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**PRACTICAL IMPLICATIONS OF NONRESPONSE BIAS  
IN SAMPLE SURVEYS**

A thesis prepared in partial fulfilment of the requirements for the  
degree of Master of Business Studies  
at Massey University

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1995

## **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.

## ACKNOWLEDGEMENTS

I would like to sincerely thank my supervisor, Philip Gendall, and my adviser, Ron Garland, for their guidance, support and encouragement throughout this research.

My thanks must also go to Ted Drawneek and Zane Kearns for their help with combining computer files from several different software packages.

Three friends, Wendy Parker, Lisa Emerson, and Jane Staple deserve a special mention for their support throughout this research, and I thank them sincerely for this.

I am also indebted to CM Research for providing access to the telephone survey data, and for their co-operation in conducting the telephone survey in a way that allowed me to use the data for my research.

# TABLE OF CONTENTS

Page no.

Abstract .....	i
Acknowledgements .....	ii
List of Tables .....	vi

## CHAPTER ONE: INTRODUCTION

1.1	Response rate trends .....	1
1.2	Components of nonresponse .....	1
1.3	Methods of addressing the nonresponse problem .....	2
1.4	What is a generally acceptable response rate? .....	2
1.5	An alternative approach .....	3
1.6	When nonresponse may be a problem .....	3
1.7	Purpose of the study .....	4
1.8	Objectives .....	4

## CHAPTER TWO: LITERATURE REVIEW

2.1	Introduction .....	5
2.2	Response rate trends .....	5
2.3	Reasons for the decline in response rates .....	8
2.4	The nature of nonresponse .....	10
2.5	The characteristics of nonrespondents .....	16
2.6	Methods of estimating nonresponse bias .....	20
2.7	Methods of compensating for nonresponse bias .....	24
2.8	The effect of additional callbacks on estimates .....	26
2.9	Summary .....	35

## CHAPTER THREE: METHOD

3.1	Introduction .....	36
3.2	Mail survey .....	36
3.3	Telephone survey .....	37

## CHAPTER FOUR: RESULTS

4.1	Introduction . . . . .	39
4.2	Mail survey . . . . .	39
4.2.1	Absolute differences between mail survey interim and final estimates . . . . .	40
4.2.2	Mail survey questions for which interim and final estimates differed by two or more percentage points . . . .	42
4.2.3	Significantly different mail survey interim estimates . . . .	43
4.3	Telephone survey . . . . .	44
4.3.1	Absolute differences between telephone survey interim and final estimates . . . . .	45
4.3.2	Telephone survey questions for which interim and final estimates differed by two or more percentage points . . . .	47
4.3.3	Significantly different telephone survey interim estimates . . . . .	50
4.4	Summary . . . . .	51

## CHAPTER FIVE: DISCUSSION

5.1	Introduction . . . . .	53
5.2	The potential for nonresponse bias . . . . .	53
5.3	Comparisons of interim and final estimates . . . . .	54
5.4	Types of questions prone to nonresponse bias . . . . .	55
5.5	A tentative minimum acceptable response rate . . . . .	60
5.6	Variables most at risk of nonresponse bias . . . . .	63
5.7	Limitations . . . . .	63
5.8	Conclusions . . . . .	64

REFERENCES . . . . .	66
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## APPENDICES

I	Mail survey questions with significantly different interim estimates . . . . .	71
II	Telephone survey questions with significantly different interim estimates . . . . .	84
III	Number of significantly different telephone survey interim estimates using $n = 1000$ . . . . .	86
IV	Contact attempt outcomes and response rate calculations . . . . .	87
V	Mail survey questionnaire . . . . .	88
VI	Telephone survey questionnaire . . . . .	119

## LIST OF TABLES

1	Absolute differences for all mail survey variables . . . . .	40
2	Absolute differences for mail survey demographic questions . . . . .	40
3	Absolute differences for mail survey attitude questions . . . . .	41
4	Absolute differences for mail survey behavioural questions . . . . .	41
5	Mail survey demographic question with an absolute difference of more than two percentage points at a 51% response rate . . . . .	42
6	Mail survey attitude questions with absolute differences of more than two percentage points at a 51% response rate . . . . .	43
7	Number of significantly different mail survey interim estimates . . . .	44
8	Absolute differences for all telephone survey variables . . . . .	45
9	Absolute differences for telephone survey demographic questions . .	46
10	Absolute differences for telephone survey awareness questions . . . .	46
11	Absolute differences for telephone survey behavioural questions . . .	47
12	Telephone survey demographic questions with absolute differences of two or more percentage points at a 48% response rate . . . . .	48
13	Telephone survey awareness questions with absolute differences of two or more percentage points at a 48% response rate . . . . .	49
14	Telephone survey behavioural question with an absolute difference of more than two percentage points at a 48% response rate . . . . .	49
15	Number of significantly different telephone survey interim estimates	50
16	Mail survey attitude questions with significantly different interim estimates . . . . .	72
17	Mail survey behavioural questions with significantly different interim estimates . . . . .	80
18	Mail survey demographic questions with significantly different interim estimates . . . . .	82
19	Telephone survey questions with significantly different interim estimates . . . . .	85
20	Number of significantly different telephone survey interim estimates using n = 100 . . . . .	86
21	Contact attempt outcomes for mail survey . . . . .	87
22	Contact attempt outcomes for telephone survey . . . . .	87

## **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.<sup>1</sup>

### **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

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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'.<sup>2</sup>

### 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:

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