A guide to good survey design

Fourth edition

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Message from the Government Statistician

Statistics NZ is committed to unleashing the power of data to change lives. One of the ways we do that is by sharing our knowledge and expertise in designing surveys.

Survey design is critical in determining quality research and obtaining good data. From crafting good questions to accurately measure opinions, experiences, and behaviours, to producing good measures, survey design is a multi-stage process that requires attention to many details at once.

Historically, survey design has been treated as an art form. Today, we understand it better as a science. In this introductory guide we share an overview of the pitfalls and best practices of designing surveys. It includes insights on sample design and questionnaire design, as well what to consider when interacting with respondents.

I encourage anyone involved in commissioning or carrying out surveys to make use this valuable guide.

Liz MacPherson
Government Statistician

1 Introduction

Information is the cornerstone of our society. Relevant and timely information is essential so well-informed decisions can be made by individuals, organisations, central and local government, iwi, business, and the wider community.

Surveys are an accepted way of producing statistical information that is used for planning vital public services such as education, health, housing, and transport. This information is also used to help understand our country's economic performance, to see how our society changes over time, and to plan for the future.

Essentially, a survey involves collecting information from some (or all) members of a population. Well-defined concepts, methods, and procedures are used and the information collected is combined and summarised so it is useful.

This guide outlines the issues, and steps to take when planning and undertaking a survey. We present an overview of good survey design principles – this is not intended to be a technical, comprehensive guide.

2 Before beginning a survey, ask yourself …

2.1 Is suitable information already available?

The information you need may already be available from existing sources, which may mean a new survey is unnecessary. Where to look for existing sources will depend on the type of information required. The following list is a starting point.

- **Literature search**

  Libraries are a good place to start, searching under relevant topic headings. Using the Internet to search for information will also be useful. The indexes of professional journals could be used to take your research further.

- **Published statistics**

  Statistics NZ publishes a wide range of economic, social, demographic, and environmental statistical information. Other sources of published statistics include local councils, various government departments, universities, and other research agencies.

- **Statistics NZ**

  We lead the Official Statistics System, which is a government-wide system of policies, practices, processes, and people involved in producing official statistics. Our role is to:

  o ensure all government statistics efficiently meet the country's needs for relevant, trustworthy, and accessible information

  o produce the majority of New Zealand's official statistics.

  The Statistics NZ website has a wealth of publicly available information. Even if the published information does not appear to have enough detail, more may be available. Find out by contacting our Information Centre on 0508 525 525 or info@stats.govt.nz. We also have more complex datasets that are not available on our website. For more information, contact our Customised Data Services team using the above details.

- **Government agencies and professional associations**

  Other government agencies, professional, or business associations can be good sources of unpublished information.

- **Local sources**

  If you need quantitative data for local planning, you can find useful information in local authority records, from the local Chamber of Commerce or other agencies. Piecing together information from various sources may provide much of the data to meet your information needs.

- **Related information**

  Searching available information may not precisely meet your information need, but it might provide related data. This proxy information may be adequate for research purposes, particularly because running a specialised survey can be expensive and time-consuming. For example, sales data could be used to approximate production or consumption data.

- **Administrative forms and records**

  Administrative data records people's contact with public organisations, for example a hospital stay, tax returns, immigration applications, student loans and

allowances, or birth registrations. Forms associated with a service, applications, and membership registrations are also being used more often as sources of readily available statistical information.

However, particular issues are associated with using administrative data for statistics. One issue is that definitions set for a regulatory purpose may not suit your information need. For example, income statistics derived from Inland Revenue returns (which come from information collected for tax purposes) may use different measures of income from what you need.

- **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 may provide useful common-sense solutions. Talking with experts on the topic you are interested in will sometimes provide the guidance needed to obtain the required information. Possible contacts include Statistics NZ, other government departments, non-governmental agencies, universities, Crown research institutes, the New Zealand Statistical Association, and various experts on the topic of interest.

2.2 You've established a survey is needed – what next?

Careful planning is vital to ensure a satisfactory result. Here are some factors you need to consider.

Timeframes

The time set aside needs to be realistic. Designing and undertaking a survey can take months. Even a relatively small survey can have many interrelated phases.

Finances

A survey needs a financial outlay. The more detail needed the more it will cost. It is important to check that you, or the organisation sponsoring the survey, has the necessary resources or the funds to buy them.

Information collected matching produced measures

The information you propose to collect must measure what it is intended to measure. For example, reported opinion may not be a good way to predict behaviour.

Cooperation and participation

Any survey needs respondents to participate and possibly the cooperation of other organisations and agencies. If a survey contains questions on sensitive issues, the cooperation received from respondents may be affected. Before undertaking a survey, make an assessment of response rates, for example using pilot surveys, to ensure it is possible to achieve an acceptable level of response.

Adding questions to an existing survey

Rather than undertaking a new survey, you may be able to get sufficient information by adding questions to an existing survey questionnaire. Investigate if there is an existing questionnaire appropriate to add your question(s) to – and if the organisation running that survey is agreeable to it.

Contracting out your survey

You may choose to contract out all or part of the work of a survey project because of staffing, financial, time, or expertise constraints. Issues associated with contracting out surveys are discussed in more detail in chapter 3.

Sampling or a census

Once you've decided to undertake a statistical survey, you need to decide what type of survey is most appropriate.

You'll need to decide whether to seek information from the whole population (a census) or from a sample of the target population. In many cases, a census is ruled out by a shortage of money, time, or trained personnel. In other cases a census may be desirable, because the population of interest is relatively small.

A sample survey uses a subset of the population of interest. If you use correct statistical techniques, you can make estimates about the characteristics of the whole population, and associate a measure of error to the estimates. Sampling issues are discussed in more detail in chapter 5.

Advantages of sample surveys

- 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 sample surveys

- 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 5.

- Detailed data analysis may not be possible as there may not be enough information on small subgroups from which to draw conclusions.

2.3   Do you have a thorough plan for the whole process?

Before you begin a survey, make sure you have a thorough plan for the whole process. The quality of data analysis and reports produced depends very much on what happens in the early stages. Poor planning may result in the objectives of the survey not being met, and statistically invalid estimates being produced. Chapter 4 has more detail about survey management.

2.4   What expert advice will you need?

It's 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 any problems that come up. This includes help in defining goals and objectives, designing a questionnaire, developing sampling methodology, and working out what data analysis is

needed. Market research companies or experts may be able to help with some or all of the planning and operational phases.

If the project is large, difficult, or beyond your or the survey sponsor's technical and planning resources available, an advisory committee can provide help and support. A well-selected committee can give objective advice from several points of view at relatively little and sometimes no cost. If you form a committee, it's important to define its objectives and have a plan for what you want to achieve at each meeting.

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

2.5 Have your survey objectives been adequately defined?

Survey objectives tend to be expressed in broad and often over-simplified terms when first conceived. As planning progresses, you may find the objectives are so broad that meeting them fully would not be feasible. The original vague terms need to be more clearly defined so they can be used as the basis for taking specific action when designing the survey.

2.6 What is the end-use of your survey results?

Clarifying the end-use of the information collected helps determine the objectives, tailor the overall approach, formulate the actual questions, and make decisions on processing, analysis, and the format of the final report.

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

- future policy decisions
- programme monitoring
- facilities or operational planning
- market research
- contingency planning
- creating, updating, or expanding a database
- planning more detailed surveys in the future
- 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 the results would not be suitable for. Once an end-use has been clearly stated, selecting survey topics and designing the questionnaire will be simplified and the groundwork for analysis will already be established.

2.7 What will your survey proposal include?

A proposal sets out the survey's intent and plan for its implementation. If the work is contracted out, the proposal may be a specification to your supplier of survey services

(see chapter 3). The exact content and aim of a proposal may vary, but items which could be included are as follows.

Abstract

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

Background

Include any relevant information relating to the survey topic and comments on any work that has been done previously.

Administration

Include:

- the title of the survey
- the sponsor of the survey
- the organisation or person who is carrying out the work
- whether the survey is a one-off or will repeat
- the frequency of a repeating survey.

