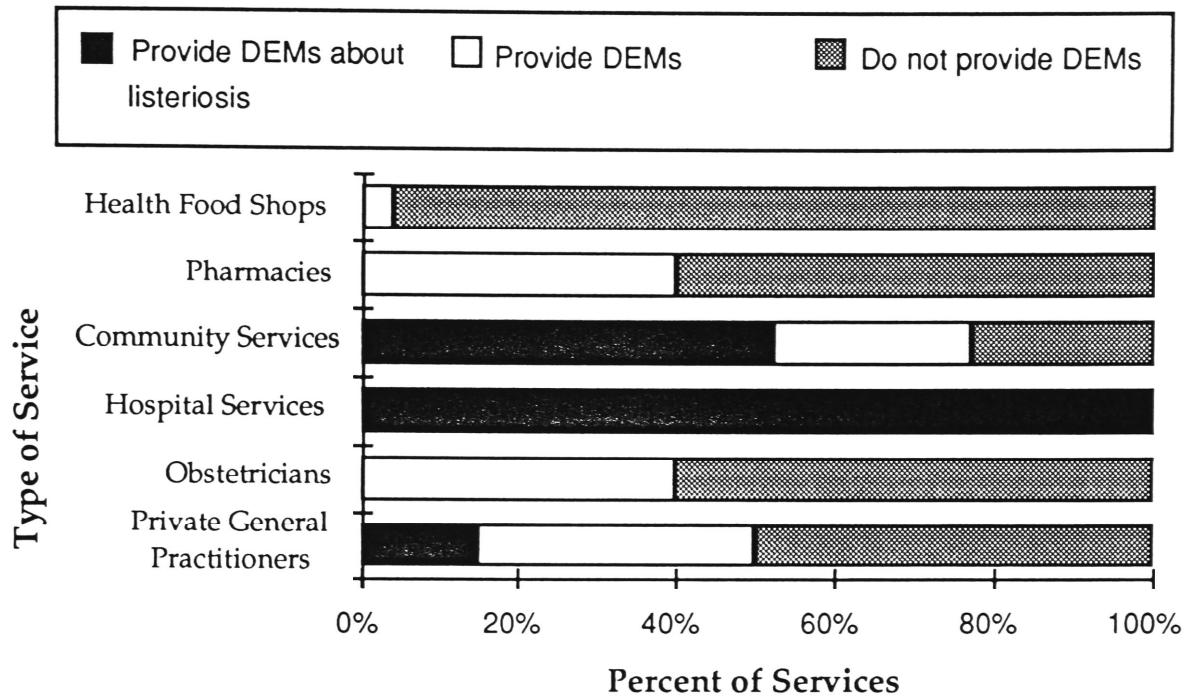
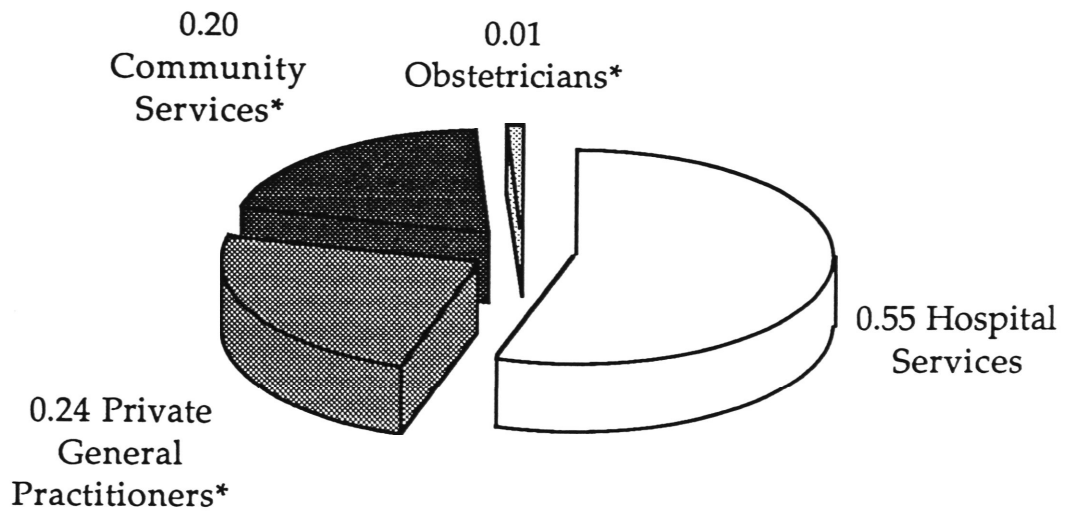


Figure 1.1 shows that DEMs for pregnant women, including DEMs about listeriosis, are available from all hospital services and the majority of community services. Fifty percent of private general practitioners provided DEMs for pregnant women. Thirty two percent of these also provided listeriosis information. None of the obstetricians, pharmacies or health food shops provided any dietary information about listeriosis.

The proportion of DEMs given away to pregnant women by each type of service can be seen in Figure 1.2. The data are based on respondents' estimates.

Figure 1.2 The proportion of DEMs given away to pregnant women by type of service.

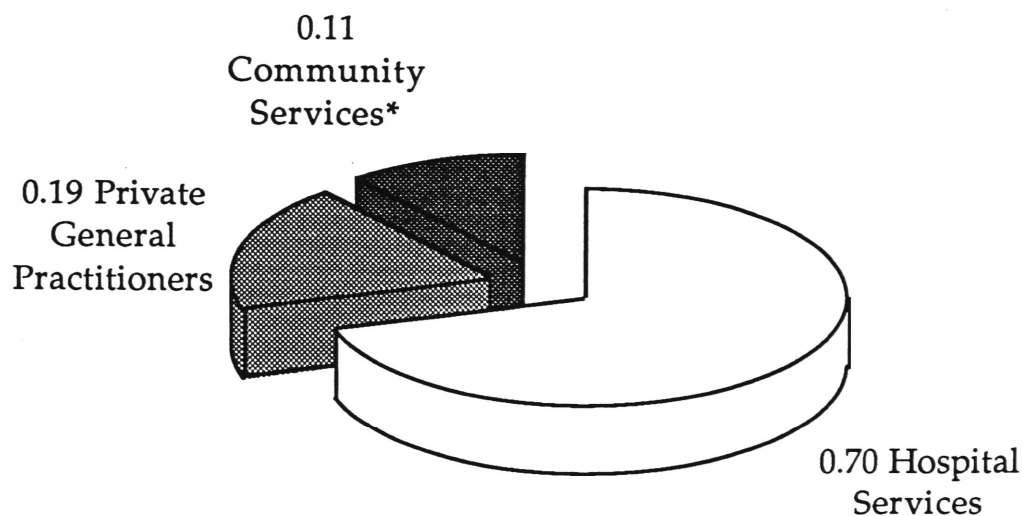


*These figures may be higher as one private general practitioner, one obstetrician and three community services were unable to estimate the number of DEMs that they gave to pregnant women. None of the five pharmacies nor the one health food shop were able to indicate the number of DEMs that they gave to pregnant women and therefore have not been included.

Figure 1.2 indicates that out of all the services surveyed, hospital services are the major distributors of DEMs for pregnant women. Community organisations and general practitioners also were important distributors. Obstetricians provided very few DEMs.

Figure 1.3 shows the proportion of the DEMs specifically about listeriosis that were given to pregnant women by each type of service. The proportions are based on the respondents' estimates.

Figure 1.3 The proportion of DEMs specifically about listeriosis given to pregnant women by type of service

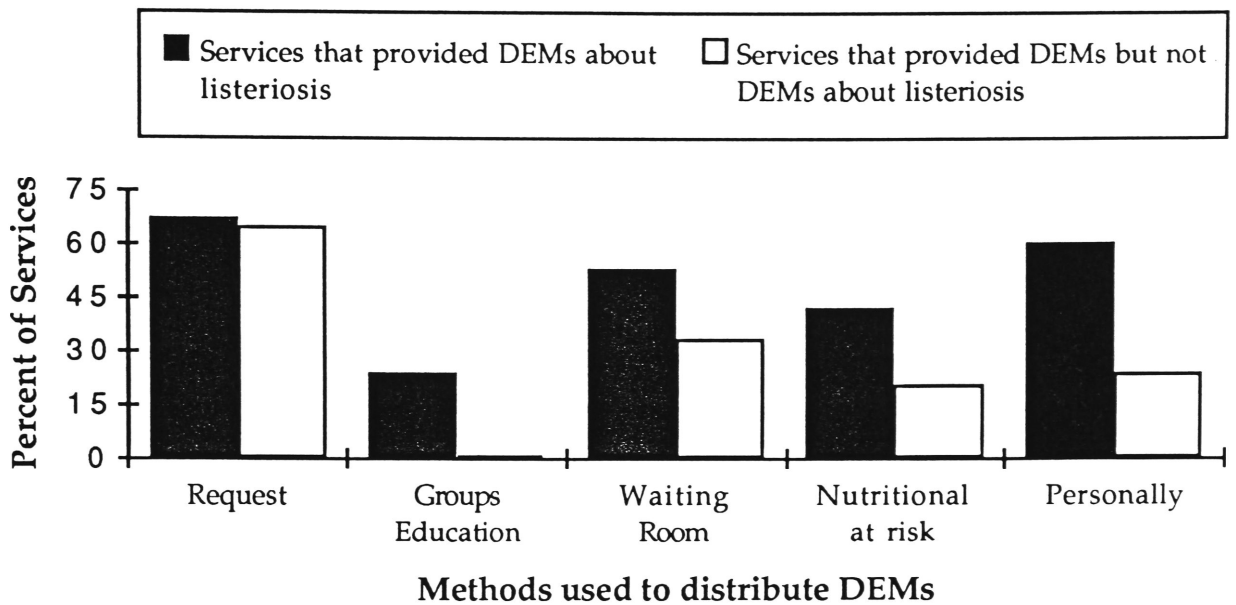


*This figure may be higher as one community service was unable to estimate the number of DEMs about listeriosis given to pregnant women.

