PRACTICAL IMPLICATIONS OF NONRESPONSE BIAS IN SAMPLE SURVEYS

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ABSTRACT

Researchers world-wide are concerned about a decline in survey response rates. One consequence of such a decline is the potential for increasing nonresponse bias.

This research reports the results of an attempt to establish a tentative 'minimum acceptable response rate' at which the interim estimates for two surveys did not differ significantly from final estimates. Data from a mail survey with a sample of 1270 respondents randomly selected from New Zealand electoral rolls, and from a telephone survey with a sample of 183 respondents randomly selected from five telephone directories were used for the research.

The results indicate that a tentative 'minimum acceptable response rate' may be close to 50%. The study found that, at a response rate of 48%, demographic and awareness variables were prone to nonresponse bias in the telephone survey, and that attitude and demographic variables had a very low potential for nonresponse bias in the mail survey at a response rate of 51%.

Perhaps researchers can now be more confident that a response rate close to 50% is acceptable for many practical purposes. Ultimately, however, the potential for nonresponse bias in a particular survey will depend on the demographic characteristics of respondents and nonrespondents and the strength of the relationship between these characteristics and the key variables of interest.

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CHAPTER ONE: INTRODUCTION

1.1 Response rate trends

Researchers in general and the market research industry in particular are concerned about a world-wide decline in response rates of surveys (Baim, 1991; Hawkins, 1975; Meier, 1991; O'Neill, 1994; Smith, 1976; Steeh, 1981). Reasons which have been advanced to explain the decline in response rates include the increase in telemarketing, sugging (selling under the guise of research), and changing lifestyles - the increase in urbanisation and the increase in the number of married women in the paid workforce (Baim, 1991; Dunkelberg and Day, 1973; Meier, 1991; Smith, 1976; Steeh, 1981).

One consequence of declining response rates is the concomitant potential for nonresponse bias to increase. This, in turn, has resulted in the validity of results of surveys with low response rates being questioned. If the non-response rate for a survey is high, the views of a considerable number in the original sample who refused to take part or were not contacted are not incorporated into the results. Thus, the estimates on which the results are based may be biased.[1]

1.2 Components of nonresponse

Non-response has two major components - noncontacts (or 'not at homes') and refusals. More minor components of nonresponse include respondents who have 'gone-no-address' or are unable to respond.

Refusers and noncontacts differ. On one hand, refusers tend to be older, have lower levels of education and income, to be unemployed and to live in central cities (DeMaio, 1980; Dalecki, Whitehead and Blomquist, 1993; Fitzgerald and Fuller, 1982; O'Neil, 1979; Rauta, 1981; Schneider and Rodgers, 1990; Streubbe, Kernan and Grogan, 1986; van Westerhoven, 1978). On the other hand, noncontacts tend to be younger, male, better educated, more likely to be employed, and to earn higher incomes (Gendall and Davis, 1993; Merkle, Bauman and Lavrakas, 1993). The extent to which each of these types of nonrespondents contributes to nonresponse bias may

1. This study is concerned with unit nonresponse only (cases where no response of any sort was received from respondents). Item nonresponse (to individual questions) is not dealt with.

differ, depending on the proportion of each type. Further, these types of nonresponse bias may interact with or offset each other (Wilcox, 1979).

1.3 Methods of addressing the nonresponse problem

Methods of addressing the nonresponse problem have included pre-notification letters and telephone calls, increasing the number of callbacks to reduce the number of noncontacts, attempting to convert refusers into respondents, improved interviewer training, and weighting survey data. The use of the first four of these methods has increased response rates somewhat (Dillman, Gallegos and Frey, 1976; Fox, Crask and Kim, 1988; Kanuk and Berenson, 1975; Traugott, Groves and Lepkowski, 1987), but none has been completely successful in eliminating nonresponse. In particular, time and cost constraints have limited the number of callbacks and conversion attempts which can be made.

In addition, although several methods of weighting data to account for biases have been developed, none of these methods is able to compensate completely for nonresponse bias. Moreover, the chosen weighting factor may not be relevant for the variables under investigation. Substantive bias, especially, will not be eliminated by weighting. A further drawback of weighting is that the variance of any estimates made from the weighted data will increase.

1.4 What is a generally acceptable response rate?

Although the potential for nonresponse bias remains until a 100% response rate is reached, many researchers have noticed that, at some level of response, interim estimates do not vary from final estimates. Their hypothesis is that the effect of any nonresponse bias in these situations is likely to be minimal and, in many cases, relatively unimportant, particularly if the final response rate was 70% or more - at least for practical purposes. To test the above hypothesis, some survey results have been analysed to compare the estimates based on the 'first call' data with those based on 'third call' data or 'total' data. Most investigations revealed either no or few significant differences between such estimates (Brown, 1994; Dolsen and Machlis, 1991; Dunkelberg and Day, 1973; Gendall and Davis, 1993; Hochstim and

Athanasopoulos, 1970; Johnson, 1983; Merkle, Bauman and Lavrakas, 1993; Opatow, 1991; Stroeven, 1981; Thompson, 1993; Traugott, 1987). This suggests that if the estimates obtained after one, two or three calls are the same or very similar to those obtained after all calls, a low response rate may not necessarily be a serious problem. If this is true, the results of many market research and social surveys could be accepted with increased confidence.

1.5 An alternative approach

However, nearly all surveys do have some nonresponse, hence the potential for nonresponse bias remains. A different approach to dealing with nonresponse bias would be to build up knowledge of when interim estimates do and do not vary from final estimates. This could be used, along with general information about respondents and nonrespondents, to predict those cases in which non-response bias is likely to occur, and, when it does, to estimate the direction and extent of the bias. If these cases could be predicted accurately, the seriousness of low response rates could be lessened.

1.6 When nonresponse may be a problem

When such predictions are made, it must be remembered that any behaviour or attitude that is related to respondents' gender, education, or age, could be subject to nonresponse bias, although the amount would depend on the strength of the relationship between these demographic characteristics and the attitude or behaviour in question. For example, several studies have found that, demographically, *nonresponders* were likely to be older, have lower levels of education and income, and to live in central cities (DeMaio, 1980; O'Neil, 1979; Schneider and Rodgers, 1990). In addition, two studies found that the behaviour of *not-at-homes* differed; they tended to watch less television, listened to the radio less and attended the cinema less (Gendall and Davis, 1993; Merkle, Bauman and Lavrakas, 1993). However, it is unknown to what extent their attitudes and beliefs may also differ.

Other factors that need to be considered when judging whether nonresponse bias may be a problem are the purpose of a study and the type of questions being asked. For

example, in a study that includes questions about racial discrimination, if minority or ethnic groups are underrepresented, the survey estimates may well not reflect the true level of discrimination in the population.

1.7 Purpose of this study

The purpose of this study was to examine the issue of nonresponse bias in sample surveys, its practical implications and to investigate when survey estimates are likely to vary from final estimates. To achieve this, interim estimates from two surveys (one mail and one telephone survey) were generated at several different response rates and compared with the final estimates. In this way, the points at which the interim estimates did not differ significantly from the final estimates were established and these were considered to be tentative 'minimum acceptable response rates'.[2]

1.8 Objectives

The overall objective of this research was to examine the issue of nonresponse bias in sample surveys and its practical implications.

Specific objectives were:

- To compare the estimates obtained at various interim response rates with those obtained at the final response rate.
- To determine which types of questions may be prone to identifiable nonresponse bias.
- To investigate whether a 'minimum acceptable response rate' could be determined.
- To attempt to identify questions that may be most at risk of nonresponse bias, even when a 'minimum acceptable response rate' is achieved.

To place this study in perspective, the relevant literature is reviewed in the following chapter.

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2. The response rates reported in this study have been calculated as follows:

$$\frac{\text{No. of interviews}}{\text{Selected sample - (GNA/Disconnected + Ineligible)}} \times 100$$

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The target response rate in a survey is 100%. That is, all members of the selected sample have participated in the survey. The reality, however, is that few surveys do achieve this ideal response rate and, hence, the potential for nonresponse bias exists.

The literature on nonresponse bias in surveys entails several strands. These include: the decline in survey response rates, what causes nonresponse, the characteristics of nonrespondents, the implications of low response rates, methods of estimating nonresponse bias, methods of compensating for nonresponse bias, and the effect of additional callbacks on survey estimates.

2.2 Response rate trends

Survey response rates have declined over time. This decline has prompted academics, market researchers and members of other survey organisations to examine the trends in response rates and to investigate reasons for non-response.

Hawkins (1975) reported that participants of the 1974 American Statistical Association's Conference claimed that response rates of 60% to 65% were average completion rates for current surveys. More particularly, response rates for the Detroit Area Study had dwindled from 85% or more in the 1950s to rates of near 70% or less in the 1970s.

At the same time, in Britain (1974), the British Market Research Society (Smith, 1976) set up a working party to study the problems involved in obtaining adequate response rates in sample surveys of the general public. The working party confirmed that response rates had declined. The response rates for the National Readership Survey had declined from 78% in 1965 to 73% in 1974, and for the National Travel Survey from 80% in 1965 to 70% in 1974 (but had increased to 86% twice during this period). Not all surveys experienced changes of this magnitude; the response rates for the General Household Survey and for the National Food Survey and Family Expenditure Survey were reasonably consistent.

Further investigation into the components of nonresponse led the British working party to comment that the problem did not seem to be with noncontacts. The working party did not find any conclusive evidence of an increase in failures to contact respondents in random sample surveys. In the British General Household Survey, for example, noncontacts accounted for approximately 40% of nonresponse over the period 1971-74. Noncontacts had been more of a problem in London, however, where they accounted for a considerably higher proportion of nonresponse (76%, 70% and 66% in 1973, 1974 and 1975, respectively). Their relative importance, though, had obviously diminished. By contrast, refusal rates had increased from 7% in 1971 to 11% in 1975 for the National Readership Survey.

Meanwhile, in the United States, Steeh (1981) found that refusal rates for the National Election Studies (NES) had increased markedly between 1952 and 1978 from 6% to 23%. A similar, but not so dramatic, picture emerged for the Surveys of Consumer Attitudes (SCA). For that survey, the refusal rate rose from 5% in 1952 to 15% in 1978.

Steeh established that there had been substantial increases in nonresponse rates since the early 1950s, and that those increases were due primarily to changes in refusal rates; the increase in refusal rates accounted for 85.7% of the increase in total nonresponse for the SCA and for 83.6% of the increase for the NES.

Ten years later, Baim (1991) reported on the decline in European and North American survey response rates. He prefaced his article with the comment that several variables affected the validity of comparisons of response rates. These included differences in calculating response rates themselves, the design of the sample, the number of callbacks, pre-alert procedures, interviewer training and questionnaire length or content. Despite these differences, he claimed that the studies reported on were almost all similar in design and execution. In fact, most surveys examined were designed to measure media behaviour and all (except mail) lasted 30 minutes or more.

Baim found substantial variation among response rates across several countries. For

example, response rates in the late 1980s ranged from 50% for a British omnibus survey to 83% for one of Germany's national media surveys. In particular, the response rate for the British omnibus survey had dropped from between 65% and 75% in 1975 to 50% in 1990. A French media (radio and television) survey also experienced a substantial drop in response rates - from 86% in 1974 to 77% in 1987. Similarly, the response rate for the British National Readership Survey decreased from 74% in 1982 to 65% in 1989, although a Canadian media survey experienced a lesser decrease from 69% in 1983/4 to 65% in 1988/9.

Several surveys did, however, have constant response rates over time. These included a French press survey, a Swiss media survey, an Irish survey, and a German press survey. Only one survey's response rate increased minimally; Germany's broadcast media survey response rate rose 1% from 82% in 1987 to 83% in 1989.

On a more anecdotal level, Baim reported that a Swedish study's response rates had declined by approximately 10% over the previous 15 to 20 years. Irish researchers also agreed that response rates were declining. In addition, some market research studies in Germany had shown sharp declines. For example, one door-to-door study from 1953 to 1979 experienced a response rate decline from 91% to 76%, and a similar study indicated a response rate drop from 67% to 59% over a five-year period from 1979 to 1984. Compared to these trends, one American study was reported to have had fairly consistent response rates between 1972 and 1982 at around 71% to 73%.

In contrast to other researchers, however, Baim claimed that "neither the number of callbacks nor the length of interview appear to correlate with response rate levels" (p 115).

Nonresponse information about the National Readership Survey (NRS) conducted in Britain has featured in other studies (Smith, 1976 - covering the period 1965 to 1974; Baim, 1991 - from 1982 to 1989). Meier (1991) extended this coverage by reporting on trends for the 30-year period from 1960 to 1990. He found that response rates had

declined from 77% to 62.6% over that time and that the increase in nonresponse was mainly accounted for by an increase in refusals.

Attempts had been made to arrest the fall in response rates for the NRS by increasing the number of calls made. The average number of calls per address had increased from 2.4 in 1983 to 3.4 in 1989, without having the desired effect. Other attempts to stem the tide included clustering addresses more than before, shortening the interview and record keeping, handing introduction letters to informants, and handing letters to refusers, among others. Although advance letters increased response rates of Government-sponsored surveys, the 1990 NRS response rate was 1% lower when this approach was used.

Meier also found that the response rates for another three British surveys had decreased by between 2% and 4% over a three-year period. The response rate for the General Household Survey dropped from 84% in 1982 to 81% in 1984. The response rate for the Family Expenditure Survey decreased from 72% to 68% over the same period. Finally, the response rate for the National Food Survey (already very low) decreased from 55% in 1982 to 51% in 1986.

More recently, in New Zealand, O'Neill (1994) claimed that response rates for face-to-face and telephone surveys were dropping sharply, with telephone response rates dropping most significantly. O'Neill believed that the decline had been evident for ten years.

2.3 Reasons for the decline in response rates

Several reasons have been advanced to explain the decline in response rates. The most important of these appears to be the increase in urbanisation (Baim, 1991; Dunkelberg and Day, 1973; Smith, 1976; Steeh, 1981). This is supported by Baim's report that a 1989 Swiss media study achieved 93% response rate in the rural Italian area, compared to approximately 74% for the rest of the country, including four large cities.

Another important change in society has been the increase in the number of married women who work (Baim, 1991; Meier, 1991; Smith, 1976). Other reasons proffered include concerns with personal security, inaccessibility of private residences to interviewers, the increase in crime, and increased concerns about privacy - as well as an increasing reluctance on the part of the general public to agree to co-operate in market research surveys (Baim, 1991; Smith, 1976).

Meier (1991) suggested that the increased complexity of National Readership Survey sampling, interviewing and contacting tasks had contributed to the increase in nonresponse for that survey. A more pertinent reason could be that, in 1970, the non-media part of the NRS questionnaire contained 27 questions, but these increased to 46 in 1980 and to 71 in 1988. A very real problem was the introduction of the poll tax in the late 1980s. Market research interviewers were viewed with suspicion by parts of the population and were often thought to be poll tax inspectors in disguise.

More generally, Baim (1991) reported that European researchers' explanations for declining response rates were respondent unavailability (especially 15 to 24 year olds), inaccessibility (particularly among upper income earners and more highly educated people), regional differences (reported for Switzerland, Britain and France), an increase in the number of one-person households, the quality of interviewing, and insufficient callbacks.

The notion that survey response rates have declined is confirmed by the above reports on trends for several different periods of time and in several countries. Each report, regardless of the period covered, demonstrated that survey response rates have indeed declined, and appear to be continuing to do so. Overall, when the two major components of nonresponse were considered separately, it was found that refusal rates had increased, while noncontact rates were, on the whole, consistent. The major problem identified by all researchers was the increasing difficulty in interviewing residents in inner city areas.

2.4 The nature of nonresponse

Nonresponse in surveys has two major components (refusal and noncontact), and two minor components (gone-no-address, and unable-to-respond). Within the 'noncontact' category, Wiseman and McDonald (1979) listed several reasons for this outcome: (1) respondent not at home, (2) respondent is at home but did not get to the telephone in time, (3) engaged signal, (4) unlisted, unpublished or disconnected number, (5) non telephone-subscriber, and (6) respondent not contacted because some member of the household refused participation (p 481).

Brown (1994) distinguished five main areas of interest in the literature on response rates and nonresponse: (1) the extent of nonresponse, (2) the factors that caused response rate variation, (3) the characteristics of nonresponders, (4) the implications of response rate and of the representativeness (or otherwise) of the achieved sample for the quality of the data actually collected, and (5) the policies and practices adopted to minimise nonresponse and to adjust, as far as possible, for such deleterious effects as it may have (p227).

However, Groves and Couper (1993) considered that the literature on nonresponse had a number of shortcomings.

> "First, most of the work is descriptive, addressing the question of what kinds of people tend to be nonrespondent. Second, these descriptions have focused largely on individual attributes of nonrespondents, ignoring multivariate relationships. Third, the literature is characterised by an over-emphasis on case studies, with few (if any) cross-survey comparisons of nonresponse. Fourth, many of the studies have failed to distinguish between varieties of nonresponse (noncontact, refusal, etc) or focus on only one component to the exclusion of others. This has led to a number of inconsistent findings (Goyder, 1987). Finally, the literature's collective results are largely the result of data dredging with conveniently available data, not theoretically motivated concepts" (p514).

Nonresponse is a factor in virtually all surveys. What does differ across surveys, however, is the level of nonresponse. Goyder (1987) asserted that a nonresponse rate of between 20% and 40% seemed unavoidable on nongovernment surveys conducted on general, geographically dispersed populations in democratic societies, whether collected door-to-door, by telephone, or in a well-designed mail questionnaire (p188). Several studies have been conducted to investigate what factors affect response and nonresponse rates. Heberlein and Baumgartner (1978) examined 98 mail surveys, yielding 214 treatments of independent variables, in their study of factors affecting response rates to mailed questionnaires. The number of contacts strongly influenced response rates. Half of the surveys analysed had only one contact with the respondent and response rates for these surveys ranged from a low of 20% to more than 80%, with an average response rate of 46%. The average response rate rose to 81% for studies with three contacts and to 84% for studies with four contacts.

Heberlein and Baumgartner found that questionnaires were more likely to be returned if they were judged to be salient to the respondent. Surveys with non-salient questionnaires averaged a 42% response, while the questionnaires judged to be salient for the respondent obtained a 77% return. The possibly salient group showed yields of 66%. This reinforced their finding that special-interest groups such as students, employees, and military personnel were more likely to return questionnaires than the respondents in surveys of heterogeneous populations.

Responses also varied depending on research areas. Public health surveys had a high response of 81%, with 65% for surveys published in scientific journals. These were followed by university-based studies at 62%, and surveys published in market research journals with a 40% response. In most cases these differences were explained by the greater number of contacts and higher salience of the more effective surveys.

Two variables, the number of contacts, and the judged salience to the respondent explained 51% of the variance in final response. Two further variables - a high initial response rate, and the use of a special third contact - tended to increase the final response rate, while an increase in the length of a questionnaire, measured in terms

of the number of pages, tended to decrease the final response rate. Together, these five variables accounted for over 90% of the variance in the final response rate.

A similar approach was taken by Wiseman and McDonald (1979) when they analysed noncontact and refusal rates in consumer telephone surveys conducted early in 1978. Members of the Marketing Science Institute and the Council of American Survey Research Organisations provided data from 182 surveys.

First, Wiseman and McDonald examined the non-contact rates and found that in half of the surveys more than 39% of selected respondents/households with known phone numbers were not contacted. Strong relationships were found between four variables and noncontact rates. The variable found to be most highly correlated to the noncontact rate was the number of interview attempts. When only one contact attempt was made, the median noncontact rate was 51%, whereas with four or more attempts this fell dramatically to 24%. More respondents were contacted when interviewing was done primarily during evening hours and/or on the weekends than during weekdays before 5pm (the median difference was 8%). Next, surveys in which differential callback procedures were used had a lower noncontact rate than those that had arbitrary callback procedures (the median difference was 7%). Finally, the median non-contact rates were generally lower when more than five rings were specified.

