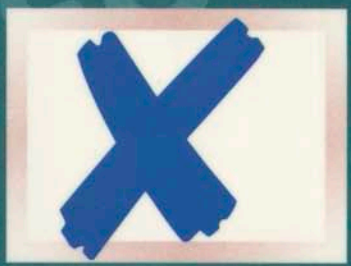
A Guide to good survey design



Statistics NEW ZEALAND
Te Tari Tatau

A Guide to Good Survey Design

Revised July 1995 by

Statistics New Zealand
Te Tari Tatau
Wellington, New Zealand

Catalogue Number 01.701.0095
ISBN: 0-477-06492-2

Recommended retail price $24.95
(includes 12.5% GST)

Preface

This guide is a revision of the 1986 Handbook on Survey Procedures. It is aimed at those who undertake surveys or commission surveys. Its objective is to identify the issues associated with the planning, undertaking, commissioning, management and processing of a survey, but not to deal exhaustively with ways of addressing these issues.

We have adopted this approach because there are so many factors associated with the undertaking or commissioning of a survey - the type of information need, the nature of what is being measured, the type of survey methodology - that an exhaustive treatment of all the ways of addressing survey problems would be beyond the scope of this type of publication. For fuller treatment of specific issues, such as sample design, questionnaire design or estimation, readers may refer to the list of references. There are also suggestions about where to obtain expert opinion and advice.

I recommend this guide to all who commission, carry out or use surveys.

Len Cook
GOVERNMENT STATISTICIAN

Acknowledgment

This report was prepared by the Statistical Co-ordination and Standards Section, the Social Statistics Development Section and the Mathematical Statistics Branch and was published by the Publishing and Media Services Division of the Department of Statistics.

Further information

For further information on this report, or on other publications or products, just contact the Information Consultancy Group at the office nearest you.

AUCKLAND
70 Symonds Street
Postal Address: Private Bag 92003
Phone: 0-9-358 4588
Fax: 0-9-379 0859
StarNet: DOS002

WELLINGTON
Aorangi House
85 Molesworth Street
Postal Address: PO Box 2922
Phone: 0-4-495 4600
Fax: 0-4-472 9135
StarNet: DOS001

CHRISTCHURCH
Winchester House
64 Kilmore Street
Postal Address: Private Bag 4741
Phone: 0-3-374 8700
Fax: 0-3-374 8864
StarNet: DOS003

DUNEDIN
Norwich Union Building
Cnr Bond/Rattray Streets
Postal Address: Private Bag 1935
Phone: 0-3-477 7511
Fax: 0-3-477 5243
StarNet: DOS004

Reproduction of material

Contents

Chapter 1

Introduction

Information is a cornerstone of modern society. For both individuals and organisations, for Government, business and the wider community, relevant and timely information is essential. Surveys provide a widely accepted vehicle for producing information of a statistical nature. Government requires statistical information for policy-related purposes, such as policy formulation, and programme implementation and monitoring. Businesses need statistics on which to base decisions in the market-place. The public have a right to assess the nation's economic and social condition, and statistics are vital for such an assessment. Statistics derived from surveys are vital inputs for social and economic research.

In essence, a survey involves the collection of information from some (or all) units of a population using well-defined concepts, methods and procedures, and the compilation of such information into a useful summary form.

The purpose of this guide is to outline the issues to be addressed and the steps to be taken in the course of planning and undertaking a statistical survey and its subsequent analysis. The guide summarises Statistics New Zealand's understanding of the principles of good survey design. It is not intended, however, to be a complete guide to survey design and analysis. Those intending to be involved with survey work, and interested readers who require more detail, should refer to the list of references or consult experts in survey design and operation.

Readers of this guide are likely to be involved in survey work; they may be involved with commissioning surveys or the various phases of planning, undertaking or processing surveys. To a lesser extent those using survey-based statistics may be interested in the background that the guide provides on issues associated with undertaking surveys.

Chapter 2

First considerations

Is suitable information already available?

The information required may be available in whole or in part from existing sources, which may mean a proposed survey could be unnecessary. Where to look for existing sources will depend very much on the type of information required. The following list is offered as a starting point.

Literature search

Libraries are a good starting place. A catalogue search under the relevant topic headings could be helpful. The indexes of relevant professional journals could then be used to take the research further.

Published statistics

Statistics New Zealand publishes a wide range of statistical information on demographic, economic and social topics. Other sources of published statistics include local councils, various Government departments, universities and other research agencies.

Statistics New Zealand

Even if information does not appear to be published in enough detail, a telephone call to Statistics New Zealand will quickly establish what is available. Generally, what is published is only a summary of what is available.

Government agencies and professional associations

Government agencies and professional or business associations can be good sources of unpublished information.

Local sources

In situations where quantitative data is needed for local planning, useful information can sometimes be found in local authority records, the local Chamber of Commerce or other agencies. Piecing together information from various sources may provide much of the data needed.

Surrogate information

Often a search of available information will not precisely satisfy an information need, but it might give data related to it. Such "surrogate" information might be adequate for research purposes, particularly because running a specialised survey may be expensive and time consuming. Examples might be using volume data as a surrogate for value, sales for production, or sales for consumption.

Administrative forms and records

Forms associated with a service, an application, a membership or a registration are being used more frequently as sources of readily available statistical information. There are particular issues, however, associated with the use of administrative data for statistics, such as coverage definitions being set for some regulatory purpose and not ideal for the required information need. For example, income statistics that are derived from Inland Revenue Department returns relate to taxable income.

Seeking expert knowledge and opinion

Not all problems require a statistical approach, even when at first they seem to. Controlled experiments, case studies, participant observations or subjective evaluation will often provide useful common-sense solutions. Discussion with experts in the relevant field of enquiry will sometimes produce all the guidance needed to obtain the required information. Possible contacts include: Statistics New Zealand, other Government departments, universities, the New Zealand Statistical Association, Crown Research Institutes, subject-matter experts and management consultants.

Factors to consider

Once it is established that a statistical survey is indeed what is needed, careful planning in the pre-survey stages is necessary to ensure a satisfactory result. Here are some of the factors that need to be considered:

Realistic time horizon

Designing and executing a survey can take many months. Even a relatively small survey will have a large number of interrelating phases.

Money

A survey will require financial outlay; the greater the detail required the greater the cost. Does the sponsoring organisation have the necessary resources or can it afford to purchase them?

Likelihood of co-operation

To conduct a survey, co-operation is needed from the respondents and possibly also from other organisations and agencies. If a survey contains questions on sensitive issues, the co-operation received from the respondents may be affected. Before such a survey is undertaken, an assessment of response rates, by, for example, undertaking pilot surveys, should be made to ensure that it is possible to achieve an acceptable level of response.

Match between information collected and measures or indicators produced

Will the information to be collected measure what it is intended to measure? For example, reported opinion may not be a good predictor of behaviour.

Contracting out

Because of factors such as unavailability of staff or expertise, it may be appropriate to contract out all or part of the work of a survey project. There are particular issues associated with the contracting out of surveys. This topic is addressed in more detail in Chapter 3.

Adding questions to an existing survey

Rather than undertaking a new survey, sufficient information may be obtained by appending a relatively small number of questions to an existing survey questionnaire.

Why sample rather than take a census?

Once a decision has been made to undertake a statistical survey, it needs to be decided what type of survey is most appropriate.

The researcher must decide whether information is to be sought from the whole population (via a census) or only from a sample of the target population (via a sample

survey). In many cases, a census is ruled out by a shortage of money, time or trained personnel. In other cases (for example, when the population of interest is relatively small) a census may be desirable.

A sample survey uses a subset of the population of interest. If correct statistical techniques are used, it is possible, using the survey data, to make estimates about the characteristics of the whole population, and to associate a measure of error to these estimates. Sampling issues are addressed in more detail in Chapter 5 and sampling and non-sampling errors in Chapter 7.

The advantages of a sample survey over a census are:

- Sample surveys are generally cheaper and faster.
- A census is sometimes impossible due to a lack of resources or the difficulties of contacting the whole population within a limited period of time.
- Sample surveys are easier to control. The small number of measurements from a sample may well be more accurate than the large number of measurements from a census. This is because more resources can be employed and directed at careful selection of personnel who can be given intensive training along with more careful supervision of the fieldwork and processing of results.

Disadvantages of a sample survey are:

- Sampling error. As samples are only part of the population, different selections of samples can give different results: different from each other and different from the results which would be obtained if the whole population was surveyed. These differences are due to sampling error. Censuses do not have sampling error. Sampling and non-sampling errors are discussed in more detail in Chapter 7.
- Detailed analysis of data may not be possible as there may be insufficient information on small subgroups from which to draw conclusions.

Importance of survey planning

Before a survey is undertaken, it is vitally important that a thorough plan of the whole process is prepared. The quality of analysis and reports produced depends very much upon what happens in the initial stages. Poor planning may result in the objectives of the survey not being met, and statistically invalid estimates being produced. Chapter 4 deals in more detail with survey management.

Seek help

It is almost impossible to think through all the ramifications of a survey without some advice and guidance from people knowledgeable in one or more aspects of the problem. This includes help in defining goals and objectives, designing a questionnaire, developing sampling methodology and working out what tabulations of data and analyses are needed. Management consultants or market research firms may be able to assist with some or all of the planning and operational phases.

If the project is large, difficult or beyond the technical and planning resources immediately available to a survey sponsor, an advisory committee can be helpful and supportive. If well-selected, the committee can give objective advice from several points of view at relatively little and sometimes no cost. If a committee is formed, it is important to define its objectives and to plan what is to be accomplished at each meeting.

The committee should be appointed while ideas (and the survey sponsor's commitments) are still flexible enough to permit change. If the problem is a big one - in scope, geographically or technically - a committee large enough to reflect all the relevant expert knowledge and skills will be needed. If the problem is more limited, a small group will do, but it still helps to consult outsiders.

Defining survey objectives

Objectives of surveys tend to be expressed in very broad and often over-simplified terms when they are first conceived. As planning progresses, it may become apparent that the survey objectives are so all-encompassing that meeting them fully would not be feasible. It is necessary to convert the original vague terms into more clearly defined requirements which can be used as the basis for taking specific action when designing the survey.

End-use of survey results

Clarification of the end-use of information gained from the survey will help to clarify its objectives, to tailor the overall approach, to formulate the actual questions, and to make decisions on processing, analysis and the format of the final report.

The results of a survey may be used as input for one or more of the following:

- future policy decisions
- programme monitoring
- facilities or operational planning
- market research
- contingency planning
- formation, updating or expansion of a database
- planning of more detailed surveys to be conducted subsequently
- public relations planning
- measuring customer satisfaction
- improving general knowledge about a situation

It may also be worthwhile at this stage to determine any end-uses for which the results would not be suitable.

Once an end-use has been clearly stated, the selection of survey topics and questionnaire design will be simplified and the groundwork for analysis will have already been established.

Developing a survey proposal

A survey proposal is a document which sets out the survey's intent and lays out the plan for its implementation. If the work is being contracted out, a survey proposal may be a specification to a supplier of survey services (see Chapter 3). Thus, the exact contents and aim of such a proposal may vary, but items which could be included are:

Abstract

An overview of the need for the survey and how it fits in with the needs of the organisation sponsoring the survey.

