

Designing Community Surveys for Behaviour Change Research: A Practical Guide

Lynette J. McLeod¹, Aaron B. Driver¹ and Donald W. Hine^{1,2},
¹University of New England, ²University of Canterbury



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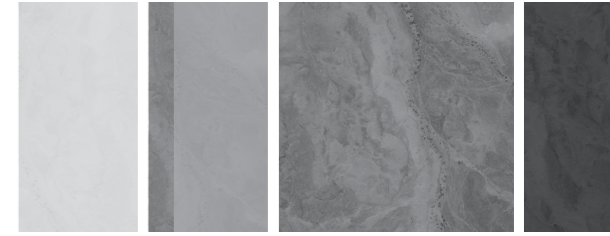
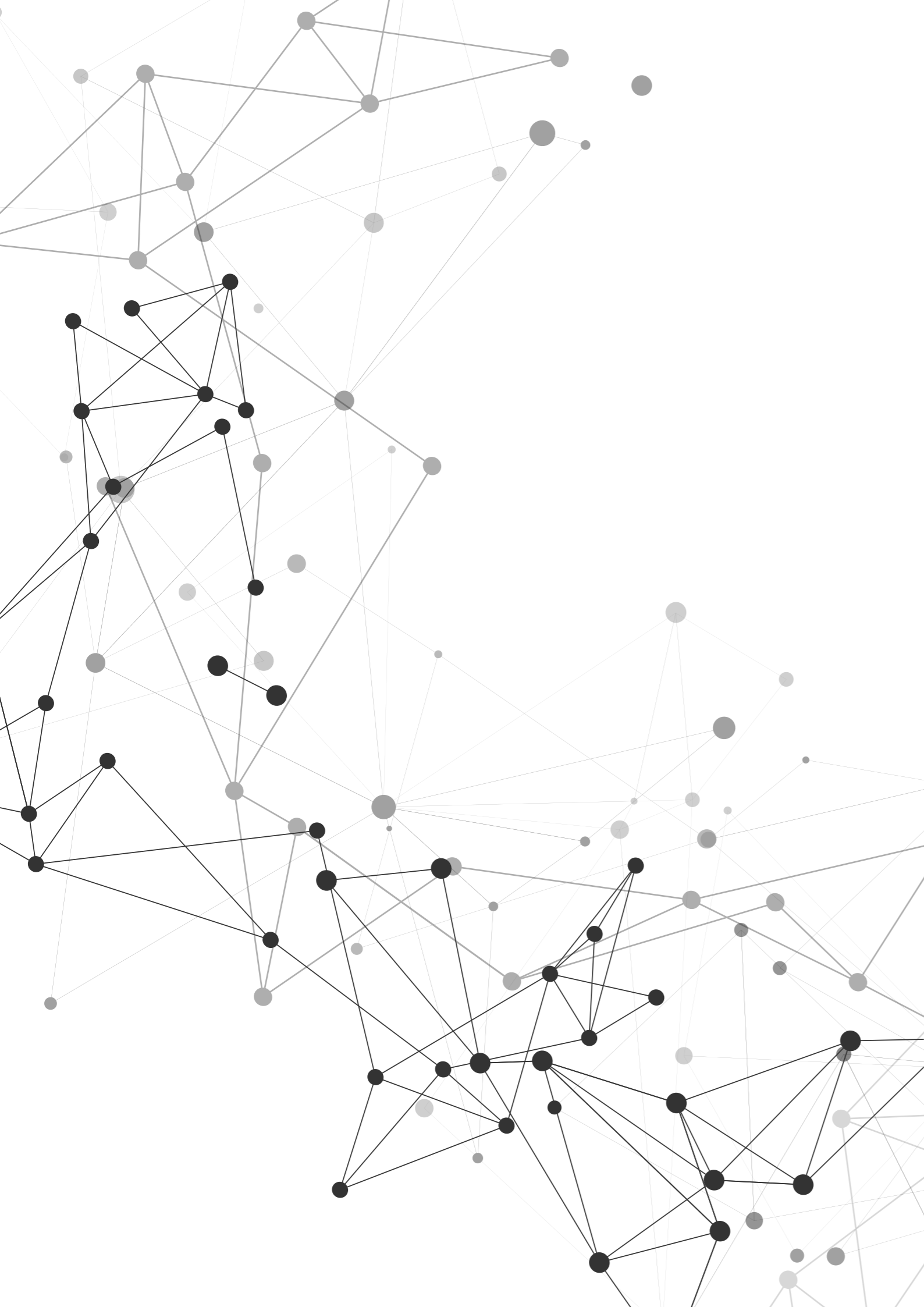