Figure 1.3 shows that most DEMs specifically about listeriosis are given away by hospital services. Nineteen percent of these DEMs are given away by private general practitioners and eleven percent by community services.

The methods used to distribute DEMs can be seen in Figure 1.4. Services have been grouped into those providing DEMs about listeriosis and those not providing DEMs about listeriosis. Most services distributed DEMs by more than one method.

Figure 1.4 The methods used to distribute DEMs by services according to whether listeriosis information was provided.



*Nutritionally at risk = DEMs were personally only given to pregnant women who were perceived to be at risk. *Personally = DEMs were personally given to all women who used the service.

Figure 1.4 shows that the most frequently used method to provide DEMs was by request. More services providing DEMs about listeriosis than services not providing DEMs about listeriosis distributed DEMs by more than one method. Sixty percent of services providing DEMs about listeriosis personally gave DEMs to all women they saw. Only services providing DEMs about listeriosis distributed DEMs to pregnant women through group education sessions.

The number of women requesting information from any one service ranged from 0 to 16 women per month. The services providing DEMs to pregnant women through group education sessions included all hospital services and two community organisations. Ninety-five percent of the pregnant women using hospital services attended group education sessions. Only 15 pregnant women attended group education sessions conducted by community services.

Fifty three percent of the services did not provide DEMs for pregnant women. The reasons given by these services for not providing the materials are shown in Figures 1.5 to 1.7.

Figure 1.5 Reasons given by private general practitioners for not providing DEMs for pregnant women.

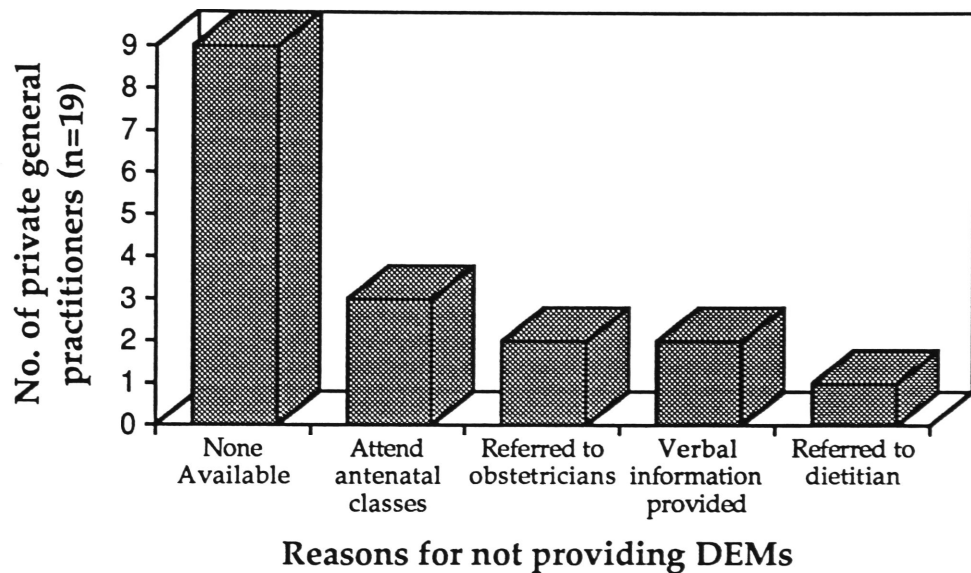


Figure 1.5 shows that the reasons given by almost half of the respondents for not providing DEMs were because they had not been supplied with any relevant materials. Six general practitioners referred pregnant women to other services where they expected them to receive dietary education. Finally, two general practitioners felt that verbal information was sufficient.

Similarly, two obstetricians provided dietary advice orally and two obstetricians expected their patients to receive dietary information at antenatal classes. The other two obstetricians did not have a specific reason for not providing DEMs for pregnant women.

Figure 1.6 Reasons given by pharmacies for not providing DEMs for pregnant women.

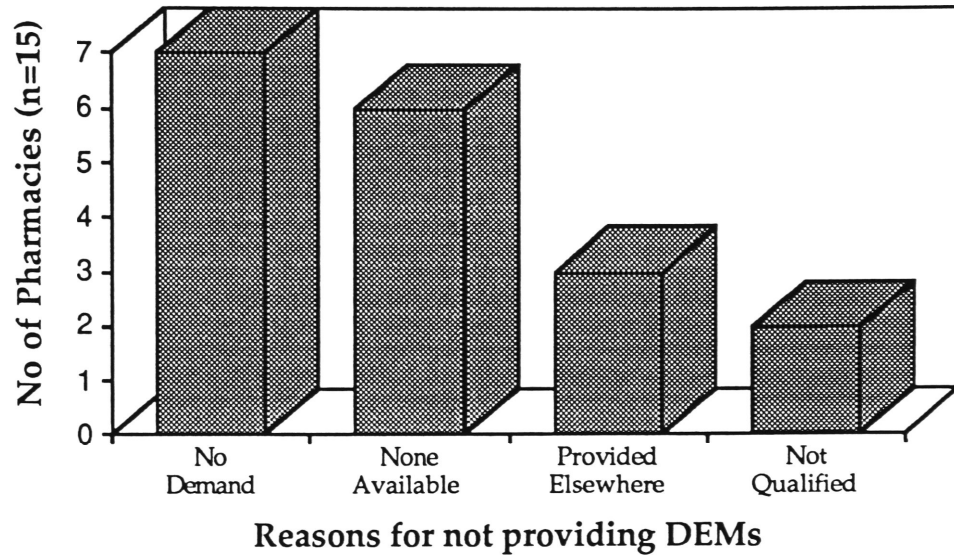
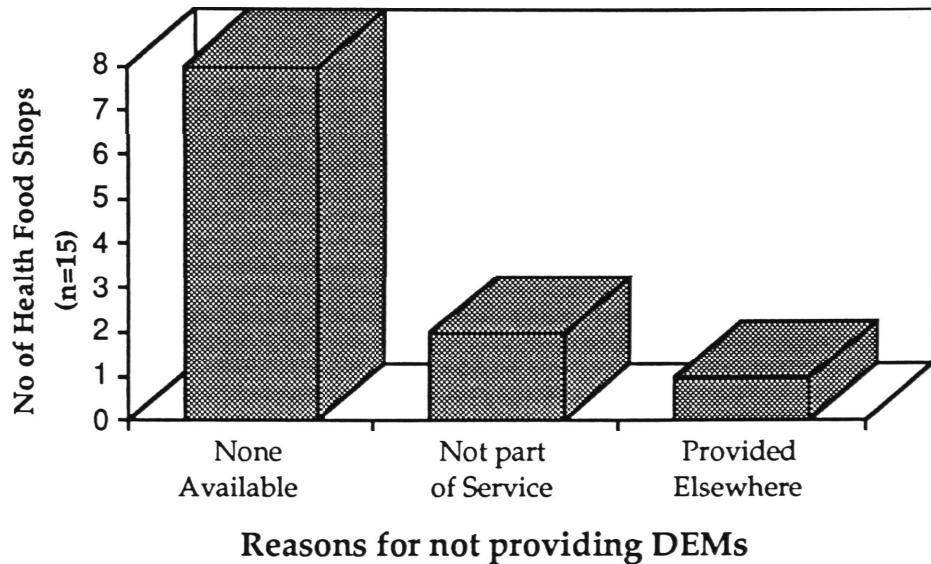


Figure 1.6 shows that seven pharmacy managers thought there was no demand for DEMs from their services. Another six services had not been able to access appropriate DEMs. Other reasons included that DEMs were provided elsewhere and that the pharmacist did not feel qualified to provide DEMs. Two pharmacy managers were unable to give a specific reason for not providing DEMs for pregnant women.

Figure 1.7 Reasons given by health food shops for not providing DEMs for pregnant women



None of the health food shops provided any DEMs for collection. Figure 1.7 shows that this was primarily due to a lack of availability of appropriate DEMs. Four health food shops specifically expressed their interest in distributing DEMs for pregnant women. Other reasons given for not providing DEMs included a lack of demand, it was not seen as a part of their service and because DEMs were provided elsewhere.

Only four community services indicated that they did not provide any DEMs for pregnant women. One respondent said that the women she saw were all "very aware about diet". Another explained that the particular clients that he saw would be unlikely to follow the advice due to economic constraints. Of the other two services one provided verbal information only and the other expected women to receive information elsewhere.