Next, the other major component of nonresponse, refusal, was considered. The median refusal rate was 28%, although in nearly one-quarter of the surveys, the refusal rate was over 40%. Wiseman and McDonald found that four variables had a significant impact on the refusal rate. These were: whether callback appointments were made when a respondent indicated that it was a bad time for an interview, whether any effort was made to convert an initial refusal, whether interviewing took place primarily during the day or during the evening/weekend, and whether the location of the interviewing firm was mentioned in the introduction (p 483).

Wiseman and McDonald claimed that noncontacts and refusals together have a

dramatic effect on the response rate. More importantly, they believed the full impact of high noncontact and refusal rates could not be ascertained from the analysis because nonresponse bias depended, in part, on the magnitude of the difference between respondents and nonrespondents on survey-related variables.

A third survey mode, face-to-face interviews (with mail follow-up) was used by Goyder (1987) to investigate the reasons for response and nonresponse behaviour for two 'surveys on surveys' conducted in 1982 and 1985 (both yielded a 65% response rate).

The results revealed that the university sponsorship for these surveys, together with the fact that the 1982 enumeration was conducted by students, accounted for 39% of motives for agreeing to participate in the surveys. In addition, 32% of respondents mentioned aspects of field procedure such as liking the pre-contact letter, generally 'liking approach', and even not having 'time to say no'.

When refusers were asked why they had refused, it was found that their decisions were situation-specific. For example, 'What you are doing when the interviewer calls', was considered 'extremely important' or 'very important' by 74% of the sample. The next most important choice was 'how persistent the fieldworker is'. Just over one-quarter (27%) gave 'principled' reasons for their refusal, such as their time was 'too valuable' or they 'didn't like surveys'. Finally, 23% were 'not interested'.

Face-to-face interviews were also used for three of the six surveys considered in Hidiroglou, Drew and Gray's (1992) report on the refusal, noncontact and response rates for six surveys conducted by Statistics Canada between 1989 and 1991. (Of the three remaining surveys, two business surveys were conducted by mail and one used a combination of telephone and mail). Response rates ranged from a high of 94% (for their Labour Force Survey) to a low of 73% (for their Family Expenditure Survey).

Some reasons were advanced to explain the nonresponse component of these surveys.

For example, nonresponse rates for the three social surveys were considered to be higher than those for other surveys because of the sensitivity of income as a subject matter, the respondent burden due to the length of the interview (average of 2.5 hours), and the combination of inexperienced interviewers, telephone survey methodology and nonproxy reporting for the Survey of Consumer Finances, the Family Expenditure Survey and the General Social Survey respectively. By contrast, nonresponse was very low for the Labour Force Survey because many steps had been taken to keep nonresponse low. Similarly, nonresponse rates were low for the business surveys, as a result of initiatives undertaken during their business survey redesign program to reduce nonresponse.

Impressively, though, Statistics Canada was able to reduce the refusal rate for the General Social Survey from 13% in 1990 to 7% in 1991. They achieved this by spreading the interviewing throughout the year and using fewer but better-trained interviewers.

As indicated earlier, the topic of a survey can affect response rates, as well as the rate of return. Kojetin, Borgida and Snyder (1993) investigated people's attitudes and knowledge about recycling in a survey of registered voters in a Minnesota county. Their mail survey achieved a response rate of 71% after the third wave. The researchers had limited information about the prior recycling behaviour for one city's residents, and they were able to obtain records of actual participation in that community's recycling program for six months following the survey. They found that infrequent recyclers were more likely to respond during the third wave and that people who returned their questionnaires more quickly recycled more frequently during the following six months. Kojetin et al surmised that people who were not as involved with, aware of, or knowledgeable about the survey topic, were less likely to return the questionnaire.

People who participate actively in a sport might be expected to respond to a survey on that sport. Martin (1994) chose 1,731 US participants of a large international amateur bowling tournament to examine whether interest in a survey topic affected

response rates in a mail survey. Respondents were randomly selected to receive one of two versions of a mail questionnaire. Both versions were similar except for the presumed topic: a 'higher-interest' bowling survey and a 'lower-interest' restaurant survey. Bowlers who received the 'bowling' version were found to be almost twice as likely to respond (35% versus 18%). However, despite the significant differences in response rates between the higher and lower interest groups, almost two-thirds of the questionnaire recipients in the higher interest group *did not* respond. Martin suggested, therefore, that response rates were also affected by factors other than interest in the survey topic.

Instead of investigating how the survey topic influenced one particular study, McDaniel, Madden and Verille (1987) took a different approach when they queried people as to their willingness or unwillingness to participate in research studies on seven different topics (political candidates, personal hygiene, automobiles, advertising, television, food products and telephone company service). They did warn, however, that respondents in their study may be more compliant, in general, since they were already participating in one type of research study. Equally, those individuals who held strongly negative opinions of survey research may not have been included. Because of that, their major focus was on the relative tendencies regarding their various survey topics, rather than on the absolute tendencies toward survey nonresponse. They reported a participation rate of 54%.

Respondents' levels of willingness to participate in surveys on each topic varied considerably. About half of the respondents (51%) indicated an unwillingness to participate in surveys regarding political candidates. Fewer were unwilling to participate in surveys about personal hygiene (39%), new automobile design (27%), advertising recall and opinion (23%), television viewing habits (19%), food product trials (18%), and telephone company service (14%).

This wide range of intended refusals by topics, suggested McDaniel et al, may mean that nonresponse, to some extent, was driven by lack of interest, lack of involvement, or negative feelings toward specific topics, rather than just a generalised unwillingness

to take part. This proposition is supported by their examination of the unwillingness to respond by topic which showed that, in 16 of the 21 cases, no significant difference occurred. They concluded that nonresponse (as approximated by self-reported intentions to respond to a variety of survey topics) seemed to differ across survey topics.

A survey's mode may also affect its response rate. Groves (1979) compared the response rates of two national United States telephone surveys and a personal interview survey. The personal interview survey's response rate of 74% was higher than that of the combined telephone surveys' response rate of approximately 70%. The telephone surveys, however, had slightly higher response rates in large metropolitan areas than did the personal interview survey.

Respondents were asked how they might prefer to answer the questions in the survey. Far more respondents interviewed personally preferred that mode (78%), while only 39% of telephone respondents favoured the telephone mode. Those who favoured personal interviews preferred seeing the interviewer and the personal contact. Telephone respondents, however, most often preferred mail questionnaires because they allowed more time to think about the questions.

Several different factors have been found to affect response and nonresponse rates. These include salience, type of research area, number of interview attempts, conversion attempts, questionnaire content, length of interview, experience of interviewers, time of interview attempt, survey mode and survey topic. Most of these factors can be controlled, or at least influenced, by researchers - this was demonstrated particularly by Statistics Canada's reduction in the refusal rate for their General Social Survey. What cannot be controlled, however, is what the respondent may be doing when an interviewer calls, yet this may be one of the most important factors in a respondent's decision to participate in a survey.

2.5 The characteristics of nonrespondents

It is difficult to obtain information about nonrespondents, simply because they are

nonrespondents. However, researchers have attempted to compare respondents and nonrespondents (noncontacts and refusers) using several different methods. These methods include: converting early refusers (Stinchcombe, Jones and Sheatsley, 1981; van Westerhoven, 1978); using existing data on nonrespondents, for example list data (Bennett and Hill, 1974; Ellis, Endo and Armer, 1970), or census data (DeMaio, 1980; Rauta, 1981); special studies of nonrespondents - often samples of refusers - (O'Neil, 1979; Brown and Wilkins, 1978); interviewer estimates of information about nonrespondents (Fitzgerald and Fuller, 1982; Smith, 1983); surveys of previous refusers (Streubbe, Kernan and Grogan, 1986; Brennan and Hoek, 1992); and brief initial interviews (Dalecki, Whitehead and Blomquist, 1993; Schneider and Rodgers, 1990).

Most researchers have reached similar conclusions about refusers. Demographically, these people tended to be 50 years or more, as well as being less likely to have dependent children. They also had lower levels of education, the lowest potential for doing college-level work, and lower incomes, or were unemployed. Central city dwellers were more likely to refuse an interview than small town or rural residents. Refusers were also more likely to be white (Dalecki, Whitehead and Blomquist, 1993; DeMaio, 1980; Ellis, Endo and Armer, 1970; Fitzgerald and Fuller, 1982; O'Neil, 1979; Rauta, 1981; Schneider and Rodgers, 1990; Streubbe, Kernan and Grogan, 1986; van Westerhoven, 1978). However, differing results were found for marital status; Fitzgerald and Fuller (1982) and Smith (1983) found refusers were more likely to be married, but Schneider and Rodgers (1990) found they were less likely to be married. Refusers were also markedly less likely to participate in the activities of neighbourhood organisations (O'Neil, 1979). Finally, Bennett and Hill (1964) found virtually no difference in the personality characteristics and intelligence of responders and nonresponders.

Refusers also differ from noncontacts, whom Gendall and Davis (1993) and Merkle, Bauman and Lavrakas (1993) found to be younger, male, to be better educated, more likely to be employed, and to earn higher incomes. That being so, refusers and noncontacts may bias results in differing ways. O'Neil (1979) noted that with the

inclusion of refusers, the proportion of younger, more highly educated, and higher income respondents reduced. However, this contrasted with Dunkelberg and Day's (1973) finding that the proportion of such respondents increased with an increasing number of callbacks.

Stinchcombe Jones and Sheatsley (1981) asserted that the principal biasing effect in their survey was due to refusals. They concluded that if their results from a telephone survey of a sample of a rural population could be generalised to other surveys, bias depended less on the response rate overall, than on the number of refusers who were not converted. They hypothesised that as more money was put into higher response rates, more of the difficult to reach would be reached, and the nonrespondents would be more nearly all refusals. To estimate nonresponse bias accurately, they believed it was essential to be able to distinguish between nonresponse due to refusal and nonresponse due to inaccessibility.

Most studies have simply reported on differences between respondents and nonrespondents. A few studies, however, have investigated how these differences have affected estimates. For example, O'Neil (1979) found white people were overrepresented among initial refusers, but considered that although the magnitude of the effect was modest, it could be important because of the salience of race in many surveys. Similarly, Kojetin, Borgida and Snyder (1993) found that recycling behaviour was significantly different for respondents and nonrespondents; respondents recycled more frequently than nonrespondents.

The inclusion of nonrespondents had a dramatic effect on estimates in one of Brown and Wilkins' (1978) studies. They attempted to estimate total trips to major waterways, total harvest of various species of fish, and total associated expenditures by means of a 'statewide' survey of 5,000 licensed anglers. After a response rate of 68% was reached, a one-page special delivery questionnaire was mailed to one-half of the nonrespondents. Stark differences were found between respondents to the primary questionnaire and those who answered the special delivery follow-up, with regard to angler days fished during 1973. The mean number of angler days fished for

primary respondents was 26, whereas the mean for those answering the special delivery follow-up was only eight days. If those answering the follow-up were typical of all nonrespondents, the mean days fished would have to be adjusted to 17 for all anglers. Thus, if nonrespondents had not been considered, the estimates would have been inflated by a factor of 1.53. Brown and Wilkins concluded that their study showed that considerable nonresponse bias could exist, even with a "good" return rate, especially when a notable proportion of the sample (even 10% or 15%) had withdrawn from, or was no longer actively involved in the subject of the survey.

Rather than considering demographic or socioeconomic characteristics only, Schneider and Rodgers (1990) and van Westerhoven (1978) suggested that respondents and nonrespondents were at opposite ends of the family life cycle spectrum and that the probability of a respondent being at home was related to life cycle factors such as whether the woman had children, a job outside the home, age, and household size. Van Westerhoven also argued that, as at least 80% of those initially refusing could later be persuaded to grant an interview, the 'refusers' group was composed of people who *sometimes* refused.

None of the studies reviewed above examined whether respondents' response behaviour was consistent over time. Brennan and Hoek (1992) did precisely this when they sampled women who had been previously asked to participate in a mail survey on "Women and Finance". Behaviour appeared to be reasonably consistent across these two surveys, especially for respondents. Brennan and Hoek's highest mail response rates (almost 90%) were from the previous responders. However, fewer people refused twice; over 55% of the previous refusers again refused, and even fewer (30%) of the previous nonreturners again failed to respond.

A telephone follow-up was effective in gaining interviews with the previous nonreturners; 18 out of 22 were interviewed in this way. This approach was not successful for the refusers; six out of seven again refused to take part. Brennan and Hoek surmised that this provided further support for the suggestion that some people are consistent or "hard-core" refusers. This conflicts with van Westerhoven's (1978)

conclusion that the refusers group was composed of people who *sometimes* refused, and with Goyder's (1987) finding that what a respondent was doing when the interviewer called was extremely or very important. However, these latter two studies were conducted by personal interview, whereas Brennan and Hoek used a mail survey.

Most of the above studies have found differences between respondents and nonrespondents. However, because of the limited information available on nonrespondents, the majority of the differences that could be examined were those for demographic variables. The study (Brown and Wilkins, 1978) that did attempt to determine how estimates changed when a sample of nonrespondents was included, found that if these differences had not been taken account of, estimates would have been considerably overstated.

2.6 Methods of estimating nonresponse bias

Because few surveys (if any) achieve a response rate of 100%, the potential for nonresponse bias remains in virtually all surveys. Several methods of estimating the level of this nonresponse bias in surveys have been developed by researchers.

Comparisons of estimates for an original sample with estimates for a subsequently-interviewed sample of nonrespondents is one method of estimating the extent of any nonresponse bias. When Lagay (1969/70) compared estimates for several demographic variables, he failed to find any significant differences between two such groups. However, when he compared the two groups on a dependent variable, the "scale of family functioning", he discovered a significant positive sampling bias which was not detected in the earlier comparison of demographic variables.

Hawkins (1975) used regression coefficients to analyse interim substantive bias[1] and found that the race coefficient showed considerable change. This was considered important as it was a significant explanatory variable for the three dependent variables examined (political affiliation, subjective class, and race discrimination). In addition,

1. Interim bias in the key variables of a survey.

all dependent variables were subject to terminal bias[2] because the final response rate was 72%.

More importantly, Hawkins believed his findings suggested that, as in the case of interim bias[3], the distributional bias[4] of respondent characteristics caused by terminal nonresponse may have differential effects on the substantive issues within the survey itself, though in this instance the differences (bias) were slight. For example, the discrimination item was affected more by refusals than were other items. Therefore, researchers who were concerned with the percentages of people having a given opinion on an issue such as race discrimination, may find that nonresponse bias greatly affected the validity and accuracy of their interpretations.

Reporting on work conducted in the late 1970s, Fitzgerald and Fuller (1982) investigated the association between community characteristics and social networks in a general population survey. This enabled them to examine the effects of refusers and reluctant respondents on estimates of population distributions and multivariate relationships. Interviewers gathered limited demographic information on most refusers which allowed the researchers to investigate the extent of terminal distributional bias for these demographic variables.

In order to examine interim distributional bias, Fitzgerald and Fuller compared respondents accumulated through various numbers of callbacks with the final sample of respondents on eight demographic and household characteristics, on number of kin in network and on attitude toward women with young children working outside the home. By the time the fifth call had been made, any early interim distributional bias had ceased for all but one of these variables (full-time workers).

Fitzgerald and Fuller then investigated whether interim substantive bias had occurred.

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2. Bias that remains at the final response rate.

3. Bias that is present at an interim response rate.

4. Bias that arises when a sample is not representative of population characteristics.

Respondents were divided into two groups - those interviewed within four callbacks (easy-to-contact), and those who required five or more callbacks (difficult-to-contact). Overall, they found no difference between estimates of the four relationships examined for the entire sample and those that would have been generated had they stopped interviewing after four callbacks. They attributed the lack of significant differences to the size of the easy-to-contact group compared to the total sample and the magnitude of the effects of differences between the easy- and hard-to-contact respondents.

Finally, some terminal substantive bias was found for the three variables so examined, but Fitzgerald and Fuller believed that their findings should be treated with caution because of the limited information available for refusers.

In 1975, Daniel reviewed methods for handling nonresponse and almost a decade later, Smith (1983) used several of those methods to estimate nonresponse bias in the 1980 United States' General Social Survey (GSS). In contrast to Filion (1975/76), Fitzgerald and Fuller (1982) and Hawkins (1975), Smith concluded that nothing worked in estimating nonresponse bias, as each of the methods examined (geographical/aggregate-level analysis, interviewer estimates, difficulty in completing an interview, and temporary refusals) proved to be of limited usefulness. His analysis of nonresponse on the 1980 GSS suggested that there was no simple, general, accurate way of measuring nonresponse bias.

The above studies did not examine how nonresponse bias arising from noncontacts and nonresponse bias arising from refusals affected estimates. Wilcox (1977) claimed that most studies have involved the implicit assumption that the impacts of not-at-homes and refusals on sample estimates were independent, but warned that because both sources of error were related to the same demographic factors, there was potential for interaction.

He explored the interaction of refusal and not-at-home sources of nonresponse bias in a survey of randomly selected adult residents of a metropolitan area with a population

slightly in excess of 100,000 (the response rate was 84%). The probability of a respondent being at home, co-operating, and completing an interview after each call was examined. It was found that the probability of co-operation increased with education level, whereas the likelihood of being at home fell. This was an example of *offsetting* interaction, i.e., the two sources of bias worked in opposite directions. When data from a second call were added, the probability of an interview showed a positive relationship with formal education. Wilcox attributed this to the inclusion of more of the better educated people who were found on the second call. The probability of being at home was relatively equal after two calls but the probability of co-operation remained upward-sloping. Thus, better educated respondents tended to be over-represented in the results.

The findings for family size were somewhat different. Singles and families of five or more were easier to find at home and larger families tended to be more co-operative. Although tests of independence were not significant, the graphs of the probabilities suggested a *compounding* interaction, i.e., both sources of bias worked to include or exclude a particular type of respondent. The likelihoods for both co-operation and being at home tended to be upward-sloping in both the one- and two-call situations. The probability of interview, however, was slightly flatter after two calls. Thus, it appeared that the information added by the second call tended to reduce the degree to which smaller families were under-represented.

Wilcox concluded that although the results tended to support the presence of interaction, some limitations should be noted. First, the study itself contained nonresponse bias; after three calls only 84% of the intended sample was reached and only 29% of refusers agreed to provide some demographic information. Second, biases were discussed in terms of over- or under-representation of education and family size. For other survey estimates to be influenced, education and/or family size would have to be related to the survey variable(s) under consideration.

Wilcox proposed that it might be beneficial to consider both sources of nonresponse bias in the design of corrective techniques and in estimates of nonresponse effects.

This does not appear to have happened, however. No further published studies of the interaction of these two types of nonresponse bias were found.

The above methods for estimating nonresponse bias varied in their usefulness. Although some may estimate reasonably accurately any distributional bias for limited demographic variables, they cannot accurately estimate any substantive bias which arises from a less than 100% response rate. In support of this, Fitzgerald and Fuller believed that their results "indicated the importance of pursuing designated respondents" (p21).

2.7 Methods of compensating for nonresponse bias

In situations where nonresponse does exist, weighting may be used in an attempt to correct for any resulting nonresponse bias. One method of weighting is to establish trends from the results of several waves and weight the nonresponse by continuing these trends (Kanuk and Berenson, 1975). Filion (1975/76) claimed that nonresponse bias in questionnaire surveys could be reduced and corrected in this way, provided hard-core nonrespondents did not differ from late respondents and upset any trend. However, he believed this would be unlikely in a survey with a 70% response rate, and used linear regression to estimate nonresponse bias in a special game bird harvest survey with a response rate of 79%. His calculation of percentage error due to nonresponse for the survey variables revealed that nonresponse resulted in "underestimates of the proportion of younger hunters, the number of recreation days spent hunting, and the proportion of rural residents, and tended to overestimate waterfowl harvests, previous hunting experience, and the number of potential, active, and successful hunters" (p 491).

Filion observed that the findings from his and other studies indicated that nonresponse tended to bias survey data in favour of that section of the sample more actively involved in the subject matter investigated. As a result, he warned against assuming that respondents did not differ from nonrespondents.