Background

Any relevant information relating to the survey topic, and comments on work that may have been done in the past.

Administration

- The title of the survey.
- The sponsor of the survey.
- Who is carrying out the work.
- If the survey is to be conducted once or repeated.
- The frequency of repeated surveys.

Finance

The total estimated cost and a breakdown of costs.

Objectives

It is necessary to state the survey's objectives as specifically as possible, and to put into place a system to measure how effectively these objectives have been met upon the survey's completion. Some questions to consider are:

- Over what period of time is the survey to be conducted? When are the results required?
- What is the population of interest, and is information required for some subgroup of the population (for example, women, a particular age group, an ethnic group, a geographical region)? If detailed cross-tabulations are required, they need to be specified at an early stage.
- What questions need to be answered? What information is required to answer them? What form should the results take? What is the general form, range, detail, etc of the required output?
- What unit of measurement will be used (dollars, numbers, etc)?
- Why is the information needed? Who is going to use the information and for what purpose?
- How will the information be used? For example, is it to be used for internal research, limited release, or public release?
- What is the desired accuracy of the results? The sample size affects the accuracy and a larger sample will have less sampling error. A well-planned and well-supervised survey will have less non-sampling error.

- How often is the information required? When is it first needed? Is it "one-off" or will it be continuing on a monthly, quarterly, annual or longer basis?

Time frame

A clear indication of the commencement and completion times for each phase of the survey is required.

Topics covered

A list of the specific pieces of information to be collected is required.

Resources available/needed

- Personnel
- Money
- Time
- Data processing

Sampling methodology

- Target population
- Sampling frame
- Sample selection method
- Basis for decision on sample size
- Information collection method

Questionnaire

The procedures for developing and testing the questionnaire should be outlined. These should include the steps taken to ensure that the data collected is consistent and accurate. The procedures for managing the questionnaire and its related documents should be outlined.

Outputs

What kind of statistics are required? What tables, reports, and datasets are needed?

Chapter 3

Contracting out surveys

It is often decided by survey sponsors to contract out some or all of the work of planning, conducting and analysing a survey. This chapter outlines some of the issues associated with contracting out survey work.

Reasons for contracting out

When requesting authorisation to obtain the services of a supplier of survey services, survey sponsors will normally be required to prepare some sort of request for approval to spend funds. It will be useful to be able to identify a specific rationale for the request such as:

- Specialised knowledge and skills can be obtained to deal with complex problems which are outside the skills or experience of existing staff;
- Objectivity and a fresh viewpoint are available from outsiders who are not personally involved in the outcome of the project;
- The survey can be performed promptly and on schedule because the required workforce is already trained and in place at strategic locations throughout New Zealand;
- Special interviewing facilities are required for conducting effective group or in-depth interviews;
- Work-force and cost savings can be achieved by reducing or eliminating the need for establishing and maintaining a full-time survey staff in the sponsor's organisation.

Preparing survey specifications

Survey specifications, which should be in writing, provide a description of the work to be done, the amount of work, when it is to be done and, if relevant, how it is to be done. The supplier must not be expected to make assumptions concerning any

significant factor. In order to provide this range of detail, the sponsor must develop a carefully considered survey specification. It is important that a survey specification is complete and consistent.

Specifications should include:

- Objectives of the survey;
- A description of the information needs of the sponsor;
- A description of the end-use of results;
- An explicit statement of any hypotheses that are to be tested;
- An explicit statement of any assumptions that the researcher or survey sponsor may have made;
- Some indicators of the scope of the survey;
- An indication of the available budget;
- Nature and scope of analysis and reports required;
- Materials and services (if any) to be provided by the sponsor;
- Relationship to other research (if any) to be provided by the sponsor;
- Any prior decisions concerning approach, methodology or questionnaire content;
- Sponsor's operational requirements;
- Required qualifications of supplier;
- Approvals needed from organisations.

Not every item in this list will necessarily apply in every case, but any exclusions from the specifications should be the result of a conscious decision. Several of these items are discussed in more detail below, while objectives and end-use of survey results are discussed in Chapter 2.

Indicators of scope and budget

Without knowing the background situation or the relative importance of survey results to a sponsor, the supplier may be unable to estimate the scope of the survey, the amount of work, or the accuracy of the results expected by the sponsor. In addition to a description of the sponsor's needs, and a statement of the end-use of the results, some specific indicators of the scope and size of the project should be given, such as:

- Nature and complexity of the underlying problem
- Definition of the population to be studied

- Number of interviews or mail questionnaires to be completed, if known at this time
- Geographic area to be covered
- Desired accuracy of results
- Some indication of budget limitations.

Analysis and reports

The survey sponsor must identify what analysis and reports of the results are needed. Statistical analysis is a large subject in itself. Expert assistance may need to be sought about what particular analytical tools are appropriate.

Reports covering survey results may range in style from a comprehensive report, containing all available supporting material, to a condensed summary report supported only by significant graphs or tables. In all cases, however, it is vital that the sponsor request from the supplier documentation on the details of the survey methodology (sample selection, method of information collection, call backs, quality control) because the particular methodology used can greatly affect the analysis and interpretation of results. Reports may also contain recommendations for action by the sponsor.

Materials supplied by the sponsor

The availability of background material should be noted because it may affect the amount of work to be done by the supplier. It may affect the timing of the survey. Possible examples may be:

- list of the survey population
- proposed sample
- draft questionnaire.

Relationship to other research

Some surveys are only part of a larger research project, or in some cases the current survey is:

- Exploratory and is to be followed up by more detailed surveys subsequently;
- One of several surveys, each of which is dedicated to some particular part of a complex problem;
- A detailed survey for which much of the input (for example, concepts, assumptions or base-line data) was obtained by means of earlier surveys;

- Required to be consistent with other surveys to ensure that results are comparable over time or with surveys in other areas.

Unless suppliers are informed of such situations, the specifications may appear to be incomplete or based on unwarranted assumptions, and they may be confused or misled as to the precise scope of the work to be done.

Decisions already made

The decision to conduct and then to contract out a survey (or any part of it) may occur at any time during a complex review of a programme. Consequently, much of the context and many of the parameters within which the survey must be conducted may depend on decisions which were taken without the survey in mind. Similarly, considerable survey development work may have been done before the decision was taken to contract out the actual survey or some phase of it. If any of these prior activities have established conditions or caused decisions to be made which affect the planning or conduct of the survey in any way, these should be described in the specifications.

Sponsor's operational requirements

Operational requirements may consist of items such as:

- Progress reporting intervals
- Time restrictions, deadlines and completion date;
- Access by the sponsor to completed questionnaires, or a dataset of individual information;
- Form, scope of final report, level of detail, personal presentation and interpretation of the findings;
- Approval procedure for survey and questionnaire design (including approvals under the Statistics Act 1975 for surveys undertaken by Statistics New Zealand);
- Any other requirements particular to the study.

Many of these requirements will affect the price quoted. For example, obtaining design approval may involve preparation of successive drafts, repeated trips and numerous phone calls.

Realistic completion dates are important. The competitive tendering process almost always requires a number of weeks. The tenderer who is then given the contract requires time to do an adequate job of background or exploratory research, planning, sample design, questionnaire preparation, pre-testing and assignment of survey staff.

Unless the sponsor allows sufficient lead-time, the supplier will be forced to cut corners and the quality of the findings is likely to suffer.

Required qualifications of suppliers

In the process of defining the problem and preparing objectives, the sponsor will usually become aware of any particular specialised skills or facilities which the supplier must be able to provide. The sponsor should outline such requirements in the specifications.

Other matters

In some circumstances, it may be appropriate to seek tenders on a non-competitive basis, but usually competitive tenders are sought. It may be necessary to obtain a "ball-park" figure for the cost of the proposed survey before tenders are sought, so that the risk of having to cancel a project because the tenders were beyond the budget is reduced. Equally, it is often appropriate to include an indication of the amount of funds there are available for the survey in the invitation to tender.

It should be noted that there are significant costs in preparing proposals. Practices which take advantage of free quotes to the proposed survey sponsor are unethical. Ideas and techniques contained in tenders should be treated with strict confidentiality because they remain, technically, the property of their respective organisations.

The supplier of survey services

Some organisations have developed particular research expertise and/or facilities, such as:

- In-depth interviewing
- Face-to-face interviewing
- Mail questionnaires
- Mail-out services eg for questionnaires
- Regular "omnibus" surveys which collect information for clients from a pre-selected sample of known size taken from the general population;
- Structured panel surveys;
- Shopping mall interview techniques;
- Surveys in particular subject areas.

Still other firms specialise in processing services, such as data capture and tabulation, or are active only in management consulting. Some firms supply cross-tabulations only, while others will be able to carry out more sophisticated statistical analyses.

Locating suppliers

Regular purchasers of research generally maintain a list of those firms whose activities are suited to their needs. One-time or occasional purchasers who do not have such a list will probably wish to make inquiries concerning the qualifications and capabilities of each firm before sending the firm an invitation to tender on a contract. Suppliers of survey services may be found in the yellow pages of main centre telephone directories under headings such as: Research, Management Consultants, Economic Research, Marketing Research, Marketing Consultants. In addition, marketing and social science departments of universities and polytechnics may offer a contract survey service.

What a tender should contain

A tender should be a complete response to the sponsor's invitation to tender, and normally should not require further amplification or explanation. A tender should, in general, cover the following subject-matter:

- The tenderer's interpretation of the sponsor's description of the project and its objectives, particularly if the original specifications are vague or if any details were expanded in discussion between the sponsor and tenderer;
- A description of the tenderer's proposed approach, usually called a "creative proposal", when the approach and techniques to be followed are not outlined in the specifications or where the tenderer feels strongly that the sponsor's approach is not suitable for the project;
- A description of the proposed work-plan including survey size, an outline of the type of questions to be used, methodology, quality controls, scheduling and completion date;
- A description of any sub-contracting of part of the work to other firms or to individuals who are not regular employees of the firm;
- A description of the type and amount of the resources planned for each phase of the project, particularly in the case of a large project;

- A statement concerning any materials or services to be provided by the sponsor and their effect on the specified completion date;
- A statement concerning any formal briefing sessions or other meetings requested by the sponsor;
- A description of the reports to be presented to the sponsor, including progress reports and the final report;
- Acceptance or otherwise of terms and conditions;
- Price with a reasonable breakdown of the survey by components and the contribution of each component to the overall price;
- Identification of the staff members responsible for the survey and their qualifications;
- Related experience of the firm and of those staff members designated to work on the survey;
- Stability of the firm, and the adequacy of its reserve resources to ensure the survey is implemented on schedule.

Tender evaluation

Tender evaluation criteria should be prepared before any actual proposals are received. Suggested evaluation criteria are listed below.