Finance

The total estimated cost and a breakdown of costs.

Objectives

You should state the survey's objectives as specifically as possible to define the kind of information needed. This also puts in place a system to measure how effectively these objectives have been met when the survey is completed. Some questions to consider:

- What period of time is the survey to be conducted over? When are the results required?
- What is the population of interest, and is information required for some subgroup of that 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, details, etc of the required outputs?
- What unit of measurement will be used (dollars, numbers, etc)?
- Why is the information needed? Who is going to use it 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 the survey a 'one-off' or will it be administered on a monthly, quarterly, annual, or longer basis?

Time frame

Have a clear indication of the start and finish times for each phase of the survey.

Topics covered

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

Resources available/needed

- Personnel
- Money
- Time
- Processing the data and producing a clean dataset
- Analysing the dataset, producing any outputs, and presenting results

Sampling methodology

- Target population
- Sampling frame
- Sample selection method
- Basis for decision on sample size
- Mode of collection to be used

Questionnaire

The procedures for developing, testing, and managing changes to the questionnaire should be outlined, along with any related documentation. The procedures should also include the steps to take to ensure the data collected is consistent and accurate.

Outputs

What kinds of statistics are required? Will you need tables, reports, or datasets? For more information of presenting results see chapter 14.

3 Contracting out surveys

Survey sponsors often contract out some, or all, of the work to plan and conduct a survey, and analyse the results. This chapter outlines some of the issues to consider when contracting out survey work.

3.1 Reasons for contracting out

Survey sponsors will normally need to prepare some sort of request for approval to spend funds on survey suppliers. It is useful 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 outcomes 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

- all or some of the specialist skills needed, for example designers, programmers, online survey expertise, interviewers, data processing, and analysts etc, are in place. This means workforce 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.

3.2 Preparing survey specifications

Written survey specifications describe the work to be done, the amount of work, when it is to be done and, if relevant, how it is to be done. Do not expect the supplier to make assumptions about any significant factor. The sponsor must develop a carefully considered survey specification. It is important that the specification is complete and consistent.

Specifications should include:

- objectives of the survey

- a description of the information need

- a description of the end-use of results

- an explicit statement of any hypotheses to be tested

- an explicit statement of any assumptions 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

- the sponsor's operational requirement

- any required qualifications of the supplier

- any and all approvals needed from any organisations involved in the survey.

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

3.3 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 survey's scope, the amount of work, or the accuracy of the results expected. As well as a description of the sponsor's needs, and a statement of the end-use of the results, give some specific indicators of the scope and size of the project, such as:

- nature and complexity of the underlying problem

- definition of the population to be studied

- number of interviews, paper, and/or online questionnaires that need to be completed, if known at this time

- geographic area to be covered

- desired accuracy of results

- some indication of budget limitations.

3.4 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 be needed about which analytical tools are most appropriate for the job.

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

3.5 Materials supplied by the sponsor

Note the availability of background material, because it may affect the amount of work to be done by the supplier and / or the timing of the survey. Possible examples include:

- list of the survey population

- proposed sample

- draft questionnaire.

3.6 Relationship to other research

Some surveys are 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

- one of several surveys, each of which is dedicated to some particular part of a complex problem

- a detailed survey for which many of the concepts, assumptions, or baseline data was obtained from earlier surveys

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

Unless you inform suppliers of such situations, the specifications may appear to be incomplete or based on unwarranted assumptions. Suppliers may be confused or misled about the precise scope of the work to be done.

3.7   Decisions already made

The decision to conduct and contract out a survey (or any part of it) may happen at any time during a complex review of a programme. Much of the context and any limitations within which the survey must be conducted may therefore depend on decisions already made. Considerable survey development work may also have been done before the decision was made to contract out the actual survey or some phase of it.

If any prior activities have established conditions or caused decisions to be made which affect the planning or running of the survey, describe them in the specifications.

3.8   Sponsor's operational requirements

Operational requirements may consist of:
- progress reporting timeline

- time restrictions, deadlines, and completion date

- access by the sponsor to completed questionnaires, or a dataset of individual information

- form and scope of the final report, level of detail, personal presentation, and interpretation of the findings

- approval procedures for survey and questionnaire design (including approvals under the Statistics Act 1975 for surveys undertaken by Statistics NZ)

- any other requirements particular to the research.

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

Realistic completion dates are important. The competitive attainment of a survey provider almost always takes several weeks. The chosen supplier requires time for background or exploratory research, planning, sample design, questionnaire preparation, pre-testing, and assigning 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.

3.9   Required qualifications of suppliers

When defining the research question and preparing objectives, the sponsor will note specialised skills or facilities which the supplier must be able to provide. The sponsor should outline such requirements in the specifications.

3.10 The supplier of survey services

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

- in-depth interviewing
- face-to-face interviewing
- telephone interviewing
- mail questionnaires
- Internet 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 organisations specialise in processing services, such as data capture and tabulation, or are active only in management consulting. Some supply simple cross-tabulations only, while others can carry out more sophisticated statistical analyses.

3.11 Locating suppliers

Regular purchasers of research generally have a list of organisations whose activities suit their needs. If you do not have such a list, find out about the qualifications and capabilities of each organisation before sending them an invitation to submit a proposal. You can find suppliers of survey services through an Internet search or the Yellow Pages of main centre telephone directories under headings such as: research, management consultants, economic research, market research, marketing consultants. Marketing and social science departments of universities and polytechnics may also offer a contract survey service.

3.12 What a proposal should contain

A proposal should cover all the information required in the sponsor's invitation to supply a proposal, and should not normally need further expansion or explanation. Survey providers should, in general, cover the following in their proposal document:

- their 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 survey provider
- a description of their proposed approach, when the approach and techniques were not outlined in the specifications or where they feel 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 companies or to individuals who are not their regular employees
- 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 component, 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 organisation and of those staff members designated to work on the survey

- stability of the organisation and the adequacy of its reserve resources to ensure the survey is implemented on schedule.

3.13 Proposal evaluation

Prepare criteria for evaluating proposals before you receive any. Listed here are some suggested evaluation criteria.

- The survey provider shows an understanding of the survey as specified in the objectives and information need.

- The sponsor's problem is analysed in the survey provider's proposal and demonstrates originality and creativity, if these are called for.

- The work-plan is realistic and adequate. The various steps are spelt out adequately to show the levels of quality control to be exercised.

- The proposed work schedule is reasonable. If the schedule appears unbalanced, it may be that the organisation's resources are already heavily committed, and this project must wait its turn to use these resources. Consider whether rigid adherence to the schedule is important to the sponsor.

- The project control techniques are suitable and adequate for the type of project. It's clear when the sponsor be informed of significant delays.

- The survey provider has resources in place to carry out the project – or if not, they have a clear plan for which phases they will sub-contract. Some organisations are equipped to carry out only certain phases of a project and must sub-contract other phases.

- The survey provider should indicate they have reserve resources available to cope with delays or unexpected problems.

- The survey provider should give evidence of financial stability and overall capability of meeting the contractual commitments.

- The proposal should identify the people who will actually work on the survey, or a list of partners or principals.

- The qualifications and experience of the designated individuals should be spelt out.

- The survey provider agrees to abide by the terms, conditions, and timing specified in the invitation.

- The price is 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 task of evaluating the proposals may itself be contracted out.

3.14 The contract

After selecting the supplier, the sponsor needs to prepare a formal written contract to be signed by both parties. The contract is extremely important. Legal advice may be necessary on the contract's terms and content.

3.15 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 done
- 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.

4 Survey management

This chapter covers the issues to consider and the decisions needed when managing a survey.

Even a relatively small survey may involve a significant amount of organisation and coordination – balancing time and resources with the needs of the survey sponsors and users. A survey needs to be planned as a whole project right from the start.

A survey manager needs to make decisions, or get the relevant people to make them, at the right time. Some of the issues raised are dealt with in more detail in other chapters.