Earlier, Ellis, Endo and Armer (1970) found that *late* respondents did not provide a

suitable basis for estimating the characteristics of nonrespondents, and concluded that there was no justification for the practice of correcting nonresponse error in surveys by weighting the omitted segment of the sample on the basis of information gathered on potential or late respondents. However, Filion (1976) regarded their conclusions as "both unfounded and misleading" (p 406). He made this claim after reanalysing Ellis et al's data and discovering that "extrapolation across successive cumulated response waves indicated the presence, direction, and extent of nonresponse bias related to the variables surveyed" (p 406). In turn, Filion's claims were not supported by Ognibene's (1971) finding that this method of weighting resulted in a 14.5% loss of accuracy.

Weighting data by known population parameters such as gender and/or age is common. The Dutch Sociaal en Cultureel Planbureau used this approach in two studies and found that, in general, differences between weighted and unweighted results disappeared when rounded off. They attributed this lack of effect to the weak relationship between people's opinions and sociodemographic characteristics. They also pointed out that variables such as education or income may be more strongly related to opinions and in that situation, weighting may affect the estimates to a greater extent.

Another weighting method is to analyse a sample of nonrespondents and weight all the nonrespondents according to the results. When Ognibene (1971) did this, the corrected estimates improved the accuracy of the survey by 29.5%.

A further alternative method is that of weighting by at-home behaviour. Ward, Russick and Rudelius (1985) had mixed results when they weighted 'one-call' data by at-home behaviour. They found that weighting 'one-call' data gave some improvement over unweighted 'one-call' data for income and gender when compared to unweighted 'three-call' data and census data. However, much worse results emerged for age compared to unweighted 'three-call' data and for education compared to census data. Slightly worse results using weighted 'one-call' data were obtained for party preference and probable voting behaviour compared to 'three-call' data. On

the other hand, they obtained slightly better results for attitudes towards the president's economic policy and advertising recall. Overall, Ward, Russick and Rudelius reported that although weighted results tended to be more accurate than unweighted results in eight of 12 comparisons, "the increase in the variance of the estimates offset the small gains in accuracy by increasing confidence intervals three times or more and thus greatly decreased the precision of the estimates" (p 72).

The problems encountered with weighting and the mixed results have led some researchers and organisations to doubt its usefulness. Holt and Elliot (1991) and the US Bureau of the Census (1967 (cited in Fuller, 1974)) considered that it was more important to achieve small nonresponse rates than to adjust for nonresponse.

2.8 The effect of additional callbacks on estimates

Instead of weighting survey results, many researchers have investigated the difference additional callbacks for telephone surveys (or reminders for mail surveys) make to estimates of survey results. Several different methods of comparison have been used. Examples include comparisons of: estimates after only one call with estimates after all calls (including the first call) (Opatow, 1991), estimates after only one call with estimates for subsequent calls (excluding the first call) (Stroeven, 1981; Gendall and Davis, 1993), estimates after up to three calls with estimates after all calls (Merkle, Bauman and Lavrakas (1993), cumulative estimates up to four calls with all calls (Traugott, 1987), cumulative estimates up to seven calls with all calls (Dunkelberg and Day, 1973; Thompson, 1993), cumulative estimates at each wave with final estimates (Dolsen and Machlis, 1991) and cumulative estimates at each wave with final estimates and with information on nonrespondents (Hochstim and Athanasopoulos, 1970). These surveys included personal and telephone interviews as well as mail surveys.

Opatow (1991) reported on an Advertising Research Foundation (ARF) study which investigated how a survey's results may be affected if it were based on those reached at the first call instead of everyone reached after repeated interview attempts. The study examined unweighted data from four surveys conducted by various research

organisations in the United States from 1986 to 1989 to determine whether statistically significant differences existed at or beyond the 95% level of confidence between estimates for demographic and behavioural questions after one call and after all calls. Sample sizes ranged from 2,100 to 59,000. Opatow did not report the response rates for these surveys.

The largest of the significant differences were for household income $50,000-plus and the most urbanised counties (respondents in these two categories were harder to reach). Statistically significant differences were also found between estimates for the number of unlisted telephone numbers, whether respondents were college graduates, and unemployment. When estimates for behavioural questions were examined, Opatow found significant differences for the use of a hotel/motel for business in the previous six months and whether respondents drank imported beer in the previous seven days. All these estimates increased with more calls.

Opatow thought differences between results based on all calls and first call were small because of the law of diminishing returns (each additional attempt yielded an ever smaller number of interviews, and as these were added, they were less and less likely to change the total) and because, over the years, research methods and procedures had been changed to increase efficiency. Some of these changes also influenced the types of people reached on the first call. Finally, Opatow suggested that whether researchers needed to worry about fine differences depended on the nature and purpose of the study, how precise results needed to be, how the results were to be used; and whether percentages would be applied to the population to yield numerical counts.

The above ARF study was extended by Thompson (1993), who used the Canadian Print Measurement Bureau's 1992 (PMB'92) survey data to explore how many calls were required before the results at various numbers of interview attempts showed virtually no difference from the final results. The response rate for this survey was not reported. Thompson compared the PMB'92 findings with the results presented in the ARF report and found, with a few exceptions, very similar results. After comparing the differences in estimates, Thompson proposed that the number of calls

could be limited to a maximum of seven without having an impact on the demographic profile, the measurement of readership, or the estimates of product and service use. He suggested that the results demonstrated that seven calls were sufficient to achieve results which were even better than 'not significantly different' - they were 'virtually identical'.

Stroeven (1981) and Gendall and Davis (1993) compared estimates for demographic and behavioural characteristics of 'first call' and 'callback' respondents. Both surveys used personal interviews. Gendall and Davis reported a 57% response rate, but Stroeven did not report a response rate. Stroeven found that more callback respondents went to the cinema in the previous six months, to live theatre or concerts and ate out at restaurants. By contrast, Gendall and Davis found that later respondents tended to watch less television, listen to radio less and attend the cinema less often. Gendall and Davis also found that later respondents were more likely to be in regular, paid employment, to be younger, male, better educated and to earn higher incomes. Contrary to these findings, Stroeven found very little difference when the two samples were analysed using the Elley & Irving socio-economic scale. He also claimed to have found very little difference in terms of age groups. Finally, Stroeven found that readership of some magazines and a newspaper was higher among callback respondents, and the differences were relatively greater among higher socio-economic level profile publications such as *Time*, *NBR* and *Signature*.

Gendall and Davis went further than Stroeven and weighted their first-call sample to match the age and sex distributions of the Palmerston North population, but as the resulting estimates did not differ significantly from the total sample estimates, they concluded that, for many practical purposes, the differences could be regarded as irrelevant. Finally, they compared weighted estimates of first-call data with weighted estimates for the whole sample. Once again, no significant differences were found.

Gendall and Davis concluded that although these differences may be small, they may be important, depending on the decisions which are based on them. Their answer to the question "Are callbacks a waste of time?" was that it depended ultimately on how

accurate the results of a survey need to be. This, in turn, depended on the nature and purpose of the study and on how the results were to be used.

Instead of comparing estimates for first-call and callback respondents, Merkle, Bauman and Lavrakas (1991) compared estimates for up to three calls and after all calls. They used data from the Chicago Area Survey Project omnibus survey which is carried out annually in Illinois, using random digit dialling. Data were analysed for three years (1990 (response rate not reported), 1991 (68% response rate) and 1992 (74% response rate)). As in the case of Gendall and Davis, the researchers found that more calls were required to reach respondents who were younger, were in full-time employment, were male, and who had a higher level of education. In addition, respondents' amount of television viewing was negatively related to the number of calls in all three years.

Merkle et al commented, however, that the most striking finding was the general absence of significant correlations for most variables; even the statistically significant correlations were quite small. Overall, for 135 questions across three years, approximately half of the estimates changed by less than one percentage point; over three-quarters of the estimates changed by less than two percentage points; and 5% changed by four percentage points or more, with the largest change being 7.5 percentage points.

Nevertheless, in their conclusion Merkle et al warned that although conducting numerous callbacks was an easy way to increase the response rate in a telephone survey by decreasing the number of noncontacts, in some cases this strategy may actually increase nonresponse bias if refusals were ignored or pursued to a lesser extent because, in some situations, those who were easier to contact were also more likely to refuse. Thus, by conducting a large number of callbacks and ignoring refusal conversions, the potential bias due to noncontacts decreased, but any bias due to refusals remained and may actually increase. They concluded that, in some cases, it may be desirable to conduct somewhat fewer callbacks and shift resources to another area, such as converting refusals, in order to minimise total survey error.

More detailed analysis was carried out by Traugott (1987) when he reviewed two political surveys with response rates of 65% and 61% conducted in the United States in 1984 leading up to the presidential election to investigate the importance of persistence in respondent selection. Estimates were obtained at one, two, three, four, and all calls.

Traugott found that those interviewed on the first call were older, more likely to be female and somewhat more likely to be white. For example, on the first call it was estimated that 23% of respondents were between 18 and 30 years of age, but the final estimate reached 30%. The change in the percentage of male respondents was even more dramatic - 34% of respondents were male at the first call, yet this rose to 44% after all calls were made.

More importantly for a political poll, at the first call 48% of respondents supported Reagan, while 45% supported Mondale. By the time all calls were made, however, these figures had increased to 52% and decreased to 39%, respectively. Traugott concluded that differences in the persistence in contacting designated respondents could result in differences in observed levels of support for political parties and candidates. Nevertheless, by the time four calls were made, the sample had assumed characteristics which were very close to those observed after contacting the remainder of the eventual sample.

Estimates for each of seven calls, plus total calls were used by Dunkelberg & Day (1973) in their analysis of data from the 1967 Survey of Consumer Finances which achieved a response rate of 82%. Dunkelberg and Day found the estimate of those aged over 64 was 27% at two calls, whereas the final estimate was 21%. The direction of change reversed for respondents living in the 12 largest central cities; at two calls it was 8% compared to a final estimate of 13%.

In order to sort out any joint or interacting effects of many demographic characteristics, and to identify the respondent attributes contributing to the variability in number of calls, Dunkelberg and Day used the search algorithm AID (auto

interaction detector), and found that the most important characteristic explaining differences in number of calls required was city size of residence. Respondents living in the 12 largest central cities were the most difficult to reach - as demonstrated earlier.

Next, interviews on the first call in the 1967 survey were weighted by factors which would correct their distributional deficiencies with respect to city size of residence (age, income and education). However, the estimates obtained through this process did not accurately predict the estimates obtained after all calls had been made. Dunkelberg and Day commented that any weighting scheme must be more selective, with weights based on comparisons to reliable outside data and focused on characteristics that are important to the study being conducted.

Finally, Dunkelberg and Day wanted to estimate the rate of convergence of the actual distribution of a characteristic to the 'correct' distribution as the number of callbacks increased. Overall, they found that the distributions of the variables studied (age, education, city size, income) converged rather quickly (after two or three callbacks) on their true sample values. A few categories, however, were slow to converge and were characterised by rather large initial distributional errors. Consistent with earlier statements, central city respondents were difficult to contact, even with large numbers of callbacks. Rural respondents were, therefore, overrepresented. Lastly, the education distribution converged much more quickly, indicating that over 85% of the initial distributional errors had been eliminated after the third callback.

Ascertaining an optimum number of calls for a telephone survey can be likened to identifying an 'adequate' level of response rate in a mail survey. Dolsen and Machlis (1991) studied responses to four visitor studies conducted in four different United States national park areas to examine whether survey results profiling homogeneous recreation populations could be valid at lower response rates. Limited sociodemographic information (respondent age and group size) was collected from park visitors so that respondents could be compared to nonrespondents, and so that the level of response bias could be estimated. Overall, for the four surveys, 86% of

questionnaires were returned; individual survey response rates were 85%, 84%, 87% and 89%.

Dolsen and Machlis compared estimates at 35%, 50%, and 65% response rates with estimates at the final response rates, and classed variables with means which fell outside the confidence interval of what was attained at final response rates as 'inaccurate'. The results showed that at a 35% response rate, 20% of variables were inaccurate; at a 50% response rate, 4.5% were inaccurate; and at a 65% response rate, 1.6% were inaccurate. As a result, they suggested that attaining above 80% response rates may not be necessary for some types of recreational surveys and that results from mail-back surveys of relatively homogeneous recreation populations that were defined in advance may yield useful data when at least a 65% response rate was secured, substantive response bias could be ruled out, and sampling error was assumed to be random.

Hochstim and Athanasopoulos (1970) used mail **and** personal interviews in the 1965 Californian Health and Ways of Living study in an attempt to obtain a high response rate (they achieved a response rate 86%). They were also able to compare some demographic and socio-economic characteristics of respondents and nonrespondents as their sample of 8,083 people had been enumerated in the 1965 census.

Although the personal interviews improved estimates associated with low socioeconomic status, they also introduced some not-at-home bias, with the result that the final sample was slightly overweighted with large families and with women. Significant differences were found when final estimates were compared to census figures for the number of women and for the number living in households with five or more people.

When Hochstim and Athanasopoulos compared estimates after mail-only responses with estimates after the personal interviews (that is, total responses), they found that people who reported no organisation membership and those who indicated no political activity were significantly less likely to respond by mail, as were those with low

education and without provision for medical care.

Overall, the non-respondents were older and somewhat more likely to be retired, widowed, to live in a small household without children, and to own their own home. Nonrespondents were also more likely to be white, male, skilled, and to have relatively spacious living quarters. The researchers commented that although these differences tended to bias the sample, the omission of nonrespondents had very little effect on sample estimates for the 13 characteristics they considered. In support of their claim, all the differences between their final results and the enumeration were within two percentage points, as were the majority of relative biases.

Brown (1994) compared interim estimates for two variables in the British 1993 National Readership Survey (NRS): employment status and terminal education age. The NRS response rate was 60%. At the first call, only 27% of respondents were in full-time employment, but the final estimate more than doubled to 55%. By contrast, as would be expected, the proportions were reversed for those who were retired. At the first call, retirees were 25% of respondents and the final estimate was more than halved at 10%. The estimates for those who completed their education early and later also changed considerably; 8% of respondents completed their full-time education at the age of 21 or later at the first call. The final estimate rose to 13%. Conversely, those who completed their education at age 16 or under were estimated as 68% of respondents at the first call and as 56% of respondents by the last call. Brown considered, however, that these final estimates would be biased because the final response rate was only 60%. This claim was supported by the fact that the final survey estimate of self-employed people (2,897,000) was far less than half the numbers reported in the Government Statistical Service's *Employment Gazette* (8,688,000).

Johnson (1983) examined data from two surveys conducted in 1978 and 1980 for the British Gas biennial National Domestic Equipment Survey (NDES) in which up to 45,000 personal interviews were conducted. He found no statistical difference in estimates obtained at an 80% response rate from those obtained at the final response

rate of 85%. (This rate of 85% was mandatory for surveys up to and including 1980). Moreover, at a response rate of 70%, differences were marginal and appeared insignificant to the problems of marketing consumer durables. The largest difference of 4% was in the estimate for the number of 'not working housewives'. Conversely, housewives working full-time were under-represented by a similar amount.

Even at the much lower response rate of 50%, most estimates were only 1% different and therefore "relatively insignificant to marketing". At that level, however, six estimates differed by 5% or more. Once again, these estimates related to working and non-working housewives aged 65 and over. Johnson claimed that it would be possible to overcome this by weighting the data for the correct proportions. Going further, he suggested that perhaps a response rate of 50% was all that was required. He did concede, however, that his conclusions related to samples which were both large and executed according to sound sampling principles, and that they may not extend to small nor to less statistically acceptable samples.

The above studies have shown that both respondents' characteristics and estimates differ at different levels of response rates. More importantly though, comparisons of estimates after three calls for most telephone surveys (or, for mail surveys, after two reminders), with final estimates showed that only a small proportion of interim estimates differed significantly from final estimates. Whether this mattered, however, depended on how accurate the results needed to be, the nature and purpose of the study, and how the results were to be used. It must be remembered, however, these findings are based on surveys with reported response rates ranging from 57% to 86% and only one study used census data to compare respondents and nonrespondents.

Few researchers made recommendations about the number of calls or level of response rate required to obtain 'accurate' estimates. Traugott found that four calls were sufficient to obtain estimates which were very close to final estimates. Thompson, however, suggested that up to seven calls be made, and Dolsen and Machlis suggested that, for a homogeneous recreation population, a response rate of 65% may be sufficient. Johnson went further, and suggested that a response rate of 50% may be

all that is required. Dunkelberg and Day suggested that the city size of residence was the most important explanation of the number of calls required, but did not recommend a particular number of calls. They did suggest, however, that callback policies required a balancing of the bias-reducing benefits of additional calls against the increasing cost of completed interviews, and Brown considered that final estimates would be biased with a response rate of 60%.

2.9 Summary

Survey response rates have declined over the last 30 to 40 years. This decline has been due more to refusals than noncontacts, and has been attributed to lifestyle changes such as the increase in urbanisation and the increase in the number of women in the paid workforce. Increased concerns about privacy, personal security, and, more generally, an increasing reluctance on the part of the general public to agree to cooperate in market research surveys have also contributed to the decline in survey response rates. Other factors that have been found to affect response rates include salience, number of interview attempts, conversion attempts, the experience of interviewers and what the respondent may be doing when an interviewer calls.

Differences have been found between responders and nonresponders, but it is very difficult to obtain information about nonresponders. More important to survey researchers, however, is the question of whether survey estimates would have changed if nonresponders had been included in the sample.

Several methods of estimating the level of nonresponse bias that might arise in a survey with less than a 100% response rate have been developed by some researchers. In addition, weighting survey data by known population parameters or at-home behaviour has been used in attempts to correct for nonresponse bias, but the usefulness of such attempts has been questioned. Other researchers have investigated how additional callbacks have affected survey estimates, as a means of identifying what might be an acceptable response rate.

A detailed description of how this research was conducted follows in Chapter 3.

CHAPTER THREE: METHOD

3.1 Introduction

The research reported here involved analysing the data from a New Zealand mail survey in an attempt to establish a tentative 'minimum acceptable response rate' at which interim estimates did not differ significantly from the final estimates at the 95% confidence level. Then, a telephone survey on a different topic was conducted and the data analysed to determine whether the tentative 'minimum acceptable response rate' was consistent with that of the mail survey.

3.2 Mail Survey

The mail survey was conducted in 1993 for the International Social Survey Programme (ISSP), and involved a sample of 1883 people aged 18 and over, randomly selected from the 1993 New Zealand Electoral Roll. The ISSP addresses a different topic each year in a five-year cycle; the topic in 1993 was 'Attitudes to the Environment'. The survey included questions about health and social issues as well as questions about attitudes to the environment. Behavioural and demographic questions were included along with attitude questions. Altogether, the survey involved 178 questions on 28 pages.

This survey was conducted between September and November 1993. Questionnaires were mailed to respondents during the last week of September. Reminder letters were mailed to nonrespondents four weeks later, and further reminders were mailed after another three weeks. After these reminders, the survey produced 1272 valid responses, resulting in a response rate of 70%. Twenty-six percent of respondents chose not to respond to the questionnaire and were regarded as refusers. The remaining 4% were either ineligible, deceased, or had left the address to which their questionnaire had been sent.

The data from the ISSP survey were analysed to generate interim estimates for each question at several different response rates (21%, 30%, 40%, 51%, and 60%) so that they could be compared with the final estimates (at a 70% response rate). Before such comparisons could be made, however, it was necessary to check for any systematic

error in the data. Once this possibility had been eliminated, confidence intervals were calculated for each variable so that comparisons could be made to determine whether any of the interim estimates were significantly different from the final estimates at the 95% confidence level. It was hoped that a 'minimum acceptable response rate' could be established as a result of such comparisons.

3.3 Telephone Survey

The telephone survey involved a sample of 500 people between 12 and 45 years of age, randomly selected from several New Zealand telephone directories (Auckland, Wellington, Christchurch, Dunedin and Napier/Hastings). One hundred and twenty-five respondents were selected in each of Auckland and Wellington; 100 respondents were selected in each of Christchurch and Napier/Hastings; and 50 were selected in Dunedin. Business telephone numbers were excluded from selection. The 'birthday method' was used to select a respondent in each household. That is, the person in the household aged between 12 and 45 who had the last birthday was selected. The survey topic was Payphone Usage and Attitudes, and the questionnaire contained 188 questions on 15 pages.