- Does the tenderer show an understanding of the survey as spelt out in the objectives and in the sponsor's identification of the need for information?
- To what extent is the sponsor's problem analysed in the tenderer's proposal? Does it show originality and creativity, if these are called for?
- Is the work-plan realistic and adequate? Are the various steps spelt out adequately to show the levels of quality control which will be exercised?
- Is the proposed methodology statistically valid when considering the survey's objectives?
- Is the proposed work schedule reasonable? If the schedule appears unbalanced, it may be that the firm's resources are already heavily committed, and this project must wait its turn for use of these resources. Is rigid adherence to the schedule important to the sponsor?
- Are the project control techniques suitable and adequate for this type of project? Will the sponsor be informed of significant delays?

- Does the tenderer have the resources in place to carry out the project? Some firms are equipped to carry out only certain phases of a project and must sub-contract other phases. Is the sponsor prepared to accept this?
- Does the tenderer give an indication of having reserve resources available to cope with delays or unexpected problems?
- Does the tenderer give evidence of financial stability and overall capability of meeting the contractual commitments?
- Does the tender identify the people who will actually work on the survey, or does it list only partners or principals?
- Are the qualifications and experience of the designated individuals spelt out?
- Does the tenderer agree to abide by the terms, conditions and timing specified in the invitation?
- Is the price competitive for the amount of work proposed?

The process of evaluation needs to be undertaken carefully and ethically. It needs to be well documented. The evaluation of tenders may itself be contracted out.

The contract

After the supplier has been selected, the sponsor will need to prepare a formal written contract to be signed by authorised representatives of the sponsor and the supplier. The contract is of extreme importance. Legal advice may be necessary on the terms and content of a contract.

Evaluation of a supplier's performance

On completion of a contract the sponsor should prepare an evaluation of the supplier's performance. This should be carried out promptly while the relevant facts are fresh in the sponsor's mind. Points which could be covered in an evaluation include:

- A description of the work undertaken;
- The quality of the work performed when measured against the original specifications;

- The quality of communication maintained with the sponsor during the project and in the interpretation of the survey findings;
- The supplier's adherence to the schedule during the survey, and the timeliness of the final report;
- Comments regarding the possible selection of the supplier for any future contract.

Chapter 4

Survey management

Even a relatively small survey may involve a significant amount of organisation and co-ordination - balancing time and resources with the needs of the survey sponsors and users. A survey needs to be thought through as a whole project right from the start.

A survey manager will need to make decisions, or get the relevant people to make them, at the right time. This chapter aims to canvass the issues that need to be considered and decisions to be made when managing the operation of a survey. Some of the issues raised are dealt with in more detail in other chapters.

Even if a survey is to be contracted out, a survey sponsor will still need to undertake a significant amount of survey management. This may involve monitoring progress reports from the supplier of survey services detailing work done to date, work remaining to be done, progress against time and money allocations, etc.

Planning

Once a decision to undertake a survey has been made, it needs to be decided who will be responsible for proposals for approval in principle, approval for funding, invitations to tender, survey specifications, evaluation of tenders, preparation of a formal contract, etc. Other approvals may have to be arranged when survey planning is well advanced.

Detailed timetables need to be prepared and a system set in place for monitoring them. Timetables need to be specific about interlinking and critical phases of the project. What happens if the timetable is not being met?

For all phases of the survey, quality assurance procedures need to be put in place. This should also involve contingency resources and time to restore lapses in quality.

Consultation

A programme needs to be drawn up in consultation with the users of the survey results. Consultation with sponsors or funders of the survey is also important. It needs to be clear at what stages changes can be made, and when it becomes too late to make

changes. There will also need to be consultation with suppliers of goods and services - contractors, designers, printers, etc.

Design

Design phases need to be co-ordinated. Who will decide on and design the survey methodology? Who will decide what type of collection method should be used? It also needs to be considered whether to use some computer application such as Computer Assisted Telephone Interviewing (CATI). Who will do the questionnaire and sample design? Who will do the interviewer training? Who will design ancillary documents such as interviewer instructions, record books, brochures, interviewer control documents, timesheets? How will printing and publishing of these documents be organised - right quantities and quality, in time? Will any special equipment be needed?

An important consideration in the early stages of survey planning is what classifications and definitions will be needed. For example, in a survey of businesses, respondents may need to be classified according to their industrial activity. This will need to be done in a standard way so that the resulting statistics can be compared with existing published statistics or with a later repeat of the survey.

In cases where the subject matter of the survey has not previously been researched in-depth, it may be necessary to develop new classifications. This could mean a long development phase before other planning can begin, but it is vital if meaningful statistics are to be produced.

Important economic variables for which standard definitions and classifications are important are industry, commodity, and institutional sector. Standard social classifications such as those for occupation, marital status, household and family type, ethnicity and age should be used. In addition, geographic region should be consistently classified.

Pre-tests and pilot surveys

At an early stage a programme to test the survey methodology needs to be developed. This is likely to involve pre-tests and pilot surveys. When should they be done? What should they achieve? Who decides when enough testing has been done? Who will review feasibility and provide any checks and balances during design phases?

Operation

The mechanics of dispatch, return, storage, recording, security and destruction of questionnaires need to be clearly established as being feasible and in line with what is required by survey sponsors and ethical practice.

How exactly will the data be collected? If interviewer-administered, how will interviewers be recruited? What arrangements are there for employment contracts, wages and conditions? Is the representativeness or appropriateness of interviewers an issue (eg ethnic mix, women only)?

How will interviewers get to the right households or businesses, if the survey uses a face-to-face interview method? What are the phone interview mechanisms, if relevant?

There will be issues of quality assurance. How will it be clear whether the interviewers have done their job properly?

Non-response

What will be done to ensure that the response rate is as high as possible? How many call-backs will be made or reminder letters sent, and at what intervals? Will there be a study of non-respondents' characteristics? With regard to partial non-response, where will the line be drawn between usable and unusable responses? Will there be imputation for non-response?

Processing and analysis

What are the arrangements and what is the timetable for getting the questionnaires from the field to the office? What data is to be captured from the questionnaires? What grooming, coding, checking, or editing of questionnaires or captured data will be done? Who will design editing rules? Will data be edited at all? What reconciliations will be done to identify non-respondents and to ensure that there is a questionnaire for every respondent?

How will data be captured? How will the computer file of captured data be arranged?

Will special computer programs be written or will a standard statistical software package be used to analyse the data? Will processing or analysis be contracted out? Who will ensure that what is planned for is what is wanted? How will it be checked that the rules for deriving measures from the survey data are theoretically correct (such as in deriving a measure of health status from answers to questions)? Is supplementary data, not from the survey, needed to calculate or finalise results?

How will data be backed up so that it can be restored if accidentally lost? How will data be stored or archived so that it can be retrieved and further analysed at a later date?

The quality of, and timetable for, processing and analysis need to be monitored.

Publicity

What publicity, if any, will there be before, after, and during the survey? Will there be news releases or media articles?

How will respondents be persuaded to take part? Who will deal with respondent reaction? Who will be responsible for damage control if there is adverse publicity? Whose responsibility is it to deal with correspondence? At what level are different problems dealt with? Who takes the ultimate responsibility?

What feedback to respondents will there be? Will they be sent a copy of the results? Will they go in a draw for a prize? Will they be formally debriefed or just thanked nicely?

Report and other outputs

Who will be responsible for text, tables and graphs in a written report? How will it be confirmed that the report will be what the sponsors want? How will the report be reviewed to ensure validity of cross-tabulations, interpretive text, etc? What are the mechanics of drafting, incorporation of tables and graphs, printing, number of copies, distribution? Will there be a data tape delivered to sponsors? Will this contain anonymised data or individually identifiable data? Does this have implications for information privacy or confidentiality?

How will results be released? What caveats will there be on using the results? How will it be ensured that these caveats are obeyed? Will the report be advertised? If the report is to be sold, who decides on a price? If the report is confidential, who decides if there will be any exceptions? Will statistics from the survey be available for sale?

Costs

How will costing be organised? What progress reports will there be on expenditure? Will expenditure be forecasted? What happens if there are cost overruns? Will there be any cost recovery from the sale of report or survey data?

Dealing with major problems

What happens if the expected response rate is not achieved? What if the expected accuracy of the statistics cannot be achieved? What if special circumstances arise which adversely affect the survey in some way? What if this means that there need to be more resources allocated, or the objectives need to be rethought in some way? Whose responsibility is it if the survey is wholly overtaken by subsequent events and becomes irrelevant?

Chapter 5

Sampling issues

Target population

The target population is the entire group from which we would ideally like to get information.

The definition of the target population needs to be as exact as possible, such as, "Maori females living in the greater Auckland area aged between 18 and 24 on 1 January 1995".

If information is also required for a subgroup of the population, a clear definition of that subgroup will also be required.

Survey population

The survey population is the group who have a chance of being selected as part of the sample.

Sometimes, for practical reasons, the survey population is not the entire target population. For instance, some surveys are conducted by telephone but claim to measure the whole population. In such cases, the target population includes everyone, but the survey population includes only those people who have telephones.

Sampling frame

Once we have defined the survey population, the next step is to develop a means of accessing it. The sampling frame provides this means of access. In its simplest form, a sampling frame is just a list of elements covering the target population. Possibilities include:

- A physical list
  eg an electoral roll, a telephone book, a computer printout of a membership list, a list of businesses.
- A conceptual list
  eg people booking airline tickets where a certain proportion may be sampled to ascertain reasons for travel.
- An area frame
  Geographical areas can form part of a multi-stage sampling frame, with lists of dwellings for each selected area, and lists of people for each selected dwelling.

What is a good sampling frame?

- Each unit should be counted.
  Excluded units introduce a bias if they have different characteristics from the included ones.
- Each unit should be counted only once.
  If some units are accidently duplicated, we cannot tell what chance a unit has of being sampled. The results will be biased towards the duplicated subgroup of the population.
- Each unit should be distinguishable from other units.
  If a unit is selected we should be able to tell exactly what it refers to and we should be able to access it.
- Up-to-date information should be provided.
  Unit names, addresses, etc. should be current.

Sample selection

Sample selection principles can be summed up in the phrase "everyone has to have a measurable chance of being selected". A sample selected with known probabilities allows generalisations to be made about the entire population and estimates to be made of associated errors. To do this, it is necessary to randomise the selection procedure. For example, random numbers can be generated either from a book of tables or by using a random number generator on a computer. If systematic sampling is being used, that is, sampling every kth unit from a list, then there must be a random starting point, between 1 and k to establish the first unit.

Random selection of respondents reduces the chance of getting a non-representative sample. Randomisation is the only safe way to overcome the effects of unforeseen biasing factors. The selection probabilities can be used to calculate weights to be applied to individual responses.

The method of sample selection used depends a great deal on the sampling scheme being used. The more complex the design, the more difficult the selection procedures required, and expert guidance is essential.

Sample size

Choosing a sample size for a survey involves considering factors such as:

- Available resources
  - Time
  - Money
  - Personnel
  - Equipment (eg computers, software, envelopes)

  The extent of resources available may dictate the scale of the survey.
- The required accuracy of the results
  - Acceptable margin of error
  - The level of confidence required

  The acceptable margin of error is the accuracy wanted from the survey. It gives the chance that the results obtained do not reflect the attributes of the population due to the particular sample that was chosen. The smaller the acceptable margin of error, the larger the sample required. There is, however, an optimal size after which little appreciable gain in accuracy is made.