Response rate of DEMs for content analysis

Forty seven DEMs were collected as a result of the telephone survey. The response rate for the collection of DEMs from the services surveyed was 86 percent. The non-response was due to six general practitioners, two obstetricians, one pharmacy and two community services who were unable to produce any DEMs for collection or provide sufficient information for the DEMs to be obtained elsewhere. Five DEMs which were provided by one health food shop and four pharmacies were ineligible to be included in the content analysis.

A Description of the DEMs obtained

The following DEMs were obtained: 4 DEMs specifically about listeriosis; 5 education materials about pregnancy with a component on diet; 11 DEMs about nutrition and pregnancy, 12 DEMs about specific nutrients and 10 general nutrition DEMs. Figure 1.8 shows the proportion of services providing each type of DEM.

Figure 1.8 The proportion of services providing each type of DEM

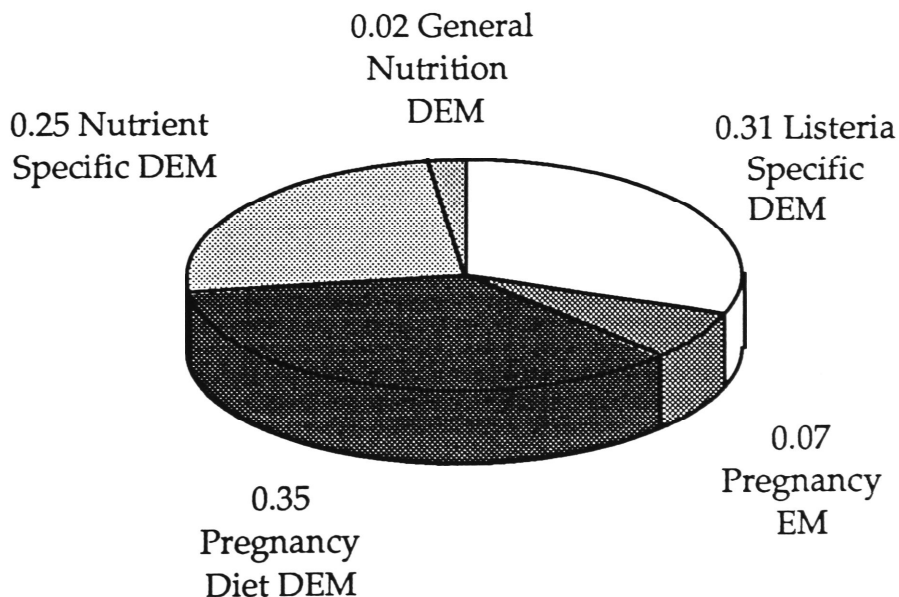


Figure 1.8 shows that the majority of DEMs provided to pregnant women were nutrient specific DEMs, pregnancy DEMs or DEMs about listeriosis.

The number of A4 equivalent pages ranged from half a page to 13.5 pages, with an average of 3.9 ± 1.1 pages. Size of DEMs include 13 that were 1/3 of an A4 page or smaller, 14 that were greater than a 1/3 of an A4 page and less than an A4 page and 15 that were an A4 page or greater.

Assessment of the DEMs

The content analysis revealed that seven DEMs contained information about the prevention of listeriosis. Table 5 provides details of the types of the DEM that included this information and the extent of information provided.

Table 5 The percent of DEMs containing content elements by type of DEM: Listeriosis content

Content Element	Type of DEM % (No. of DEMs)					
	Total 17% (7)	Listeria specific 100% (4)	Pregnancy EM 20% (1)	Pregnancy DEM 9% (1)	Specific nutrient 8% (1)	General DEM 0% (0)
Foodborne	7	100 (4)	20 (1)	9 (1)	8 (1)	0 (0)
Risk	7	100 (4)	20 (1)	9 (1)	8 (1)	0 (0)
Foetus outcomes	6	75 (3)	20 (1)	9 (1)	8 (1)	0 (0)
Mother symptoms	4	100 (4)	0 (0)	0 (0)	0 (0)	0 (0)
Prevention	7	100 (4)	20 (1)	9 (1)	8 (1)	0 (0)
Treatment	3	50 (2)	0 (0)	0 (0)	0 (0)	0 (0)

Table 5 shows that in addition to the four DEMs specifically about listeriosis only one education material about pregnancy, one about diet and pregnancy, and one about a specific nutrient also included listeriosis information. Not all DEMs included information about the mother's symptoms and what treatment was available if a listeriosis infection was diagnosed.

Table 6 provides more details about the information included in these DEMs regarding which foods to avoid. No other DEMs recommended that any high risk foods for listeriosis be avoided.

Table 6 The percent of DEMs recommending high risk foods to be avoided by DEM type.

Content Element	Type of DEM % (No. of DEMs)					
	Total 17% (7)	Listeria specific 100%(4)	Pregnancy EM 20%(1)	Pregnancy DEM 9%(1)	Specific nutrient 8%(1)	General DEM 0% (0)
Paté	7	100 (4)	20 (1)	9 (1)	8 (1)	0 (0)
Soft cheese	6	100 (4)	20 (1)	9 (1)	0 (0)	0 (0)
Cold meats	6	100 (4)	20 (1)	9 (1)	0 (0)	0 (0)
Cooked diced chicken	6	100 (4)	20 (1)	9 (1)	0 (0)	0 (0)
Pre-prepared salad	4	100 (4)	0 (0)	0 (0)	0 (0)	0 (0)
Raw seafood	2	50 (2)	0 (0)	0 (0)	0 (0)	0 (0)
Smoked seafood	4	100 (4)	0 (0)	0 (0)	0 (0)	0 (0)

Table 6 shows that not all DEMs providing information about listeriosis identified all the types of food that pregnant women should avoid. In particular, only two DEMs recommended that pregnant women should avoid raw seafood and only the DEMs specifically about listeriosis identified smoked seafood and pre-prepared salads as high risk foods.

The content analysis showed that 20 of the DEMs provided to pregnant women recommend the consumption of high risk foods. Table 7 contains details of the high risk foods included by DEM type. Forty nine percent of the services that provided DEMs for pregnant women distributed at least one of these DEMs.

Table 7 The number of DEMs recommending 'high risk' foods in the diet by DEM type.

Content Element	Type of DEM % (No. of DEMs)										
	Total 48% (20)	Listeria specific 0% (0)		Pregnancy EM 0% (0)		Pregnancy DEM 55% (6)		Specific nutrient 58% (7)		General DEM 70% (7)	
Paté	1	0	(0)	0	(0)	0	(0)	8	(1)	0	(0)
Soft cheese	13	0	(0)	0	(0)	27	(3)	42	(5)	50	(5)
Cold meats	8	0	(0)	0	(0)	36	(4)	8	(1)	30	(3)
Cooked diced chicken	2	0	(0)	0	(0)	0	(0)	0	(0)	20	(2)
Pre-prepared salad	2	0	(0)	0	(0)	0	(0)	8	(1)	10	(1)
Raw seafood	3	0	(0)	0	(0)	9	(1)	17	(2)	0	(0)
Smoked seafood	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)

Table 7 shows that the high risk foods that were most likely to be included in DEMs were soft cheeses and cold meat products. All high risk foods, except for smoked seafood, were included in at least one DEM. Six DEMs written specifically for pregnant women included high risk foods.

Many of the DEMs included more than one high risk food from the same food category. If this occurred it was still recorded as a single count. The following specific foods were recommended in the DEMs given to pregnant women in the ACT. The number in brackets is the number of DEMs recommending that food: paté (1), ricotta cheese (6), feta (4), camembert (4), brie (2), lean luncheon meats - type not specified (5), corned beef (1), strasbourg (1), sandwich ham(1), cold sandwich chicken (2), coleslaw (1), pre-prepared foods - type not specified (1), sushi (1) and oysters (3).

The content analysis showed that three of the DEMs recommended high risk food handling procedures. One contained a recipe for a milk drink made with raw egg, one included raw egg in a list of high iron foods and one recommended a cheese mixture containing ricotta cheese be made the night before and stored in the refrigerator. All three of these were DEMs specifically about nutrition during pregnancy. Thirty-seven percent of the services that provided DEMs for pregnant women distributed at least one of these DEMs.

Fourteen DEMs obtained from the survey did not contain high risk foods, unsafe food handling practices, or advice on how to prevent listeriosis. These DEMs were provided by 47 percent of the services.

The readability of the DEMs

The readability levels of the materials that contained information about listeriosis had a mean SMOG grading of 12.14 ± 2.7 . All seven had a readability level above eight. No significant difference was found between the SMOG gradings of DEMs containing information about listeriosis, DEMs recommending high risk foods and DEMs that did not contain any information relevant to listeriosis prevention. Table 8 shows the average SMOG scores as well as the percentage of DEMs that conform to each of the following readability criteria.