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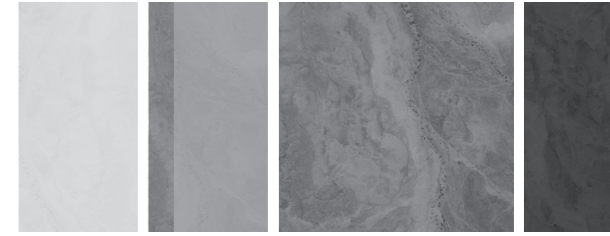
Designing Community Surveys for Behaviour Change Research

A Practical Guide

Lynette J. McLeod
Aaron B. Driver
Donald W. Hine

University of New England
Armidale, NSW 2351

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introduction

An impressive set of technologies and recommended management best practices have been developed for landscape management. All these proposed solutions will fail unless the public – land managers and community members – are sufficiently empowered and motivated to change behaviours and adopt new approaches.

Changing behaviour, and sustaining it over time, can be difficult. Social psychology and behavioural economics have generated an array of intervention strategies and behaviour change techniques to increase audience understanding, engagement and, ultimately, adoption of desired behaviours. Hine, McLeod and Driver (2022) proposed four guiding principles for developing behaviour change interventions:

1. Focus on behaviour.
2. Know your audience.
3. Match your interventions to the primary causes of behaviour.
4. Evaluate, review and reflect.

This guide focuses on an important research tool – community surveys. Surveys can collect information on current behaviours and intentions and identify factors that encourage or impede engagement in desired behaviours. In short, surveys provide essential background for designing behaviour change interventions.

How to use this guide

Using real world examples, this guide offers practical advice for designing and implementing surveys and analysing the data they generate.

Each chapter ends with references so you can access more in-depth information. A list of general resources on survey methods is found at the end of the guide.

Ultimately, this guide will help you better connect with your communities, more effectively tailor and target interventions, and increase the impact of your management programs.

References

Hine, D. W., McLeod, L. J., & Driver, A. B. (2022). *Designing behaviour change interventions for sustainable land management: A practical guide.* Canberra, Australia: Centre for Invasive Species Solutions.



one

Planning your community survey

Purpose, goals and outcomes

The first step is to clearly define the purpose of your community survey, its specific goals and desired outcomes.

Purpose: Purpose is a key motivational driver of action. An explicitly stated purpose shapes your project's goals and outcomes, and justifies the time and resources required.

Clarify: Why exactly am I conducting this study? What am I hoping to achieve?

Goals: Goals are how you achieve your purpose: What questions are you going to answer, and what shape do you think the answers will take?

Outcome: Projects should be designed with specific outcomes in mind: What are the benefits your project will deliver? Outcomes often include outputs – the tangible and intangible products that result from project activities.

Example 1

Amy and John are biosecurity officers at a generic government land management organisation. They rely on landholder reports of wild dog sightings and attacks, to plan and budget their wild dog management activities. Amy and John are frustrated by landholders in their local area who fail to report. They decide to improve their understanding of why some do and others do not.

Project purpose: In order to improve wild dog management planning and resource allocation, better understand why landholders in the local area do or don't report wild dog sightings and attacks.

Project goal: To understand factors that encourage or prevent landholders from reporting wild dog sightings and attacks.

Project outcomes: To identify landholder segments in the community and the key barriers and drivers that influence reporting behaviour. This information will help target intervention strategies to increase reporting of wild dog sightings and attacks.



Research approach and participants

Clarifying your purpose, goals and outcomes will help determine:

- **The best approach to answer your research question** – The two main approaches to collecting research information are quantitative and qualitative (see Table 1 for more details). Quantitative methods help you answer the 'who', 'what', 'when', 'where' and 'how many' questions, and gain an appreciation of 'why' people act in certain ways. Qualitative methods can provide a deeper understanding of the 'how' and 'why' questions, focusing on people's feelings about their actions. This enriches the information and provides a more detailed picture. Combining two methods harnesses the strengths of each and is called a mixed methods approach.