Even if a survey is contracted out, the sponsor still needs to do a significant amount of survey management, for example monitoring the supplier's progress of work done to date, work remaining to be done, and progress against time and money allocations.

4.1 Planning

Once you have decided to undertake a survey, you also need to decide who will be responsible for the proposals for approval in principle, approval for funding, invitations to supply a proposal, survey specifications, evaluating proposals, preparing a formal contract, etc. Other approvals may also be needed when survey planning is well advanced.

Prepare detailed timetables and set in a place a system for monitoring them. Timetables must be specific about interlinking and critical phases of the project. Create a plan to follow if the timetable is not being met.

For all phases of the survey, quality assurance procedures are needed and should include contingency resources, funding, and time to fix any quality issues.

4.2 Consultation

A programme needs to be drawn up in consultation with the users of the survey results. Consulting 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. You also need to consult suppliers of goods and services, such as contractors, designers, and printers.

4.3 Design

Design phases must be coordinated. You'll need to agree on:
- who will decide on and design the survey methodology
- what type of collection method should be used
- who will do the questionnaire and sample design
- who will do the interviewer training, if necessary
- who will design any supporting documents such as reminder letters, emails, interviewer instructions, brochures, and timesheets
- how the printing and publishing of these documents will be organised – including making sure you get the right quantities and quality, in time
- whether any special equipment will be needed.

Another important consideration in the early stages of survey planning is what classifications and definitions you will use. You may need to create new classification.

For more on classifications and statistical standards, see chapter 6.

4.4 Pre-tests and pilot surveys

Develop a programme to test survey methodology at an early stage. This is likely to involve pre-tests and pilot surveys. Decide:

- when they should be done

- what they should achieve

- who will decide when enough testing has been done

- who will review feasibility and provide checks and balances during design phases.

4.5 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.

You'll need to decide how the data will be collected. If interviewer-administered, consider how you'll recruit interviewers and plan employment contracts, wages, and conditions. You may need to consider the match of interviewers to target respondents, for example interviewers that have Māori language skills, or a female-only interviewer force.

Other things to consider include how interviewers will get to the right households or businesses, if the survey uses a face-to-face interview method, or what the processes will be for phone interviews.

There will be issues of quality assurance. Decide how to make it clear to interviewers whether or not they have done their job properly.

4.6 Non-response

Put methods in place to ensure the response rate is as high as possible. This may include call-backs or reminder letters or emails. Decide how many of these to send, and at what intervals.

For more on non-response, see chapter 12.

4.7 Processing and analysis

If the survey uses paper questionnaires, plan how and when to get completed forms from respondents to the office. Other important points to consider in processing include:

- what data is to be captured?

- what checking, coding, or editing of data will be done?

- who will design editing rules?

- what reconciliations will be done to identify non-respondents and ensure there is a questionnaire for every respondent?

- what system / program will be used capture the data?

- how will the dataset be organised?

- what special computer programs will 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 you check the rules for deriving measures from the survey data to make sure they're theoretically correct? (eg in deriving a measure of health status from answers to questions)

- will you need supplementary data, not from the survey, to calculate or finalise results?

Back up data so that it can be restored if accidentally lost. Store or archive it so it can be retrieved and further analysed at a later date.

Data quality and the timetable for processing and analysis need to be monitored.

4.8 Publicity

Consider what publicity – if any – there will be before, during, and after the survey. This may include news releases or media articles.

How will you persuade respondents to take part? Methods to persuade may include providing feedback to the respondents, sending a copy of the results, entering them into a prize draw, or perhaps just thanking them nicely.

It will also be helpful to assign someone to deal with respondent reaction and correspondence, and to be responsible for damage control if there is adverse publicity. Also assign someone to take ultimate responsibility for publicity.

4.9 Report and other outputs

Think about how you will produce and release a report or other outputs from your survey. Decide:

- who will be responsible for text, tables, and graphs in a written report

- how you will confirm that the report is what the sponsor wants

- how the report will be reviewed to ensure validity of cross-tabulations, interpretive text, etc

- what mechanics of drafting, incorporating tables and graphs, printing (if necessary) to use, and how do distribute printed copies

- whether you will give a dataset to the sponsor

- will the report or outputs contain anonymised data or individually identifiable data

- how to deal with any implications for privacy or confidentiality

- how the results will be released

- what caveats there will be on using the results – and how to ensure these caveats are obeyed.

4.10 Costs

Plan how to organise costing. Things to consider may include:

- what progress reports there will be on expenditure

- whether expenditure will be forecasted

- what happens if there are cost overruns
- whether you will try to recover any costs from selling the report or survey data.

5 Sampling issues

5.1 Target population

The target population is the entire group from which you would ideally like to get information. It needs to be defined exactly as possible, for example 'Māori females living in the greater Auckland area aged between 18 and 24 years on 1 January 2014'.

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

5.2 Survey population

The survey population is the members of 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 or Internet 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 a landline telephone or only those who have Internet access.

5.3 Sampling frame

Once the survey population is defined, 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 such as the electoral roll, a telephone book, a computer printout of a membership list, a list of businesses

- a conceptual list such as people booking airline tickets where a certain proportion may be sampled to ascertain reasons for travel

- an area frame, as 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.

5.4 What is a good sampling frame?

- **Each unit must be counted.**

  Excluding units introduces a bias if those units have different characteristics from the included ones.

- **Each unit must be counted only once.**

  If some units are accidently duplicated, you cannot tell what chance a unit has of being sampled. The results will be biased towards the duplicated subgroups of the population.

- **Each unit must 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.

5.5 Sample selection

Sample selection principles can be summed up by 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, you need to randomise the selection procedures. 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 Xth unit from a list, then there must be a random starting point, between 1 and X 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.

5.6 Sample size

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

- **Available resources**:
    - time
    - money
    - personnel
    - equipment (for example computers, software, smartphones, 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 you want from the survey. It gives the chance that your results 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 you'll need.

- **The amount of detail needed in results**

    If you need information for a smaller subgroup of the entire sample, then you'll need a larger sample 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, you'll need a larger sample to get enough data to maintain accuracy levels for these subgroup estimates.

- **The variability of the attributes being measured**

  If the attribute you're measuring varies a lot in the population, you'll need a larger sample size to achieve your desired accuracy level.

- **The expected level of non-response**

  If you expected that a large proportion of units will not respond to the survey, you'll need to approach more units to achieve the sample size required.

- **The sample design used**

  Some sample designs are more efficient than others – in general, if you use known information about the population, a smaller sample size is possible.

Once you've determined these factors, you can calculate the sample size required to obtain the required level of accuracy. For more information on sample size calculations, consult references in appendix 2 or a sample design expert.

5.7 Sampling strategies

There are 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 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.

Non-probability sampling includes:
- haphazard sampling
- sampling of volunteers
- judgement (purposive) sampling
- snowball sampling.

It is beyond the scope of this guide to give details of various sampling schemes, but the lists above are provided for interested readers to research. Brief notes on these sampling schemes are also in the glossary.

5.8 Non-response

It is almost inevitable that you won't get information from some units in the sample. This is referred to as non-response.

For more information about non-response see chapter 11.

6 Classifications

An important consideration in the early stages of survey planning is what classifications are needed. The value of your data will be increased if you use common classifications. Using these also permits the repeated collection of comparable data over time and across different surveys.

6.1 What are classifications?

A classification is a way to group a set of related categories in a meaningful, systematic, and standard format. They allow us to group and organise information meaningfully and systematically, usually in exhaustive and structured sets of categories.

For example, in a survey of businesses, respondents may need to be classified according to their industrial activity. If you use standard classifications, the resulting statistics can be compared with existing published statistics or with a later repeat of the survey.

In cases where the subject of the survey has not been researched in-depth before, you may need to develop new classifications. This could mean a long development phase, but it is vital for producing meaningful statistics.

It's especially important to use standard definitions and classifications for:
- economic variables – industry, harmonised system (trade), and institutional sector
- social variables – eg occupation, household and family type, ethnicity, and age
- geographic regions.