Table 8 The SMOG scores and the percent of DEMs that fulfil the recommended readability criteria

	DEMs with listeria information	DEMs including high risk foods in diet	DEMs not affecting listeriosis prevention
SMOG μ	12.14 ± 2.7	10.8 ± 1.2	10.9 ± 0.7
Readability Criteria No. (%)			
Upper and lower case	7 (100)	19 (100)	15 (100)
Active voice	1 (14)	9 (47)	7 (47)
White Space	100 (7)	18 (85)	13 (87)
Illustrations	3 (42)	17 (89)	9 (60)
Constrasting Colours	6 (86)	17 (89)	11 (73)
Font>12	2 (29)	9 (47)	6 (40)
Plain text	6 (86)	18 (95)	15 (100)

Table 8 shows that all three categories of DEMs had an average SMOG grading above ten. No significant difference was found in the adherence to the readability criteria between the three groups of DEMs. Most of the DEMs were written in the passive voice and used a font size less than 12. Less

DEMs containing information about listeriosis included illustrations which complemented the text when compared to the other groups of DEMs.

Discussion

The availability of DEMs to pregnant women in the ACT

A response rate of 83.7 percent for the telephone survey was considered satisfactory to provide a representative indication of the provision of DEMs to pregnant women in the ACT. The method used to select private general practitioners provided an adequate sampling fraction whereby 45 percent of these doctors were interviewed.

Pharmacies and health food shops were not in a position to determine the number of first time visits they had from pregnant women each month.

Data from all the other services showed that all service types saw in excess of 160 pregnant women, for the first time, each month. Within the community services subpopulation, it is possible for one woman to have been counted twice, as she may have visited more than one service. Within all other service groups, however, it is most likely that a woman would have used only one service. Forty-seven percent of these services provided DEMs for pregnant women, thirty percent of these provided DEMs containing information about listeriosis.

An average of 60 women were seen at each hospital service. There was considerable variation in the number of pregnant women seen by individual services, as indicated by the 90 percent confidence interval of 43.8 to 76.6 women per month. The results from the telephone survey identified hospital services as the major providers of DEMs for pregnant women. Not only did all hospital services provide DEMs for pregnant women but 55 percent of all DEMs and 70 percent of DEMs about listeriosis were provided by hospital services.

Antenatal classes are the primary method used by hospital services to provide DEMs to pregnant women. Through these group education sessions the majority of pregnant women are able to access DEMs about listeriosis.

Not all pregnant women are able to attend these classes. As indicated by McGregor (1994) in a review of maternity services in the ACT, these classes are difficult to access for some women. Problems of transport, inflexible times, heavy bookings and a lack of childcare were identified as barriers.

In the ACT most women attend antenatal classes after they are six months pregnant. Information about diet, including listeriosis prevention, needs to be given to them as early as possible. Iron status, alcohol intake, folate intake and obesity should to be addressed before conception. Information about listeriosis needs to be given certainly before six months. In the ACT women are receiving this information too late in their pregnancy.

The survey results showed that on average general practitioners who provide antenatal care see approximately six pregnant women for initial consultations each month. This data indicates that general practitioners, as a group, see by far the majority of pregnant women. As highlighted by McGregor (1994), general practitioners also provide the first point of contact for pregnant women.

General practitioners are in an ideal position to provide DEMs to pregnant women in the very early stages of pregnancy and in some cases before conception. Despite this, of the 50 percent of general practitioners who provided DEMs for pregnant women only 32 percent provided listeriosis

information. This shows that less than one quarter of pregnant women are able to access listeriosis information through general practitioners.

A lack of available material was a principal reason given by private general practitioners for not providing DEMs for pregnant women. There appears to be some discrepancy because DEMs about listeriosis were to have been distributed to the majority of general practitioners by the NFA (1994a).

Although not specifically asked as part of the telephone survey, a number of general practitioners volunteered the information that they were unaware of any pamphlet about listeriosis.

The majority of general practitioners are not sole providers of antenatal care for pregnant women but rather share care with an obstetrician, midwife or the antenatal clinic. Two of the general practitioners surveyed did not provide DEMs for pregnant women as they expected their client to receive this information from their obstetrician.

Forty percent of the obstetricians surveyed indicated that they provided DEMs for pregnant women. The total number that they provided was very small. Obstetricians provided no information about the dietary prevention of listeriosis.

The majority of community services surveyed provided DEMs for pregnant women. Almost half of these services provided DEMs about listeriosis and pregnancy. This is partly a reflection of the community services included in the sample. Although not evident in the results, the primary providers from within community organisations were dietitians, either private or within a community health centre. In most cases the women receiving

information about listeriosis from these services would be women who are nutritionally at risk.

One community organisation, two private general practitioners and two obstetricians did not provide DEMs for pregnant women because they provided verbal advice and felt that this was sufficient. Glanz & Rudd (1990) maintain that when only verbal information is provided it can be misunderstood, distorted or forgotten.

Forty percent of pharmacies indicated that they provided DEMs for pregnant women. On collection of these materials it became evident that half of the pharmacies provided material about vitamin supplements only. Despite the fact that pharmacies were selected by the NFA (1994a) to distribute DEMs about listeriosis for pregnant women, no pharmacies provided these DEMs. The principal reasons given by them for not distributing this information was firstly that there was no demand, and secondly that they had no materials to provide.

Pharmacies are not an obvious place for pregnant women to seek dietary information but, since pharmacies have health care credibility, DEMs could be effectively provided by them. The success of this would depend on pharmacies taking the initiative to make the material available.

In common with the private general practitioners, pharmacies were unaware that DEMs were available for them to distribute. Although not specifically asked in the survey, a number of pharmacies indicated that they had seen the NFA (1994b) pamphlet about listeriosis and pregnancy. All of these commented that they had been supplied with one pamphlet only, and in the words of one respondent "What good is that?". These services had

misunderstood the intended system of ordering more pamphlets from the State Health Department or, in the case of Canberra, from the Public and Environmental Health Service.

It may have been inappropriate to have included health food shops in the survey. No health food shops provided any DEMs. The one health food shop that indicated that they did provide these materials distributed only information about vitamin supplements. Four health food shops volunteered that they would be pleased to distribute listeriosis information if they were provided with it.

The survey itself may have helped to increase the awareness of many services of the need to provide DEMs about listeriosis to pregnant women. As explained by Cockburn and De Luise (1992) some respondents may modify their behaviour as a result of participating in a survey. A number of respondents in both the pilot and actual survey expressed interest in finding out more about listeriosis and asked the interviewer many questions. Most of these also indicated that they would like to distribute DEMs about listeriosis in the future. Details of how to access the NFA (1994b) pamphlet were provided in these instances.

The methods used to provide DEMs affect how accessible they are to their target audience. Most services that provide DEMs for pregnant women provide them on request. In order for a pregnant woman to request information she needs to be aware of her need for the information. Since there is a lack of public awareness about listeriosis (Forsyth, 1991) it is likely that many women will be unaware of their need for this information.

Personally handing DEMs to pregnant women is the only method of distribution that ensures that they get it. Additionally, studies have shown that written education materials used together with personalised reinforcement achieve the best outcomes (Bernier, 1993). Only sixty percent of services providing listeriosis information, and considerably fewer of the services providing other DEMs, personally gave these materials to all pregnant women using their service.

A number of services provided DEMs only to pregnant women whom they perceived to be at nutritional risk. Two general practitioners in particular commented that they provided listeriosis information only to pregnant women who had previously had a miscarriage.

Fifty three percent of services provided DEMs about listeriosis in their waiting rooms, foyers or shop fronts. This way of distributing DEMs depends on the initiative of the pregnant women to collect the DEMs. A more positive aspect of this method occurs when waiting rooms are shared. In this instance the number of pregnant women able to access DEMs is greater than when DEMs are personally given to all women at only one service.

It is worth noting that the method used by all pharmacies to provide DEMs to pregnant women is through computer printouts. These are available on request or are provided in a self-service manner in the shop front. This method is likely to be used considerably more frequently in the future. A number of general practitioners commented that they are given so many handouts it is difficult to make them all accessible. Computer programs would provide an opportunity to overcome this difficulty.

The content of DEMs given to pregnant women in the ACT

A sample size of 42 eligible DEMs is comparable to the sample sizes of other studies evaluating DEMs using content analysis (Glanz & Davis, 1990; Allen, 1995). A response rate of 86 percent for the collection of DEMs from the respondents surveyed was adequate. Although proportionally the number of services unable to provide DEMs was large, the number of DEMs provided by these services was small. The survey question about the titles of the DEMs provided to pregnant women was reliable. In almost all cases the DEMs provided for collection matched the informant's response in the telephone survey.

Although five education materials about pregnancy with a dietary component and 10 general nutrition DEMs were received, these materials were provided only to a small proportion of pregnant women. The DEMs that were most frequently distributed were specifically about nutrition and pregnancy, listeriosis or a specific nutrient.

The number of pages containing dietary information varied considerably between DEMs. There was also a large range in the size of the DEMs, although they were fairly evenly distributed between the three groups. As pointed out by Glanz and Davis (1990), smaller DEMs are more useful as they are more easily carried around by the client and used as a reference when required. This is particularly important when considering dietary education material, as pregnant women may wish to refer to the pamphlet while doing their grocery shopping. Smaller DEMs are, however, limited in the extent of information that can be included.