The telephone survey was conducted in two stages. First, a commercial research organisation made calls to respondents between 9.00am and 9.00pm seven days a week between 24 June and 19 July 1994. Up to 20 attempts were made to contact the 500 respondents in an effort to achieve a high response rate. Contact status details (number of call attempt, no reply, number disconnected, engaged, non-qualifier, refusal, required respondent out, appointment made for callback, language problem, etc) were recorded for each call attempt.

Originally, it was planned that the researcher would attempt to interview respondents who had not been contacted after 20 attempts. Only four respondents had not been contacted by that stage, however, and 133 respondents had refused to be interviewed. Because of this, the response rate at that stage was only 44%.

The second stage of the research involved a much reduced questionnaire with 48

questions only on six pages, and included attempts to convert the refusers. These attempts were made between 15 August and 21 October 1994 (also between 9.00am and 9.00pm seven days a week). During this process, it was found that 46 of the 'refusers' were in fact ineligible (mostly because of age). Interviews were eventually obtained with 59 of the refusers (32% of all interviews), resulting in a final response rate of 84%[1]. At this response rate, only two respondents had not been contacted, and 16% of eligible respondents had refused to take part in the survey.

The data from the telephone survey (including conversions) were then analysed to calculate a response rate for each call number and to generate interim estimates for each question at several different response rates (25%, 40%, 48%, 55%, 68% and 84%). Confidence intervals were calculated for each variable so that the interim estimates could be compared with the final estimates to establish whether significant differences occurred at the 95% confidence level, and to determine the 'minimum acceptable response rate' for this survey.

1. The commercial interviewers introduced themselves and their company, and mentioned the topic of the survey. This researcher introduced herself as a university student, stating that she needed to do the research to complete her degree, and that the interview would take about five minutes. This approach could have been a major factor in the success with which refusers were converted.

CHAPTER FOUR: RESULTS

4.1 Introduction

In this chapter, interim estimates for a number of variables are compared with final estimates at various response rates, and a tentative 'minimum acceptable response' rate for the two surveys is identified. The types of questions which may be prone to identifiable nonresponse bias are also examined, and the variables with interim estimates which differ significantly from final estimates at the 'minimum acceptable response rate' are identified.

4.2 Mail survey

Interim estimates were calculated at several response rates for all variables. First, at a 21% response rate, then at 30%, 40%, 51%, and, finally at 60%. Final estimates were also calculated at the 70% response rate. These response rates were selected as approximately 10 percentage point intervals[1]. The 21% response rate was achieved on the fifth day of replies being received, with 30% being reached shortly afterwards on the eighth day. A week later, on the 15th day, a 40% response rate was reached, and by the 33rd day of questionnaires being returned, a 51% response rate was achieved. At the cut-off point for accepting replies (after 74 days), the final response rate of 70% was achieved.

The mail survey contained 178 questions and the sizes of the absolute differences between estimates at response rates up to 51% and at the final response rate were calculated for each variable. These ranged from zero to 6.7% (see Table 1).

1. These percentage response rates were chosen (rather than response by wave) so that they could be compared to the response rates for the telephone survey. In fact, after the first wave of the mail survey, a response rate of 45% was reached, with 58% being achieved after the second wave.

4.2.1 Absolute differences between mail survey interim and final estimates

Table 1. Absolute differences for all mail survey variables

Difference	21% response rate		30% response rate		40% response rate		51% response rate	
	n	%	n	%	n	%	n	%
none	5	3	1	1	6	3	1	1
< 1%	31	17	55	31	89	50	123	69
1 - 1.99%	45	25	69	38	56	31	47	26
2 - 2.99%	47	27	29	16	23	13	7	4
3 - 3.99%	25	14	15	9	3	2	-	-
4% or more	25	14	9	5	1	1	-	-
Total	178	100	178	100	178	100	178	100

At a 21% response rate, fewer than half (45%) of the absolute differences were less than two percentage points. This proportion rose to 70% at a 30% response rate, and to 84% at a 40% response rate. Virtually all differences (96%) were less than two percentage points by the time a 51% response rate was achieved. This level of 'less than two percentage points' was selected as a level at which the absolute difference was relatively small and, for practical purposes, would probably not affect any decisions which might be made.

The questions were grouped into three categories: demographic, attitude and behavioural. Tables 2, 3 and 4 show the number and sizes of the absolute differences for demographic, attitude and behavioural questions, respectively.

Table 2. Absolute differences for mail survey demographic questions

Difference	21% response rate		30% response rate		40% response rate		51% response rate	
	n	%	n	%	n	%	n	%
none	1	4	-	-	1	4	1	4
< 1%	3	13	4	17	8	33	16	67
1 - 1.99%	6	25	10	41	11	46	6	25
2 - 2.99%	8	33	5	21	4	17	1	4
3 - 3.99%	2	8	4	17	-	-	-	-
4% or more	4	17	1	4	-	-	-	-
Total	24	100	24	100	24	100	24	100

Forty-two percent of the absolute differences for the demographic questions were less than two percentage points at a 21% response rate, and over half (58%) were of that order at a 30% response rate. This proportion rose to 83% at a 40% response rate and to 96% by the time a 51% response rate was achieved.

Table 3. Absolute differences for mail survey attitude questions

Difference	21% response rate		30% response rate		40% response rate		51% response rate	
	n	%	n	%	n	%	n	%
none	3	2	1	1	5	4	-	-
< 1%	23	18	44	33	71	53	90	68
1 - 1.99%	36	27	53	40	37	28	37	28
2 - 2.99%	35	26	20	15	16	12	6	4
3 - 3.99%	21	16	7	5	3	2	-	-
4% or more	15	11	8	6	1	1	-	-
Total	133	100	133	100	133	100	133	100

The proportion of attitude questions with absolute differences of less than two percentage points rose steadily as the response rate rose. These were 47%, 74%, 85% and 96% at response rates of 21%, 30%, 40% and 51%, respectively.

Table 4. Absolute differences for mail survey behavioural questions

Difference	21% response rate		30% response rate		40% response rate		51% response rate	
	n	%	n	%	n	%	n	%
none	1	5	-	-	-	-	-	-
< 1%	5	24	7	33	10	48	17	81
1 - 1.99%	3	14	6	29	8	38	4	19
2 - 2.99%	4	19	4	19	3	14	-	-
3 - 3.99%	2	10	4	19	-	-	-	-
4% or more	6	28	-	-	-	-	-	-
Total	21	100	21	100	21	100	21	100

A very similar pattern emerged for absolute differences for the behavioural questions. Although only 43% of the absolute differences fell into the less than two percentage points category at a 21% response rate, this jumped to 64% at a 30% response rate, and to 86% at a 40% response rate, and reached 100% at a 51% response rate.

A slightly higher proportion of attitude questions (47%) than demographic questions (42%) or behavioural questions (43%) had small (less than two percentage points) absolute differences at a response rate of 21%. This proportion was even higher at a 30% response rate (74% of attitude questions, compared to 58% of demographic questions and 62% of behavioural questions), but by the time a 40% response rate was reached, the vast majority of differences were less than two percentage points. By the time a 51% response rate was achieved, all the differences for the behavioural questions, and virtually all differences for demographic and attitude questions were of this order, and the few remaining differences were all less than three percentage points.

4.2.2 Mail survey questions for which interim and final estimates differed by two or more percentage points

The few remaining variables (one demographic and five attitude) with absolute differences of two or more percentage points at a 51% response rate, and the sizes of the differences, are listed in Tables 5 and 6.

Table 5. Mail survey demographic question with an absolute difference of more than two percentage points at a 51% response rate

Question	Size of absolute difference*
Describe the place where you live A country home	- 2.1

* - = underestimated at 51% response rate

Overall, rural respondents responded more slowly than those living in urban areas, and this is reflected in the underestimate of those living in 'a country home' at a 51% response rate. At that level of response, rural residents were underestimated by 1.5 percentage points.

Table 6. Mail survey attitude questions with absolute differences of two or more percentage points at a 51% response rate

Question	Size of absolute difference*
How much are you in favour of or against imposing stricter controls on pornographic materials	
Somewhat in favour	- 2.0
In your area, is time spent waiting in accident and emergency departments before getting treatment from a doctor satisfactory or in need of improvement	
In need of some improvement	- 2.0
In general, do you think that a rise in the world's temperature caused by the 'greenhouse effect' is	
Somewhat dangerous for the environment	+ 2.3
How strongly would you be in favour or against charging drivers tolls on motorways	
Somewhat against	- 2.3
How strongly would you be in favour or against reserving many more streets in cities and towns for pedestrians only	
Somewhat in favour	+ 2.5

* + = overestimated at 51% response rate
- = underestimated at 51% response rate

The sizes of these differences are relatively small, and probably would not have changed any decisions which might be made as a result of this survey. However, the number and sizes of the absolute differences, in themselves, do not mean very much. More to the point is whether any such differences were important for practical purposes. One measure of possible importance is whether or not these differences were statistically significant. In order to determine whether this was the case, confidence intervals were calculated for each variable. These were calculated using 'n' at the final response rate, then interim estimates were compared with the final estimates to determine whether any of these fell outside the confidence interval at a 95% level.

4.2.3 Significantly different mail survey interim estimates

The sample size for the mail survey (1,270) resulted in reasonably narrow confidence intervals. In spite of this, however, only two variables had significantly different interim

estimates at a response rate of 51% (see Table 7).

Table 7. Number of significantly different mail survey interim estimates

Type of question	No. of questions	21% response rate		30% response rate		40% response rate		51% response rate	
		n	%	n	%	n	%	n	%
Demographic	24	17	65	12	46	4	15	2	1
Attitude	133	72	54	42	32	17	13	-	-
Behavioural	21	14	64	7	32	2	9	-	-
Total	178	103	58	61	34	23	13	2	1

Over half (58%) of the interim estimates differed significantly at a 21% response rate, yet only 1% differed significantly at a 51% response rate. The first demographic variable with a significantly different estimate at this level of response was 'current religion', for which the estimate of Methodists was overstated by 1.1 percentage points. The size of this difference is not likely to be important for most practical purposes. The second variable (place lived in) underestimated those living in a country home by 2.1 percentage points at a 51% response rate (this was reported earlier in Table 5).

It would appear, then, that with so few variables differing by two or more percentage points at a response rate of 51%, this rate may be a 'minimum acceptable response rate' for most practical purposes.

4.3 Telephone survey

Interim estimates were calculated at several response rates. First, at a 25% response rate (first and second calls), next at 40% (up to third call), then at 48% (up to fourth call), again at 55% (up to fifth call), and finally at 68% (up to seventh call). These response rates were calculated to be as close as possible to the mail survey response rates. Final estimates were also calculated at a response rate of 84%.

The following tables report differences up to a response rate of 48% because this rate was close to the 51% response rate in the mail survey.

4.3.1 Absolute differences between telephone survey interim and final estimates

The telephone survey contained 48 questions. The sizes of the absolute differences were considerably higher than those in the mail survey, and ranged from zero to 17.6 percentage points. Possible reasons for such large differences will be discussed in Chapter 5. Table 8 lists these absolute differences.

Table 8. Absolute differences for all telephone survey variables

Difference	25% response rate		40% response rate		48% response rate	
	n	%	n	%	n	%
none	2	4	-	-	-	-
< 2%	21	44	24	50	25	52
2 - 3.99%	7	15	8	17	8	17
4 - 5.99%	5	10	12	25	10	21
6 - 7.99%	8	17	2	4	4	8
8 - 9.99%	1	2	-	-	-	-
10 - 11.99%	1	2	2	4	-	-
12 - 13.99%	2	4	-	-	-	-
14 - 15.99%	-	-	-	-	1	2
16 - 17.99%	1	2	-	-	-	-
Total	48	100	48	100	48	100

At a 25% response rate, just under half (48%) of the absolute differences were less than two percentage points. This proportion rose slightly to 50% at a 40% response rate, and by the time a 48% response rate was achieved, it increased to only 52%.

The questions were grouped into three categories: demographic, awareness and behavioural, and Tables 9, 10 and 11 show the number and sizes of the absolute differences for the demographic, awareness and behavioural questions, respectively.

Table 9. Absolute differences for telephone survey demographic questions

Difference	25% response rate		40% response rate		48% response rate	
	n	%	n	%	n	%
< 2%	3	19	4	25	4	25
2 - 3.99%	3	19	3	19	4	25
4 - 5.99%	1	6	7	44	5	31
6 - 7.99%	6	38	1	6	2	13
8 - 9.99%	1	6	-	-	-	-
10 - 11.99%	1	6	1	6	-	-
12 - 13.99%	1	6	-	-	-	-
14 - 15.99%	-	-	-	-	1	6
Total	16	100	16	100	16	100

Only 19% of these absolute differences were less than two percentage points at a 25% response rate. At both 40% and 48% response rates, only one-quarter (25%) of the differences were of this size.

Table 10. Absolute differences for telephone survey awareness questions

Difference	25% response rate		40% response rate		48% response rate	
	n	%	n	%	n	%
none	1	4	-	-	-	-
< 2%	13	54	12	50	14	58
2 - 3.99%	3	13	5	21	3	13
4 - 5.99%	3	13	5	21	5	21
6 - 7.99%	2	8	1	4	2	8
..						
10 - 11.99%	-	-	1	4	-	-
12 - 13.99%	1	4	-	-	-	-
..						
16 - 17.99%	1	4	-	-	-	-
Total	24	100	24	100	24	100

For the awareness questions, far more absolute differences (58%) were less than two percentage points at a response rate of 25%, but this dropped to 50% at a 40% response rate. However, it rose again at a 48% response rate, but only to the same proportion (58%) as at the 25% response rate.

Table 11. Absolute differences for telephone survey behavioural questions

Difference	25% response rate		40% response rate		48% response rate	
	n	%	n	%	n	%
none	1	13	-	-	-	-
< 2%	6	74	8	100	7	88
2 - 3.99%	1	13	-	-	1	12
4 - 5.99%	-	-	-	-	-	-
Total	8	100	8	100	8	100

Even more of the absolute differences for the behavioural questions were less than two percentage points. The proportion in this range rose from 87% to 100%, then fell again to 88% at response rates of 25%, 40% and 48%, respectively.

As so few variables differed by two or more percentage points at a response rate of 48%, it would appear that this rate may be, for most practical purposes, the 'minimum acceptable response rate' for the telephone survey. This response rate of 48% is virtually the same as the minimum acceptable response rate (51%) for the mail survey.

4.3.2 Telephone survey questions for which interim and final estimates differed by two or more percentage points

The questions with absolute differences of two percentage points or more at a 48% response rate, and the sizes of the differences, are listed in Tables 12, 13 and 14.

Table 12. Telephone survey demographic questions with absolute differences of two or more percentage points at a 48% response rate

Question	Size of absolute difference*
Access to a telephone for personal use, while at work Can use one at any time	- 2.5
Household income before tax: $20,001 - $30,000	- 3.2
Main occupation when not working: School student	+ 3.5
Gender: Male	- 3.9
Age: 36 - 40	- 4.0
Access to a motor vehicle to drive personally: Don't drive	+ 4.7
Socioeconomic status of main income earner: Level 2	- 4.8
Respondent's socioeconomic status: Level 1	+ 5.0
Respondent's household situation Young person living with family or guardian	+ 5.0
Employment situation: Not in paid employment	+ 6.2
Area: Auckland	- 6.5
Use of mobile or cellular telephone for business or personal use: Both	- 14.4

* + = overestimated at 48% response rate
- = underestimated at 48% response rate

As well as respondents in the 36-40 age group being underrepresented, those aged between 12 and 14 years were overrepresented by 3.5 percentage points, and those aged between 15 and 18 years were also overrepresented by 1.9 percentage points at a 48% response rate.

These differences could well result from the survey mode; respondents aged from 12 to 18 years are highly likely to be 'at home' and, therefore, contacted by telephone early in the survey period. The above age group underrepresentation and overrepresentations probably explain why young people living with family or guardian, those not in paid employment, school students, and those who did not drive were overrepresented at this

response rate. Further possible explanations will be discussed in Chapter 5.

Table 13. Telephone survey awareness questions with absolute differences of two or more percentage points at a 48% response rate

Question	Size of absolute difference*
Unprompted awareness of coin phones in blue booths	+ 2.7
Unprompted awareness of cardphones	+ 3.1
Preference for Calling Card or Phonecard: Phonecard	+ 3.1
Company operating unspecified coin phones: Telecom	- 4.0
Company operating Credit card phones: Telecom	- 4.8
Prompted awareness of Red phones	+ 5.5
Cost per minute for Telecom payphones: 20c	+ 5.5
Company operating Red phones: Telecom	+ 6.5
Company operating Handyphones: Telecom	+ 6.6

* + = overestimated at 48% response rate
- = underestimated at 48% response rate

These absolute differences are similar in size to those for the demographic questions, and some of these differences may have arisen for demographic reasons. These, and other possible reasons are discussed in Chapter 5.

Table 14. Telephone survey behavioural question with absolute difference of more than two percentage points at a 48% response rate

Question	Size of absolute difference*
Which of those payphones that you know of have you ever used Coin phones in blue booths	+ 2.3

* + = overestimated at 48% response rate

As the sample became older and included more people in paid employment, fewer respondents may have been likely to have used coin phones in blue booths; these respondents would have access to a telephone at work, and have their own residential telephone.

The next step, as for the mail survey, was to calculate confidence intervals for each variable to determine whether any of the interim estimates differed significantly from the final estimates at the 95% confidence level.

Since the sample size was so much smaller than the mail survey sample, confidence intervals were much larger. This is reflected in the fact that at a 25% response rate, only 23% of interim estimates differed significantly from final estimates in the telephone survey, compared to 58% in the mail survey at a 21% response rate. At a 40% response rate in the mail survey, 13% of interim estimates still differed significantly from final estimates, whereas in the telephone survey, only 7% did so at a response rate of 40%. However, by the time the response rate for each survey reached approximately 50%, very few interim estimates differed significantly from final estimates.

4.3.3 Significantly different telephone survey interim estimates

The number and sizes of statistically significant differences in the telephone survey are shown in Table 15.

Table 15. Number of statistically significantly different telephone survey interim estimates

Type of question	No. of questions	25% response rate		40% response rate		48% response rate	
		n	%	n	%	n	%
Demographic	16	8	50	2	13	1	6
Awareness	24	2	8	1	4	-	-
Behavioural	8	-	-	-	-	-	-
Total	48	10	21	3	6	1	2

Few demographic and awareness, and no behavioural estimates, differed significantly at a 40% response rate, and only one significant difference remained by the time a 48% response rate was achieved. This difference was for the demographic variable of 'area'. At a 48% response rate, 19% of respondents were estimated to live in the Auckland area, but this rose to a final estimate of 25.5% at a response rate of 84%. Twenty-five percent of the original sample was selected from both the Auckland and Wellington telephone directories, and although the final sample was representative of these two areas, more calls were required to reach the Auckland respondents than were needed to reach the Wellington respondents.

As mentioned earlier, the telephone sample size was much smaller than the sample in the mail survey, resulting in larger confidence intervals. To get an indication of how a larger sample size may have affected the number of interim estimates which were significantly different from final estimates, confidence intervals were recalculated using a 'standard' sample size of 1,000. This was done so that the number of significantly different interim estimates in the telephone survey could be compared with those in the mail survey on a more similar basis. The results of these recalculations are reported in Table 19 in Appendix III.

4.4 Summary

For the mail survey, 96% of absolute differences between interim and final estimates for both demographic and attitude variables, and 100% of absolute differences for behavioural variables were less than two percentage points at a response rate of 51%. Fewer absolute differences were of that order for the telephone survey, however. Only 25%, 62%, and 88% of absolute differences for demographic, awareness and behavioural variables, respectively, were less than two percentage points at a response rate of 48%.