- **Key stakeholders** – Who has an interest or investment in the problem? Who can help understand the problem? The knowledge and expertise of stakeholders helps build the survey and improve the validity of its items.
- **Target audience** – Who is the focus of your project? Who do you need to collect information from? Identifying the target audience helps you narrow the focus of your survey and craft appropriate questions.
- **The type of information or 'variables' to be measured** – What type of information should you collect to achieve your goals? What are the variables, i.e. factors, traits or conditions to be measured?

*Goals are how you achieve your purpose:
What questions are you going to answer, and what
shape do you think the answers will take?*

Example 2

Research approach: Amy and John choose a mixed research method. They will conduct a small number of key stakeholder interviews to get insight into the locals' wild dog problems and the factors that could encourage or prevent reporting. This information will be used to design a quantitative survey to poll a representative sample of local landholders, then identify landholder segments and key barriers and drivers.

Key stakeholders: Key stakeholders in this survey include:

- fellow biosecurity officers in their organisation
- other local NRM groups (e.g. local wild dog associations, landcare groups)
- livestock industry groups impacted by wild dog attacks (e.g. AWI, MLA)
- managers of public lands (e.g. state government agencies, local council)
- the landholders.

Target audience: Amy and John's target audience will be all landholders living on properties greater than 10ha within the defined study area, where wild dogs are known to be a problem.

The type of information to be collected: Amy and John need to collect information about landholder experiences with wild dogs and any previous reporting behaviour - including how these reports were made, and to who. They must uncover landholders' knowledge, skill, values and beliefs about wild dogs, and their perceptions of the benefits and limitations of reporting. Learning more about individual landholders and their properties may also be useful if they influence reporting behaviour - for example, whether they have livestock and if so what type, whether livestock production provides their main income, how big their property is, how long they have lived in the area, etc.



Table 1: A description of quantitative and qualitative approaches (after Cresswell & Plano Clark, 2006; Minichiello et al., 2008).

	Quantitative	Qualitative
Conceptual	<ul style="list-style-type: none"> Concerned with discovery of facts about human behaviour Assumes a fixed and measurable reality 	<ul style="list-style-type: none"> Concerned with understanding human behaviour from the informant's perspective Assumes a dynamic and negotiated reality
Methodological	<ul style="list-style-type: none"> Data are collected through measuring things using observations and surveys Data are analysed through numerical comparisons and statistical inferences 	<ul style="list-style-type: none"> Data are collected using participant observations, interviews, focus groups and case studies Data are analysed by themes from descriptions by informants
Strengths	<ul style="list-style-type: none"> Allows for broad study, involving large numbers of subjects to enhance the objectivity, accuracy and generalisation of the results Uses standard methods which can be replicated to facilitate comparisons over time and across categories Data can be collected relatively quickly 	<ul style="list-style-type: none"> Allows for deeper understanding and provides a more detailed, richer picture of an individual's actions Subtleties and complexities about research subjects and/or topics are uncovered that are often missed by quantitative approaches The research framework and direction can be quickly revised as new information emerges
Limitations	<ul style="list-style-type: none"> Only provides a limited measure of the variables Lack of resources to collect larger sample size (e.g. available participants, cost) Research hypotheses are relatively rigid Some analyses require understanding of complex statistical methods 	<ul style="list-style-type: none"> Volume of data makes analysis and interpretation time consuming Rigour is more difficult to maintain, assess and demonstrate Quality is heavily dependent on the researcher's skills, and more easily influenced by their biases

Measurement of variables

The information you gather shapes the best way to measure your variables.

- **Required sample size** – The sample size should ideally be large enough to describe the phenomenon of interest. It is determined by the size of the target population, the variability of the constructs being measured, the type of sampling strategy and the required precision (or statistical power) required. In practice, sample size is unfortunately driven by pragmatic considerations like cost, time and/or convenience of data collection. Generally, in quantitative research, the bigger the sample size the better. In qualitative research, large samples risk repetitive data being collected. The goal is to attain 'saturation' (i.e. when 'no new information or themes are observed in the data').
- **Sampling protocol** – Measures can be obtained in three main ways: direct observation, observing residual evidence, and asking questions. Direct observation is when a behaviour or event is personally witnessed.