  The level of confidence required refers to a range above and below the estimated value which may be expected to contain the true value with a known probability. For example, a 95 percent confidence interval implies that if 100 samples were taken, we would expect the confidence interval to contain the true value in all but five cases. The greater the level of confidence required that the results fall into the range, the larger the sample size required.

- The amount of detail needed in results.
  If information is required for a smaller subgroup of the entire sample, then a larger sample will be necessary to maintain the accuracy levels for subgroup estimates.
- The proportion of the population with the attributes being measured.
  If only a small percentage of the population have the attributes being measured, a larger sample will be required to obtain sufficient data to maintain accuracy levels for these subgroup estimates.
- The variability of the attributes being measured.
  If the attribute being measured varies a lot in the population, a larger sample size will be required to achieve the desired accuracy level.
- The expected level of non-response.
  If it is expected that a large proportion of units will not respond to the survey, a larger number of units will need to be approached to achieve the sample size required.
- The sample design used.
  Some sample designs are more efficient than others. In general, if known information about the population is utilised, a smaller sample size is possible.

Once these factors are determined, it is possible to calculate the sample size required to obtain the required level of accuracy. For more information on sample size calculations, consult references in Appendix A or a sample design expert.

Sampling strategies

There are basically two types of sampling methods: probability sampling and non-probability sampling.

In probability sampling, every unit of the population has a measurable chance of selection. This desirable feature allows sampling errors to be calculated and an accurate estimation of population characteristics to be made.

Probability sampling includes:

- Simple random sampling
- Systematic sampling
- Stratified sampling

- Sampling with probability proportional to size
- Cluster sampling
- Multi-stage sampling
- Multi-phase sampling
- Replicated sampling

In non-probability sampling, the chance of a unit's selection is not known. It is not possible in such cases to calculate sampling errors nor to make generalisations about the population.

Non-probability sampling includes:

- Haphazard sampling
- Sampling of volunteers
- Judgement (purposive) sampling
- Snowball sampling

It is beyond the scope of this publication to go into the details of various sampling schemes but the lists above are provided for interested readers to research. Brief notes on these sampling schemes are, however, contained in the Glossary, Appendix B.

Non-response

It is almost inevitable that information will not be able to be gained from some units in the sample. This is referred to as non-response. Some of the possible reasons for non-response are:

- refusal or inability to participate in the survey because of:
  - sensitivity of the questions
  - fear of the misuse of information requested
  - length of questionnaire
  - difficulty of the questions
  - wrong person approached to provide the information
  - respondent does not understand the language of the questionnaire
  - illness

- inability of the respondent to provide the information requested
- inability to contact the respondent
- inaccuracy in the sample frame

Partial non-response is where the respondent provides some but not all requested information.

Minimising non-response

Non-response introduces bias into the survey results where the non-respondents differ in characteristic from respondents. It is desirable to minimise the amount of non-response. Some ways to minimise non-response are:

Call backs

Interviewers return if they are unable to contact the person.

Pre-warning

It may help if potential respondents are contacted in advance and a convenient interview time arranged. It may be useful when conducting a telephone interview to establish the credentials of the interviewer by, for example, sending a letter of certification in advance.

Interview times

Interviewers call at times most likely to suit the respondent.

Reminder letters

Reminders are sent to people who have not responded to a mail-out/mail-back questionnaire.

Assurances of confidentiality

Respondents should be told who will see the information they supply (with or without the associated name and address), the purpose of collecting the information, procedures for data security and publication of results. This information should aim to encourage response by being truthful, reassuring, brief, and unambiguous.

Questionnaire design

Factors such as wording of questions, length of questionnaire, sensitivity of questions, ease of questionnaire completion, etc will all affect response. Questionnaire development is dealt with in more detail in Chapter 6.

Providing incentives

Even a simple incentive such as supplying survey results to respondents may increase the response rates.

Dealing with non-response when processing survey data

There are various ways of dealing with non-response during data processing. An assumption may be made that the characteristics of the non-respondents will be the same as those of respondents. Alternatively, a study of non-respondents could be undertaken to establish whether this is the case and a scheme developed accordingly to impute data for non-respondents. In any case, response rates and how they are calculated should be reported.

Chapter 6

Questionnaire development

Introduction

This chapter outlines what needs to be considered in developing a questionnaire, and gives a useful set of steps for developing a questionnaire.

Some reasons for poor quality questionnaires are:

- people think that designing a questionnaire is a trivial task - anyone able to write English can put one together; and/or
- people are unwilling or unable to put the time and effort into developing questionnaires properly, or they do not know how to go about it.

Why questionnaire design is important

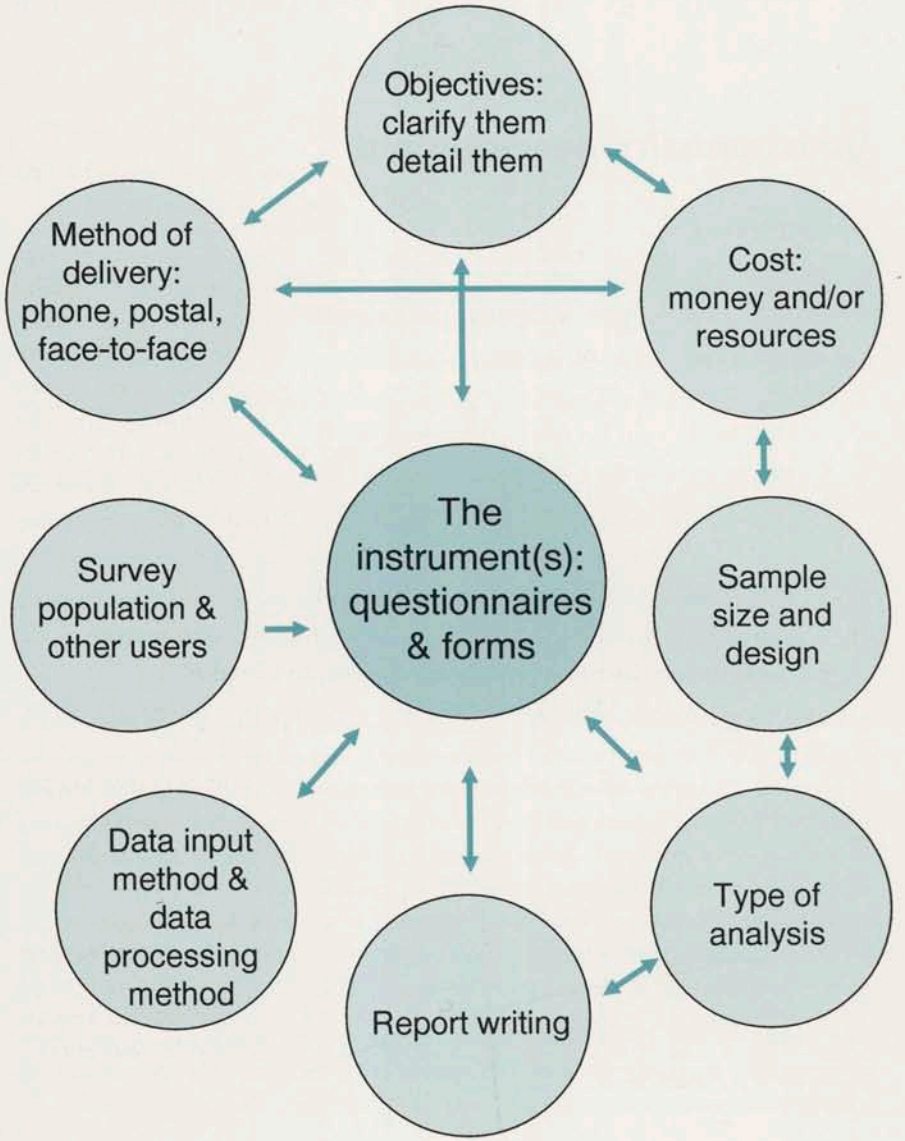
The questionnaire is the survey's measuring instrument and as such the importance of good questionnaire design cannot be overestimated.

Asking poor questions results in an increase in non-sampling error - the error that is not due to the sampling process, the error that would occur even in a census (see Chapter 7). Getting the sample design right, and ensuring that the sampling error is at the level wanted, is pointless if there is a high (and unknown) level of non-sampling error due to poor questions. These questions could be ambiguous (so that different respondents interpret questions differently) or too difficult (so that respondents are wildly guessing). Moreover, if the questionnaire has not been developed properly, it is unlikely that anyone will know that these things have happened. For some examples of poor questions, see the list of pitfalls on pages 53-61.

Poor questions and questionnaires can increase overall non-response and item non-response, especially in mail-out surveys. Non-response also contributes to non-sampling error.

Figure 1

Impact of other aspects of a survey on questionnaire design



In addition, poor questions have a cost in data repair. Checking, correcting and imputing data takes time and effort, and reduces confidence in the data quality.

Finally, well-designed questions are easier for respondents to answer than poor questions.

What has to be considered in developing a questionnaire

Figure 1 on page 42 shows that the instrument (the questionnaire or form) affects and/or is affected by every other part of the survey, either directly or indirectly.

One example will make the relationships clearer. The sample size may limit the type of analysis that can be done. For instance, with a small sample it may be possible to disaggregate another variable by income only if income is in three very broad groups. If only three groups are going to be used in analysis, the designer should not ask for annual income in actual dollars, which is difficult for most people to answer, or even ask for annual income to the nearest $100. Either question would be likely to get a lot of "don't know" responses, which would lower data quality, and also impose an unnecessary burden on respondents. In this case, the respondents should only be asked to say which of the three groups their income is in. This is a comparatively easy task and is likely to produce few "don't know" responses.

The main things which should determine what questions are asked and how they are asked are the objectives and the respondents. For each question, it is important to ask:

- Will this question contribute towards fulfilling an objective?
- Are respondents likely to be willing, and able, to answer the question in the way intended?
- Is there any way that it can be made easier for respondents to give accurate data?

The steps in developing a questionnaire

There is no agreed formula for the proper development of a questionnaire, but there is now fairly wide acceptance of a set of steps similar to those outlined in Figure 2 below, and explained in more detail in this section. All the steps outlined here are certainly useful, and if they are followed, a designer can be reasonably confident that the questionnaire will work.

Figure 2

What is needed to develop a questionnaire

1. Clear precise information needs - agreed to by everyone involved
2. List of groups who will "use" the questionnaire - with information about them
3. Questions written and approved
4. Reasonable confidence that questions will work - based on evaluation with all "users" concerned
5. Questionnaire produced and approved by everyone who has to approve it
6. Reasonable confidence that the questionnaire will work - based on an evaluation involving all "users" concerned

Note that these are steps for developing a questionnaire for the first time. If an existing questionnaire is being revised, one should start with an evaluation of its performance.