The content analysis showed that only seven DEMs included information about listeriosis. Four of these were specifically about dietary requirements

to prevent listeriosis. The extent of information included about listeriosis depended on the coverage of the DEM. All DEMs mentioning listeriosis identified that it was a foodborne disease and that prevention involved avoiding certain foods. All but one identified the need for this in terms of the potential risks to the foetus during pregnancy. Few, however, included information about the possible symptoms of the disease in the mother and available treatment. Since the purpose of the materials is primarily to prevent the disease this information is not essential.

Ideally, all DEMs given to pregnant women should include some information about listeriosis. The need for this in DEMs written specifically for pregnant women is most evident. Since pregnant women are being given general nutrition information, and information about specific nutrients, the need for information about listeriosis in these DEMs also must be considered. One example of this was a DEM specifically about iron that included listeriosis information.

The extent of the information included about how to prevent listeriosis varied within the DEMs. Only two out of seven of these DEMs advised pregnant women to avoid raw seafood. Although few cases of listeriosis have been traced to the consumption of raw seafood, *L. monocytogenes* has been found in raw seafood on a number of occasions (Arnold and Coble, 1995). As these foods are stored in the refrigerator, allowing for rapid growth of the bacteria, and eaten without further cooking, they are potentially a source for a *L. monocytogenes* infection. It is, therefore, essential that DEMs advising pregnant women about listeriosis should inform these women of their need to avoid raw seafood.

The other food type that was not well covered was pre-prepared salads. With the recent increase in salad bars in many supermarkets and the increase in smorgasbord style restaurants it is likely that many women will select these foods choices if not warned to the contrary.

Within the five education materials about pregnancy some dietary advice was included. In all cases this information was very general. It provided an outline of the nutrition requirements for pregnant women in terms of servings of food groups. In most cases no meal plan or examples of recommended foods were included. Therefore no high risk foods for listeriosis were included as part of the recommended diet. Without further clarification such general information could be interpreted to mean that all foods within the food groups were appropriate to be included in the diet of pregnant women. Most of these DEMs however provided examples of high fat foods which should be avoided. A similar approach could be used to address the high risk foods for listeriosis.

Twenty of the DEMs contained high risk foods for listeriosis. In assessing the implications of this finding it is important to consider the intended target audience for each type of DEM. Seven general DEMs included high risk foods. This in itself is not a problem. For most people a listeriosis infection will cause few or no symptoms (Donnelly, 1990). The problem in this situation is that these DEMs were provided to pregnant women and as such encouraged them to consume foods that could be potentially harmful to their unborn infant. Ideally pregnant women should not be given these materials. At very least these DEMs should only be given to pregnant women with verbal clarification identifying the foods which they should avoid.

Of major concern was that six out of eleven DEMs written specifically for pregnant women included foods that carry a high risk of listeria growth. In effect these materials are not only advocating that these foods are safe for pregnant women but are actively encouraging pregnant women to eat unsafe foods.

The high risk food types that were most commonly recommended were cold meat products and soft cheeses. There are two reasons why these foods may have been a problem. Firstly, they include nutrients important for pregnancy. A simple way to educate pregnant women about how to increase their protein and iron requirements is to recommend that they have an extra serve of meat each day. A meat and salad roll at lunch is a common example to show how this can be done. In most cases the meat choice will be a high risk food for listeriosis. The best sources of calcium are dairy products. Soft cheeses are invariably presented as more interesting ways to meet calcium requirements. Ricotta cheese was the type of soft cheese most frequently included.

Secondly, luncheon meats and some soft cheeses are more likely than other high risk foods to be regularly included in the diet. Foods like smoked salmon, paté and fresh oysters are more expensive. They are most likely to only be consumed as special occasion foods.

Seven nutrient specific DEMs also included high risk foods for listeriosis. Soft cheeses and oysters were included in DEMs about calcium and luncheon meats in DEMs about iron. Only one iron DEM recommended paté in the diet. Paté is an extremely good source of iron and for this reason it was expected that it may have been recommended to pregnant women. This was not the case. It is hypothesised that perhaps health professionals

are aware of the link between listeriosis and pâté, but less aware that other food products such as sandwich ham also can carry this bacteria. Another reason why pâté was not recommended is its higher fat content (DCS&H, 1991)

The potential for listeriosis cases to occur as a result of the consumption of cold meat products should not be overlooked. In the ACT specifically the foods which have been found to be contaminated with *L. monocytogenes* are meat and fish products (ACT Health and Environmental Services, 1993). A luncheon meat was also responsible for the most recent outbreak in France where 279 cases and 86 deaths were reported (Bader, 1993).

Many of the high risk foods for listeriosis are 'luxury' food items. Therefore the high education level (ABS, 1994) and subsequently 'comfortable' standard of living in the ACT may in some ways add to the potential risk of listeriosis within this population group. Special care should be taken during festive events and at such events as farewells for pregnant women entering maternity leave.

Three DEMs written specifically for pregnant women included unsafe food handling practices. It should be a basic responsibility of all health professionals to scan DEMs to make sure only hygienic food handling practices are recommended. According to Tan (1995) most listeria contamination occurs after high risk foods have left the manufacturer. More emphasis needs to be placed on educating consumers about safe food handling practices.

The readability of listeriosis DEMs

DEMs that are easy to read are more likely to be understood and hence to affect behaviour. Although no significant difference was found, the average SMOG score of DEMs that included high risk foods was lower than the SMOG scores of DEMs that included information about listeriosis.

The average SMOG scores for the three groups of DEMs analysed in this research were all above ten. This is similar to the findings of other studies. For example Swanson and Birklid (1992) found that the average readability of the 32 nutrition education materials they assessed to be 11.8. Using the SMOG score Zion and Aiman (1989) assessed the readability of obstetric and gynecological education material for pregnant women and found that only 1 out of 21 materials had a readability score below 10.

Although as a population education levels in the ACT are higher than the national average (ABS, 1994) there is still a considerable proportion of women who have not completed high school (ABS, 1993). In addition a small number of pregnant women are teenagers (ABS, 1993). It is most likely that their reading level will be below year 12.

Jubelirer (1991) reports that the readability levels of most patients are actually one or two levels below their education level. As a general guide most authors (Allensworth & Luther, 1986) recommended that education materials be written below the eighth grade level. The average SMOG score for DEMs containing listeriosis information was 12.14 ± 2.6 and all had SMOG scores of 9 or higher. According to the United States Department of Health and Human Services key (1981, p.94) for interpreting SMOG scores most DEMs containing listeriosis information are fairly difficult to read.

One factor that needs to be considered in interpreting these scores is that many essential words in these DEMs are multi-syllabic, for example: listeriosis, bacteria, ready-to-eat. In most cases definitions of these terms were provided.

The organisation of educational information in the listeriosis DEMs was not quantitatively measured. The DEMs tend to reflect the lack of clarity that is evident as a result of the incomplete information known about listeriosis. There was some inconsistency between DEMs regarding which foods were high risk for the disease. In addition high risk foods were identified by food type, and exhaustive lists of which foods were unsafe were not provided.

In general the setting out of all DEMs increased their readability. Most had adequate white space, used plain text, contrasting colours and upper and lower case letters. Few of the DEMs containing information about listeriosis, however, used illustrations to complement the text. Illustrations help to reinforce the text, aid memory recall, explain the text and help to make materials more appealing and easier to read (Estey et al, 1993). In most cases DEMs that recommended high risk foods included such illustrations, unfortunately in some cases helping to reinforce unsafe information.

Across all DEMs there was a trend to use the passive voice and to use a font size less than 12 points. Although the importance of a large font is greater when writing for the elderly, small font makes materials more difficult to read.

Many DEMs about listeriosis have a 'negative flavour'. A woman may be left feeling that she has to avoid every delicious food. One way to overcome this difficulty is to suggest safe and tasty alternatives.

At present there are many different DEMs relevant to pregnant women. There are DEMs on iron, calcium, folate and neural tube defects, alcohol and pregnancy, general healthy eating and finally, listeriosis and pregnancy. All these materials are advocating different foods which pregnant women should be eating. It is a difficult and time consuming task for women to integrate all the information from each DEM to determine their diet. Experts should assimilate all this information into one clear and simple pamphlet which provides safe, usable and delicious nutrition information for pregnant women. Motivated women can seek additional information if required.

The following pages provide recommended guidelines for health professionals regarding the selection and development of DEMs for pregnant women.

Guidelines for health professionals.
Choosing dietary education materials (DEMs) for
pregnant women.

Easily read DEMs use:

- Short words and sentences
- Contrasting colours
- Plain printing with large letters
- Relevant pictures
- A lot of blank space
- The active voice

DEMs should:

- Suggest only safe foods
- Alert women to the danger of listeria to their babies.
- Tell women which foods are unsafe
- Suggest how food can be handled safely

What is listeria like?