Demographic and awareness variables were prone to nonresponse bias in the telephone survey, and demographic and attitude variables had a very low potential for nonresponse bias in the mail survey. Behavioural variables did not appear to be prone to nonresponse bias in either survey.

When the abovementioned absolute differences were examined for statistical significance, though, only two demographic variables in the mail survey, and one behavioural variable in the telephone survey, had statistically significant differences between interim and final estimates at a 95% confidence level at a response rate close to 51%.

It would appear, therefore, that a response rate close to 50% may be a tentative minimum acceptable response rate.

These results will be discussed in the following chapter.

CHAPTER FIVE: DISCUSSION

5.1 Introduction

The purpose of this study was to examine the issue of nonresponse bias in sample surveys, its practical implications, and to investigate when survey interim estimates are likely to vary from final estimates. To achieve this, interim estimates from two surveys (one mail and one telephone survey) were generated at several different response rates and compared with the final estimates. In this way, the points at which the interim estimates did not differ significantly from the final estimates were established and these were considered to be tentative 'minimum acceptable response rates'. The types of questions which may be prone to identifiable nonresponse bias were identified, as were particular questions that appear to be most at risk of nonresponse bias, even when a 'minimum acceptable response rate' is achieved.

5.2 The potential for nonresponse bias

For most commercial market research surveys, a response rate of more than 60% is unlikely. For the purposes of this study, however, surveys with response rates of at least 70% were used. The mail survey achieved a final response rate of 70%, and the telephone survey reached a final response rate of 84%. It must be remembered, though, that the potential for some residual nonresponse bias will remain at these response rates; the size and direction of this potential nonresponse bias is unknown.

Further, the type of potential bias arising from nonresponse may differ depending on the proportions of refusals and noncontacts among nonrespondents. For example, Gendall and Davis (1993) and Merkle, Bauman and Lavrakas (1993) both found that noncontacts were younger, male, better educated, more likely to be employed and to earn higher incomes. Therefore, if the majority of nonrespondents in a survey are noncontacts, respondents with these characteristics may well be underrepresented. Refusers, on the other hand, tend to be older and less likely to have dependent children. They also tend to have lower levels of education, lower incomes and to be unemployed (Dalecki, Whitehead and Blomquist, 1993; DeMaio, 1980; Fitzgerald and Fuller, 1982; O'Neil, 1979; Schneider and Rodgers, 1990; Streubbe, Kernan and Grogan, 1986; van Westerhoven, 1978).

For both surveys in this study, virtually all nonrespondents were refusers, so it could be that younger, better-educated, employed, higher-income respondents were underrepresented at the final response rate. This was partially true for the demographic variable 'age' in the mail survey. When demographic distributions were compared with population distributions, it was found that, in the mail survey, those aged 25 to 34 years were underrepresented by 2.6%. However, in the telephone survey, those aged 19 to 30 years were overrepresented by 4.3%.

Few significant gender differences have been found in previous studies reported in the literature comparing respondents and refusers. DeMaio (1980) and Fitzgerald and Fuller (1982) found no such differences, but Dalecki, Whitehead and Blomquist (1993) found nonresponders were more likely to be female. In the mail survey, males were underrepresented by 4.3% and in the telephone survey they were underrepresented by 10.9%, compared to population distributions. It is not known however, what effect these underrepresentations may have had on the potential for nonresponse bias.

5.3 Comparisons of interim and final estimates

In the mail survey, the proportion of absolute differences of less than two percentage points rose quickly from 45% at a 21% response rate to 96% at a response rate of 51%. This level of 'less than two percentage points' was selected as a level at which the absolute difference was relatively small and, for practical purposes, would probably not affect any decisions which might be made. A similar proportion of absolute differences (48%) in the telephone survey were of this size at a 25% response rate, but at a 48% response rate, only just over half (52%) of the absolute differences were less than two percentage points. Overall, the absolute differences were considerably higher than those in the mail survey.

This disparity in the sizes of the absolute differences between the interim estimates and the final estimates in the two surveys could have arisen because of the small sample size in the telephone survey. A further factor could have been that, in the telephone survey, younger respondents and those not in paid employment were overrepresented at the 48% response rate. This overrepresentation on these two

demographic variables probably accounted for most of the differences between the interim and final estimates in the telephone survey. The possible effect of these overrepresentations will be discussed in the next section.

5.4 Types of questions prone to nonresponse bias

In this section, only questions with absolute differences between interim and final estimates of two or more percentage points at a response rate close to 50% will be discussed.

Demographic questions

Only one demographic variable[1] (4% of demographic variables) in the mail survey had an absolute difference of two or more percentage points at a 51% response rate; those who lived in a country home were underrepresented at this response rate. Overall, respondents in rural areas were underrepresented early in the survey period. The major reason for this underrepresentation could be the period during which the survey was conducted; spring is a busy time for farmers. For example, one respondent commented as follows: "It was a bit silly sending a farmer a questionnaire at this time of the year I thought. I am afraid it was not very high on my list of priorities".

By comparison, far more (75%) of the demographic variables in the telephone survey had absolute differences of two or more percentage points at a 48% response rate (see Table 12). For example, as well as respondents in the 36 to 40 age group being underrepresented, those aged between 12 and 18 years were overrepresented at a 48% response rate. The overrepresentation of younger respondents is likely to have arisen because of the mode of the telephone survey. Such young respondents are more likely to be 'at home' compared to older respondents and those in paid employment. They are thus more likely to be contacted early in the survey period. Moreover, this overrepresentation of young people was probably the reason for young people living

1. For the purposes of this study, socioeconomic variables have been included in the demographic variables category.

with family or guardian, those not in paid employment, school students, and those who did not drive motor vehicles being overrepresented at a 48% response rate.

The underrepresentation of respondents living in the Auckland area at a response rate of 48% is consistent with the market research industry's experience that people in the Auckland area are more difficult to contact than people living in other areas of New Zealand.

As the response rate rose in the telephone survey, proportionally more respondents in paid employment, more males and more 'older' respondents (aged 36 to 45) were incorporated into the sample. This finding on employment status is supported by Brown (1993), Fitzgerald and Fuller (1981), Gendall and Davis (1993), and Merkle, Bauman and Lavrakas (1993), and the finding on gender was consistent with previous findings by Gendall and Davis (1993) Merkle, Bauman and Lavrakas (1993), Thomson (1993), and Traugott (1987).

The abovementioned increase in those in paid employment, males and 'older' respondents could explain the increase in those with access to a telephone for personal use at any time and, particularly, the large increase in those who have the use of a mobile or cellular telephone for both business and personal use. This latter group was likely to require more telephone calls to their homes before they were contacted. However, these increases do not explain the underrepresentation of those with a high socioeconomic status. This is more likely to be explained by the fact that respondents with a household income before tax of $20,001-$30,000 were underrepresented at a response rate of 48%. However, the usefulness of socioeconomic status as a variable is limited. Respondents' socioeconomic levels were coded according to their occupations, but these classifications do not necessarily reflect each respondent's socioeconomic status, as respondents categorised as 'Level 1' may, in fact, earn far less than a respondent categorised as 'Level 4'.

Overall, most of the differences between interim and final estimates for the demographic variables in the telephone survey can be explained by the change in the

ages of those in the sample, and in the increase in the proportion of the sample in the paid workforce through to the final response rate.

Attitude questions

Previous studies have found that the topic of a survey has affected response rates, as well as rates of return (Heberlein and Baumgartner, 1978; Kojetin, Borgida and Snyder, 1993; McDaniel, Madden and Verille, 1987). It was, therefore, thought that the mail survey respondents who were more interested and involved in environmental issues may have returned their questionnaires earlier than those who were not so interested. This appeared to happen at the earlier response rates, but by the time a response rate of 51% was reached, there was little difference between interim and final estimates for variables concerning attitudes to the environment. In fact, only three questions about attitudes to the environment had absolute differences of more than two percentage points at a 51% response rate. Those who believed that a rise in the world's temperature caused by the 'greenhouse effect' was somewhat dangerous for the environment, and those who were somewhat in favour of reserving many more streets in cities and towns for pedestrians only were both overrepresented. However, respondents who were somewhat against charging drivers tolls on motorways were underrepresented.

The interim and final estimates for two other attitude questions also differed at a 51% response rate; those who were somewhat in favour of imposing stricter controls on pornographic materials, and those who believed that, in their area, time spent waiting in accident and emergency departments before getting treatment from a doctor was in need of some improvement, were both underrepresented.

Overall, only five (4%) attitude questions had absolute differences of two or more percentage points at a 51% response rate, and those that did only just fell into this category.

Awareness questions

Over one-third (38%) of the telephone survey awareness questions had absolute differences between interim and final estimates of two or more percentage points at a response rate of 48%.

The overrepresentation of respondents with unprompted awareness of coin phones in blue booths and cardphones at a response rate of 48% could have resulted from the overrepresentations of younger respondents aged 12 to 18 years, and those not in paid employment at this response rate. Such respondents are less likely to have "their own telephone in their own residence", and less likely to have access to a telephone at work. Hence, they may be more aware of these coin payphones. However, it is difficult to draw any conclusions from these results as only a relatively a small number (16%) of respondents had an unprompted awareness of coin phones in blue booths.

Because only one question was asked about preferences, it has been included with the awareness questions for convenience. Respondents who preferred a Phonecard rather than a Calling Card were overrepresented at a 48% response rate. It would seem feasible that as more older respondents who were likely to have their own telephones were added to the sample, they could be more likely to prefer a Calling Card (which allows them to charge calls made from a payphone to their home telephone number), rather than to use a pre-paid Phonecard. This supposition may have been confirmed by the increase in the proportion of respondents who preferred a Calling Card at the final response rate.

Respondents who thought Telecom operated coin phones (unspecified) and credit card phones were both underrepresented, while those who thought Telecom operated Red phones and Handyphones were overrepresented at a 48% response rate. However, respondents were only asked which company operated the payphones for which they had earlier indicated awareness and, because of this, less than half of the sample were asked which company operated credit card phones, Red phones and Handyphones. The underrepresentation of those who thought Telecom operated credit card phones

could have arisen because earlier, younger respondents were less likely to have credit cards and, therefore, to know which company operated these phones. It is difficult to understand how the other variations between interim and final estimates arose because of the small numbers involved. The addition of only a few respondents could markedly change estimates of the percentage of respondents who answered in a particular way.

It could also be that respondents who mentioned 'coin phones' were referring to 'coin phones in blue booths'. This is supported by the fact that the majority (71%) of respondents were aware of 'coin phones (unspecified)', but only 16% of the final sample specifically mentioned 'coin phones in blue booths'.

Finally, those who thought the cost per minute for a call from a Telecom payphone was 20c (the correct charge) were overrepresented at a 48% response rate. Fewer later responders may have known this, simply because they may be less likely to use payphones.

Behavioural questions

None of the behavioural questions in the mail survey had an absolute difference of two percentage points or more, and only one behavioural question in the telephone survey fell into this category. Those who had used a coin phone in a blue booth were overrepresented at a 48% response rate. The fact that 'earlier' respondents were generally younger could explain this overrepresentation. However, although only 25% of all respondents had used this particular payphone, 45% of the final sample indicated that they had used coin phones, but did not specify coin phones in blue booths. Respondents may not have differentiated between these two types of phones; they may not have even realised there was a difference.

This study found that, at a response rate of 48%, demographic and awareness variables were prone to nonresponse bias in the telephone survey. It would appear that a relationship existed between these two types of variables. In other words, the differences between interim and final estimates for the awareness variables may have

arisen because of differences in the demographic characteristics of the survey sample at these response rates. For this particular telephone survey, behavioural variables did not appear to have such a relationship with the demographic characteristics of early and late respondents.

The attitude and demographic variables in the mail survey appeared to have a very low potential for nonresponse bias and, as for the telephone survey, behavioural variables were not prone to nonresponse bias at a response rate close to 50%.

It is difficult to compare these findings directly with those of earlier studies because many of the earlier studies compared final estimates with interim estimates obtained after one contact attempt (Brown, 1994; Gendall and Davis, 1993; Opatow, 1991; Stroeven, 1981; Thompson, 1993; Traugott, 1987). The only study to compare interim estimates at a response rate of 50% with those obtained at the final response rate was that of Johnson (1983). He found that the proportions of working and non-working housewives were biased at the lower response rate.

Ultimately, the potential for nonresponse bias in a particular survey will depend on the demographic characteristics of respondents and nonrespondents and the strength of the relationship between these characteristics and the key variables of interest. Further research is required to determine the situations in which demographic, attitude and behavioural variables are especially prone to nonresponse bias.

5.5 A tentative minimum acceptable response rate

A tentative minimum acceptable response rate appeared to be close to 50% for both the surveys conducted for this study. Very few (1.3%) of the interim estimates at 51% and 48% response rates for the mail and telephone surveys, respectively, fell outside the 95% confidence interval calculated at the final response rates. In fact, at the 95% confidence level used in this study, we would expect an error rate of 5% to occur by chance.

A factor in the small number of significant differences between interim and final

estimates was the percentage of replies received by the time the minimum acceptable response rate was reached; 74% of the replies in the mail survey, and 67% of the replies in the telephone survey, had been received at that stage. As the proportion of nonresponders decreased, the responses of later responders would need to become increasingly different from those of early responders to change the estimates markedly.

The sample size for the mail survey (1,270) resulted in reasonably narrow confidence intervals. Even so, at a 51% response rate for the mail survey, the interim estimates for only two demographic variables (current religion and type of residence) differed significantly from the final estimates by 1.1 and 2.1 percentage points, respectively. However, although these differences are statistically significant, they were small in magnitude and, for most practical purposes, would probably not affect any decisions to be made.

Since the telephone survey sample size was so much smaller than the mail survey sample, confidence intervals were much larger, but, by the time the tentative minimum acceptable response rate was reached, the interim estimate for only one variable was significantly different from the final estimates. Although it would appear that a response rate of 48% may be a 'minimum acceptable response rate' for the telephone survey, it must be remembered that a sample of this size (183) has a maximum error margin at the 95% confidence level of approximately plus or minus 7%. By comparison, the maximum error margin at that level for a sample of 1,270 is approximately plus or minus 3%.

Table 19 in Appendix III gives an indication of the effect sample size would have had on the telephone survey estimates had a sample of 1,000 been used. Instead of only 6% of interim estimates differing significantly from final estimates at a 48% response rate, 48% of variables had significantly different estimates.

Perhaps the concept of a 'minimum acceptable response rate' needs to incorporate a 'minimum acceptable sample size' for it to be reasonably robust.

This study has found that a response rate of 50% appears to be acceptable for many practical purposes and supports Johnson's (1983) suggestion that a 50% response rate may be all that is required. Dolsen and Machlis (1991) were more cautious when they concluded that a response rate of 65% was acceptable for *homogeneous* recreation populations. At that point only 1.6% of estimates were outside the 95% confidence interval which was calculated at a final response rate average of 86%. They believed, therefore, that a response rate of 65% may well result in useful and valid results. Instead of suggesting an acceptable response rate, Thompson (1993) suggested a maximum of seven calls was needed to achieve results that were "virtually identical" to the final estimates. Similarly, Merkle, Bauman and Lavrakas (1993) did not suggest an acceptable response rate, but noted that 87% of estimates after three calls differed by less than three percentage points from estimates at final response rates of approximately 70%.

It is important to remember, however, that at the tentative minimum acceptable response rate, the potential for nonresponse bias remains. Researchers must carefully consider how serious this potential nonresponse bias may be for each survey undertaken. Moreover, the minimum acceptable response rate found in this study would not necessarily be acceptable in other studies. The accuracy required in a survey would depend on its nature and purpose, on how the results will be used, and on the decisions to be based on the survey's estimates. For example, researchers conducting a survey to estimate the level of a particular behaviour or the level of participation in a particular activity would need to consider how the inclusion of nonrespondents might affect survey estimates. Depending on the response rate achieved, the omission of the input of nonrespondents could significantly affect the survey estimates. This importance was highlighted in Brown and Wilkins' (1978) survey of anglers. They had achieved a response rate of 68% before following-up nonresponders, but the inclusion of nonresponders dramatically affected the survey estimates. A further consideration would be whether small differences in estimates are important, or if important subgroups are likely to be underrepresented.

A final consideration is whether a survey uses probability sampling. The surveys

conducted for this study used probability sampling, and the determination of a tentative minimum acceptable response rate rested on the valid calculation of response rates. If a survey uses non-probability sampling, a valid response rate cannot be calculated. Thus, a minimum acceptable response rate close to 50% may not be appropriate for such surveys.

5.6 Variables most at risk of nonresponse bias

It would appear from both surveys that few of the variables examined would be classed as 'high-risk' when considering whether nonresponse may be a problem. Only two variables in the mail survey, and one in the telephone survey, had significantly different interim estimates at the tentative minimum acceptable response rate.

In the mail survey, rural respondents were significantly underrepresented at the minimum acceptable response rate. By comparison, respondents living in the Auckland area were significantly underrepresented in the telephone survey at the minimum acceptable response rate. These results may be important if decisions are to be made based on the proportion of, or views of, rural respondents in a mail survey, or the proportion or views of Auckland respondents in a telephone survey. Finally, respondents in the mail survey who selected 'Methodist' as their current religion were significantly overrepresented at the tentative minimum acceptable response rate but, as mentioned earlier, although this difference was statistically significant, it was small in magnitude (1.1 percentage points). However, the possibility that these results arose by chance cannot be rejected.

5.7 Limitations

The major limitation of this study was the response rates achieved for the mail and telephone surveys. The 70% response rate for the mail survey resulted in an unknown amount of potential nonresponse bias. The accuracy of the final estimates could not be determined as true population values were unknown for most variables. This applied to a lesser extent to the final estimates for the telephone survey because a response rate of 84% was reached, but once again, it was impossible to assess any remaining potential nonresponse bias.

A further limitation (as with all surveys that use telephone directories as sampling frames) was that households without telephones or with unlisted telephone numbers were excluded from the sample. In New Zealand in 1993, 93% of households had a telephone. Therefore, the views of the minority who may be most likely to use payphones were not incorporated in the results of the telephone survey.

A minor limitation was that respondents in the telephone survey were selected from the four main New Zealand cities, plus one provincial city, and thus may not be truly representative of the New Zealand population. However, for most market research purposes, this is a typical sampling frame.

5.8 Conclusions

The findings of this study contribute to the understanding of nonresponse bias in relation to the types of question that could be prone to nonresponse bias, and to the identification of what might constitute a tentative minimum acceptable response rate.

The results indicate that, at a response rate of 48%, demographic and awareness variables were prone to nonresponse bias in the telephone survey. It would appear that a relationship existed between these two types of variables. In other words, the differences between interim and final estimates for the awareness variables may have arisen because of differences in the demographic characteristics of the survey sample at these response rates. For this particular telephone survey, behavioural variables did not appear to have such a relationship with the demographic characteristics of early and late respondents.

The attitude and demographic variables in the mail survey appeared to have a very low potential for nonresponse bias and, as for the telephone survey, behavioural variables were not prone to nonresponse bias at a response rate close to 50%.

This study found that a tentative minimum acceptable response rate appeared to be close to 50%. At this response rate, only three variables in the two surveys had an interim estimate which differed significantly from the final estimate. Perhaps

researchers can now be more confident that a response rate close to 50% is acceptable for many practical purposes because the estimates may not vary significantly from those obtained at, say, a 70% response rate.

Further research needs to be undertaken to establish the situations in which a response rate close to 50% is acceptable. Research is needed to investigate whether this study's findings apply to face-to-face surveys. More especially, telephone surveys with larger samples than that for this study could be conducted to find a 'minimum acceptable sample size' that could be used in conjunction with the minimum acceptable response rate.

The results of future research on a minimum acceptable response rate that incorporates a minimum acceptable sample size could be added to the findings of this study and used to develop a 'tentative theory of nonresponse bias' in which the direction and extent of nonresponse bias may be able to be estimated for particular types of questions and particular types of surveys.