Some general points about these steps

Developing a questionnaire is not the simple procession of steps this might suggest. As Figure 1 on page 42 shows, designing a questionnaire is an iterative process, so the designer must be prepared to double back to an earlier step. For instance, at Step 3 it may be decided that it is impossible to get a satisfactory answer to a certain question (perhaps because most people do not have the information they need to answer it). It might then be necessary to go back to the information needs (Step 1) and drop one of them, then decide whether it is worth developing the survey with a reduced set of objectives.

Evaluation at two stages is suggested because there is usually a great deal of work involved in producing a finished questionnaire, nicely laid out, with all page, question and code numbers and any other elements in their right places. If the designer waits until this stage before starting to evaluate the performance of the questions, a lot of work (on layout etc) will have to be done each time changes are required. By evaluating before doing most of that work, a great deal of time and effort can be saved.

While the steps in Figure 2 show two evaluation stages, in practice it may be easier to carry out the evaluation process at a number of stages throughout the design process.

The steps in more detail

Step 1 Clear precise information needs

Time taken at this stage to establish clear and precise survey objectives will save time and frustration later. Usually one starts with broad statements. Before moving to the next step one should have a list of detailed and specific information needs. It will probably look rather like the list of tables in the final survey report.

If there are other parties involved in the survey (eg a client or a fellow researcher), it is important that they agree to the detailed information needs. Otherwise, development work may be wasted if it becomes clear later that the information the questions under development would elicit is not really the information needed by those other parties.

Step 2 List of groups who will "use" the questionnaire

A list should be made of all the people are who will "use" the questionnaire, and what is known about them. They are referred to in this chapter as "users".

Respondents are users even if the survey is interviewer-administered. What is known about them? If they are "the general public", research suggests that many of them will have trouble with most types of calculation, cannot do fractions and percentages, and have a fairly low reading age.

Unless a questionnaire designer is doing everything her/himself, there will be other users of the questionnaire such as interviewers, coders, people who enter data into a computer, those who write programs to process the data, and researchers who will analyse it. A designer will probably know a lot about the people in those groups (eg their skills, their expectations, what they are likely to be able to adapt to). Even if the designer is doing some of these tasks her/himself, the tasks should be listed as a reminder to check that the questionnaire will meet all relevant needs (eg for data entry).

All users' needs have to be considered as questionnaires and associated documents are developed. However, the most important

group is the respondents, largely because the designer has least control over them (in most cases, they cannot be trained as people employed to work on the survey can be trained). Also they give their time and effort, without reward, and the designer owes it to them to make their job as easy and pleasant as possible.

Step 3 Questions written and approved

Keeping in mind all the aspects of the survey (as shown in Figure 1), all users who are relevant at this stage, and all the possible pitfalls s/he is aware of, the designer should now write the questions. A list of pitfalls is provided on pages 53-61.

At this stage layout is not important - the designer should only do what is absolutely necessary to do an evaluation (discussed in more detail below). The question order should be as correct as possible but it should be evaluated and revised if necessary.

If the questions need to be approved by, for example, a client or a superior, it is important to get approval at this stage, rather than wait for a later draft. This is important because if the evaluation is under way and then questions are changed, some or all of that evaluation work will be wasted, and a re-evaluation of new questions necessary.

Step 4 Evaluation of questions

Types of evaluation are described on pages 47-52.

A series of evaluations will be needed at this stage. Elements may be added, eg tick boxes or instructions, throughout the evaluation process.

Step 5 Questionnaire produced and approved

To turn the questions into a questionnaire, all remaining elements must be added. Questions should be numbered, as the order of questions should now be well established. The questionnaire should be laid out in a way that will make it easy to use, and, if this does not interfere with its function, good to look at. A cover or an introduction, routing instructions, codes, and page numbers, if needed, should be added. Whatever is needed to produce the final questionnaire, short of typesetting and printing it, should now be done.

In practice, it is not necessary to do all of this at once. For instance, if codes are being used that are based on question numbers, it is sensible to leave adding them until the last possible moment, when it is certain that the question numbers will not change. Similarly, quite a lot of evaluation can be done while awaiting input on cover design. However, a near final product should always be evaluated. Colour can be added later, and if used properly, it should have a positive effect on the questionnaire's performance.

If the questionnaire needs approval, that approval is best gained before beginning evaluation. It is highly undesirable to change the questions at this stage; any input to questions should be at Step 3. If changes are made to questions they will need to be evaluated again.

Step 6 Evaluation of the questionnaire

This is dealt with in Evaluation below.

All that is left to do is to have the questionnaire printed and put it into use, although interviewer instructions, coding instructions and other documents may still need to be written and evaluated.

If the questionnaire will be used for some time, and a revision is possible, an evaluation of its performance over the first convenient period should be arranged, to establish whether any revision is needed. Evaluation methods for that are not covered in this guide.

Evaluation

There are two basic types of evaluation that should be used while developing a questionnaire, desk evaluation and user study. A desk evaluation can be done just by examining the questionnaire at one's desk, while a user study involves having users of the questionnaire actually working with it.

Desk evaluations

In a desk evaluation, one is simply looking for things that are likely to cause problems.

Designers can do it themselves, but it should also be done by at least one other person, preferably someone who did not have any hand in designing the questions. With practice, people get good at picking likely sources of problems, but it does take experience. Among other things, people have to develop a readiness to be super-critical, and a willingness to accept such criticism.

A list of things that are known to be likely to cause problems - likely pitfalls (as provided on pages 53-61) - is useful when doing this sort of evaluation. Designers may have their own lists.

Three important types of checks are:

- checks against objectives;
- checks for consistency; and
- checks against what is known about users.

Something that can be done as a result of a desk evaluation is simplification. A useful rule of thumb is that if something can be said more simply, it should be. There is, in theory, a danger of getting too simple and "talking down". But that is a remote danger, while the danger of being too complex or too "educated" is real. This is partly because the people who design questionnaires tend to be educated people and forget that not everyone uses the same terms or thinks the same way as they do. In addition, the idea exists that only formal language is appropriate for a written document. This is not true even for self-administered questionnaires, and when an interviewer has to read questions out, it is especially important that the questions can be read as everyday conversational language.

How often to do desk evaluations

At each stage of the evaluation process, desk evaluations should take place. After changes to questions or the questionnaire, there should be some desk evaluation. Whenever possible, desk evaluations should be done by more than one person, as that is likely to increase the evaluations' effectiveness.

Why desk evaluations are important

While "user studies" could be relied on entirely to discover problems, it is quicker and cheaper to get rid of obvious sources of problems at each stage before beginning user evaluations. Otherwise, a larger number of user studies will be needed to reach a stage

where the designer is reasonably confident that the questions and questionnaire will work.

User studies

What they are

This term is used here to cover any evaluation that involves people (respondents, interviewers, coders, etc) actually working with the questions/questionnaire in a way that allows problems and their causes to become visible. It covers:

- observation studies and other types of pretests (described in this section);
- pilot surveys - full "dress rehearsals" - where all types of users are involved and all processes are tested, from the delivery of questionnaires to processing of the data, and where everything is done as it will be in the main survey.
- other tests of the questionnaire with specific groups of users (eg a trial of data entry from the questionnaire).

This chapter deals only with small-scale evaluations, not with pilot surveys, which are covered in Chapter 8.

Whether a pilot survey is carried out depends on a number of factors, but the small-scale evaluations of the type described in this chapter should always be part of questionnaire development. A pilot survey, if done, should be seen as part of a systematic development. It would not be efficient to do only pilot surveys, as many problems can be identified earlier and corrected during a set of small-scale cheaper evaluations. In fact, the types of evaluation described below can identify problems that would not be discovered in a pilot.

Why user studies are essential

User studies are necessary because no-one, not even a very experienced questionnaire designer, can be confident that a question or a questionnaire will work until it has been shown to work. A designer can look for sources of problems, as suggested, in a desk evaluation, but s/he can never see the questions through the eyes of respondents, because:

- the designer knows too much about the questions; and
- is probably not exactly like many respondents.

Nor can a designer be sure that the questionnaire will suit the needs of other users until they have had the opportunity to try it.

User studies of the type described here are used to discover both where errors are made, and why they are being made. This is something that cannot be done by simply looking at completed questionnaires.

The aim of user studies is to ensure that the questionnaire will work for the respondent, and for the coders, data entry staff and whoever else is involved. If compromises need to be made, respondents' needs should always be put before the needs of other users. Unfortunately, this is not always possible. For example, it sometimes happens that information, such as a name and address, has to be printed onto a questionnaire by computer which can only print in a certain place. If computer printing is not used it will be too expensive to do the survey at all, but the result is that the form does not suit the respondent as well as it could. However, every effort should be made to find a way to make the questionnaire suit the respondent.

User studies with respondents

The method has to be slightly different for self-administered and for interviewer-administered questionnaires. In addition, the choice of a method can sometimes be restricted by other circumstances.

Observation studies are suitable for self-administered questionnaires, and are probably the most fruitful method. Doing observation studies involves getting someone to fill in the questionnaire while a researcher watches them and takes notes; the respondents are encouraged to think out loud and talk about how they are going about answering the questions; and the researcher asks them questions if they seem to have a problem and when they have finished.

An alternative approach sometimes taken if the answering process cannot be observed (eg with a business questionnaire that is filled in by a number of people over a number of days) is to follow up the completion of the questionnaire with a check for any obvious errors, and then ask:

- questions about those errors;
- questions about how answers were arrived at; and
- questions about respondents' perceptions of problems and about changes they would like to see made.

Follow-up questions almost always have to focus on selected items - otherwise the process would take too long - but a general question about which items the respondent thought caused them problems should be asked.

For interviewer-administered questionnaires, observation studies of the type described above cannot be done. A number of approaches are possible, and it is often a good idea to use more than one. Throughout the questionnaire development, the designer ought to ask the questions a number of times. On the other hand, interviewers need to be involved in the evaluation too, as they are the people who will be working with the questionnaire.

Quite a lot of important information can be obtained by having interviewers report problems, but some type of observation study should also be done, observing the actual interview if possible, and carefully examining completed questionnaires for problems. (The observation is recommended because sometimes interviewers, and respondents too, can report that there is no problem but still be making errors, eg because an ambiguous question may not be seen as having the meaning the designer intended.) Interviewers, or researchers, can also ask respondents some follow-up questions to check understanding, and identify any difficulties the respondents encountered. Similarly, interviewers themselves can be asked questions to check that their understanding of questions matches that of the designer.

One important point to remember when doing any type of user study with respondents is that the focus must always be on the faults of the questionnaire - respondents should never feel that they have failed, that they are being judged, or that they are in any way the source of the problems being identified.

At some stages it may be necessary to do some extra evaluation of questions expected to be, or found to be, troublesome. It is not necessary to evaluate the whole set of questions every time, though it should be kept in mind that the way a question is answered can be affected by its position in a questionnaire.

Who should be the subjects for user studies?

In most cases, it cannot be assumed that the respondents are like the designer, or even that they are like the people a designer knows. However, that does not rule out doing some user studies with friends, family, or colleagues as a first step. Those studies are usually easier to organise (and cheaper) and may show up problems that can then be fixed before beginning further studies. Those further studies should be with people who there is reason to believe will be like the survey respondents, and/or a sample

from the same frame as the survey respondents. For a number of reasons, eg because of respondent burden, it is desirable to exclude those respondents from the full survey. The questionnaire designer should consult the person responsible for sample design about the implications of their choice of user-study respondents.