If the behaviour or event cannot be directly seen, residual evidence can sometimes serve as a proxy (e.g. the amount of litter in a park may be a proxy for park-users' littering behaviour). Asking questions, also known as self-reporting, can be done via interview or survey. Inaccuracies can occur with all three techniques – through observer error, type of evidence selected or interviewee responses. If possible, use multiple measurements to improve the quality of the information collected (refer to Breakout Box 1 for more detail).

- **Data analysis plan** – We highly recommend consulting a statistician at the start of your project. A common error is to collect as much information as possible, then decide what to do with it. It's better to consider the type of analysis you require upfront. It influences the type of questions you ask, the levels of measurement required and the amount of confidence you can have in your findings. It also reduces the chance that you waste time and resources or, more importantly, interviewees' time as that may deter them from being part of any future surveys.

Quality of measured variables

When it comes to measurement quality, consider these two aspects:

1. **Reliability** refers to how accurate and consistent a measure is across multiple items and/or time. Where possible, use measures known for reliability.
 - Reliability is assessed differently, depending on the type of measure. For example, with observational data, have two or more observers record the same event, then compare their results using inter-rater reliability. With self-report data, ask multiple questions that measure the same construct, then compare the strength of their relationship using internal consistency – often quantified using a statistic called Cronbach's alpha. More information about these specific tests can be found in any statistical reference book. Cooksey (2007) is a good starting point.
 - Combining a range of measures from multiple sources sometimes allows for a more reliable index (i.e. triangulation). For example, verify landholder self-reporting of 1080 bait use, by checking their bait purchases in the local 1080 bait register.
2. **Validity** refers to how well a measure assesses what it claims to. Where possible, use measures that have already been validated.
 - The validity of a measure is assessed by examining its relationship with other measures – it should correlate with similar measures (convergent validity) and not correlate with unrelated measures (divergent validity). For example, the number of neighbourhood baiting activities a landholder participates in annually might be a valid, yet narrow, measure of action to manage invasive animals. Counting the times they visit the pub and complain to neighbours about invasive animals, would not.

Example 3

Amy and John's project purpose, goals and outcomes are defined; their research approach is thought through; and the stakeholders, target audience and information they need, are identified. They now consider how to gather the data.

Required sample size: Amy and John have identified eight groups of stakeholders and will interview one or two representatives from each. In the initial interviews, they'll aim to capture a range of perspectives without collecting repetitive data. Analysing data as they go will inform them early if they have attained 'saturation' (i.e. no new ideas are emerging). If not, they will do more interviews.

Amy and John want their landholder survey to be representative. They know roughly 2,000 landholders in their defined study area have properties greater than 10ha. They use an online sample size calculator to input the:

- population size (2,000)
- required confidence level (i.e. how sure they can be of their results - typically 95%)
- margin of error (confidence interval) they are willing to tolerate (i.e. the reported 3 amount of results).

For a 35 margin of error (a typical research tolerance) they would need to survey 322 landholders. A 310 margin of error (probably the maximum they should tolerate) would require 92 landholders.

Sampling protocol: Amy and John's primary sampling protocol is to 'ask questions'. They'll check the quality of the landholders' survey responses against their answers to multiple questions, to measure some of the variables (testing reliability). They'll also compare what landholders tell them about their 'reporting' behaviour, with the observed reporting records of local land services (LLS).

Data analysis plan: Amy and John consult a statistician about the best way to analyse their data. This advice gives them confidence to move onto the next step - designing both their interview and survey questionnaires.



Other considerations

- **Ethics** – When involving human participants, it is the researcher's responsibility to weigh the potential social benefits of the research against the social costs. Important ethical issues to consider before commencing any human research include consent, privacy and confidentiality. Most research organisations require you to seek approval from an appropriate institutional ethics review board. Many scientific journals will not publish your research without it.
- **Time** – Survey research takes time – initial consultation with stakeholders, designing your survey instrument and applying for ethics approval may mean months before

you can begin collecting data. Don't be tempted or pressured to rush, or even skip, this process. The quality and usefulness of your results will largely depend on the design of your research plan.

- **Budget** – Survey research can be expensive. Make sure this essential component is included in the early stages of drafting your project budget. If you are going to pay a third party to collect data, shop around. Some companies offer options, like paying them to collect the data but allowing you to do the analysis and write the report.