For more information about classifications and statistical standards see
http://www.stats.govt.nz/methods/classifications-and-standards.aspx

7 Privacy, security, and confidentiality

This chapter outlines the importance of protecting respondents' information when conducting a survey. Respondents to your survey have the right that their information is kept confidential, stored securely, and only used for the stated purpose of the collection.

The terms confidentiality, privacy, and security are often used interchangeably. Definitions have been provided below.

- **Confidentiality** refers to not releasing information that could identify the respondent.
- **Privacy** refers to collecting only the information you need and using it for that purpose.
- **Security** refers to keeping data safe from unauthorised access or use.

7.1 Privacy

The respondent has the right to control who has access to their information and what is done with it. Respondents' privacy concerns must be minimised. Here are some factors you need to consider:

- Need for any information is justified.
- Survey questions are limited in their intrusiveness.
- Respondents are informed about access limitations to their data (see security section below).
- Respondents are informed about their rights and obligations in providing data.

7.2 Security

You must consider the security of any forms or surveys during collection, transporting, processing, storage, and destruction. Online surveys need similar consideration.

Access to forms

- Access to forms supplied by the respondent should be controlled.
- We recommend keeping an up-to-date list of staff who are entitled to access the forms. Keep a log of anytime someone accesses the forms.
- Store forms securely. Paper forms should be stored in locked areas, and electronic forms should be password-protected.

Respondent interaction

- If a respondent has to be contacted again after the survey has been completed and collected, ensure that the correct person is approached.
- When dealing with respondent be careful not to divulge information previously gathered from other respondents.

Disposing of forms

Once the required information has been extracted from the forms, dispose of the forms securely.

7.3 Confidentiality

When publishing findings from your survey you must ensure that the respondent cannot be identified or deduced. Provide your respondents with assurances that their information will be kept confidential. This can be done before or during the survey. If respondents are assured their information will be kept confidential, response rates to your survey may increase.

Here are some other factors you need to consider.

- Confidentiality of the respondents' information must be strictly conserved unless consent has been given directly from the respondent. Get this consent in writing.

- Microdata (individual response data from surveys) may be released under the following conditions:

    o data has been confidentialised eg through random rounding or by suppressing cells

    o there are conditions on access to the data eg researchers may be approved for access under certain contractual conditions.

- Information is protected for the life of the data.

- Data in tables should also be protected, for example, through random rounding, suppressing cells, and/or other statistical disclosure techniques. Privacy, security, and confidentiality of information supplied to Statistics NZ has details about these techniques.

8 Questionnaire development

This chapter outlines things you need to consider when developing a questionnaire, along with a useful set of steps for questionnaire development.

8.1   Introduction

Some reasons for poor quality questionnaires are:

- people think that designing a questionnaire is a trivial task – anyone able to write a sentence can put one together

- 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.

8.2   Why is questionnaire design important?

The questionnaire is the survey's measuring instrument and it affects the quality of the data collected. The importance of good questionnaire design cannot be overestimated.

Poor questions and questionnaires:

- increase non-sampling error (the error that is not due to the sampling process, the error that occurs even in a census)

- can increase overall non-response and item or partial non-response, especially in self-complete surveys (non-response also contributes to non-sampling error)

- cost in data repair – checking, correcting, and imputing data takes time and effort, and reduces confidence in the quality of the data.

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. For examples of poor questions see the list of pitfalls at the end of this chapter.

Figure 1: Impact of other aspects of a survey on questionnaire design
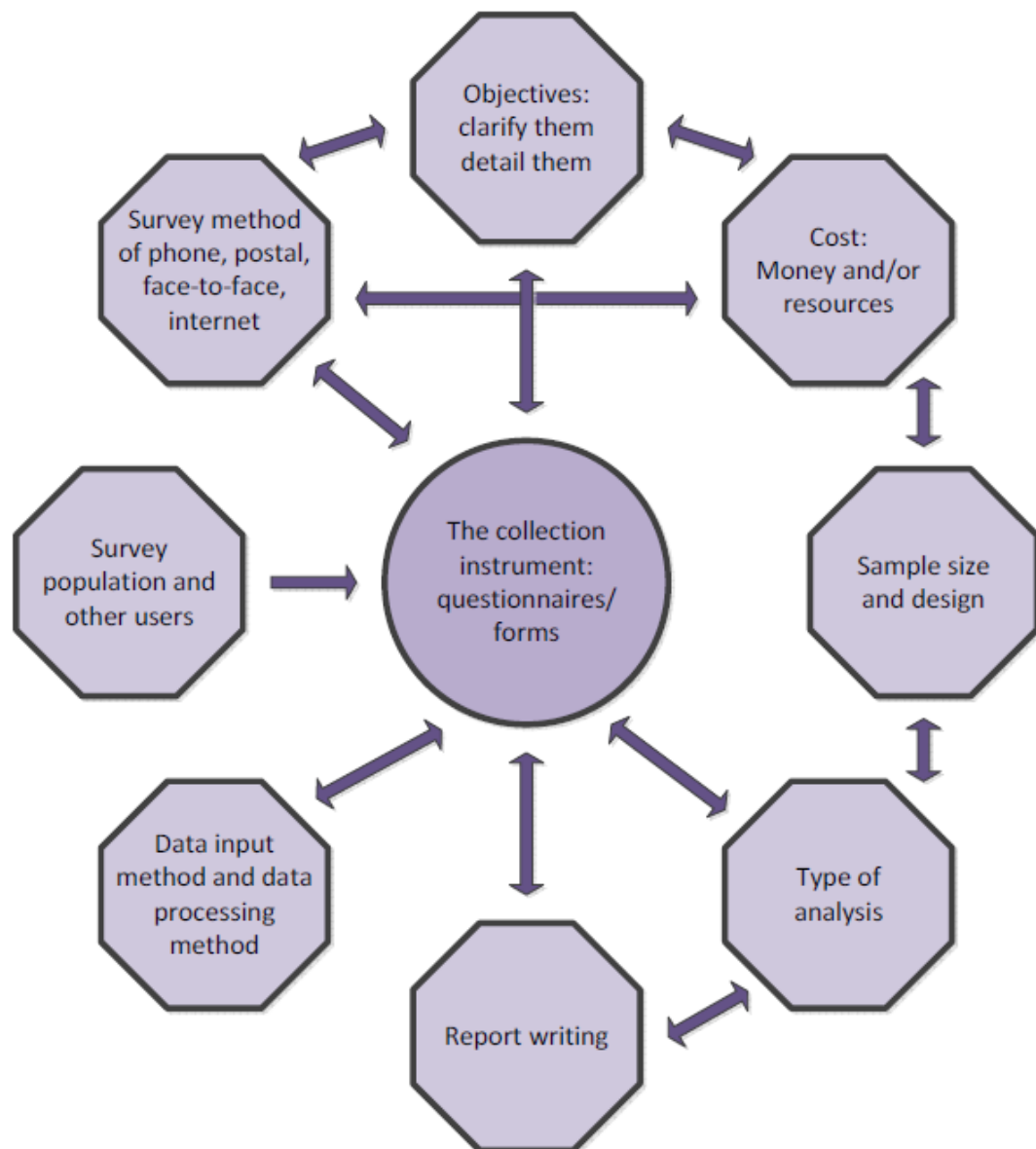
Well-designed questions are easier for respondents to answer than poor questions. Improving your questions is one of the easiest, most cost-effective ways to increase the quality of survey data (Fowler, 1995).

8.3 What to consider when developing a questionnaire?

The objectives, the survey mode, and the respondents are the main things that should determine what questions to ask and how to ask them. For each question, it's important to consider:

- will this question help fulfil an objective?
- are respondents likely to be willing, and able, to answer the question as intended?
- is there any way to make it easier for respondents to give accurate data?

8.4   The steps to take when developing a questionnaire

There is no magic formula for proper questionnaire development, but the steps outlined below are useful, and if followed, mean you can be reasonably confident that your questionnaire will work.

What is needed to develop a questionnaire?