User studies with other users

Observation can be a very useful evaluation method with some groups (eg it could show why some fields were being missed by coders), but it is often not possible because of the way work is organised. The minimum that should be done is to get each group to carry out its job on the questionnaire and report any problems. If possible, the output from each group should be checked. For some user groups some prior work will need to be done on the questionnaires, such as filling in some questionnaires to create a test set for data entry or data processors.

How many user studies to do

Ideally, there should be three such studies at Step 3 (see Figure 2) and three at Step 6, or six studies spread throughout the development process. If this is not possible, at least three user studies should be done as part of the development process.

Sets of three user studies with respondents are recommended. After the first, the problems discovered are fixed. (If the first study fails to show any problems at all, it is likely the evaluation was not done properly.) Then a second is done to uncover problems not identified the first time, or problems created as a result of fixing the first ones. Those problems are fixed and one more study is done to make sure everything is working well. In fact, no questionnaire is ever perfect, but one cannot go on forever. The important thing is being systematic. That means not having a brainwave about better ways to write the questions after the first two studies have been done. Otherwise the third study is really the first. For the same reasons, any other people who are to have input to questionnaire design should have their input at a very early stage.

The number of people needed for user studies with other groups will vary with the survey and the number of interviewers/coders, etc, involved. At least one user study should be done with all relevant groups at Step 3 and Step 6. (At Step 3, it is unlikely that there will be a document suitable for data entry.) In fact, whenever there have been changes that would affect a particular group, a user study should be done with them.

List of pitfalls to guard against and check for

The list of pitfalls below is not exhaustive. Every designer could develop their own list as they read the literature and develop questionnaires over the years. In the absence of a personal list, this one can be used:

- as a guide, or a set of warning signs, when designing questions and questionnaires; and
- as a list to check against when doing desk evaluations.

Examples have been added in most cases to clarify the problem described. Many examples, however, have more than one thing wrong with them.

Pitfalls with language

a) Hard to understand - just badly written

b) Overly educated, complex or technical words/sentences

Example:
Do you engage in leisure time pursuits involving aerobic exercise during school vacations?

Comment:
- The terms "engage in" and "leisure time pursuits" are unnecessarily educated
- "aerobic" is technical
- "vacation" is not the common term used in New Zealand

c) Abbreviations that respondents may not understand

Example:
- N.E.C.
- Passport No.

Comment:
N.E.C. (Not Elsewhere Classified) is not widely understood. It may seem safe to use the shortened form of "number" but some respondents, especially those with English as a second language, may be confused by it. The use of abbreviations depends on who the respondents are.

d) Undefined terms or concepts

Example:
What was the income of your business last year?

Comment:
"Year" may mean calendar year, March or June financial year, or even the 12 months ending today. "Income" also needs to be defined in terms of what is included and what is excluded, and whether it is before or after tax. Instructions on how to treat the income of subsidiary companies should also be given.

Pitfalls with questions

a) Questions which do not fit the objectives

This is very important. It can be difficult to check this without a clear and precise set of information needs.

b) Ambiguity - it is hard to be sure what is being asked

Example:
(i) What grade did you get in 1993 in:
Maths..... Physics.....

(ii) Did you do better in Maths or Physics in 1994?

Comment:
Question (ii) is ambiguous. You could be asking respondents to compare their marks in the two subjects in 1994, or asking whether their marks in either subject improved in 1994 when compared with those gained in 1993.

It should be noted that a respondent may never notice the ambiguity. Different respondents may be answering different questions, depending on which meaning they see.

c) Questions that are too long

For example, questions with long options or many options are unsuitable for telephone interviews.

d) Double or triple questions

Example:
During the last 12 months did your business import or export any goods?

YES ☐ NO ☐

Comment:
Questions like this may make logical sense but respondents may get confused if they want to say "yes" to one part and "no" to another. This can lead to respondents giving an answer that is not true.

Example:
Do you agree that buses and trains and taxis are kept clean?

YES ☐ NO ☐

Comment:
Logically you must say "no" unless you can say "yes" about all three things, but people find this very confusing.

e) Unreasonable recall period

Example:
How many drinks containing alcohol have you had in the past 12 months?

f) Double negatives

Example:
Do you agree or disagree that teachers should not be expected to teach red-haired children?

Comment:
People find it hard to work out that they have to disagree in order to say that, yes, teachers should teach red-heads.

g) Questions which assume a state of affairs exists

Example:
What is the income of your spouse or partner?

- ☐ zero
- ☐ under $25,000
- ☐ $25,000 - $50,000
- ☐ over $50,000
- ☐ not applicable

Comment:
The question assumes that the respondent has a spouse or partner. Just adding a "not applicable" option does not fix the problem. Respondents tend not to read all the options when the question does not seem to apply to them. This can cause confusion about where to go next (especially if the next few questions are about the spouse or partner), and they may miss other questions they should answer. There is a danger that if respondents are confused in this way, they may stop answering questions and not return the questionnaire.

The other error that they can make is to tick "zero" because they have no partner. If there are no other questions about partners, the researcher may never realise this.

The solution is to use a filter question.

h) Social desirability or other bias (leading, loaded, unbalanced)

Example:
Do you think that teachers are:

- ☐ very kind
- ☐ fairly kind
- ☐ not very kind

Comment:

- This is an unbalanced scale - it has no negative end, ie no categories for "unkind".
- If teachers were asking students this question, students may feel pressured to say what they think the teacher would like to hear.

Example:
How often do you get drunk?

Comment:
There is likely to be a social desirability bias for this question. Under-reporting would be expected.

i) Questions which require information, or a level of skill, which respondents may not have

Example:
Give your electricity costs for the 1993 calendar year as a percentage of your electricity costs for the 1994 calendar year.

Comment:
Most people will not have the information. Even if they have perfect records, and are willing to try to answer this question, they are likely to find the calculation difficult and get it wrong. Most respondents would not attempt it.

j) Response options that are not mutually exclusive

Example:
What types of assets does your business hold?

- ☐ land
- ☐ real estate
- ☐ computers
- ☐ telecommunications equipment

☐ tractors

☐ plant and machinery

☐ other

Comment:
A number of pairs of response categories overlap: land and real estate, computers and telecommunications equipment, tractors and plant and machinery. Overlapping categories confuse respondents. For example, respondents who have tractors may tick the box marked "tractors", or the box marked "plant and machinery" or both. The researcher will not know which assets have been indicated by a particular response. It will not be possible to analyse the resulting data in a meaningful way.

k) Response options that are not exhaustive

Example:
How do you usually get the magazines you said you read?

☐ buy them

☐ borrow them from a library

☐ borrow them from other people

Comment:
There are other possible categories, for example, read them at work, or read them in a cafe. An "other" category will at least provide an option for people who do not belong in the categories provided. Pre-survey evaluation work should indicate whether there is likely to be a large number of different responses under "other". Whether this matters depends on the survey objectives.

l) Response options that do not fit the questions

Example:
Some people say the new material given to students this month makes it easier to choose courses; other people say that it has made no difference. Which of those is closest to what you think?

☐ made it easier

☐ made no difference

☐ I have changed my choices since seeing new material

☐ don't know

Comment:
The third response is not an answer to the question. In an interviewer- administered survey it will not be seen by respondents. It cannot legitimately be used as a measure of the number of people who have made a change.

Pitfalls with the questionnaire

a) Crowded or untidy appearance

b) Type hard to read

Block capitals are much harder to read than mixed case. The type size should be large enough to be read by respondents with poor eyesight.

c) Inconsistent use of terms

If the term "business" is used in one question and "company" is used in another, respondents may think the words have different meanings.

d) Inappropriate title for the questionnaire or for sections

This can be irritating to respondents. Care needs to be taken with titles for sections, as people can misinterpret them and skip sections they think do not apply to them. In general it is easier and safer to avoid having them.

e) Routing instructions which are incorrect or hard to folow

f) Inconsistent layout

If the questionnaire has "no" before "yes" most of the time, respondents may make mistakes if the order is occasionally reversed.

g) Layout which is likely to cause recording mistakes

One of the most common problems is having a large gap between the options and the tick boxes. If the space between options is also small, respondents may tick the wrong box.

Example:

Nothing ☐
House broken into and/or burgled or vandalised ☐
Pocket picked or purse snatched ☐
Car stolen ☐
Money stolen ☐
Property damaged ☐
People attacked ☐
Other (please specify) ☐

Another common problem is having options halfway between tick boxes. Again respondents may tick the wrong box.

Example:

☐ Never married ☐ married ☐ divorced/widowed

h) Layout which is difficult for respondents or interviewers

An example of this is where the layout switches between one, two and three columns. This layout makes it hard to see where to go next.

Another example is where it is hard for interviewers to distinguish between their instructions, and the parts of the questionnaire that they are to read out.

i) Illogical grouping or flow of questions

j) Mistakes in numbering

This includes having parts of questions that are not numbered at all, or have too many numbers. Sometimes designers number questions, sections and even tables. This can lead to confusion. Only use the numbers necessary to lead respondents through the questionnaire.

Chapter 7

Sources of error

Survey error is made up of two components: sampling and non-sampling error.

Sampling errors

Sampling errors are a consequence of the sample survey collecting information from only a fraction of the population, rather than all members of the population. The extent of the error depends on many factors, including:

- Sample size
  Increasing the sample size reduces the sample error. However, there is a point beyond which little appreciable gain is made by further increasing the sample size.
- The variability of the characteristic of interest
  The greater the variation in the population, the greater the sampling error.
- The sample design
  Designs which use information known about the population reduce the sampling error.

With careful design and estimation procedures, sampling errors can be minimised and calculations made to determine their extent.

Non-sampling errors

Non-sampling errors are present in both surveys and censuses. They are not easy to measure, and may be larger than sampling errors. There are many ways in which non-sampling errors can occur and they can arise at any stage of the survey process. One possible effect of non-sampling errors is to introduce bias into the results, where the estimated value moves to one side of the true value. Non-sampling errors may be related to:

- Definition of the target population
  Excluding groups within the scope of the survey or including groups outside the scope of the survey will cause non-sampling errors. The target population needs to be accurately and carefully defined.
- Selection of the sample frame
  A frame which does not match the target population will cause bias. See pages 33-34.
- Sample design
  The design should give everyone in the target population a known or assessable chance of selection.
- Sample selection
  Random selection procedures should be used to eliminate bias due to selection by, for example, interviewers, survey sponsors or the respondents themselves.
- Non-response
  See pages 37-39.
- Defining the objectives
  Imprecise objectives may lead to survey information which does not meet requirements. An example might be confusion about whether information was required for families or households.
- Questionnaire construction
  See Chapter 6.
- Time period of survey - seasonality factors
  Many quantities differ according to the time of the year or even the day of the week. Surveys designed to measure such quantities may need to be conducted over a sufficiently long time period to measure any seasonal effects.
- Collection of Information
  See Chapter 9.
- Inadequate interviewer training
  See Chapter 9.
- Data coding and entering
  See Chapter 10.