- Listeria can move from one food to another
- Listeria is killed by heat
- Listeria grows in the fridge
- Listeria is grows in moist, alkaline foods

What foods are likely to contain listeria?
--

Unsafe food	Examples	Safe alternative
Cold meat products	<ul style="list-style-type: none"> • ham, corned beef, • devon cabanossi, • cooked diced chicken • paté 	<ul style="list-style-type: none"> • canned meats, • home cooked meats eaten within 12 hours • cooked meat eaten 'piping' hot
Soft cheeses	<ul style="list-style-type: none"> • ricotta, feta*, • camembert, brié • blue vein, dips* 	<ul style="list-style-type: none"> • cottage cheese, • hard block cheese, • cream cheese, yoghurt
Raw and smoked seafood	<ul style="list-style-type: none"> • fresh oysters • smoked salmon • sushi 	<ul style="list-style-type: none"> • canned fish • prawns and cray fish with shell intact • cooked fish eaten 'piping' hot
Pre-made salads	<ul style="list-style-type: none"> • coleslaw • potato salad • pasta salad 	<ul style="list-style-type: none"> • freshly made salad • washed vegetables • hot dishes

*There is some debate as to whether these foods are likely to contain listeria.

How can foods be handled safely?

- Store and prepare raw and cooked foods separately
- Wash vegetables
- Cook all meat and eggs
- Keep hot foods hot and cold foods cold
- Reheat foods so they are 'piping hot'
- Avoid raw milk

Conclusion

Forty seven percent of services included in the telephone survey provided DEMs. Thirty percent of these services provided DEMs about listeriosis. Seventy percent of listeriosis DEMs were distributed through hospital antenatal classes. Unfortunately these classes are difficult to access for some women and provide DEMs late in pregnancy. It is recommended that more general practitioners provide DEMs about listeriosis.

Of the 42 DEMs obtained in the telephone survey, 7 included information about listeriosis, 20 included high risk foods and 3 included high risk food handling practices. Fifty five percent of the DEMs written specifically about nutrition and pregnancy included high risk foods. These DEMs are actively encouraging pregnant women to eat foods that are potentially harmful to their unborn baby.

Luncheon meats and soft cheeses, particularly ricotta cheese, were the high risk foods most commonly recommended. These foods are of nutritional benefit during pregnancy and are more likely than other high risk foods to be regularly included in the diet of pregnant women.

No significant difference was found between the readability of DEMs that contained listeriosis information and those that did not. All DEMs containing listeriosis information were fairly difficult to read with an average SMOG grading 12.14 ± 2.6 . Although persons in the ACT generally are well educated this may be too difficult for some pregnant women. This is well above the recommended reading level for health education materials.

The majority of DEMs were written in the passive voice using less than a 12 point font. In addition fewer listeriosis DEMs used illustrations to complement the text than other DEMs not containing listeriosis information.

This research focused on DEMs provided to pregnant women in the ACT and therefore conclusions can not be applied to the population at large. Many of the DEMs were published outside the ACT. Therefore it is likely that many problems related to the DEMs are occurring elsewhere in Australia.

Limitations of the Study and Areas for Further Investigation

This research only focused on written education materials. There are other ways in which listeriosis information can be communicated to pregnant women. Information already has been included in women's magazines and newspapers. There is potential for exposure through television, radio and personal communication. The extent to which these mediums have addressed listeriosis has not been explored.

The readability assessment used in this research only functions to highlight some of the difficulties that may be faced by women in terms of comprehending DEMs about listeriosis. A low readability level does not guarantee comprehension. To truly determine the appropriateness of DEMs for pregnant women in the ACT these women need to be consulted.

This study only addressed the issue of listeriosis in regard to pregnant women. Listeriosis is a serious disease for any person with suppressed immunity. The elderly are another group within the community who should be receiving listeriosis information. Within the hospital context many patients are at risk of listeriosis.

Many methodological difficulties were encountered in this research. There is not a finite population of services from which DEMs for pregnant women should be supplied. DEMs for pregnant women could theoretically be distributed anywhere. The services included in the telephone survey were identified because they provided care specifically for pregnant women, were services offering dietary advice or, in the case of pharmacies, were a service chosen by the NFA (1994b) to distribute listeriosis information.

Difficulties were encountered in obtaining a complete list of general practitioners that provided antenatal care. The best solution available was a list of all private general practitioners. From this, private general practitioners providing antenatal care were systematically identified. These difficulties prevented general practitioners in the public services from being directly contacted.

It is difficult for individual respondents to speak on behalf of their entire organisation. Gaps in the data collected from some services were evident.

The telephone survey used respondents' estimates to determine the number of women seen by each group and the number of DEMs provided. Estimates of this type can only provide approximate figures and as such only can be used as indicators.

There is no way of knowing the characteristics of respondents who could not be contacted or who refused to participate in the study. Particularly in small populations non-responses may have distorted the data.

The diversity of the survey population made it very difficult to write survey questions that were relevant to all respondents. The result of this meant that some questions were too vague.

Dillman (1987) suggests that for telephone surveys each response option should be converted into one individual question. In following this recommendation problems were created for the researcher. The questions about the way in which DEMs were accessed was not well designed.

Insufficient filter questions were included. In addition the methods lacked clarity and therefore were open to different interpretations.

Recommendations

* DEMs which recommended the consumption of foods likely to carry high levels of *L. monocytogenes* or that included unsafe food handling practices should not be given to pregnant women (nor to other persons with suppressed immunity).

* DEMs should be continually updated. There is a need to develop a single DEM which integrates all the dietary requirements of pregnant women. There is also a need for an easily readable DEM with more detailed information about how to prevent listeriosis.

* The current method used by the National Food Authority to provide DEMs about listeriosis to selected services should be reviewed.

* It is recommended that general practitioners be encouraged to provide DEMs for pregnant women. Ideally they should be personally handed to every pregnant woman during the initial consultation. Other services providing antenatal care for pregnant women also need to take initiative in providing this information.

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Appendix A

The Survey Instrument:

TELEPHONE QUESTIONNAIRE (Organisation)

Location: _____
 Occupation of Respondent: _____
 Date: _____

Please answer each question as accurately as you can. All your answers will be treated confidentially. Please take as long as you need to answer each question. If you need to look up some information, or to refer to someone else, in order to answer any of the questions, then please do so.

FILTER QUESTION

QUESTION 1

Does your service provide free written dietary education material for pregnant women?

Yes [a]GO TO QUESTION 3
 No [b]GO TO SECTION 1

QUESTION 2

There are valid reasons for not providing free nutrition education material. Is there a specific reason why your service does not provide free written dietary education material for pregnant women?

.....GO TO
SECTION 3

SECTION 1
 The following questions are concerned with how pregnant women access the free written dietary education material that your service provides.

QUESTION 1

(a) Does your service provide free written dietary education material to pregnant women if they specifically request it?

Yes [a] _____

No [b] |

|

V

(b) Last month approximately how many pregnant women specifically requested free written dietary education material from your service?

Number of women _____

Don't know [a]

QUESTION 2

Does your service have free written dietary education material in your waiting room, foyer or shop front for pregnant women to take away with them?

Yes [a]

No [b]

QUESTION 3

(a) Does your service provide free written dietary education material to pregnant women through group education sessions?

Yes [a] _____

No [b] |

|

V

(b) Last month approximately how many different pregnant women attended the group education sessions that your service offered?

Number of women _____

Don't Know [a]

QUESTION 4

Do you or someone else in your organisation personally hand free written dietary education material to any pregnant women who you perceived to be at nutritional risk?

Yes [a].....GO TO QUESTION 5

No [b].....GO TO QUESTION 6

QUESTION 5

In answering this next question do not include women who you know are planning to terminate their pregnancy.

Do you or someone else in your organisation personally hand free written dietary education material to every pregnant women that uses your service?

Yes [a]

No [b]

QUESTION 6

Is there any other way that your service makes free written dietary education material available to pregnant women that has not been covered by the previous questions?

-----GO TO SECTION 2

.....

SECTION 2

The next questions are about the dietary education material that your service provides for pregnant women

QUESTION 1

Can you list the titles of the free dietary education materials that your service provides for pregnant women?

Yes [a].....**GO TO QUESTION 2**

TITLES

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

(6) _____

(7) _____

(8) _____

(9) _____

(10) _____

(11) _____

(12) _____

(13) _____

(14) _____

(15) _____

(16) _____

(17) _____

(18) _____

(19) _____

(20) _____

(21) _____

(22) _____

(23) _____

(24) _____

No [b]..... **GO TO QUESTION 3**

QUESTION 2

In the last three months approximately how many of the education material titled _____(1)etc. _____ were given away?

TITLE	1	2	3	4	5	6	7	8	9	10	11	12
NO.												
TITLE	13	14	15	16	17	18	19	20	21	22	23	24
NO.												

Don't know [a].....**GO TO QUESTION 3**

QUESTION 3

Would it be possible for me to collect a copy of the free written dietary educational material that your service provides to pregnant women?

Yes [a] Thank you. When would be a convenient time to come and collect it?

Collection Time _____

No [b]GO TO SECTION C

SECTION 3
The following question is about the pregnant women who use your services

QUESTION 1 *(Not asked to pharmacies and health food shops.)*
Not including return visits, last month approximately how many pregnant women used your services?

Number of women [_____]

None [a]

Don't know [b]..... GO TO SECTION 4

SECTION 4

QUESTION 2

Would you like a summary of the findings of this study?