1. Clear precise information needs – agreed by everyone involved

2. List of groups who will 'use' the questionnaire – with information about them

3. Questions written and approved

4. Reasonable confidence the questions work – based on evaluation with all 'users'

5. Questionnaire produced and approved by everyone who needs to approve it

6. Reasonable confidence the questionnaire works – based on evaluation involving all concerned.

Note: These steps are for developing a questionnaire for the first time. If you are revising an existing questionnaire, start with an evaluation of its performance.

Each step is explained in more detail in this section.

Some general points about these steps

Designing a questionnaire is not the simple linear process these steps suggest. It's iterative, so you must be prepared to double back to an earlier step. For instance, at step 3 you may decide 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). You may then have to go back to the information needs (step 1) and drop one, 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, well laid out, with all page, question, and code numbers, and all other elements, in their right places. If you wait until this stage before evaluating how questions are performing, a lot of work (for example on layout) will have to be done each time changes are required. Evaluating questions before doing most of this work saves a great deal of time and effort.

While the steps show two evaluation stages, in practice it may be easier to carry out evaluations at several stages throughout the design process.

The steps in more detail

Step 1: Clear, precise information needs

Taking time to establish clear and precise survey objectives will save you time and frustration later. Usually you start with broad statements. Before moving to the next step you should have a list of detailed and specific information needs.

If other parties are involved in the survey, for example a client or a fellow researcher, it's important they agree with the detailed information needs. Otherwise, development work may be wasted if you discover that the information the questions under development would collect is not the information the other parties need.

Step 2: List of groups who will 'use' the questionnaire

List all the people who will 'use' the questionnaire, and what you know 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 they may have trouble with some types of calculations and may not necessarily read or listen to questions in detail.

Unless a questionnaire designer is doing everything themselves, there will be other users of the questionnaire such as interviewers, programmers, coders, and researchers who will analyse the data. A designer will probably know a lot about the skills, expectations, and what the people in these groups are likely to be able to adapt to. Even if the designer is the one doing some of these tasks, the tasks should be listed as a reminder to check that the questionnaire will meet all relevant needs, for example for scanning and processing.

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 aspects of the survey (as shown in figure 1), all users who are relevant at this stage, and being aware of all the possible pitfalls, you should now start developing the questions. A list of pitfalls is given in chapter 8.

Layout is not important at this stage – only do what is absolutely necessary to do an evaluation. 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 a client or a manager, it is important to get approval at this stage, rather than wait for a later draft. This is important because if the evaluation is underway and then questions are changed, some or all of that evaluation work will be wasted, and a re-evaluation necessary.

Step 4: Evaluating questions

A series of evaluations is needed. Elements may be added, for example tick boxes or instructions, throughout the evaluation process. Types of evaluation are described in chapter 8.

Step 5: Questionnaire produced and approved

To turn the questions into a questionnaire, all remaining elements must be added. Number the questions, as the order 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. Add a cover or an introduction, routing instructions, codes, and page numbers, if needed. Whatever is needed to produce the final questionnaire, short of typesetting and printing a paper questionnaire, should now be done.

In practice, you don't need to do all of this at once. For instance, if you are using codes 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, you can complete quite a lot of evaluation 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 need to be evaluated again.

Step 6: Evaluation of the questionnaire

See the information under 'Evaluation' in the next section.

All that is left to do is have the questionnaire printed, or go live if it is an online form, 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, arrange an evaluation of its performance over the first convenient period, to establish whether any revision is needed. Evaluation methods for this are not covered in this guide.

8.5 Evaluation

Two basic types of evaluation should be used when developing a questionnaire: peer review and user testing. A peer review can be done just by having a colleague look at the questionnaire, while user testing involves having users of the questionnaire actually working with it.

Peer review

In a peer review, you are simply looking for things that are likely to cause problems.

You can do this yourself, but it should also be done by at least one other person, preferably someone who was not involved 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 pitfalls known to cause problems can be found at the end of this chapter. This list is useful when doing this sort of review.

Three important types of checks are checks:
- against objectives
- for consistency
- against what is known about the users.

A peer review can help simplify questions and instruction wording. 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 technical is real. This is partly because questionnaire designers often write questions to collect information on topics that have a set of terms with technical statistical definitions. The questionnaire is the conversation you have with the respondent and wherever possible everyday language should be used.

How often to do peer reviews

At each stage of the evaluation process and after changes are made to the questionnaire, peer reviews should take place. Where possible, peer reviews should be done by more than one person to increase the effectiveness of the evaluations.

Why peer reviews are important

While 'user testing' 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 testing. Otherwise, a larger number of user tests will be needed to reach a stage where you are reasonably confident that the questions and questionnaire will work as intended.

User testing

User testing 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 others types of pre-tests (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 (for example a trial of scanning and processing data from the questionnaire).

This chapter deals with small-scale evaluations, not with pilot surveys, which are covered in chapter 10.

Whether a pilot survey is carried out depends on several factors, but the small-scale evaluations of the type described in this chapter should always be part of questionnaire development. If a pilot survey is done, it should be seen as part of a systematic development. It is not 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 here can identify problems that would not be discovered in a pilot.

Why user testing is essential

User testing is 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 proved to work. A designer can look for sources of problems, as suggested, in a peer review. But they will never see the questions through the eyes of respondents, because the designer:

- knows too much about the questions

- is 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 testing will discover both where errors are made and why they are being made. You can't do this by simply looking at completed questionnaires.

The aim of user testing is to ensure that the questionnaire will work for the respondent, and for everyone else 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 – but do all you can to make the questionnaire suit the respondent.

User testing with respondents

How you test respondents is slightly different depending on how a survey is administered. The choice of a method can also sometimes be restricted by other circumstances.

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

An alternative approach is sometimes taken if the answering process cannot be observed (for example with a business questionnaire that different people fill in different parts of,

over several days). You can follow up the completion of the questionnaire with a check for any obvious errors, and then ask questions about:

- those errors

- how they arrived at those answers

- what they understood certain words or concepts to mean

- the respondents' perceptions of problems and about changes they'd like to see made.

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

One important point to remember when doing any type of user testing 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.

For interviewer-administered questionnaires, you cannot observe respondents as described above. Several approaches are possible, and it is often a good idea to use more than one. Throughout the questionnaire development, the designer should be asking respondents the survey questions to check they have a consistent understanding of the wording. Interviewers also need to be involved in the evaluation, as they are the people who will be working with the questionnaire.

You can obtain important information by having interviewers report problems, but you should also observe the actual interview if possible, and carefully examine completed questionnaires for problems. (Observation is recommended because sometimes interviewers, and respondents too, can report that there is no problem but still be making errors. For example, because an ambiguous question may not be seen as having the meaning the designer intended.) Interviewers, or researchers, can also ask respondents 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.

Sometimes you will need to do 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 keep in mind that how a question is answered can be affected by its position in a questionnaire.

Who should be the subjects for user testing?

Do not assume 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 testing with friends, family, or colleagues as a first step. These tests are usually easier to organise (and cheaper) and may show up problems that can be fixed before doing any more testing.

Further testing should be with people who will be like the survey respondents, and/or a sample from the same frame as the survey respondents. The designer should consult the person responsible for sample design about the implications of their choice of respondents they have undertaken user testing with. It may be desirable to exclude them from the full survey, for several reasons, for example respondent burden.

User testing with other users

Observation can be a very useful evaluation method with some groups (for example it could show why some fields were being missed by coders or why answers provided in an online form are not coding correctly), but it is often not possible because of the way work is organised. At minimum, get each group to carry out its job on the questionnaire and

report any problems. Check the output from each group if possible. For some user groups, prior work will need to be done on the questionnaires, such as filling in some questionnaires, to create a test set for processing.

How many rounds of user tests to do

Three rounds of testing 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 you 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 have input to the design of the questionnaire should do so at a very early stage.

The number of people to test within each round of testing is specific to each survey. It depends on the quality you want for the required outputs, the complexity of the topics, and question wording. The number of rounds of user testing with other groups will vary with the survey and the number of interviewers, programmers, processing staff etc, involved. At least one user test should be done with all relevant groups at steps 3 and 6 (see section 8.4). At step 3, it is unlikely that there will be a document suitable for processing. In fact, whenever there are changes that would affect a particular group, user testing should be done with them.