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APPENDICES

APPENDIX I

MAIL SURVEY QUESTIONS WITH SIGNIFICANTLY DIFFERENT INTERIM ESTIMATES

Table 16 **Mail survey attitude questions with significantly different interim estimates**

Attitude questions	Interim Estimate 21% *	Interim Estimate 51%	Final Estimate 70%	Maximum Absolute Difference
Which do you think should be NZ's next highest priority, the second most important thing it should do: Protect freedom of speech	26.5	23.3	21.8	+ 4.7
We believe too often in science and not enough in feelings and faith Agree	44.5	42.4	41.3	+ 3.2§
Any change humans cause in nature - no matter how scientific - is likely to make things worse Strongly agree	9.9	8.0	7.2	+ 2.7
Human beings should respect nature because it was created by God Disagree	16.6	14.9	13.6	+ 3.0
People worry too much about human progress harming the environment Neither agree nor disagree	16.9	14.5	14.8	+ 2.1
It is right to use animals for medical testing if it might save human lives Agree	51.5	49.2	48.1	+ 4.3§
Nature is sacred because it is created by God	15.5	17.4	19.0	- 3.5
How willing would you be to pay much higher taxes in order to protect the environment Fairly willing	31.4	27.4	27.8	+ 3.6
How willing would you be to accept cuts in your standard of living in order to protect the environment Very willing	3.8	5.8	5.9	- 2.1
I do what is right for the environment, even when it costs more money or takes more time Strongly agree	4.6	5.4	6.1	- 1.7§
Antibiotics can kill bacteria, but not viruses Probably true	41.6	39.1	38.8	+ 2.8

Table 16 (cont'd)

Attitude questions	Interim Estimate 21%	Interim Estimate 51%	Final Estimate 70%	Maximum Absolute Difference
Human beings developed from earlier species of animals Probably true	47.8	43.1	41.2	+ 6.6
All man-made chemicals cause cancer if you eat enough of them Probably not true	34.3	31.1	30.9	+ 3.4
Some radioactive waste from nuclear power stations will be dangerous for thousands of years Probably not true	1.8	3.4	3.1	- 1.3
Within the next 10 years, how likely do you think it is that there will be a large increase in ill-health in NZ's cities as a result of air pollution caused by cars Not very likely to happen	28.4	31.7	31.5	- 3.1
In general, do you think that nuclear power stations are Very dangerous for the environment	21.4	17.8	17.3	+ 4.1
And do you think that nuclear power stations are Very dangerous for you and your family	19.4	17.6	17.3	+ 2.1
In general, do you think that a rise in the world's temperature caused by the 'greenhouse effect' is Somewhat dangerous for the environment	38.5	37.6	35.3	+ 3.2
Do you think that a rise in the world's temperature caused by the 'greenhouse effect' is Not very dangerous for you and your family	12.3	14.5	14.3	- 2.0
Government should pass laws to make ordinary people protect the environment, even if it interferes with people's rights to make their own decisions	71.2	69.8	68.2	+ 3.0

Table 16 (cont'd)

Attitude questions	Interim Estimate 21%	Interim Estimate 51%	Final Estimate 70%	Maximum Absolute Difference
I don't believe in a personal God, but I do believe in a Higher Power of some kind	22.4	18.8	17.2	+ 5.2
How much are you in favour of or against the government legalising the use of marijuana Strongly against	57.0	54.4	52.7	+ 4.3
How much are you in favour of or against increasing police powers to fight crime Strongly against	3.8	2.9	2.7	+ 1.1
How much are you in favour of or against imposing stricter controls on pornographic materials Somewhat in favour	16.0	18.4	20.4	- 4.4
How much are you in favour of or against abolishing compulsory trade union membership Strongly against	13.9	11.6	11.8	+ 2.1
How much are you in favour of or against the government owning big industries in NZ, like steel and banking Somewhat in favour	18.5	20.8	22.6	- 4.1
How much are you in favour of or against redistributing income and wealth in favour of the less well off Strongly in favour	23.7	20.1	19.4	+ 4.3
How much are you in favour of or against giving Maoris special land and fishing rights to make up for past injustices Somewhat against	24.6	22.9	22.3	+ 2.3
How much are you in favour of or against allowing sporting teams visits to South Africa Somewhat in favour	32.7	30.2	29.9	+ 2.8

Table 16 (cont'd)

Attitude questions	Interim Estimate 21%	Interim Estimate 51%	Final Estimate 70%	Maximum Absolute Difference
Choice between increasing government spending and higher taxes or cutting government spending and reducing taxes for the military, armaments and defence Greatly cut	20.9	18.0	17.8	+ 3.1
Choice between increasing government spending and higher taxes or cutting government spending and reducing taxes for the Domestic Purposes Benefit Keep the same	41.5	44.0	45.4	- 5.0§
Choice between increasing government spending and higher taxes or cutting government spending and reducing taxes for special assistance for Maori and Pacific Islanders Greatly cut	24.1	21.2	20.6	+ 3.5
Choice between increasing government spending and higher taxes or cutting government spending and reducing taxes for health services Cut	1.3	0.6	0.7	+ 0.6
Choice between increasing government spending and higher taxes or cutting government spending and reducing taxes for spending on special sporting events like the Commonwealth Games Greatly increase	3.3	2.5	2.3	+ 1.0
How much do you approve or disapprove of the anti-nuclear movement Strongly disapprove	4.6	5.2	5.9	- 1.3
How much do you approve or disapprove of the Women's movement Somewhat approve	43.3	47.7	47.3	- 4.0
How much do you approve or disapprove of the Maori rights movement Somewhat approve	19.8	24.7	25.4	- 5.6
How much do you approve or disapprove of the anti-apartheid movement Strongly approve	30.1	27.9	27.4	+ 2.7

Table 16 (cont'd)

Attitude questions	Interim Estimate 21%	Interim Estimate 51%	Final Estimate 70%	Maximum Absolute Difference
Within the next 20 years or so finding official sites to dump or burn household rubbish will be one of the most serious problems for NZ Probably not true	7.3	10.8	11.0	- 3.7
For the sake of the environment, the NZ government should control the amount and type of packaging on products, even if it leads to higher prices or less convenience for the customer Strongly in favour	26.6	24.1	23.6	+ 3.0
To get people to do less harm to the environment, the government should pass strict environmental laws in order to stop causing harm to the environment Strongly in favour	41.3	38.8	37.4	+ 3.9
How strongly would you be in favour or against charging drivers tolls on motorways Somewhat in favour	12.4	10.7	9.9	+ 2.5
How strongly would you be in favour or against allowing only vehicles with permits for essential business in city centres in working hours Somewhat in favour	23.7	21.9	21.4	+ 2.3
How strongly would you be in favour or against charging much higher parking charges in towns and cities Somewhat against	27.8	29.8	31.4	- 3.6
How strongly would you be in favour or against encouraging shops and offices to move out of town and city centres Strongly in favour	9.2	7.5	7.4	+ 1.8
How strongly would you be in favour or against banning company cars except where they are essential for employees in their work Strongly in favour	17.0	15.4	13.9	+ 3.1

Table 16 (cont'd)

Attitude questions	Interim Estimate 21%	Interim Estimate 51%	Final Estimate 70%	Maximum Absolute Difference
How strongly would you be in favour or against the government reserving many more streets in cities and towns for pedestrians only Somewhat in favour	46.1	43.6	41.1	+ 6.7§
Many of the short journeys I now make by car, I could just as easily walk Neither agree nor disagree	11.7	9.9	9.5	+ 2.2
Driving one's own car is too convenient to give up for the sake of the environment Agree	38.5	36.6	36.1	+ 2.4
Building more roads just encourages more traffic Agree	33.0	28.4	26.7	+ 6.3
For the sake of the environment, the NZ government should spend public money on campaigns to persuade people to cut back on driving Disagree	37.2	34.9	33.7	+ 3.5
For the sake of the environment, the NZ government should put up taxes on petrol each year for the next 10 years to get people to cut back on driving Strongly agree	1.5	2.2	2.5	- 1.0
For the sake of the environment, the NZ government should put a special environment tax on private cars and use the money to improve public transport Disagree	33.9	36.4	36.9	- 3.0
For the sake of the environment, the NZ government should restrict or ration the amount of petrol or diesel that people are allowed to buy to make them cut back on driving Agree	10.2	9.5	8.6	+ 1.6

Table 16 (cont'd)

Attitude questions	Interim Estimate 21%	Interim Estimate 51%	Final Estimate 70%	Maximum Absolute Difference
Are GPs' appointment systems in your area satisfactory or in need of improvement In need of a lot of improvement	11.5	10.4	9.8	+ 1.7
Are hospital waiting lists for non-emergency operations in your area satisfactory or in need of improvement In need of a lot of improvement	55.3	52.3	52.5	+ 2.8
Are waiting times for getting appointments with hospital consultants in your area satisfactory or in need of improvement In need of a lot of improvement	54.0	49.5	48.8	+ 5.2
Is the general condition of hospital buildings in your area satisfactory or in need of improvement Very good	5.6	7.3	7.3	- 1.7
Is the staffing level of nurses in hospitals in your area satisfactory or in need of improvement Satisfactory	19.2	20.8	22.0	- 2.8
Is the quality of medical treatment in hospitals in your area satisfactory or in need of improvement Satisfactory	34.8	38.7	39.8	- 5.0
Are waiting areas in accident and emergency departments in hospitals in your area satisfactory or in need of improvement In need of a lot of improvement	24.9	23.1	22.6	+ 2.3
Is time spent waiting in out-patient departments in your area satisfactory or in need of improvement Satisfactory	19.1	21.1	22.4	- 3.3
Is time spent waiting in accident and emergency departments before getting treatment from a doctor in your area satisfactory or in need of improvement In need of some improvement	34.5	36.3	38.3	- 3.8

Table 16 (cont'd)

Attitude questions	Interim Estimate 21%	Interim Estimate 51%	Final Estimate 70%	Maximum Absolute Difference
Is time spent waiting for an ambulance after a 111 call in your area satisfactory or in need of improvement In need of a lot of improvement	4.2	5.4	5.5	- 1.3
The welfare state makes people nowadays less willing to look after themselves Strongly disagree	4.9	3.8	3.7	+ 1.2
People receiving social security are made to feel like second class citizens Strongly agree	16.0	13.5	13.4	+ 2.6
The welfare state encourages people to stop helping each other Disagree	26.5	29.0	29.3	- 2.8
The government should spend more money on welfare benefits for the poor, even if it leads to higher taxes Strongly agree	9.4	7.8	7.2	+ 2.2
Around here, most unemployed people could find a job if they really wanted to Disagree	38.8	34.0	34.9	+ 3.9
Most people on the dole are fiddling in one way or another Strongly disagree	10.9	9.3	8.6	+ 2.3
If welfare benefits weren't so generous, people would learn to stand on their own two feet Disagree	35.3	31.3	31.2	+ 4.1
Social workers have too much power to intervene in people's lives Neither agree nor disagree	33.3	37.4	36.1	- 2.8

Table 17 Mail survey behavioural questions with significantly different interim estimates

Behavioural questions	Interim Estimate 21%	Interim Estimate 51%	Final Estimate 70%	Maximum Absolute Difference
How often do you make a special effort to sort glass or metal or plastic or paper and so on for recycling Not available where I live	4.8	7.2	7.4	- 2.6
How often do you cut back on driving a car for environmental reasons Never	54.3	59.3	60.6	- 6.3
In the last five years, have you signed a petition about an environmental issue Yes	60.3	55.4	55.1	+ 5.2
In the last five years, have you given money to an environmental group Yes	52.7	49.4	49.1	+ 3.6
In the last five years, have you taken part in a protest or demonstration about an environmental issue No	97.4	96.5	95.7	+ 1.7
When you are shopping, how often do you pay attention to the amount of packaging used on products before you decide to buy something Often	26.2	22.5	22.3	+ 3.9
In the last month or so, did you actually NOT buy something because you felt it used too much packaging or wrapping Yes, did NOT buy something	24.9	20.5	19.8	+ 5.1
When you are choosing a product, how often do you pay attention to any environmental labelling before deciding to buy Sometimes	37.6	40.9	42.4	- 4.6
Whether or not you own a car, how many days a week do you usually drive a car or van or motorbike Never drive	10.4	9.2	8.8	+ 1.6

Table 17 (cont'd)

Behavioural questions	Interim Estimate 21%	Interim Estimate 51%	Final Estimate 70%	Maximum Absolute Difference
In the last two years, have you or a close family member visited a patient in a public hospital Yes	81.4	83.5	83.6	- 2.2
At the 1990 General Election, which political party did you vote for Green Party	2.1	3.7	4.6	- 2.5
How often do you attend a religious service Never	33.2	30.5	29.5	+ 3.7
About how often do you pray Several times a day	7.0	8.0	9.2	- 2.2
How long did it take you to complete this questionnaire Between 46 and 60 minutes	11.8	1.5	18.2	- 6.4

Table 18 Mail survey demographic questions with significantly different interim estimates

Demographic questions	Interim Estimate 21%	Interim Estimate 51%	Final Estimate 70%	Maximum Absolute Difference
Age				
65-69	7.9	6.9	6.5	+ 1.5§
Highest level of formal education				
Some university or other tertiary	9.4	10.7	11.8	- 2.4
Current employment status				
Unemployed or beneficiary	7.7	5.6	5.2	+ 2.5
Hours worked per week				
31 - 40 hours	41.8	36.2	36.2	+ 5.6
Current type of employment				
Self-employed	18.3	21.9	21.7	- 3.6§
Number of people in household				
Three	26.4	24.5	23.5	+ 3.1§
Spouse's current employment status				
Housewife/husband - home duties	10.5	12.7	12.9	- 2.4
Household owns or has regular use of a car or van or motorbike				
No	5.1	4.0	3.8	+ 1.3
In politics what do you usually think of yourself as				
Labour	30.7	28.8	27.8	+ 2.9

Table 18 (cont'd)

Demographic questions	Interim Estimate 21%	Interim Estimate 51%	Final Estimate 70%	Maximum Absolute Difference
Personal yearly income from all sources before tax $10,001 - $15,000	16.4	14.3	14.1	+ 2.3
Household yearly income from all sources before tax $10,000 or less	6.4	5.2	5.1	+ 1.3
In terms of social status, where do you think you fit Upper working/lower middle	16.0	14.9	14.0	+ 2.3§
Current religion Methodist	5.4	4.9ª	3.8	+ 1.6
Are there regular collections from your home of any materials for recycling Yes	52.3	48.0	47.1	+ 5.2
Do you live in a rural or urban area Urban	81.5	76.3	74.8	+ 6.7
Describe the place where you live A country home	8.1	10.7ª	12.8	- 4.7
What size of city or town do you live in Farm or rural property	8.1	10.1	11.6	- 3.5

* Differences significant at the 95% confidence level
ª Difference significant at a response rate of 51%
§ Maximum absolute difference at a response rate of 30%

APPENDIX II

TELEPHONE SURVEY QUESTIONS WITH SIGNIFICANTLY DIFFERENT INTERIM ESTIMATES

Table 19 Telephone survey questions with significantly different interim estimates

Type of question	Interim Estimate 25% *	Interim Estimate 48%	Final Estimate 84%	Maximum Absolute Difference
Awareness questions				
Company that operates coin phones (unspecified)				
Telecom	83.0	84.9	88.9	- 5.9
Company that operates Handyphones				
Telecom	58.8	47.8	41.2	+ 17.6
Demographic questions				
Age 12 - 14 years	20.8	16.5	13.0	+ 7.8
Location				
Dunedin	15.3	13.2	9.2	+ 6.1
Employment				
Not in paid employment	45.8	42.1	35.9	+ 9.9
Main occupation if not employed full-time				
School student	50.0	43.5	40.0	+ 10.0
Socioeconomic status of main income earner				
Level 2	10.1	11.7	16.5	- 6.4
Joint household income				
$60,001 - $80,000	4.2	6.6	8.7	- 4.5
Use of mobile/cellular telephone				
Yes	27.8	21.5	21.7	+ 6.1
Access to a motor vehicle for personal use				
Don't drive	29.2	26.4	21.7	+ 7.5

* Differences significant at the 95% confidence level

APPENDIX III NUMBER OF SIGNIFICANTLY DIFFERENT TELEPHONE SURVEY INTERIM ESTIMATES USING n = 1000

As mentioned in Chapter Four, the telephone sample size was much smaller than the sample in the mail survey, resulting in larger confidence intervals. To get an indication of how sample size may have affected the number of interim estimates in the telephone survey which were significantly different from final estimates, confidence intervals were recalculated using a 'standard' sample size of 1,000.

The results of these recalculations are reported in Table 20 below.

Table 20 Number of significantly different telephone survey interim estimates using n = 1000

Type of question	No. of questions	25% response rate		41% response rate		49% response rate	
		n	%	n	%	n	%
Demographic	16	13	81	12	75	11	69
Awareness	24	8	33	9	38	9	38
Behavioural	8	1	13	1	13	1	13
Total	48	22	45	22	45	21	44

APPENDIX IV CONTACT ATTEMPT OUTCOMES AND RESPONSE RATE CALCULATIONS

Table 21 Contact attempt outcomes for mail survey

Outcome	n	%
Successful interviews	1270	67
Gone no address	51	3
Ineligible/deceased	11	1
Refusal	551	29
Total	1883	100

Response rate calculation for mail survey:

$$\frac{\text{Successful interviews}}{\text{Sample size - ('Gone no address' + Ineligible)}} \times 100$$

$$= \frac{1270}{883 - (51 + 11)} \times 100 = 70\%$$

Table 22 Contact outcomes for telephone survey

Outcome	n	%
Successul interviews	183	37
Disconnected number	42	8
Ineligible - language problem	7	1
Ineligible - employment	25	5
Ineligible - age	196	39
Ineligible - other	7	1
Business number/fax	4	1
No contact	2	1
Respondent refusal	13	3
Household refusal	21	4
Total	500	100

Response rate calculation for mail survey:

$$\frac{\text{Successful interviews}}{\text{Sample size - (Disconnected + Ineligible)}} \times 100$$

$$= \frac{183}{500 - (42 + 239)} \times 100 = 84\%$$

APPENDIX V

MAIL SURVEY QUESTIONNAIRE

CONFIDENTIAL

ID:_____(1-4)

NEW ZEALANDERS' ATTITUDES

TO THE ENVIRONMENT

Department of Marketing

International Social Survey Programme

August 1993

How to fill out this questionnaire

To answer these questions all you have to do is to tick (✓) a box or boxes, or write in the space provided. After some questions, there is an instruction in **bold type** explaining what to do. Some questions may not apply to you, in which case there are instructions on which questions to go to next.

The questions cover a wide range of subjects, but no special knowledge is required and there are no right or wrong answers. We just want to know your *own personal opinions*.

Returning the questionnaire

When you have completed the questionnaire, please post it back in the reply-paid envelope, **as soon as you possibly can**.

Enjoy the questionnaire, and thank you for your help.

USE ONLY

1. Which of these would you say is more important in preparing children for life...

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
... to be obedient,	1
OR	
... to think for themselves?	2
Can't choose	8

2. How much do you agree or disagree with each of these statements?

*PLEASE TICK **ONE** BOX ON EACH LINE*

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Can't choose
a. Private enterprise is the best way to solve New Zealand's economic problems	1	2	3	4	5	8
b. It is the responsibility of the government to reduce the differences in income between people with high incomes and those with low incomes	1	2	3	4	5	8

3a Looking at the list below, please tick a box next to the **one** thing you think should be New Zealand's **highest priority**, the most important thing it should do.

*PLEASE TICK **ONE** BOX ONLY*

New Zealand should...	**Highest priority** (✓)
Maintain order in the nation	1
Give people more say in government decisions	2
Fight rising prices	3
Protect freedom of speech	4
Can't choose	8

b. And which **one** do you think should be New Zealand's **next highest priority**, the second most important thing it should do?