When involving human participants, it is the researcher's responsibility to weigh the potential social benefits of the research against the social costs

Example 4

Time and budget considerations: Amy and John have allocated space in their work-plans for this study, figuring any time they commit now will make future work easier. They have secured external money so a third party can do the survey, and will save on costs by analysing and writing the report themselves.



Ethics: Their research isn't intended for publication in a scientific journal, but Amy and John may present their findings at a conference, so they plan to seek approval from an appropriate institutional ethics review board. They will get landholder consent before asking questions and take privacy and confidentiality protocols seriously.

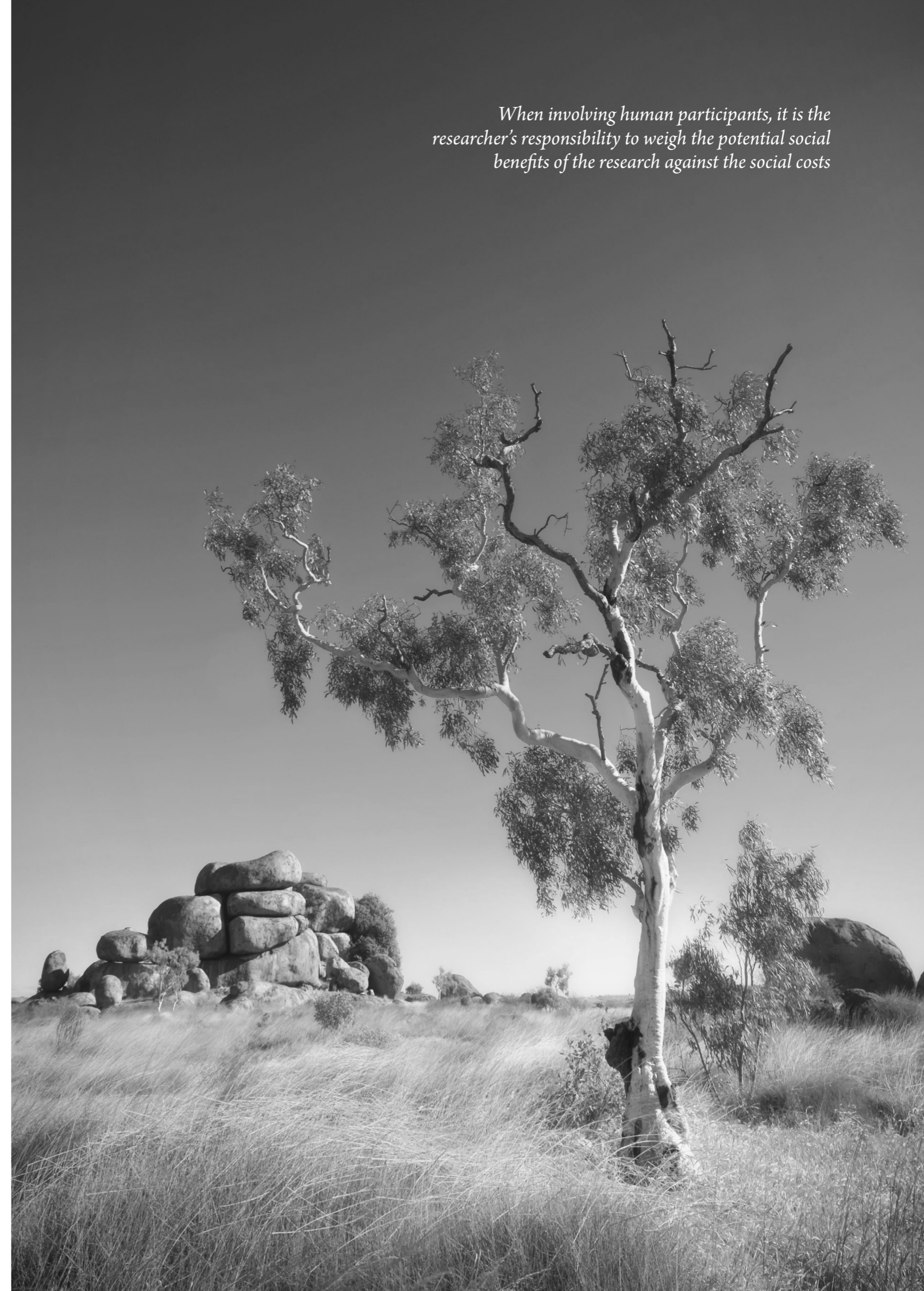
Key recommendations

When planning your community survey it is important to:

- Clearly define the general purpose of your project, its specific goals and desired outcomes.
- Determine the best approach to answer your research question.
- Identify key stakeholders and your target audience.
- Identify the type of information to be collected and the best sampling protocol.
- Plan how the collected information will be analysed so you can develop an effective data collection strategy.
- Consider budget, time and other resources; as well as your survey's ethical implications.

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two

Designing your community survey

Survey delivery

You need to decide how to deliver your community survey before you design it – delivery may influence the types of questions you can ask. There are four main options – face-to-face, by phone, online or through the post. Each has its strengths and limitations (see Table 2). The best method will depend on your circumstances (e.g. purpose, time, budget), and the characteristics of the target audience. For example, there is no point designing an online survey if your target audience lacks reliable internet access.

Example 5

With their community survey plan in place, Amy and John begin designing their key stakeholder interview questions and their landholder survey.

Survey delivery: As time and budget are limited, Amy and John will interview the key stakeholders by telephone or video conference, whichever best suits each interviewee. This will leave more funds for the outsourced landholder survey. The survey company will phone a random sample of landholders in the local area – this method is more likely to generate the representative sample that Amy and John will need for their analysis.

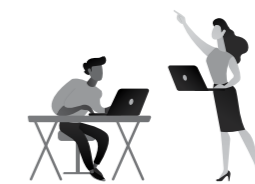


Table 2: Strengths and limitations of the four main delivery methods for interviews and surveys (Abrahamse, Wesley Schultz & Steg, 2016; Hine, Kormos and Mark, 2016).

Delivery	Strengths	Limitations
Face-to-face	<ul style="list-style-type: none"> • Build rapport with respondent • Clarify questions if required • Probe for more detailed responses 	<ul style="list-style-type: none"> • Can be time consuming and costly • Interviewer's skills may bias responses • Coding and data entry is time consuming and prone to errors
Online	<ul style="list-style-type: none"> • Least expensive to administer • Easier access to respondents • Software readily available • Able to personalise survey • Can use text, graphics and sound to elicit responses in a wide variety of formats • Direct download of data to spreadsheets and statistical packages 	<ul style="list-style-type: none"> • Lack of representativeness with some demographics • Less chance to build rapport • Response rates tend to be lower • Better suited to short, user-friendly surveys
Phone	<ul style="list-style-type: none"> • Best method to collect random sample • Build rapport with respondent • Clarify questions if required • Probe for more detailed responses 	<ul style="list-style-type: none"> • Can be costly and time consuming • Gaining access to phone numbers can be difficult • Survey lengths need to be relatively short • Interviewer's skills may bias responses • Data entry time is prone to errors
Printed and mailed	<ul style="list-style-type: none"> • Less expensive than face-to-face or phone • Survey length can be longer • Can use graphics as well as text 	<ul style="list-style-type: none"> • Less chance to build rapport • Response rates can be low • Can be time consuming and costly • Coding and data entry is time consuming and prone to errors

Survey questions

Question wording

Questions lie at the heart of every community survey. What you ask and how you ask it play a huge role in what you find. Wording must be carefully considered. Badly worded questions can mean response errors and biases, which can lead to invalid conclusions. Remember – the aim of community surveys is to provide data to inform sound evidence-based policy, not to justify existing policy or help drive ideological agendas.

Krosnick & Presser (2010) advise question wording should:

- **Use simple, familiar words (plain English)** – Where possible, avoid technical terms, jargon, slang and words with ambiguous meanings that respondents may interpret in different ways. For example, the term 'wild dog' may not mean the same thing to different people. In cases like these it is best to define what you mean.
- **Strive for wording that is specific and concrete** (rather than general and abstract) – For example, asking, 'Have you had any bad experiences when reporting wild dogs?'

is open to different interpretations of 'bad experiences'. It could be replaced with specific examples like 'having to make multiple calls', 'abuse from neighbours', etc.