8.6   List of pitfalls to guard against and check for

This list of pitfalls 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, use this one as a:

- guide, or a set of warning signs, when designing questions and questionnaires

- checklist for undertaking peer reviews.

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

Using language that is hard to understand, or overly technical and full of abbreviations and words that are not defined, makes it difficult for respondents to answer as intended.

Avoid the following language pitfalls:

- Hard to understand or just badly written questions

- Overly academic, complex, or technical words/sentences:

> **Example**
>
> Do you engage in leisure time pursuits involving aerobic exercise during school vacations?
>
> The words 'engage in' and 'leisure time pursuits' are unnecessarily formal, 'aerobic' is a technical term, and 'vacation' is not a term commonly used in New Zealand.

- Abbreviations that respondents may not understand:

> **Example**
>
> NEC or NFD
> Passport no.
>
> The abbreviations NEC (Not elsewhere classified) and NFD (Not further defined) are 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.

- Undefined terms or concepts:

> **Example**
>
> What was the income of your business last year?
>
> 'Year' may mean calendar year, March or June financial year, or even the 12 months that ends 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. Ensuring terms or concepts are well defined lets respondents know what sort of answer is expected.

Pitfalls with questions

- Questions that do not fit the objectives:
  - o This is very important. It is difficult to check this without a clear and precise set of information needs.
- Ambiguity where it is hard to be sure what is being asked:

> **Example**
>
> 1. What grade did you get in 2011 in:
>   Maths
>   Physics
> 2. Did you do better in maths or physics in 2012?
>
> Question 2 is ambiguous. You could be asking respondents to compare their marks in the two subjects in 2012, or asking whether their marks in either subject improved in 2012 when compared with those gained in 2011.
> Respondents may never notice the ambiguity. Different respondents may answer different questions, depending on which meaning they see.

- Questions that are too long:
  - o Questions with long response options and/or many response options are unsuitable for telephone interviews. Even for self-administered questionnaires, numerous response options can affect how respondents answer. Respondents tend to read only as much of the question and response options they think they need to, to answer the question.

- Double or triple questions:

Example

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

☐ Yes

☐ No

Questions like this may make logical sense but respondents are likely to be confused about how to answer 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

Logically you must say 'no' unless you can say 'yes' about all three things, but people find this confusing.

- Unreasonable recall period:

Example

How many drinks containing alcohol have you had in the past two years?

- Double negatives:

> **Example**
>
> Do you agree or disagree that people should not be expected to obey the law?
>
> People find it hard to work out that they have to disagree in order to say that, yes, people should be expected to obey the law.

- Questions which assume a state of affairs exist:

> **Example**
>
> What is the income of your spouse or partner?
>
> ☐ zero income
> ☐ $1 to $25,000
> ☐ $25,001 to $50,000
> ☐ $50,001 to $75,000
> ☐ $75,001 or more
> ☐ not applicable
>
> This 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. If respondents are confused in this way, there is a danger they may stop answering questions and not complete 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 to find out whether the respondent does have a spouse or partner, and then route them to the next part of the questionnaire they need to answer.

- Leading or loaded questions and unbalanced scales:

Example

How satisfied were you with this course?

☐ Very satisfied

☐ Satisfied

☐ Dissatisfied

- This is an unbalanced scale – it has no negative category for 'very dissatisfied' nor does it have a neutral category for those who were 'neither satisfied nor dissatisfied'.
- If the person taking the course were asking the participants this question, students may feel pressured to say what they think the course facilitator would like to hear.

Example

How often do you get drunk?

People may not want to say that they get drunk, let alone how often. A social desirability bias may exist, where respondents tend to answer a question in way that puts in them in a favourable light or won't make them look bad. Under-reporting would be expected.

- Questions that require information, or a level of skill, which respondents may not have:

Example

Give your electricity costs for the 2012 calendar year as a percentage of your electricity costs for the 2013 calendar year.

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. Many respondents will not attempt it.

- 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
>
> 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. You 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.

- 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
>
> Other possible categories exist, for example, read them at work, or read them in a café. An 'other' category will give people an option if their situation does 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.

- 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 these is closest to what you think?

☐ made it easier

☐ made no difference

☐ I have changed my choices since seeing the new material

☐ don't know

The third response is not an answer to the question. It cannot legitimately be used as a measure of the number of people who have made a change.

Pitfalls with the questionnaire

- **Crowded or untidy appearance**
- **Font hard to read:**

    Block capitals are much harder to read than sentence case.

    Use a font size large enough to be read by respondents with poor eyesight.

    Words or terms that need emphasising should be in bold, not underlined, capitalised, or in italics.

- **Inconsistent use of terms:**

    Decide on one term and use it consistently throughout the questionnaire.

    For example, if the term 'business' is used in one question and 'company' and/or 'enterprise' is used in other questions, respondents may think the words have different meanings.

- **Inappropriate title for the questionnaire or for sections:**

    This can be irritating to respondents. Take care 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 section titles.

- **Routing instructions which are incorrect or hard to follow**
- **Inconsistent layout:**

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

- **Layout that is likely to cause mistakes when answering:**

    One of the most common problems is having a large gap between the response options and the tick boxes.

Example

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

Another common problem is having options halfway between tick boxes or having too small a gap between because respondents may tick the wrong box.

Example

☐ never married ☐ married ☐ divorced/widowed

- **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.

- **Illogical grouping or flow of questions**

- **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.

9 Sources of error

There are two types of survey error: sampling and non-sampling error.

9.1 Sampling errors

Sampling errors are a result 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 characteristics 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 sample error.

With careful design and estimation procedures, you can minimise sampling errors and make calculations to determine their extent.

9.2 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. Non-sampling errors can occur in many ways and 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. For example, excluding a remote geographical area due to expected difficulties with collection, or including children in a survey that was designed for adults may cause bias. 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 chapter 9.

- **Sample design**

  The design should give everyone in the target population a known chance of selection.

- **Sample selection**

  Use random selection procedures to eliminate bias due to selection by, for example, interviewers, survey sponsors, or the respondents themselves.

- **Non-response**

  See chapter 12.

- **Defining the objectives**

  Imprecise objectives may lead to survey information which does not meet requirements, for example confusion about whether information is required for families or households.

- **Questionnaire development**

  See chapter 8.

- **Time period 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 run over a long enough period to measure any seasonal effects.

- **Collection of information**

  See chapter 11.

- **Inadequate interviewer training**

  See chapter 11.

- **Data coding and entering**

  See chapter 13.

10 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. You should have a mechanism in place to ensure that people who took part in the pilot survey are not selected for the main survey (unless the pilot survey is for a census).

This guide distinguishes pre-tests from pilot surveys, though they are both types of 'user testing'. A systematic programme of both pre-tests and pilot surveys should be part of survey development. Pre-tests, relatively small-scale exercises, are discussed in chapter 8.

Pilot surveys are an important part 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 ensure that deviations from the intended design are minimised. This principle of operational control, which is difficult to achieve, requires the survey designer to subject 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 underway, a great deal of money and time has been wasted.

As well as further testing of questionnaire wording, respondent burden, and interview length, all of which are likely to have already been pre-tested, 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 gets underway.

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 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 a 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.

11 Collecting information

For many surveys and censuses, information is obtained by asking people questions – although the information 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 time spent watching television).

In the case of direct measurement, the way information is collected will depend 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). Seek expert advice to ensure there is consistency.

The two main ways to collect information from people are self-complete or self-administered surveys, and interviewer-administered surveys.

11.1 Self-complete / self-administered surveys

- **Mail questionnaires**

  Written responses are provided on a paper questionnaire that is posted or delivered to respondents.

- **Internet questionnaires**

  Written responses are entered into a questionnaire that respondents access through a website. A number of web-based questionnaire design tools exist that you can download, or buy a licence to use.