*PLEASE TICK **ONE** BOX ONLY*

New Zealand should...	Next highest priority (✓)
Maintain order in the nation	1
Give people more say in government decisions	2
Fight rising prices	3
Protect freedom of speech	4
Can't choose	8

USE ONLY

4. How much do you agree or disagree with each of these statements?

PLEASE TICK *ONE* BOX ON EACH LINE	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Can't choose
a. We believe too often in science and not enough in feelings and faith	1	2	3	4	5	8
b. Overall, modern science does more harm than good	1	2	3	4	5	8
c. Any change humans cause in nature - no matter how scientific - is likely to make things worse	1	2	3	4	5	8
d. Modern science will solve our environmental problems with little change to our way of life	1	2	3	4	5	8

5. And please tick one box for each of **these** statements to show how much you agree or disagree with it.

*PLEASE TICK **ONE** BOX ON EACH LINE*	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Can't choose
a. We worry too much about the future of the environment and not enough about prices and jobs today	1	2	3	4	5	8
b. Almost everything we do in modern life harms the environment	1	2	3	4	5	8
c. Animals should have the same moral rights as human beings do	1	2	3	4	5	8
d. Human beings should respect nature because it was created by God	1	2	3	4	5	8

6. How much do you agree or disagree with each of the following statements?

*PLEASE TICK **ONE** BOX ON EACH LINE*	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Can't choose
a. People worry too much about human progress harming the environment	1	2	3	4	5	8
b. Nature would be at peace and in harmony if only human beings would leave it alone	1	2	3	4	5	8
c. In order to protect the environment, New Zealand needs economic growth	1	2	3	4	5	8
d. It is right to use animals for medical testing if it might save human lives	1	2	3	4	5	8
e. Nature is really a fierce struggle for survival of the fittest	1	2	3	4	5	8
f. Economic growth always harms the environment	1	2	3	4	5	8

USE ONLY

7. Please tick **one** box to show which statement is closest to <u>your</u> views?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Nature is sacred because it is created by God	1
Nature is spiritual or sacred in itself	2
Nature is important, but not spiritual or sacred	3
Can't choose	8

8a. How willing would **you** be to pay **much higher <u>prices</u>** in order to protect the environment?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Very willing	1
Fairly willing	2
Neither willing nor <u>un</u>willing	3
Fairly <u>un</u>willing	4
Very <u>un</u>willing	5
Can't choose	8

b. And how willing would **you** be to pay **much higher <u>taxes</u>** in order to protect the environment?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Very willing	1
Fairly willing	2
Neither willing nor <u>un</u>willing	3
Fairly <u>un</u>willing	4
Very <u>un</u>willing	5
Can't choose	8

c. And how willing would **you** be to **accept cuts in your standard of living** in order to protect the environment?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Very willing	1
Fairly willing	2
Neither willing nor <u>un</u>willing	3
Fairly <u>un</u>willing	4
Very <u>un</u>willing	5
Can't choose	8

USE ONLY

9. How much do you agree or disagree with **each** of **these** statements?

*PLEASE TICK **ONE** BOX ON EACH LINE*	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**	**Can't choose**
a. It is just too difficult for someone like me to do much about the environment	1	2	3	4	5	8
b. I do what is right for the environment, even when it costs more money or takes more time	1	2	3	4	5	8

10. For each statement below, just tick the box that comes closest to your opinion of how true it is.

*PLEASE TICK **ONE** BOX ON EACH LINE*	**Definitely true**	**Probably true**	**Probably not true**	**Definitely not true**	**Can't choose**
a. 'All radioactivity is made by humans'	1	2	3	4	8
b. 'Antibiotics can kill bacteria, but not viruses'	1	2	3	4	8
In your opinion, how true is this?					
c. 'Astrology - the study of star signs - has some scientific truth'	1	2	3	4	8
d. 'Human beings developed from earlier species of animals'	1	2	3	4	8
e. 'All man-made chemicals can cause cancer if you eat enough of them'	1	2	3	4	8

11. And for each of **these** statements, just tick the box that comes closest to your opinion of how true it is.

PLEASE TICK **ONE** BOX ON EACH LINE	**Definitely true**	**Probably true**	**Probably not true**	**Definitely not true**	**Can't choose**
In your opinion, how true is this?					
a. 'If someone is exposed to any amount of radioactivity, they are certain to die as a result'	1	2	3	4	8
b. 'Some radioactive waste from nuclear power stations will be dangerous for thousands of years'	1	2	3	4	8
c. 'The greenhouse effect is caused by a hole in the earth's atmosphere'	1	2	3	4	8
In your opinion, how true is this?					
d. 'Every time we use coal or oil or gas, we contribute to the greenhouse effect'	1	2	3	4	8
e. 'All pesticides and chemicals used on food crops cause cancer in humans'	1	2	3	4	8
f. 'Human beings are the main cause of plant and animal species dying out'	1	2	3	4	8
g. 'Cars are not really an important cause of air pollution in New Zealand'	1	2	3	4	8

USE ONLY

2a. In general, do you think that **air pollution caused by cars** is ...

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
... extremely dangerous for the environment,	1
very dangerous,	2
somewhat dangerous,	3
not very dangerous,	4
or, not dangerous at all for the environment?	5
Can't choose	8

b. And do you think that **air pollution caused by cars** is ...

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
... extremely dangerous for you and your family,	1
very dangerous,	2
somewhat dangerous,	3
not very dangerous,	4
or, not dangerous at all for you and your family?	5
Can't choose	8

c. Within the next ten years, how likely do you think it is that there will be a large increase in ill-health in New Zealand's cities as a result of **air pollution caused by cars**?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Certain to happen	1
Very likely to happen	2
Fairly likely to happen	3
Not very likely to happen	4
or- Certain not to happen?	5
Can't choose	8

3a. In general, do you think that **nuclear power stations** are ...

*PLEASE TICK **ONE** BOX ONLY*

(✓)

... extremely dangerous for the environment,	1
very dangerous,	2
somewhat dangerous,	3
not very dangerous,	4
or, not dangerous at all for the environment?	5
Can't choose	8

b. And do you think that **nuclear power stations** are ...

*PLEASE TICK **ONE** BOX ONLY*

(✓)

... extremely dangerous for you and your family,	1
very dangerous,	2
somewhat dangerous,	3
not very dangerous,	4
or, not dangerous at all for you and your family?	5
Can't choose	8

a. In general, do you think that **air pollution caused by industry** is ...

*PLEASE TICK **ONE** BOX ONLY*

(✓)

... extremely dangerous for the environment,	1
very dangerous,	2
somewhat dangerous,	3
not very dangerous,	4
or, not dangerous at all for the environment?	5
Can't choose	8

b. And do you think that **air pollution caused by industry** is ...

*PLEASE TICK **ONE** BOX ONLY*

(✓)

... extremely dangerous for you and your family,	1
very dangerous,	2
somewhat dangerous,	3
not very dangerous,	4
or, not dangerous at all for you and your family?	5
Can't choose	8

OFFICE USE ONLY

5a. In general, do you think that **pesticides and chemicals used in farming** are ...

*PLEASE TICK **ONE** BOX ONLY* (✓)

... extremely dangerous for the environment,	1
very dangerous,	2
somewhat dangerous,	3
not very dangerous,	4
or, not dangerous at all for the environment?	5
Can't choose	8

b. And do you think that **pesticides and chemicals used in farming** are ...

*PLEASE TICK **ONE** BOX ONLY* (✓)

... extremely dangerous for you and your family,	1
very dangerous,	2
somewhat dangerous,	4
not very dangerous,	4
or, not dangerous at all for you and your family?	5
Can't choose	8

a. In general, do you think that **pollution of New Zealand's rivers, lakes and streams** is ...

*PLEASE TICK **ONE** BOX ONLY* (✓)

... extremely dangerous for the environment,	1
very dangerous,	2
somewhat dangerous,	3
not very dangerous,	4
or, not dangerous at all for the environment?	5
Can't choose	8

b. And do you think that **pollution of New Zealand's rivers, lakes and streams** is ...

*PLEASE TICK **ONE** BOX ONLY* (✓)

... extremely dangerous for you and your family,	1
very dangerous,	2
somewhat dangerous,	3
not very dangerous,	4
or, not dangerous at all for you and your family?	5
Can't choose	8

7a. In general, do you think that **a rise in the world's temperature caused by the 'greenhouse effect'** is ...

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
... extremely dangerous for the environment,	1
very dangerous,	2
somewhat dangerous,	3
not very dangerous,	4
or, not dangerous at all for the environment?	5
Can't choose	8

b. And do you think that **a rise in the world's temperature caused by the 'greenhouse effect'** is ...

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
... extremely dangerous for you and your family,	1
very dangerous,	2
somewhat dangerous,	3
not very dangerous,	4
or, not dangerous at all for you and your family?	5
Can't choose	8

8a. If you had to choose, which **one** of the following would be closest to your views?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Government should let **ordinary people** decide for themselves how to protect the environment, even if it means they don't always do the right things	1
OR	
Government should pass laws to make **ordinary people** protect the environment, even if it interferes with people's rights to make their own decisions	2
Can't choose	8

b. And which **one** of the following comes closest to your views?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Government should let **businesses** decide for themselves how to protect the environment, even if it means they don't always do the right things	1
OR	
Government should pass laws to make **businesses** protect the environment, even if it interferes with business' rights to make their own decisions	2
Can't choose	8

9a. How often do you make a special effort to **sort glass or metal or plastic or paper and so on** for recycling?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Always	1
Often	2
Sometimes	3
Never	4
(Recycling not available where I live)	5

b. And how often do you make a special effort to **buy fruits and vegetables grown without pesticides or chemicals**?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Always	1
Often	2
Sometimes	3
Never	4
(Not available where I live)	5

c. And how often do you refuse to eat meat for moral or environmental reasons?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Always	1
Often	2
Sometimes	3
Never	4

d. And how often do you cut back on driving a car for environmental reasons?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Always	1
Often	2
Sometimes	3
Never	4
(I do not have or cannot drive a car)	5

10. Are you a member of any group whose main aim is to preserve or protect the environment?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Yes	1
No	2

21. In the last **five years**, have you...

*PLEASE TICK **ONE** BOX ON EACH LINE*	**Yes, I have**	**No, I have not**
... signed a petition about an environmental issue?	1	2
...given money to an environmental group?	1	2
...taken part in a protest or demonstration about an environmental issue?	1	2

22. Please tick one box below to show which statement comes closest to expressing what you believe about God.

*PLEASE TICK **ONE** BOX ONLY*	(✓)
I don't believe in God	1
I don't know whether there is a God and I don't believe there is any way to find out	2
I don't believe in a personal God, but I do believe in a Higher Power of some kind	3
I find myself believing in God some of the time, but not at others	4
While I have doubts, I feel that I do believe in God	5
I know God really exists and I have no doubts about it	6
Can't choose	8

23. Would you describe the place where you live as...

*PLEASE TICK **ONE** BOX ONLY*	(✓)
a big city,	1
the suburbs or outskirts of a big city,	2
a small city or town,	3
a country village,	4
a farm or home in the country?	5

24. How much are you in favour of or against each of the following?

*PLEASE TICK **ONE** BOX ON EACH LINE*

	Strongly in favour	Somewhat in favour	Neither in favour nor against	Somewhat against	Strongly against	Can't choose
a. The government legalising the use of marijuana	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
b. Making divorce more difficult to obtain	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
c. Increasing police powers to fight crime	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
d. Imposing stricter controls on pornographic materials	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
e. Abolishing compulsory trade union membership	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
f. The government owning big industries in New Zealand, like steel and banking	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
g. Tighter government regulation of big companies and multinationals	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
h. Redistributing income and wealth in favour of the less well off	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
i. Taking much stronger measures to protect the environment, even if these hurt economic growth	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
j. Giving Maoris special land and fishing rights to make up for past injustices	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
k. Allowing sporting teams visits to South Africa	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
l. Declaring New Zealand a republic and no longer having the Queen of England as Head of State	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8

25. Suppose you had to make a choice between **increasing** government spending in particular areas even though this would mean paying **higher** taxes for this extra spending, or **cutting** government spending in these areas and thereby **reducing** taxes; which would you choose for each of the following areas of government spending?

		Greatly increase	Some increase	Keep the same	Cut	Greatly Cut	Can't Choose
a.	The military, armaments and defence	1	2	3	4	5	8
b.	The education system	1	2	3	4	5	8
c.	Pensions	1	2	3	4	5	8
d.	The domestic purposes benefit	1	2	3	4	5	8
e.	Protecting the environment	1	2	3	4	5	8
f.	Special assistance for Maori and Pacific Islanders	1	2	3	4	5	8
g.	Job training and assistance for the unemployed	1	2	3	4	5	8
h.	The health services	1	2	3	4	5	8
i.	Spending on special sporting events like the commonwealth games	1	2	3	4	5	8

26. There are a number of groups and movements looking for support of the public. How much do you approve or disapprove of each of the following movements?

		Strongly approve	Somewhat approve	Somewhat disapprove	Strongly disapprove	Can't choose
a.	Environmental movement	1	2	3	4	8
b.	Anti-nuclear movement	1	2	3	4	8
c.	Women's movement	1	2	3	4	8
d.	Maori rights movement	1	2	3	4	8
e.	Anti-apartheid movement	1	2	3	4	8

27. When you are shopping, how often do you pay attention to the amount of wrapping or packaging used on products before you decide to buy something?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Always	1
Often	2
Sometimes	3
Never	4

28. In the last month or so, did you actually NOT buy something because you felt it used too much packaging or wrapping?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Yes, did NOT buy something because of the amount of packaging or wrapping	1
No	2
Don't know/can't remember	8

29. Some household waste can be recycled (for instance, glass, paper, tins and plastics). In your area, are there regular collections from your home of any materials for recycling?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Yes	1
No	2
Don't know	8

30. How true do you think the following statement is?
"Within the next twenty years or so, finding official sites to dump or burn household waste will be one of the most serious problems for New Zealand."

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Definitely true	1
Probably true	2
Probably not true	3
Definitely not true	4
Can't choose	8

11. There are various ways governments might try to get people to produce less household waste, for the sake of the environment. Please tick one box for each policy below to show your views.

PLEASE TICK **ONE** BOX FOR EACH

For the sake of the environment, the New Zealand government should...	**Strongly in favour**	**Somewhat in favour**	**Neither in favour nor against**	**Somewhat against**	**Strongly against**	**Can't choose**
a. Spend public money on campaigns to persuade people to produce less household waste	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
b. Make each household pay for its rubbish collection according to the amount of rubbish it leaves out, to get people to produce less household waste	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
c. Control the amount and type of packaging on products, even if it leads to higher prices or less convenience for the customer	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8

12. Now a few questions about environmental labelling, that is, information about how a product or its packaging may affect the environment.

When you are choosing a product, how often do you pay attention to any environmental labelling before deciding to buy?

*PLEASE TICK **ONE** BOX*

	(✓)
Always	☐ 1
Often	☐ 2
Sometimes	☐ 3
Never	☐ 4

13. And if you look at environmental labelling on products, how often do you trust it?

*PLEASE TICK **ONE** BOX*

	(✓)
(Never look at environmental labelling)	☐ 5
Always	☐ 1
Often	☐ 2
Sometimes	☐ 3
Never	☐ 4

34. There are various ways governments might try to get people to do less harm to the environment. Please tick one box for each policy to show your views.

*PLEASE TICK **ONE** BOX FOR EACH*	**Strongly in favour**	**Somewhat in favour**	**Neither in favour nor against**	**Somewhat against**	**Strongly against**	**Can't choose**
a. Spend public money on campaigns to persuade people not to harm the environment	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
b. Put up taxes on things which harm the environment each year for the next ten years, to get people not to buy or use them	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
c. Pass strict environmental laws in order to stop causing harm to the environment	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8

35. Thinking now of <u>all</u> the possible things that people can do: compared with most people, how much effort would you say <u>you</u> make, in general, to do what is right for the environment?

*PLEASE TICK **ONE** BOX* (✓)

In general, I make...

- much more effort than most people, ☐ 1
- a bit more effort, ☐ 2
- about the same effort, ☐ 3
- a bit less effort, ☐ 4
- or - much less effort than most people. ☐ 5
- Can't choose ☐ 8

36. Whether or not you own a car, how many days a week do you usually drive a car or van or motorbike? (✓)

*PLEASE TICK **ONE** BOX*

- I never drive ☐ 1
- I usually drive less often than once a week ☐ 2
- I usually drive one or two days a week ☐ 3
- I usually drive three or four days a week ☐ 4
- I usually drive five or six days a week ☐ 5
- I usually drive seven days a week ☐ 6

37. Does your household own, or have the regular use of, a car or van or motorbike? (✓)

*PLEASE TICK **ONE** BOX*

- Yes, one vehichle only ☐ 1
- Yes, two vehicles ☐ 2
- Yes, three or more vehicles ☐ 3
- No ☐ 4

38. Here are some things that might be done about New Zealand's traffic problems.

Please tick one box for **each** to say how strongly you would be in favour or against it.

*PLEASE TICK **ONE** BOX ON EACH LINE*

	Strongly in favour	**Somewhat in favour**	**Neither in favour nor against**	**Somewhat against**	**Strongly against**	**Can't choose**
a. Drivers charged tolls on motorways	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
b. Only vehicles with permits for essential business allowed in city centres in working hours	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
c. Motorists charged for each mile they drive in city centres in working hours	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
d. Much higher parking charges in towns and cities	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
e. Shops and offices encouraged to move out of town and city centres	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
f. Banning company cars except where they are essential for employees in their work	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
g. Many more streets in cities and towns reserved for pedestrians only	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8

39. How much do you agree or disagree with this statement?
"Many of the short journeys I now make by car I could just as easily walk."

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Agree strongly	☐ 1
Agree	☐ 2
Neither agree nor disagree	☐ 3
Disagree	☐ 4
Disagree strongly	☐ 5
I never travel by car	☐ 6
Can't choose	☐ 8

USE ONLY

40. Please tick one box for **each** statement to show how much you agree or disagree.

*PLEASE TICK **ONE** BOX ON EACH LINE*

	Agree strongly	Agree	Neither agree nor disagree	Disagree	Disagree strongly	Can't choose
a. For the sake of the environment, car users should pay higher taxes	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
b. The government should build more motorways to reduce traffic congestion	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
c. A thriving car industry is essential to New Zealand's economy	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
d. Driving one's own car is too convenient to give up for the sake of the environment	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
e. Building more roads just encourages more traffic	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8

41. There are various ways governments might try to get people to cut back on driving, for the sake of the environment. Please tick one box for each policy below to show your views.

*PLEASE TICK **ONE** BOX ON EACH LINE*

For the sake of the environment, the New Zealand government should ...	Agree strongly	Agree	Neither agree nor disagree	Disagree	Disagree strongly	Can't choose
a. Spend public money on campaigns to persuade people to cut back on driving	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
b. Put up taxes on petrol each year for the next ten years to get people to cut back on driving	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
c. Put a special environment tax on private cars and use the money to improve public transport	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8
d. Restrict or ration the amount of petrol or diesel that people are allowed to buy to make them cut back on driving	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 8

Now for some questions on different subjects

42. From what you know or have heard, please tick a box for **each** of the items below to show whether you think the health service **in your area** is, on the whole, satisfactory or in need of improvement.