Yes [a] Write down address from phone book

No [b]

**THANK YOU FOR YOUR TIME IN COMPLETING THIS SURVEY.
YOU HAVE BEEN VERY HELPFUL.**

TELEPHONE QUESTIONNAIRE (Sole Practitioner)

Location: _____
Occupation of Respondent: _____
Date: _____

Please answer each question as accurately as you can. All your answers will be treated confidentially. Please take as long as you need to answer each question. If you need to look up some information, or to refer to someone else, in order to answer any of the questions, then please do so.

FILTER QUESTION

QUESTION 1

Do you provide free written dietary education material for pregnant women?

Yes [a]GO TO QUESTION 3
No [b]GO TO SECTION 1

QUESTION 2

There are valid reasons for not providing free nutrition education material. Is there a specific reason why you do not provide free written dietary education material for pregnant women?

.....GO TO SECTION 3

SECTION 1

The following questions are concerned with how pregnant women access the free written dietary education material that you provide.

QUESTION 1

(a) Do you provide free written dietary education material to pregnant women if they specifically request it?

Yes [a] _____
No [b] |
|
V

(b) Last month approximately how many pregnant women specifically request free written dietary education material from your service?

Number of women _____
Don't know [a]

QUESTION 2

Do you have free written dietary education material in your waiting room, foyer or shop front for pregnant women to take away with them?

Yes [a]

No [b]

QUESTION 3

(a) Do you provide free written dietary education material to pregnant women through group education sessions?

Yes [a] _____

No [b] |

|

V

(b) Last month approximately how many different pregnant women attended the group education sessions that you offered?

Number of women _____

Don't Know [a]

QUESTION 4

Do you personally hand free written dietary education material to any pregnant women who you perceived to be at nutritional risk?

Yes [a].....GO TO QUESTION 5

No [b].....GO TO QUESTION 6

QUESTION 5

In answering this next question do not include women who you know are planning to terminate their pregnancy.

Do you personally hand free written dietary education material to every pregnant women that uses your service?

Yes [a]

No [b]

QUESTION 6

Is there any other way that you make free written dietary education material available to pregnant women that has not been covered by the previous questions?

.....GO TO SECTION 2

SECTION 2
The next questions are about the dietary education material that you provide to pregnant women

QUESTION 1

Can you list the titles of the free dietary education materials that you provide for pregnant women?

Yes [a]**GO TO QUESTION 2**

TITLES

- (1) _____
- (2) _____
- (3) _____
- (4) _____
- (5) _____
- (6) _____
- (7) _____
- (8) _____
- (9) _____
- (10) _____
- (11) _____
- (12) _____
- (13) _____
- (14) _____
- (15) _____
- (16) _____
- (17) _____
- (18) _____
- (19) _____
- (20) _____
- (21) _____
- (22) _____
- (23) _____
- (24) _____

No [b]..... **GO TO QUESTION 3**

QUESTION 2

In the last three months approximately how many of the education material titled _____(1)etc. _____ were given away?

TITLE	1	2	3	4	5	6	7	8	9	10	11	12
NO.												
TITLE	13	14	15	16	17	18	19	20	21	22	23	24
NO.												

Don't know [a].....**GO TO QUESTION 3**

QUESTION 3

Would it be possible for me to collect a copy of the free written dietary educational material that you provide to pregnant women?

Yes [a] Thank you. When would be a convenient time to come and collect it?

Collection Time _____

No [b]GO TO SECTION 3

SECTION 3
The following question is about the pregnant women who use your services

QUESTION 1

Not including return visits, last month approximately how many pregnant women used your services?

Number of women [_____]

None [a]

Don't know [b]..... GO TO SECTION 4

SECTION 4

QUESTION 2

Would you like a summary of the findings of this study?

Yes [a] Write down address from phone book

No [b]

**THANK YOU FOR YOUR TIME IN COMPLETING THIS SURVEY.
YOU HAVE BEEN VERY HELPFUL.**

Appendix B :

Standardised Introductions:

TELEPHONE INTERVIEW INTRODUCTION

(If name of Respondent not known)

Good morning/afternoon. This is Rachel Shaw speaking. I am a Master of Science student at the University of Wollongong, specialising in Nutrition and Dietetics . I sent a letter to you last week to let you know that I would be telephoning. Did you receive that letter?

YES- Good. I would like to speak to someone for about 5 minutes about the dietary information that you provide for pregnant women. Who would be the best person to speak to?

NO- The letter explained the research that I am doing as a Masters student at Wollongong University. I am investigating the availability of nutrition information for Pregnant women in the ACT. I am particularly interested in whether these women are receiving accurate and understandable information about the risk and prevention of listeriosis. This is the first stage of the project and it involves a 5 minute telephone survey. Who would be the best person to speak to?

1. Check the name of the person you are going to talk to

2. Address the interviewee by name

Ms/Mrs/Ms _____

Good morning/afternoon, my name is Rachel Shaw and I am a Master of Science student , specialising in Nutrition and Dietetics, at the University of Wollongong. As part of my research I am conducting some research into the availability of dietary information for pregnant women in the ACT. I am particularly interested in whether these women are receiving information about the prevention of listeriosis The survey takes about 5 minutes to complete. Is it okay if I run through the questions with you now?

YES-Follow Questionnaire

NO- That's Okay, is there a more convenient time that I can phone back or would you prefer not to take part in the survey?

Time to phone back _____ **Thank You!**

TELEPHONE INTERVIEW INTRODUCTION

(If name of respondent known)

Good morning/ afternoon. This is Rachel Shaw speaking. I am a Master of Science student at the University of Wollongong. **(Insert screening question here if relevant)** I sent a letter to * _____ last week to let him/her know that I would be telephoning. Would it be possible to speak to him/her now ?

NO - That's okay. Is there a more convenient time that I can telephone him/her back?

Time to telephone back _____

YES. - Thank you.

(IF no secretary start here)

Good morning/afternoon. This is Rachel Shaw speaking. I am a Master of Science student at Wollongong University, specialising in Nutrition and Dietetics. I sent a letter to you last week to let you know that I would be telephoning? Did you receive that letter?

YES - Good. I would like to ask you some questions about the provision of dietary information for pregnant women. The questions should take about 5 minutes. Is it okay if I run through the questions with you now?

NO - The letter explained the research that I am doing as a Masters student at Wollongong University. I am investigating the availability of dietary information for pregnant women in the ACT. I am particularly interested in whether these women are receiving information about the prevention of listeriosis. This is the first stage of the project and it involves a 5 minute telephone survey. The survey takes about 5 minutes to complete. Is it okay if I run through the questions with you now?

YES - Follow Questionnaire.

NO - That's okay, is there a more convenient time that I can telephone back or would you prefer not to take part in the survey?

Time to Phone Back _____

Survey Refusal [] **END**

Thank you.

Answering Machine Message

Good morning / afternoon. This is Rachel Shaw speaking. I am a Master of Science student at the University of Wollongong. I sent a letter to you last week to let you know I would be telephoning. I will call again later this week.

Screening Question for General Practitioners

I am interested in speaking to General Practitioner that provide antenatal care and I was wondering if you could tell me, does Dr___provide antenatal care?

YES: Good. Continue with telephone interview introduction.

NO: Would you be able to tell me where Dr___would refer a pregnant women if she came to see him?

NAME OF DOCTOR/SERVICE_____

LOCATION:_____

Appendix C

Record Sheet:

TELEPHONE SURVEY NUMBER _____

 CALL ATTEMPT 1 2 3 4 5
 DATE: _____ TIME: _____

RESULT: COMPLETED INTERVIEW []
 REFUSAL []
 CONTACT MADE TO RECALL []
 Time to call back _____
 RING NO ANSWER/BUSY []
 ANSWERING MACHINE []
 INCORRECT NUMBER []

 CALL ATTEMPT 1 2 3 4 5
 DATE: _____ TIME: _____

RESULT: COMPLETED INTERVIEW []
 REFUSAL []
 CONTACT MADE TO RECALL []
 Time to call back _____
 RING NO ANSWER/BUSY []
 ANSWERING MACHINE []
 INCORRECT NUMBER []

 CALL ATTEMPT 1 2 3 4 5
 DATE: _____ TIME: _____

RESULT: COMPLETED INTERVIEW []
 REFUSAL []
 CONTACT MADE TO RECALL []
 Time to call back _____
 RING NO ANSWER/BUSY []
 ANSWERING MACHINE []
 INCORRECT NUMBER []

 CALL ATTEMPT 1 2 3 4 5
 DATE: _____ TIME: _____

RESULT: COMPLETED INTERVIEW []
 REFUSAL []
 CONTACT MADE TO RECALL []
 Time to call back _____
 RING NO ANSWER/BUSY []
 ANSWERING MACHINE []
 INCORRECT NUMBER []

 CALL ATTEMPT 1 2 3 4 5
 DATE: _____ TIME: _____

RESULT: COMPLETED INTERVIEW []
 REFUSAL []
 CONTACT MADE TO RECALL []
 Time to call back _____
 RING NO ANSWER/BUSY []
 ANSWERING MACHINE []
 INCORRECT NUMBER []

Appendix D

Letter to Informants:



UNIVERSITY OF WOLLONGONG
Department of Public Health & Nutrition

Rachel Shaw (MSc Student -Nutrition and Dietetics)
Heather Yeatman (Academic Supervisor)
Dept of Public Health and Nutrition
University of Wollongong
Northfields Avenue
Wollongong NSW 2500

To _____

As you may be aware, listeriosis is a disease which is contracted from eating food that contains the bacteria called *Listeria monocytogenes*. Pregnant women are at increased risk of developing this disease. The infection usually causes few or only minor symptoms in the mothers but can lead to miscarriage, stillbirth, premature birth or newborns with septicaemia (blood poisoning) or meningitis (brain infection). Listeriosis is not very common, however it has a relatively high mortality rate. By avoiding certain high risk foods and observing certain food handling procedures the risk of listeriosis during pregnancy can be minimised.