  Once respondents submit their completed forms the data is usually held by the survey supplier. They will often have tools for analysing the data that you can access or you could download the data file and do your own analysis. Decide what sort of analysis you need and discuss this with your survey supplier to determine whether their tools will meet your needs.

11.2 Interviewer-administered surveys

- **Face-to-face interview**

  Interviewers ask the respondents questions in a face-to-face interview. The responses are often recorded by the interviewer directly into a computer.

- **Telephone interview**

  The interviewer records the respondent's answers to questions asked over the telephone. Again, responses are recorded directly into a computer.

11.3 Mixed collection methods / modes

Unless everyone selected in a survey sample can complete the questionnaire using one mode, the researcher may need to provide an alternative. For example, you may offer a paper form to respondents who cannot complete an Internet questionnaire.

The benefits of using mixed collection methods include:

- an increased response rate, as all respondents can complete the survey and are not restricted by access to a particular mode

- a decrease in respondent burden

- improved data quality, by reducing restrictions and burden on respondents.

One disadvantage of using a mixed collection mode approach is that mode effects may occur between survey responses. 'Mode effect' is the bias caused by the mode of the data collection. Mode effects may occur when asking questions of a sensitive nature. For example, in a survey asking about alcohol consumption during pregnancy, respondents may give different estimates in person than if they were asked anonymously online.

The level of bias caused by the mode is difficult to measure. It may or may not affect the output. However, you must consider mode effects – particularly when changing the collection mode, or moving a survey from using one mode to mixed modes.

The designer can choose to use techniques to minimise potential mode effects, or simply accept that these effects will be present. Either approach may be valid, depending on the particular collection. Consider the possible effects when choosing your approach. Then explain these effects to users of the output.

Mixed-mode designs can be either sequential or concurrent. Which option is best depends on the situation. In general, we advise you use sequential design. This is where one mode is offered, and another used only if needed. Concurrent design is where you offer several modes at the same time. This can leave respondents with too much choice and may reduce response rates.

11.4 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 what collection method is used. Face-to-face interviews produce better results for complex issues and for lengthy questionnaires. Telephone interviews or self-complete questionnaires may be better for sensitive issues.

- **Response rates**

  The quality and reliability of survey data is affected by response rates. Face-to-face interviews often achieve a better response rate than other methods.

- **Resources**

  Because of the high costs of deploying an interview team, online, postal, and telephone interviews are usually much cheaper.

- **Time**

  Telephone and Internet surveys can be much quicker than mail surveys or face-to-face interviews.

  Particular issues are 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, you may need several levels of interviewer supervisors.

  Training interviewers is vital to ensure that each interviewer is behaving in the same way when collecting information from respondents. Otherwise, different information may be collected simply because of a different interviewer. Interviewer behaviour needs to be monitored, which includes checking that the right individual in the right household has been interviewed, and that the interview was conducted according to standard practice.

- **Population of interest**

  The nature and geographical location of the population of interest may have a bearing on the collection method. It's expensive to survey a remote or geographically dispersed population using face-to-face interviews.

12 Respondent experience and non-response

The quality of your results relies on the cooperation of your respondents. Some respondents will be happy to complete the survey, while others will see it as a burden.

Response rates to your survey can be influenced by respondent burden. This is the amount of time and effort the respondent feels it takes to complete the survey.

Aim to reduce respondent burden when designing your survey. If you do this, respondents are more likely to have a good experience. If they have a good experience, they are more likely to respond.

Inevitably though, you won't get information from some respondents. This is referred to as non-response. You may find complete refusal or inability to take part in the survey, or partial non-response – where the respondent provides only some of the requested information. Non-response introduces bias into survey results if the non-respondents have different characteristics to those who responded.

This section will help you understand, minimise, and deal with non-response.

12.1 Reasons for non-response

Some reasons for non-response are:

- sensitivity of the questions

- fear of information being misused

- length of questionnaire

- difficulty of the questions – eg hard to recall / can't locate information

- wrong person approached to provide the information

- respondent does not understand the language of the questions – eg if the language is too technical

- illness

- inability of the respondent to provide the information requested

- inability to contact the respondent

- inaccuracy in the sample frame.

12.2 Minimising non-response

You may be able to minimise non-response if you:

- **Call back**

  Interviewers return if they can't contact the person.

- **Provide warning**

  Interviewers contact potential respondents in advance and arrange a convenient interview time. 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.

- **Call at suitable times**

  Interviewers call at times most likely to suit the respondent.

- **Send reminder letters or emails**

  Send reminders to people who have not responded to an online or mail-back questionnaire.

- **Give assurances of confidentiality and purpose of the survey**

  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 how results will be published. Encourage response by being truthful, reassuring, brief, and unambiguous.

  Confidentiality is dealt with in more detail in chapter 7.

- **Design questionnaires carefully**

  Wording, length, order, the sensitivity of questions, and how easy the questions are to respond to all affect response.

  Questionnaire development is dealt with in more detail in chapter 8.

- **Provide incentives**

  Provide incentives as to why someone should complete your survey. Even a simple incentive such as supplying survey results to respondents may increase the response rates. Explaining the benefits of the survey may also increase rates.

  However, take care when choosing an incentive. Some incentives may only be relevant to one group, biasing the results to that group. Or some respondents may complete the survey just for the incentive, and not take their answers seriously.

12.3 Dealing with non-response when processing survey data

You can deal with non-response during data processing in various ways. You may choose to:

- ignore non-response

- assume the characteristics of the non-respondents will be the same as those of the respondents

- study non-respondents to establish their characteristics, then develop a scheme to impute data for non-respondents.

In any case, report your response rates and how you calculated them.

13 Processing

This chapter expands on the processing-related issues mentioned in chapter 4. Processing refers to the procedures by which a 'clean' dataset (ie without detectable errors or omissions) is produced from respondents' information.

The clean dataset is then analysed to produce the information required by survey sponsors, such as totals, averages, population estimates, and cross-tabulations. Statistical analysis is a broad area and is beyond the scope of this guide. You should seek expert assistance on the type of analysis required, given the nature of the survey and the information needs of survey sponsors and other relevant factors.

Data processing requirements need to be addressed in the early stages of survey planning. The processing system must be able to check that the correct person, household, or business has been surveyed. It also needs to be able to track the status of questionnaires, from when blank ones are provided to respondents through to receiving completed questionnaires and the status of questionnaires at any given stage during processing.

The processing system needs to:

- automatically code respondents' answers, with the ability for manual coding as necessary

- contain editing procedures to check each respondent has answered the correct group of questions, and that answers to these questions are not outside the range of expected responses

- identify the number of expected but missing responses and produce error reports – for example, what records are still in error or missing

- contain a mechanism for correcting data, if the correct answer can be deduced, the respondent re-contacted, or data imputed.

If only a small number of people were surveyed, the questionnaires 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.

Set up the processing system and test it before you start to collect the data.

Exactly how data will 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 often need to be manually coded. Closed questions can have their response categories automatically coded. Other questionnaire items that are not automatically coded will need to be manually coded. This is best decided during questionnaire design, so a consistent set of rules can be developed, used within the questionnaire, and during processing.

Questionnaire designers must follow established practices that allow data to be captured easily. A program or a series of programs needs to be written to get the data into a form where editing can be completed to enable statistical analyses to be carried out.

Some questions to consider:

- How will the data get into an electronic format if responses are returned on a paper questionnaire?

- Who will write the data capture programs?

- Are the questionnaires in a format in which data can easily be captured?

- Once data has been inputted into a data file, what will be done with it?

- 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?

- How much editing will be automatic, manual, or automatic with manual validation?

- 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?

- Is there an off-the-shelf product that can process the data in way that meets the survey sponsor's need?

- What security procedures are needed to ensure respondents' information is kept confidential?

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

14 Presenting results

Presenting the results is the main and often only way a survey is judged. It is a chance to display the data obtained in your survey to a wider audience.

When reporting survey statistics you must maintain the confidentiality of the respondents' data. Take great care to ensure that a published report does not contain information which could be used to identify any individual or their responses.