*PLEASE TICK **ONE** BOX ON EACH LINE*

		In need of *a lot* of improvement	**In need of *some* improvement**	**Satisfactory**	**Very good**
a.	GPs' appointment systems	1	2	3	4
b.	Amount of time GP gives to each patient	1	2	3	4
c.	Being able to choose which GP to see	1	2	3	4
d.	Quality of medical treatment by GPs	1	2	3	4
e.	Hospital waiting lists for **non**- emergency operations	1	2	3	4
f.	Waiting time before getting appointments with hospital consultants	1	2	3	4
g.	General condition of hospital buildings	1	2	3	4
h.	Staffing level of nurses in hospitals	1	2	3	4
i.	Staffing level of doctors in hospitals	1	2	3	4
j.	Quality of medical treatment in hospitals	1	2	3	4
k.	Quality of nursing care in hospitals	1	2	3	4
l.	Waiting areas in accident and emergency departments in hospitals	1	2	3	4
m.	Waiting areas for out-patients in hospitals	1	2	3	4
n.	Waiting areas at GPs' surgeries	1	2	3	4
o.	Time spent waiting in out-patient departments	1	2	3	4
p.	Time spent waiting in accident and emergency departments before getting treatment from a doctor	1	2	3	4
q.	Time spent waiting for an ambulance after a 111 call	1	2	3	4

43. In the last **two years**, have you or a close family member ...

*PLEASE TICK **ONE** BOX ON EACH LINE*

	Yes	**No**
... visited a GP?	1	2
... been an out-patient in a public hospital?	1	2
... been an in-patient in a public hospital?	1	2
... visited a patient in a public hospital?	1	2
... had any medical treatment as a **private** patient?	1	2

USE ONLY

44. Please tick **one** box for **each** statement to show how much you agree or disagree with it

*PLEASE TICK **ONE** BOX ON EACH LINE*

	Agree strongly	Agree	Neither agree nor disagree	Disagree	Disagree strongly	Can't choose
a. The welfare state makes people nowadays less willing to look after themselves	1	2	3	4	5	8
b. People receiving social security are made to feel like second class citizens	1	2	3	4	5	8
c. The welfare state encourages people to stop helping each other	1	2	3	4	5	8
d. The government should spend more money on welfare benefits for the poor, even if it leads to higher taxes	1	2	3	4	5	8
e. Around here, most unemployed people could find a job if they really wanted to	1	2	3	4	5	8
f. Many people who get social security don't really deserve any help	1	2	3	4	5	8
g. Most people on the dole are fiddling in one way or another	1	2	3	4	5	8
h. If welfare benefits weren't so generous, people would learn to stand on their own two feet	1	2	3	4	5	8

45. And how much do you agree or disagree that ...

*PLEASE TICK **ONE** BOX ON EACH LINE*

	Agree strongly	Agree	Neither agree nor disagree	Disagree	Disagree strongly	Can't choose
a. Social workers should put the child's interests first, even if it means taking a child away from its natural parents	1	2	3	4	5	8
b. Social workers have too much power to interfere with people's lives	1	2	3	4	5	8

USE ONLY

ABOUT YOURSELF

So that we can be sure we have a good cross section of people in our survey, would you please answer the following questions about yourself and your household. Remember that all responses remain **STRICTLY CONFIDENTIAL.**

46. Please indicate the year in which you were born: Year: 19 ☐☐

47. What is your sex?

Male ☐ 1

Female ☐ 2

48. Which of these categories best describes your **current** marital status?

(✓)

Married/living with partner ☐ 1

Widowed ☐ 2

Divorced ☐ 3

Separated ☐ 4

Single, never married ☐ 5

49. How many years of **full-time** education have you had? (including primary, secondary and tertiary).

Number of Years ☐☐

50. Which of these categories best describes your **highest** level of formal education?

(✓)

No formal qualification ☐ 1

Primary school ☐ 2

Secondary school for up to 3 years ☐ 3

Secondary school for 4 years or more ☐ 4

Some university or other tertiary ☐ 5

Completed trade or professional qualification ☐ 6

Completed university degree ☐ 7

Other (please specify)_____ ☐ 8

USE ONLY

51. Which of these categories best describes your current employment status? (✓)

Employed - full time (35+ hours weekly)	1	
Employed - part time (15-35 hours weekly)	2	
Employed - less than 15 hours/temporarily out of work	3	
Helping family member	4	
Unemployed or beneficiary	5	
Student	6	
Retired	7	**PLEASE**
Housewife/husband - home duties	8	**GO TO**
Permanently disabled	9	**Q58**
Other (Please specify)_____	10	

52. How many hours, on average, do you **usually** work in a normal week?

Number of hours: ☐☐

53. What is your **main** occupation?

Please describe fully, using two words or more; for example, builder's labourer *not* labourer, accounts clerk *not* clerk, deer farmer *not* farmer.

Main occupation: _____

54. Do you supervise or are you responsible for the work of any other people?

Yes	1	
No	2	--> **PLEASE GO TO Q55**

If yes, how many people do you supervise?

Number of people: ☐☐

55. Which of these categories best describes your current employment status?

Public sector (i.e., local government, Government)	1	
Publicly-owned private sector organisation	2	**PLEASE**
Privately-owned private sector organisation	3	**GO TO**
Non-profit/Charity/Welfare organisation	4	**Q57**
Self-employed	8	--> **PLEASE TO TO Q56**

56. If you are self-employed, how many **employees** do you currently have?

Number of employees ☐☐☐

57. Are you currently a member of a Trade Union?

Yes ☐ 1

No ☐ 2

58. We would now like to ask some questions about the composition of your particular household. ***EXCLUDING YOURSELF,*** could you please complete the following table, ordering members of the household by age.

(If you are the only member of your household, please go to Question 61.)

Please circle the number of people in your household, *not counting yourself,* write in their ages, and then circle a '1' or a '2' for each to show whether they are male or female.

No of persons in household	1	2	3	4	5	6	7	8	9	10	11	12
Age (years)												
Sex: Male	1	1	1	1	1	1	1	1	1	1	1	1
Female	2	2	2	2	2	2	2	2	2	2	2	2

If you are married or living with a partner, please go to Question 59. Otherwise, please go to question 61.

59. Which of the following categories best describes your **partner's or spouse's** current employment status?

	(✓)	
Employed - full time (35+ hours weekly	☐ 1	
Employed - part time (15-35 hours weekly)	☐ 2	
Employed - less than 15 hours/temporarily out of work	☐ 3	
Helping family member	☐ 4	
Unemployed or beneficiary	☐ 5	
Student	☐ 6	
Retired	☐ 7	
Housewife/husband - home duties	☐ 8	**PLEASE GO TO Q61**
Permanently disabled	☐ 9	

USE ONLY

Other (Please specify) _____ 10

60. What is your **partner's or spouse's** main occupation?

Please describe fully using two words or more; for example, builder's labourer *not* labourer, accounts clerk *not* clerk, deer farmer *not* farmer.

Spouse's/partner's main occupation_____

61. When you were 16 years old, what was your **father's** main occupation?

Please describe fully using two words or more; for example, builder's labourer *not* labourer, accounts clerk *not* clerk, deer farmer *not* farmer.

Father's main occupation_____

62. Generally speaking, in politics do you usually think of yourself as:

	(✓)
Democrat	1
Green Party	2
Labour	3
Liberal	4
National	5
New Labour	6
New Zealand First	7
Social Credit	8
Other (please specify)_____	9
No particular party	10

b. How strongly do you feel about that?

	(✓)
Very strongly	1
Fairly strongly	2
Not very strongly	3
Not at all strongly	4

63. At the 1990 General Election, which Political Party did you vote for?

	(✓)
Didn't vote	1
Democrat	2
Green Party	3
Labour	4
Mana Motuhake	5
National	6
New Labour	7
Social Credit	8
Other (please specify)_____	9

64. Which of the following categories best describes **your own** yearly income from all sources before tax?

	(✓)
$10,000 or less	1
$10,001 - $15,000	2
$15,001 - $20,000	3
$20,001 - $25,000	4
$25,001 - $30,000	5
$30,001 - $40,000	6
$40,001 - $50,000	7
$50,001 - $70,000	8
$70,001 or more	9

65. Which of the following categories best describes the total yearly income of **everyone in your household** from all sources before tax?

	(✓)
$10,000 or less	1
$10,001 - $15,000	2
$15,001 - $20,000	3
$20,001 - $25,000	4
$25,001 - $30,000	5
$30,001 - $40,000	6
$40,001 - $50,000	7
$50,001 - $70,000	8
$70,001 or more	9

USE ONLY

66. In terms of your social status, which of the following categories do you think you fit into?

	(✓)
Lower class	1
Working class	2
Upper working/lower middle class	3
Middle class	4
Upper middle class	5
Upper class	6
Don't know	8

67. What is your current religion?

	(✓)		(✓)
Anglican (C of E)	1	Mormon (Latter Day Saints)	12
Assemblies of God	2	Methodist	13
Baptist	3	Muslim	14
Brethren	4	Orthodox	15
Buddhist	5	Pentecostal	16
Catholic	6	Presbyterian	17
Christian	7	Protestant	18
Jehovah's Witness	8	Ratana	19
Jewish	9	Salvation Army	20
Hindu	10	Seventh Day Adventist	21
Lutheran	11	Other (please specify) _____	22
	11	No Religion	23

68. How often do you attend a religious service?

	(✓)
Never	1
Less than once a year	2
About once or twice a year	3
Several times a year	4
About once a month	5
Two or three times a month	6
Nearly every week	7
Every week	8
Several times a week	9
Can't choose/Don't Know	**

69. About how often do you pray?

	(✓)
Never	1
Less than once a year	2
About once or twice a year	3
Several times a year	4
About once a month	5
Two or three times a month	6
Nearly every week	7
Every week	8
Several times a week	9
Once a day	10
Several times a day	11
Can't choose/Don't Know	98

70. Which of the following categories describe your ethnic origin?

*PLEASE TICK **AS MANY** AS APPLY*

	(✓)
European	1
N.Z. Maori	1
Samoan	1
Other Pacific Island Polynesian	1
Indian	1
Chinese	1
Other Asian	1
African	1
Other (please specify)_____	

71. Have you ever been unemployed during the last ten years?

NOTE: By unemployed we mean unable to get a paid job when you wanted one.

Yes	1	
No	2	--> **PLEASE GO TO Q72**

And how many months have you been unemployed during the last ten years?
(Consider all times of unemployment)

Number of months: | | | |

USE ONLY

72. Which of the following categories best describes your current housing situation?

	(✓)
Own house (freehold or mortgaged)	1
Rent: private rental market	2
Rent: public or subsidised	3
Rent: from employer	4
Rent: other	5
Boarding	6
Living with parents or family	7
House comes with job	8
Other (please specify)_____	9

73. And in which area do you live?

	(✓)		(✓)
Northland	1	Horowhenua	12
Auckland	2	Wellington	13
Thames Valley	3	Wairarapa	14
Bay of Plenty	4	Nelson Bays	15
Waikato	5	Marlborough	16
Tongariro	6	West Coast	17
East Cape	7	Canterbury	18
Hawkes Bay	8	Aorangi	19
Taranaki	9	Clutha-Central Otago	20
Wanganui	10	Coastal-North Otago	21
Manawatu-Rangitikei	11	Southland	22

74. Do you live in a rural or urban area?

Rural	1
Urban	2

75. What size of city or town do you live in?

	(✓)
Farm or rural property	1
Village (under 1,000 people)	2
Small town (1,000 to 9,999 people)	3
Large town (10,000 to 29,999 people)	4
Small city (30,000 to 49,999 people)	5
Medium city (50,000 to 99,999 people)	6
Large city (100,000 people or more)	7

69. About how often do you pray?

	(✓)
Never	1
Less than once a year	2
About once or twice a year	3
Several times a year	4
About once a month	5
Two or three times a month	6
Nearly every week	7
Every week	8
Several times a week	9
Once a day	10
Several times a day	11
Can't choose/Don't Know	99

70. Which of the following categories describe your ethnic origin?

*PLEASE TICK **AS MANY** AS APPLY*

	(✓)
European	1
N.Z. Maori	1
Samoan	1
Other Pacific Island Polynesian	1
Indian	1
Chinese	1
Other Asian	1
African	1
Other (please specify)_____	

71. Have you ever been unemployed during the last ten years?

NOTE: By unemployed we mean unable to get a paid job when you wanted one.

Yes	1	
No	2	--> **PLEASE GO TO Q72**

And how many months have you been unemployed during the last ten years?
(Consider all times of unemployment)

Number of months: ☐☐☐

APPENDIX VI

TELEPHONE SURVEY QUESTIONNAIRE

PAYPHONE U&A
TELEPHONE QUESTIONNAIRE
94/160X

	QUESTIONNAIRE No:
Respondent's Phone No: ( )	Interviewer:
Respondent's Name:	Employment No:
Date:	Interview Start:
Supervisor Checked:	Interview Finish:
Coded By:	Interview Duration:
Week No: ( )	OFFICE ONLY: 01 02 03 04 05 06 07 08 09 10

KEYS

A) **AGE RECORD FROM SCREENER**

12 to 14 years	- 1
15 to 18 years	- 2
19 to 25 years	- 3
26 to 30 years	- 4
31 to 35 years	- 5
36 to 40 years	- 6
41 to 45 years	- 7

B) **SEX**

Male	- 1
Female	- 2

C) **AREA**

Auckland	- 1
Wellington	- 2
Christchurch	- 3
Dunedin	- 4
Napier/Hastings	- 5

D) **HOUSEHOLD STRUCTURE**

Could you please tell me which of these best represents your own household situation. Are you ....?

A young person living with your family or guardian	- 1
A young person living alone	- 2
A young person living in a flatting situation	- 3
A young married or defacto couple living together but with no children	- 4
Living in a family environment where you are responsible for children who are mainly preschool age	- 5
Living in a family environment where you are responsible for children who are mainly school age	- 6
Living in a family environment where you are responsible for children who are still at home, but who are mainly adults	- 7
Older couple or single person with no children, or with children who have all left home	- 8
Other **(DO NOT READ)**	- 9

E) **AGE OF CHILDREN**

If living in a family environment (-5,-6,-7) above, **ASK:**
Could you please give me the ages of all the children living in your household?

	Child 1	Child 2	Child 3	Child 4	Child 5	Child 6+
O to 5 years	- 1	- 1	- 1	- 1	- 1	- 1
5 to 8 years	- 2	- 2	- 2	- 2	- 2	- 2
9 to 11 years	- 3	- 3	- 3	- 3	- 3	- 3
12 to 14 years	- 4	- 4	- 4	- 4	- 4	- 4
15 to 18 years	- 5	- 5	- 5	- 5	- 5	- 5
19 and over	- 6	- 6	- 6	- 6	- 6	- 6

F) **EMPLOYMENT**

Which of these best describes your usual employment situation?

Work Full Time - 1
(35 plus hours per week)

↓

What is your occupation?

_____

Work Part-Time - 2 **Do Not Work In Paid Employment** -3

↓

Which of these best describes your main occupation, or occupation when you are not working part time?
READ OUT

A school student	- 1
A university, technical institute or other tertiary student	- 2
A home keeper	- 3
Unemployed	- 4
Retired	- 5

G) What is the occupation and sex of the main income earner in your household?

Occupation _____ Sex: Male - 1
Female - 2

H) **JOINT HOUSEHOLD INCOME BEFORE TAX**
(READ OUT)

Less than $20,000 p.a.	01
$20,001 to $30,000 p.a.	02
$30,001 to $40,000 p.a.	03
$40,001 to $50,000 p.a.	04
$50,001 to $60,000 p.a.	05
$60,001 to $80,000 p.a.	06
$80,001 to $100,000 p.a.	07
Over $100,000 p.a.	08
Refused	09
Don't Know	10

I) **ETHNIC BACKGROUND**

Could you tell me which one of the following best describes your ethnic background?

N.Z. of European descent/Pakeha	- 1
N.Z. Maori	- 2
N.Z. of Pacific Island descent	- 3
Pacific Islander	- 4
N.Z. of Asian descent	- 5
Asian	- 6
Other	- 7
Refused	- 8

J) **IF WORKING, FULL TIME OR PART-TIME, ASK:, OTHERWISE GO TO KEY K**

Which of these best describes your access to a telephone for personal use, while you are at work?

I can use one at any time	- 1
I can use one some of the time	- 2
I can use one when I am at work but I am often out	- 3
I can only use one only when on breaks or in emergencies	- 4
I do not have access to a telephone at work	- 5
Other	- 6

K) Do you have the use of a mobile or cellular telephone at all?

Yes	- 1	**CONTINUE**
No	- 2	**GO TO KEY L**

Is that for business or personal use?

Business	- 1
Personal	- 2
Both	- 3

L) Does your household subscribe to or use Clear Communications to make toll calls?

Yes	- 1
No	- 2

M) Which of the following best describes your access to a motor vehicle for you to drive personally?

I always have access to a car or other motor vehicle	- 1
I have access to a car or other motor vehicle most of the time	- 2
I sometimes have access to a car or other motor vehicle	- 3
I hardly ever have access to a car or other motor vehicle	- 4
I never have access to a car or other motor vehicle	- 5
I do not drive	- 6

THANK RESPONDENT

I hereby certify that this is an accurate and complete interview, taken in accordance with my instructions and the ICC/ESOMAR International Code.

SIGNATURE: _____ DATE: _____

Q1A This survey is mainly about payphones. Firstly, could you please tell me all the different types of payphones you know of that are available in New Zealand at the moment?
CODE ALL MENTIONED IN COL A.

PROBE IF NECESSARY: "What sort of phone is that?" or "What colour phone is that?" PROBE: Are there any others?

Q1B And were you aware that we have **(READ OUT ALL NOT CODED IN COL A)** in New Zealand?

FOR ALL PAYPHONES AWARE OF IN Q1A OR Q1B, ASK:

Q1C What is the name of the company which operates those **(PAYPHONE)?** By this I do not mean the company which owns the premises where the payphone is located, but the company which operates the payphone.
CODE IN COL C

Q1D Which of those payphones that you know of have you ever used?
CODE IN COL D.
PROBE: Are there any others?

Q1E And which type of payphone did you use the last time you used a payphone?
CODE IN COL E
SINGLE RESPONSE ONLY

	COL A Q1A Spon-taneous	COL B Q1B Prompted	COL C Q1C Company Responsible	COL D Q1D Ever Used (Multiple Response)	COL E Q1E Last Used (Single Response)
Coin phones (unspecified)	01	XXXXX	Telecom - 1 Other - 2 Don't know - 3	01	01
Coin phones in blue booths	02	02	Telecom - 1 Other - 2 Don't know - 3	02	02
Red phones	03	03	Telecom - 1 Other - 2 Don't know - 3	03	03
Handiphones	04	04	Telecom - 1 Other - 2 Don't know - 3	04	04
Cardphones (the ones in green booths)	05	05	Telecom - 1 Other - 2 Don't know - 3	05	05
Credit card phones (Yellow booths)	06	06	Telecom - 1 Other - 2 Don't know - 3	06	06
Other (Please Specify) _____	97	XXXXX	Telecom - 1 Other - 2 Don't know - 3	97	97
Don't know	98	98		98	98
None	99	99		99	

Q2A Can you recall any time when you were out somewhere and you wanted or needed to make a call from a payphone but you didn't?

Yes	- 1
No	- 2
Don't know	- 3

Q2B Are you aware of phonecards which enable you to pay for calls made from public payphones?

Yes	- 1
No	- 2
Don't know	- 3

Q3A Thinking about Telecom payphones now, do you pay for Telecom payphones by the minute or is there a set fee for calling?

By the minute	- 1	**CONTINUE**
Set fee	- 2	**GO TO Q3C**
Don't know	- 3	**GO TO Q4A**

Q3B How much per minute, does a local call cost?
DO NOT READ

20c per minute	01	**GO TO Q4A**
Other (Please Specify) **PROBE FOR BEST ESTIMATE** _____	97	
Don't Know	98	

Q3C How much is that set fee?
PROBE FOR BEST ESTIMATE

_____

Q4A Do you have a money machine card? By this I mean the card that you put into the 'hole in wall' machines to get cash out. I do not mean credit cards.

Yes	- 1
No	- 2
Don't know	- 3

Q4B Are you aware that Telecom payphones offer off-peak discounts when you make a national or international toll call on a payphone between the hours of 10.00pm and 8.00am?

Yes	- 1
No	- 2
Don't know	- 3

Q5A Have you heard of a card available from Telecom called 'Calling Card'? With this card you can make telephone calls from any type of phone including a payphone, anywhere, and the cost is automatically charged back to your home telephone?

Yes	- 1
No	- 2
Don't Know	- 3

If you needed to make a call from a public payphone, would you prefer to use one of these calling cards or would you prefer to use a phonecard?

Prefer Calling Card	- 1
Prefer Phonecard	- 2
Prefer neither	- 3
Prefer both	- 4
Don't Know	- 5

Q5C And why is that?

PROBE TO 'NO'
PROBE FOR CLARIFICATION

GO TO KEYS