In order to determine if women are currently receiving accurate and readable information about the risks and dietary prevention of listeriosis, I am conducting a three stage research project. The first stage involves a telephone survey to determine what written dietary education material women are currently receiving. Later this educational material will be evaluated in terms of content and readability. The findings of the research will be used by the National Food Authority in developing a national education campaign about listeriosis. The findings will also be available to health professionals.



UNIVERSITY OF WOLLONGONG
Department of Public Health & Nutrition

As a potential supplier of dietary education material to pregnant women, you could make a valuable contribution to this study by participating in the development of the telephone survey. This would involve completing a five minute telephone survey and then identifying any questions you found confusing or difficult to answer. I will telephone you in the next week to ask if you are interested in assisting with this project. All information obtained from this survey is completely confidential.

If you have any enquires regarding the way in which this research is being conducted please contact the Secretary of the University of Wollongong Human Research Ethics Committee. If you would like further information about the survey , please contact me on 247 2862.

Thank you for your anticipated participation.

Your sincerely

Rachel Shaw
MSc (Nutrition and Dietetics) Student
Department of Public Health and Nutrition
University of Wollongong

Appendix E

Letter to Informants - Pilot Study:



UNIVERSITY OF WOLLONGONG
Department of Public Health & Nutrition

Rachel Shaw (MSc Student -Nutrition and Dietetics)
Heather Yeatman (Academic Supervisor)
Dept of Public Health and Nutrition
University of Wollongong
Northfields Avenue
Wollongong NSW 2500

To _____

As you may be aware, listeriosis is a disease which is contracted from eating food that contains the bacteria called *Listeria monocytogenes*. Pregnant women are at increased risk of developing this disease. The infection usually causes few or only minor symptoms in the mothers but can lead to miscarriage, stillbirth, premature birth or newborns with septicaemia (blood poisoning) or meningitis (brain infection). Listeriosis is not very common, however it has a relatively high mortality rate. By avoiding certain high risk foods and observing certain food handling procedures the risk of listeriosis during pregnancy can be minimised.

In order to determine if women in the ACT are currently receiving accurate and readable information about the risks and dietary prevention of listeriosis, I am conducting a three stage research project. The first stage involves a telephone survey to determine what written dietary education material women are currently receiving. Later this educational material will be evaluated in terms of content and readability. The findings of the research will be used by the National Food Authority in developing a national education campaign about listeriosis. The findings will also be available to health professionals in the ACT.



UNIVERSITY OF WOLLONGONG
Department of Public Health & Nutrition

As a potential supplier of dietary education material to pregnant women, you could make a valuable contribution to this study by participating in the telephone survey. I will telephone you in the next week to ask if you are interested in assisting with this project. The telephone survey will take about 5 minutes and also will be conducted at this time if appropriate. All information obtained from this survey is completely confidential.

If you have any enquires regarding the way in which this research is being conducted please contact the Secretary of the University of Wollongong Human Research Ethics Committee. If you would like further information about the survey, please contact me on 247 2862.

Thank you for your anticipated participation.

Your sincerely

Rachel Shaw
MSc (Nutrition and Dietetics) Student
Department of Public Health and Nutrition
University of Wollongong

Appendix F

Coding Instrument for Content Analysis:

CRITERIA OF LISTERIOSIS CONTENT EVALUATION

NAME : _____

Occupational Group _____

TYPE: General Pregnancy [] General Nutrition [] Nutrition Pregnancy []

Specific Listeriosis.[] Specific Other []

GENERAL	YES	NO
Listeriosis identified as a foodborne pathogen	1a	1b
Increased risk during pregnancy identified	2a	2b
Possible consequences to foetus mentioned	3a	3b
Symptoms to mother identified	4a	4b
Preventative action identified	5a	5b
Treatment action identified	6a	6b

HIGH RISK FOODS	Recommended to be included in diet	Recommended to be avoided in diet	Not specifically mentioned
Paté	1a	1b	1c
Smoked seafood	2a	2b	2c
Soft cheeses	3a	3b	3c
Cooked diced chicken	4a	4b	4c

HIGH RISK FOODS	Recommended to be included in diet	Recommended to be avoided in diet	Not specifically mentioned
Cold meat products	5a	5b	5c
Pre-prepared or stored salad	6a	6b	6c
Raw seafood	7a	7b	7c

DEFINITIONS

HIGH RISK FOODS: Include general descriptions of the food, specific examples and drawn illustrations or photos of the food.

PATE: For example: Chicken Liver Paté. Does not include home made paté or tinned paté.

SMOKED SEAFOOD: For example: smoked mussels, smoked trout. Includes hot and cold smoked fish.
Does not include smoked seafood products sold in cans or jars.

SOFT CHEESE: For example: Ricotta, Mexican style cheese, Feta Cheese, cheese dip, Brie, Camembert. Does not include cottage cheese, cream cheese or cheese spreads.

COOKED DICED CHICKEN: For example: As used for chicken sandwiches.

COLD MEAT PRODUCTS: For example: Shredded Ham, Shoulder Ham, Chicken Loaf, Meat loaf.
Does not included canned cold meat products.

PRE-PREPARED SALADS: For Example: Coleslaw, Potato salad.
Does not include salads that have been stored for less than 12 hours.

RAW SEAFOOD: Oysters and sashimi.
Does not include whole crustations, whole gilled and gutted fish, and canned seafood.

FOOD HYGIENE	Opposite Recommended	Opposite not Recommended
Reheated foods to piping hot	1a	1b
Check used by dates	2a	2b
Observe standing times in microwave cooking	3a	3b
Do not eat foods prepared and stored in fridge for more than 12 hours	4a	4b
Do not thaw foods at room temperature	5a	5b
Do not reheat leftovers of takeaway chicken	6a	6b
Wash vegetables	7a	7b
Wash hands, knives, and cutting boards after handling uncooked foods	8a	8b
Keep hot foods >60 °C and cold foods <5 °C	9a	9b

Thoroughly cook all food of animal origin	10a	10b
Store raw meat and poultry below other foods in fridge	11a	11b
Keep uncooked meats covered and separate from cooked meats	12a	12b

Appendix G

Results Data:

Results Data

No. of pregnant women seen:

Type of Service:

Private General Practitioners providing antenatal care

(N=85, N=38)

1	2	3	4	5	6	7	8	9	10
2.5	3	4	4	5	2	8	4.5	16	4
11	12	13	14	15	16	17	18	19	20
6.5	6	4.5	2	4.5	2	3	6	4.5	10
21	22	23	24	25	26	27	28	29	30
3.5	10	5	6	2	12	10	1.5	7.5	2
31	32	33	34	35	36	37	38		
9	10	2	12	25	10	5	5		

Type of Service:

Community Services (N=21, n=21)

1	2	3	4	5	6	7	8	9	10
0	6	20	4	40	9	15	5	4	35
11	12	13	14	15	16	17	18	19	20
1	13.5	5	8	3	a	a	10	24	7.5
21									
5									

Type of Service:

Obstetricians (N=13, n=10)

1	2	3	4	5	6	7	8	9	10
3	6	35	15	26	25	15	17.5	12	15

Type of Service:

Hospital Services

1	2	3	4	5
85	34	72	50	60

Number of A4 equivalent Pages of DEMs

1	2	3	4	5	6	7	8	9	10
2	2	1	13.5	2	13	2	2	2	12.5
11	12	13	14	15	16	17	18	19	20
2	4	2	2	0.5	1.5	2	1	1	1
21	22	23	24	25	26	27	28	29	30
3	2.5	2.5	4	13	a	a	a	a	a
31	32	33	34	35	36	37	38	39	40
2.5	0.5	0.5	11	4	3	12	1	2	5
41	42	43	44	45	46	47			
12	10	0.66	2	2	1.3	1			

SMOG scores**DEMs with information about listeriosis**

1	2	3	4	5	6	7
12	10	9	12	13	9	20

DEMs recommending High Risk Foods

1	2	3	4	5	6	7	8	9	10
9	12	10	9	9	12	5	12	20	8
11	12	13	14	15	16	17	18	19	20
12	12	12	11	9	9	12	12	12	9

DEMs with no information related to listeriosis.

1	2	3	4	5	6	7	8	9	10
10	10	11	12	14	12	9	12	10	10
11	12	13	14	15	16	17			
8	9	12	12	12	13	9			