Chapter 8

Pilot surveys

A pilot survey is a "dress rehearsal" for the main survey. It is a trial run which should be a full test of the entire process, including collection and processing, but using a small sample selected from the target population. Some mechanism should be adopted to ensure that those surveyed for the pilot survey are not selected for the main survey (unless the pilot survey is for a census).

This guide distinguishes pretests from pilot surveys, though they are both types of "user evaluation". A systematic programme of both pretests and pilot surveys should be part of survey development. Pretests, relatively small-scale exercises, are discussed in Chapter 6.

Pilot surveys are an important component of quality assurance for statistical surveys. Some surveys fall short of expectations, especially where controls are not established. Reasons for this include instructions being misunderstood, unforeseen difficulties arising, and errors made by survey personnel. A successful survey follows procedures which collectively ensure that deviations from the intended design are kept within reasonable bounds. This principle of operational control, which is difficult to achieve, requires the survey designer to develop the habit of subjecting all survey operations to a verifying or validating procedure.

If an error in the questionnaire or a mistake in the sampling or processing methodology is discovered once the survey is under way, a great deal of money and time will have been wasted!

As well as further testing of questionnaire wording, respondent burden and interview length, all of which are likely to have already been studied by pre-tests, pilot surveys should be able to provide preliminary information on the following:

- feasibility of the sample selection plan
- variability in the target population

- fieldwork procedures
- response rate
- processing procedures
- estimates of costs

If problems are identified in any of these areas, they can be solved, or at least their effects minimised, before the main survey is undertaken.

The number of pilot surveys undertaken and the sample sizes used are likely to be determined by the complexity of the main survey and cost considerations. Pilot surveys can also be used to test alternative procedures or designs that are being considered for the main survey.

If statistical output from a pilot survey is usable, it is only likely to be usable in a highly aggregated form because of a small sample size, or possibly because of other reasons identified in the course of the survey (eg procedures not working properly, low response rate). In some cases, however, it may be acceptable for pilot survey data to be used as part of the main survey data.

Chapter 9

Collection of information

For many surveys and censuses, information is obtained by asking people questions, although the information to be collected may relate to objects such as cars or houses, or to establishments such as households or businesses rather than to people.

In other cases, information may be obtained by direct measurement (for example, heights of students at a school or blood group types of inhabitants of an island). Another example of direct measurement is electronic measurement of the time spent watching certain television programmes.

In the case of direct measurement, the method of information collection will depend a great deal on the type of measurement required. The more complex the measurement, the greater the amount of training required for those performing the collection process. It is possible that the quantity being measured will vary due to any one of a number of factors (time of day, heat, food intake, etc) and expert advice should be sought to ensure that there is consistency.

The two main types of information collection from people are self-completion surveys and interviewer-administered surveys.

Interviewer-administered:

- Face-to-face interview
  Interviewers ask the respondents questions in a face-to-face interview. The responses are recorded by the interviewer on a questionnaire or entered directly into a computer.
- Telephone interview
  The interviewer records the respondent's answers to questions posed over the telephone. Again, responses may be recorded either on a questionnaire or entered directly into a computer.

Self-completion:

- Mail questionnaire
  Written responses are sought on a questionnaire which has been mailed out (or faxed) to the respondents.
- Other self-completed questionnaires
  For example, delivered to the respondent, or done at a particular place, say a visitor centre.
- Computer response
  Answers to questions contained in a computer file are keyed in by the respondent.

Factors influencing the choice of method:

- Nature of the questions
  The depth, complexity and sensitivity of the topics to be covered will in many cases dictate the collection method employed. Face-to-face interviews produce better results for complex or sensitive issues and for lengthy questionnaires. In some cases, telephone interviews may prove satisfactory for sensitive issues.
- Response rates
  The quality and reliability of survey data is affected by response rates. Face-to-face interviews usually achieve a better response rate than mail or telephone interviews.
- Resources
  Because of the high costs associated with an interview team and their transportation, mail and telephone interviews are usually substantially cheaper. The issue of relative costs is particularly important when resources of personnel and money are limited.
- Time
  Telephone surveys are much quicker than mail surveys or face-to-face interviews.
- Population of interest
  The nature and geographical location of the population of interest may have a bearing on the collection method employed. It is expensive to survey a remote or geographically dispersed population by face-to-face interviews.

There are particular issues associated with the interviewing process. A team of suitably qualified interviewers needs to be recruited and trained in time for the fieldwork phase of a survey. If there is a large team of interviewers, there may need to be a number of levels of interviewer supervisors.

Training of interviewers is vital in order to ensure that each interviewer is behaving in the same way when collecting information from respondents. If this is not the case, different information may be collected simply because of a different interviewer. Management practices will need to be set up so that behaviour of the interviewers is monitored. This would include checking that the right individual in the right household has been interviewed, and that the interview was conducted according to standard practice.

Chapter 10

Processing

This chapter takes further the processing-related issues mentioned in Chapter 4 (Survey Management). Processing, in the context of this chapter, covers the procedures by which a "clean" dataset (ie without detectable errors or omissions) is produced from respondents' information.

The dataset is then used to produce the statistical analyses required by survey sponsors, such as totals, averages, population estimates, cross-tabulations, or more sophisticated analyses. Statistical analysis is a broad area and an account of it is beyond the scope of this guide. Expert assistance should be sought on what analysis needs to be done given the nature of the survey and the information needs of survey sponsors and other relevant factors.

Issues in the area of processing need to be addressed in the early stages of survey planning. The comments made in this chapter generally assume that a paper questionnaire has been completed for each respondent, but there will be similar issues that occur with computer interviewing systems.

As well as checking that the correct individual, household or business has been surveyed and that the interview was conducted according to the rules defined, it is vital to have appropriate mechanisms in place to track the flow of documents, and that procedures have been developed to process incoming data. These mechanisms and procedures should cover the time from when a blank questionnaire leaves the office, is completed and returned, and passes through all the office handling and processing needed to produce a clean dataset.

If there is only a small number of questionnaires, they may be able to be checked, corrected and analysed manually, provided only a few simple questions were asked. However, more than a few hundred responses are difficult to deal with by hand. A computerised recording system should be designed to track the status of questionnaires at any given stage in the processing. It should contain an editing system to check that each respondent has answered the correct group of questions, and that

answers to these questions are not outside the range of expected responses. It should also be able to identify the number of expected but missing responses and be capable of producing error reports - for example, what records are still in error or missing. It should also contain a mechanism for correcting data, if the correct answer can be deduced, the respondent re-contacted, or data imputed.

It is important that the document handling system be set up and tested prior to the start of data collection.

Exactly how the data are going to be processed must be decided at the stage of questionnaire design. Questions either allow space for a respondent's answer to be recorded (open questions), or they require the answer to fit into a set of pre-determined responses (closed questions).

Responses to open questions need to be clerically coded. Closed questions can often have their response categories pre-coded. Other questionnaire items which are not already pre-coded will need to be clerically coded. This is best decided in the course of questionnaire design, so that a consistent set of rules can be developed and used within the questionnaire.

The coding of occupation, industry and family type is usually complex. It is usually done clerically, even if there are pre-determined responses, though more sophisticated research units may have Computer Assisted Coding (CAC) software.

Getting the data efficiently from paper format to a computer dataset means that questionnaire designers must follow established practices which allow a data capture operator to easily and quickly identify what is, and what is not to be captured. A program or series of programs needs to be written to get the data into a file from which editing can be completed or statistical analyses carried out.

Some questions to consider are listed below.

> How will the data get into the computer?
>
> Who will write the data capture programs?
>
> Are the questionnaires in a format in which data can easily be captured?
>
> Once the data has been inputted into a data file, what is going to be done with the data?

> Rules must be correctly specified to handle seemingly incorrect data. Who will specify the rules?
>
> Who will write the computer programs necessary to edit the data to produce a clean dataset?
>
> Who will run the data through the editing system?
>
> What type of alterations will they be able to make?
>
> What checking mechanisms will be in place to check that the data is now correct?
>
> What will be done with any missing data?
>
> Is it feasible to impute any missing responses?

Finally, the format of the final dataset is important. This will be determined in part by the available software and by the type of data analysis required.

Chapter 11

Presentation of results

The presentation of results is the main and often only way a survey will be judged. Many people will only be interested in results, but sufficient technical detail should be included in a presentation to allow those who wish to examine survey procedures an opportunity to do so. This additional detail could be presented in the form of a technical appendix. Survey results should include a brief explanation of their limitations, such as sampling errors, response rates or survey population. These limitations will vary for different population subgroups.

Information which should be in a general report would include:

- A statement of the objectives of the survey, including a definition of the target population.
- A description of its coverage in terms of inclusion or exclusion of geographical regions, particular social or age groups, size or industrial activity of businesses or any other categories of the population covered.
- Collection procedures
    - sample frame used
    - sample selection procedure
    - expected sample size
    - achieved sample size, including subgroups
    - response rates, and how they are calculated
    - non-response methodology
    - reasons for non-response
    - collection procedure
    - date and duration of the survey fieldwork
    - quality control (eg efforts to reduce non-sampling errors, interviewer training, imputation procedures)

- Numerical results
  - actual results
  - derivation
  - accuracy
- Sampling errors
  For each estimate reported there should also be an associated measure of the sampling error. The report should also include the method used to calculate sampling errors.
- Assessment
  This could include interpretation of the reasons for the results, and recommendations for future action (eg further research, or policy implementation).
- Responsibility
  Indicate who commissioned the survey, who undertook the work, who wrote the report, etc.

An important issue in reporting survey statistics is maintaining the confidentiality of the respondents' data. Great care must be taken to ensure that a published report does not contain information which could be used to deduce individual responses.

Appendix A

References

Sample design and analysis references

Overview

Duoba, Vic and Maindonald, John H, (1988), *Understanding Surveys*, N.Z. Statistical Association

Elementary texts

Kalton, Graham, (1983), *Introduction to Survey Sampling*, Sage Publications, California

Stuart, Alan, (1962), *Basic Ideas of Scientific Sampling*, Griffins, London

Williams, Bill, (1978), *A Sampler on Sampling*, Wiley, New York

Jaffe, Abram J and Spirer, Herbert F, (1987), *Misused Statistics: Straight Talk for Twisted Numbers*, Marcel Dekker, New York

Sonim, Morris J, (1960), *Sampling in a Nutshell*, Simon and Schuster, New York

Intermediate texts

Cochran, William G, (1977), *Sampling Techniques* (3rd edition), Wiley, New York

Deming, William E, (1960), *Sample Design in Business Research*, Wiley, New York

Konijn, Hendrik S, (1973), *Statistical Theory of Sample Survey Design and Analysis*, North-Holland, Amsterdam and American Elsevier, New York

Hansen, Morris, Hurwitz, William and Madow, William, (1953) *Sample Survey Methods and Theory* (Volumes I and II), Wiley, New York

Jolliffe, Flavia R, (1986), *Survey Design and Analysis*, Halsted Press, New York and Ellis Horwood, Chichester

Kish, Leslie, (1965), *Survey Sampling*, Wiley, New York

Yamane, Taro, (1967) *Elementary Sampling Theory*, Prentice-Hall, USA

Questionnaire development references

Any chapter, book or article on questionnaire development should be treated critically. Questionnaire design chapters in books on social research may not necessarily be particularly useful. In addition, many books focus particularly on opinion or attitude surveying.