Here are some factors to consider when you are ready to present your results.

14.1 Ideas for presenting results

Who is your audience?

Before deciding the best way to disseminate your data you need to consider your audience. That is, who will be looking at and using your data. Understanding who your audience is will help you decide what level the data can be presented at.

Is your key audience going to be expert data users or the general public? This knowledge will help you publish your findings at the right level of complexity and will meet the needs of your audience. The medium you use to present your results (eg online, print) will also be determined by your audience. Knowing your audience also helps you to distribute information that is relevant and will be used.

Methods for presenting results

The method you choose to present your results will depend on your audience, budget, and available resources. Potential methods include:

- **Text**

  Text is a simple and effective way to explain your results. Text often accompanies visual displays (eg graphs or tables). Write clearly, using language appropriate to your audience.

- **Tables**

  Tables are a simple way to display data. Make sure that all the data in tables are confidentialised (see chapter 7 for further information).

- **Graphs**

  Graphs can help you show trends in your data. They can be static or interactive. Make sure that all graphs are correctly labelled and easily interpreted by your intended audience.

- **Maps**

  Maps can be useful for displaying data that includes geographical location. For example, results from a nationwide survey on household income can be displayed on a map to show the average income across different regions.

  [Design principles for maps using New Zealand's statistical data](#) has more information.

- **Other infographics**

  Using infographics to present data is becoming increasingly popular. Infographics help bring your numbers to life by using graphics.

See infographics published by Statistics NZ

14.2 Technical detail

Many people will only be interested in your results, but you should include or link to technical detail for people who wish to examine survey procedures. This 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 in a technical report should include the following:

- 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:
  - o sample frame used
  - o sample selection procedure
  - o expected sample size
  - o achieved sample size, including subgroups
  - o response rates, and how they are calculated
  - o non-response methodology
  - o reasons for non-response
  - o collection procedure
  - o date and duration of the survey fieldwork
  - o quality control (eg efforts to reduce non-sampling errors, interviewer training, imputation procedures).

- Numerical results:
  - o actual results
  - o derivation
  - o 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 the sampling errors.

- Assessment

  This could include interpretation of the reasons for the results, and recommendations for future action, for example further research or policy implementation.

- Responsibility

  Indicate who commissioned and sponsored the survey, who did the work, and who wrote the report.

References and further reading

Questionnaire design

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Statistical methodology

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American Statistical Association (nd). What is a survey. Available from www.whatisasurvey

Intermediate

Lohr, SL (1999). *Sampling: Design and Analysis* (2nd ed). Duxbury Press: California.

Statistics Canada (nd). Survey methods and practices. Available from www.statcan.gc.ca

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Appendix 1: Glossary

The bolded terms within these definitions have also been defined in this glossary.

Bias	The amount an estimate differs from a true population value because of some quality of a measurement instrument, sample selection method, or other aspect of survey methodology. This difference tends to result in a misrepresentation of what is being measured in a particular direction.
Computer 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. Automatic computer coding allows more consistent coding of question responses than manual coding.
Census	Involves surveying the total **population** of interest.
Computer assisted personal (face-to-face) or 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 errors. Also known as CAPI and CATI.
Closed questions	Provide a complete set of alternative answers from which respondents select their choice.
Cluster sampling	A sample selection method where the sampling unit in the population units belong to natural groups (clusters). 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 **multi-phase sampling**.
Codes	Identifiers, usually numeric, which are assigned to represent responses or categories of information during processing.
Coding	The process of converting answers to survey questions into numerical form (**codes**) to help compile the 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 data from questionnaires to an electronic database in preparation for analysis.
Dataset	Data collected in a particular survey that is usually stored electronically.
Estimate	The value of an **estimator** for a specific sample.
Estimator	A rule or method of estimating a parameter of a **population**.
Filter question	A question 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. For example casually asking passers-by, or casually selecting households.
Imputation	A method for entering a value for missing or unusable data.
Item or partial non-response	The respondent answers some questions but not others.
Judgement sampling	A non-probability sample selection method where respondents are selected according to a personal judgement about which members of the population will be surveyed. 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 that intentionally or unintentionally persuade the respondent towards a certain answer because of the way they are worded.
Longitudinal study	In contrast to a **cross-sectional study**, collects the same information at different points in time. See **panel survey**.
Measurement instrument	The means used to collect information. For example, for many surveys the measurement instrument is the questionnaire.
Multi-phase sampling	A sample selection method where certain items of information are collected from the entire sample and other items from a subsample of the larger original sample. Typically only two phases or double sampling is considered. Here, a large sample of population units is selected and information that 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 that is selected by stages, where the sampling units at each stage are subsampled from the larger units chosen at the previous stage. 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).
Non-response	A respondent refuses or is unable to provide the information requested.

Non-sampling error	Other errors present in surveys that come from sources other than sampling, for example, reporting error, processing error, non-response error.
Open questions	Questions that require respondents to provide an answer in their own words because a complete list of answer categories is not provided. See **closed questions**.
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. It is completed before the final survey goes into the field, to alert the surveyor to any difficulties that were not anticipated. 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 of 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 **multi-stage sampling** where each first-stage unit is selected with a probability proportional to size.
Probability sample	A sample selected so that each unit in the population has a non-zero chance of being included. This chance, 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 specific 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 so the results can be compared between the different groups.
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 which question to go to next.
Sample	A subset of the population that surveyors hope will be representative of the total population, and which will enable them to make generalisations about the total population.
Sampling error	An error resulting from collecting information from a fraction of the population rather than the whole 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 the members of the target **population** only once – though this may be not 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.
Social desirability bias	The tendency of respondents to answer a question in way that puts in them in a favourable light or won't make them look bad, for example over-reporting good behaviour (eg exercise) and under-reporting bad or undesirable behaviour (eg drinking).
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 kth 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.
Variation	A measure of the variability within a **population**.

Appendix 2: Statistics NZ's survey advice and other services

Statistics NZ offers advice to the Official Statistics System for both social and economic survey design. We can also undertake surveys of national importance on a contract basis.

Questionnaire design

Our Questionnaire Methodology and Development team provides advice about questionnaire design and development.

See Survey design and data collection for more information, including methodological standards.

Sample design

Our statistical methodologists provide technical advice on sample design.

Statistical classifications

Our classifications and standards team provides advice on the use of classifications for various topics. Using statistical classifications may save time, improve the accuracy of results, and make comparison with other statistics easier.

See Classifications and standards for more information.

Customised data services

Our Customised Data Services team produce data specific to your needs, to help you make a more informed decision. A fee applies for this service.

See Customised data services for more information.

Data Lab

The Data Lab provides secure access to anonymised microdata for research. We are legally required to protect confidential individual and corporate information. A rigorous application process and strict eligibility criteria apply based on the requirements of the Statistics Act 1975. Researchers can apply to access microdata for bona fide research or statistical purposes that are in the public interest.

See Data Lab for more information.

Data Archive

We have a digital archive that holds statistical data and associated documents – metadata, and publications that we produce. Our archive is also a safe repository for datasets by produced by other government agencies and government-funded statistical studies.

See Data Archive for more information.

Appendix 3: Case studies and examples

To see some of the practices discussed in the guide used in real-life survey design, check out the following examples.

Technical documentation – Ministry of Health
The Ministry of Health design and run many of their own surveys. The technical documentation available on their website includes survey questionnaires, content guides, methodology reports, and analytical guides.
These examples relate to chapters 5, 8, 11, 13, and 14 of this guide.

Case studies – Statistics NZ
These case studies demonstrate how statistics from Statistics NZ can be used in businesses, organisations, community groups, and central government.
While the case studies don't focus on survey design, they include information on survey objectives, and sourcing already available information.
This relates to chapter 2 of this guide.

Screen Industry: 2013/14 – Statistics NZ
The 'data quality' section of this report on a survey of the screen industry in New Zealand gives information on sampling issues, collection, and processing.
This example relates to chapters 5, 7, 9, 11, 12, and 13 of this guide.