Three readable introductory books are:

Berdie, Douglas R, Anderson, John F and Niebuhr, Marsha A, (1986), *Questionnaires: Design and Use*, (2nd Edition), Scarecrow Press, USA

Comment: A simple short treatment of the subject, suitable for students. Also contains a large bibliography.

Payne Stanley L, (1951), *The Art of Asking Questions*, Princeton University Press, USA

Comment: Old but still very relevant and readable. Tells you more than you might want to know but has features that make it worth dipping into, even if you do not want to read it all.

Platek, Richard, Pierre-Pierre, Francoise K, and Stevens, Philip, (1985), *Development and Design of Survey Questionnaires*, Statistics Canada, Ottawa

Comment: Readable and in general practical. Useful as a beginners manual on how to go about designing a questionnaire.

Other books are:

Schuman, Howard and Presser, Stanley, (1981), *Questions and Answers in Attitude Surveys: Experiments on Question Form, Wording and Context*, Academic Press, New York

Comment: A review of an interesting collection of experiments on the effects of question wording.

Converse, Jean M and Presser, Stanley, (1986), *Survey Questions: Handcrafting the Standardised Questionnaire*, (Volume 63 in the series: *Quantitative Applications in the Social Sciences*), Sage Publications, USA.

Comment: A reasonably good treatment of the evaluation process, with interesting reviews of relevant research.

Appendix B

Glossary

Note that **bolded** terms within definitions are themselves defined in this glossary.

Bias: The amount an estimate differs from a true population value because of some quality of a **measurement device**, sample selection method or other aspect of survey methodology that tends to result in a misrepresentation of what is being measured in a particular direction.

CAC (Computer Assisted Coding): The computer allocates a **code** for a respondent's answer to a question. If no exact match exists, an operator may have to make a judgement. CAC allows more consistent **coding** of question responses than clerical coding does.

Census: Involves surveying the total **population** of interest.

CAPI & CATI (Computer Assisted Personal and Telephone Interviewing): Allows interviewers to enter data directly into a computer database from a questionnaire displayed on a computer screen. This speeds up data collection and processing and reduces transcription errors.

Closed questions: Provide a complete set of alternative answers from which respondents select their choice.

Cluster sampling: A sample selection method where the population units belong to natural groups (clusters) and the population units are selected by first selecting some clusters and then selecting all or some of the population units within the selected clusters: in this form it is a two stage sampling scheme. See **multistage sampling.**

Codes: Identifiers, usually numeric, which are assigned to represent responses or categories of information during processing.

Coding: The process of converting answers to questions into numerical form (**codes**) to facilitate the compilation of survey statistics.

Cross-sectional study: In contrast to a **longitudinal study**, is based on observations at a single point in time.

Data capture: The process of transferring **coded** data from questionnaires to a storage database in preparation for manipulation and analysis.

Dataset: Data, which is usually stored electronically, collected in a particular survey.

Demographic characteristics: The characteristics of a human population such as sex, age, marital status, ethnic origin, education, income, religion and place of residence.

Diary: Written record kept by respondents to record events, incomes, expenditure and so on, over a period of time.

Estimate: The value of an **estimator** for a specific sample.

Estimation: The process of producing an **estimate**.

Estimator: A method which assigns to each possible sample generated from a population by a given sampling scheme a value, which measures some characteristics of the population.

Filter question: Questions asked to determine which subsequent questions (if any) will be asked.

Haphazard sampling: A non-probability sample selection method in which the interviewer arbitrarily selects respondents for the survey without using systematic or random selection methods. Examples are casually asking passers-by, or casually selecting households.

Interviewer instructions/directions: Instructions to interviewers, as opposed to respondents, to aid with the administration of a survey.

Judgement sampling: A non-probability sample selection method where respondents are selected according to a personal judgement about which members of the population would be the most representative. Also known as purposive sampling.

Level of confidence: The level of confidence required refers to a range above and below the estimated value which may be expected to contain the true value with a known probability. For example, a 95 percent confidence interval implies that if

100 samples were taken, we would expect the confidence interval to contain the true value in all but five cases. The greater the level of confidence required that the results fall into the range, the larger the sample size required.

Loaded questions: Questions which, by their wording, intentionally or unintentionally persuade the respondent towards a certain answer.

Longitudinal study: In contrast to a **cross-sectional study**, collects the same information at different points in time. See **panel survey**.

Measurement device: The means used to collect information. For example, for many surveys the measurement device is the questionnaire.

Modelling: The process of building a "model" out of survey results that will allow the surveyor to make predictions about the population.

Multi-phase sampling: A sample selection method used where auxiliary information about the population is not known prior to selecting the sample, but would make the sample more efficient if it was known and used. Typically only two phase or double sampling is considered. Here, a large sample of population units is selected and information which can be used to classify them into specified groups is collected. Then a subsample within each of these groups is selected and more detailed information is collected from them.

Multi-stage sampling: A sample selection method used where the population can be formed into a hierachy of sampling units. At the first stage of the hierachy, its units are indentified and a sample of units selected. At the next stage of the hierachy, only the units within the selected units from the previous stage are identified, and a sample of these units is selected. This identification and "sub-sampling" is repeated until the units are the population units. For example, for a survey of individuals (the population units), a country may be divided into physical areas (the first stage units). In the areas selected, dwellings are identified and some selected (the second stage units). In the households selected people are identified and some selected (the third stage and population units).

Open questions: Seek to elicit a response to questions without providing answer categories.

Panel survey: A type of **longitudinal study** in which information is collected from the same sample (the panel) at several points in time.

Pilot survey: A small trial run, or "dress rehearsal", of the entire survey process completed before the final survey commences. The intention is to alert the surveyor to any difficulties that were not anticipated at the survey proposal stage. Pilot surveys are undertaken after **pre-tests**.

Population: The target population is the entire group of units about which information is desired. The survey population is the group of units which have a chance to be selected for the sample. The survey population should ideally be identical to the target population, but may not be exactly the same in practice.

Pre-test: A small trial run of questions or the questionnaire. The intention is to alert the surveyor to any unseen difficulties.

Probability proportional to size sampling: A **probability sample** selection method where the sampling units are given a chance of selection proportional to their size. It is often used in multistage sampling where each first stage unit is selected with a probability proportional to size.

Probability sample: A sample selected in such a way that each unit in the population has a non-zero chance of being included that in principle can be calculated.

Purposive sampling: See **Judgement sampling**.

Quota sampling: A sample selection method in which units are selected on the basis of achieving a specified number of units in the sample. Typically, but not invariably, these are non-probability samples.

Replicated sampling: A **probability sample** selection technique where different sample groups within the same **population** are surveyed with the intention of comparing the results between these different subgroups.

Representativeness: The extent to which a **sample** has the same distribution of characteristics of interest as the **population** from which it was selected.

Routing instructions: Instructions to respondents or interviewers on what question to proceed to next.

Sample: A subset of the **population** which surveyors hope will be **representative** of the total population and which will therefore enable them to make generalisations about the total population.

Sampling frame or frame: A list or notional list of the units in the **population**. A **sample** is selected from a sampling frame. For the sample to be **representative** of the population, the sampling frame should include all, and only, the members of the target population, though this may not be fully achievable in practice.

Sampling of volunteers: A non-probability sample selection method in which respondents are selected by asking for volunteers.

Simple random sampling: A **probability sample** selection method where each member of the **population** has an equal probability of selection.

Snowball sampling: A non-probability sample selection method in which respondents are asked to suggest additional respondents for the survey.

Stratified sampling: A **probability sample** selection method in which the **population** is divided into homogeneous groups (strata) and different sampling methods are applied to the different strata.

Systematic sampling: A **probability sample** selection method in which the sample is obtained by selecting every *k*th unit of the population, where *k* is an integer greater than 1. The first member of the sample must be selected randomly from within the first *k* units.

Variance: A measure of the variability within a population.

Appendix C

Minister of Statistics' Approval for Government Department Surveys

In July 1993, the Minister of Statistics, under Section 6 of the Statistics Act 1975, waived the requirement for government departments to obtain the approval of the Minister of Statistics before commencing or commissioning a new statistical survey[1], or making a substantial alternation to an existing survey. This general waiver applies to all government department surveys, except those conducted or commissioned by Statistics New Zealand. However, the following conditions apply to other departments, as required under section 5 of the Statistics Act.

> Chief Executives of government departments must inform Statistics New Zealand when any new official statistics or substantial alterations to existing official statistics are being proposed, or when any document, which is being used or proposed to be used as the source of official statistics, is being amended or drafted.

The waiver of the need for Ministerial Approval can be withdrawn or modified, in the case of a particular department, at the request of a Chief Executive.

If you have any comment on the Ministerial Waiver, or the role of Statistics New Zealand in the co-ordination of government survey activity, please contact:

Manager
Policy and Planning
Statistics New Zealand
P O BOX 2922
WELLINGTON

[1] The term "statistical survey" is defined in the Statistics Act 1975 as a survey of the public or of undertakings, the purpose of which is wholly or primarily to produce published statistics.

Appendix D

Statistics New Zealand's Survey Services

Statistics New Zealand offers a full service in household and business survey design and operation at market rates. It is possible for Statistics New Zealand to undertake surveys of national importance on a contract basis. Statistics New Zealand may pay a portion of the cost of any such surveys and reserves the right to publish such information as the Government Statistician sees fit.

Statistics New Zealand is able to advise on specific survey functions such as planning, design and operation and in some cases carry out such functions on a contract basis.

The following services are available separately or collectively:

Questionnaire Design

Statistics New Zealand has a special unit, staffed by social scientists, which specialises in questionnaire design and development. In the course of questionnaire development, questionnaires can be systematically and rigorously tested to ensure that the information collected is sufficiently accurate.

Sample Design

Mathematical statisticians are able to undertake sample design work to clients' requirements or provide sample design advice to clients.

Information Collection

Statistics New Zealand is able to undertake both business and household surveys. Collection by means of postal surveys, telephone or personal interviews using teams of experienced interviewers is possible but is subject to the resulting data being of national importance.

Data Processing and Table Generation

This includes all procedures from receiving questionnaires to table production.

Report Writing

Reports are tailored to the specific needs of clients and may contain written commentary as well as statistical information.

Advice

Statistics New Zealand can provide technical advice and assistance on any survey-related matter whilst a client organises the survey.

Standard Classifications

Statistics New Zealand is able to advise on the use of standard classifications of occupation, industry, institutional sector etc. The use of standard classifications may save time, improve the accuracy of results and make comparison with other statistics easier.

For further information contact the Information Consultancy Group at your nearest Statistics New Zealand office.

art-time
ddress i
hen were
ou most l
he answer
is ins
e oil to
hildren t