- **Avoid leading or loaded questions that push respondents toward an answer** – For example, 'How often do you engage in inhumane trapping practices?' conveys disapproval of trapping. It may elicit either a socially desirable or reactive response from the respondent.
- **Ask about one thing at a time – avoid double-barrelled questions** – For example, 'To what extent do you believe cattle producers and grain growers have reported wild dogs on their properties?' does not allow respondents to answer differently for each landholder group.
- **Avoid questions with single or double negations** – For example, 'To what extent do you not agree with landholders who do not report because it poses a risk to their working dogs?' can be confusing to respondents, and lead to an error in their intended response.

Table 3: Strengths and limitations to open-ended and closed-ended questions (Abrahamse et al., 2016; Hine et al., 2016).

Questions	Strengths	Limitations
Open-ended	<ul style="list-style-type: none"> • Build rapport with respondent • Elicit richer and more nuanced responses • Possibility of new / unexpected responses • Responses may be more reliable and valid 	<ul style="list-style-type: none"> • Responses can be highly variable • Coding can be time consuming and costly • Coding can be a potential source of error
Closed-ended	<ul style="list-style-type: none"> • Less demanding on respondents • Easier to analyse • Facilitates comparison across individuals 	<ul style="list-style-type: none"> • Dependent on researcher's pre-knowledge • Potentially misses important responses • Potentially less reliable and valid

When providing response options, make them exhaustive and mutually exclusive – For example, do not use overlapping groupings such as 'none-low', 'low-medium', 'medium-high'. It is useful to include an 'other' option and text box so respondents can enter unique responses.

Question order

The order of your questions can influence responses and also needs to be considered.

- Early questions should be easy to understand and pleasant to answer. They should build trust and rapport between the respondent and the researcher.
- Questions on the same topic should be grouped together and go from general to specific.
- Questions on sensitive topics that might make respondents uncomfortable should be placed at the end of the questionnaire.
- Filter questions should be included if required, to avoid asking respondents questions that do not apply to them.
- If responses to one question could influence responses to another, place them well apart. For example, ask questions about respondents' general attitudes or behaviours before asking their opinions about more specific ones.
- The order of response options, that is, the various answers respondents can choose from, is also important. The answers that respondents choose can be influenced by the order in which those answers are listed (consider the importance placed on the order of candidates' names on a voting ballot). Where feasible, the order of response options should be randomised for each respondent.

Choosing an appropriate question format

There are two question formats – open-ended or closed-ended. Open-ended questions do not constrain responses, for example, asking respondents why they think other landholders do not report wild dogs. Closed-ended questions provide two or more pre-determined alternatives, for example, 'Agree', 'Disagree', 'Don't know'. Each has its strengths and limitations (see Table 3).

Choosing an appropriate measurement level

There are four levels of measurement: nominal, ordinal, interval and ratio. These influence the type of statistical analyses that can be conducted, and your level of confidence in the findings.

- **Nominal** – This is the most basic level and involves coding observed events into various categories (often designated with an arbitrarily selected numerical value). For example, when coding whether a landholder earns their main income from their farm, 'no' could be coded with a '0' and 'yes' with a '1', or vice versa. Nominal variables can be dichotomous, as above, or have as many categories as required. For example, types of enterprises might include cattle, small livestock, cropping, and none, coded from 1 to 4 respectively.
- **Ordinal** – Numeric values are assigned to observed events but, unlike nominal coding, these values have meaning. For example, the first landholder to complete a questionnaire may be assigned the identifier '1', the second '2', and so on. These coded values indicate the order in which surveys were completed, but the distance between the scores is not meaningful. For example, the first two landholders may have completed the survey within minutes of each other, but the third landholder finished it the following day.



- **Interval** – Numerical scores where the distance between each is meaningful, but where 0 does not indicate the complete absence of the variable. For example, you may ask the landholder to indicate their level of agreement with a particular statement using a 7-point Likert scale, where 1 = strongly disagree and 7 = strongly agree.
- **Ratio** – This is the most complex measure – where the distance between each numerical score is meaningful and 0 indicates complete absence of the variable. For example, you may want to quantify how many times a landholder has participated in a baiting program, or the number of baits used. Other ratio-level measures include physical properties such as age, area, distance, speed and mass.
Statistical analysis is limited if you only have nominal and ordinal-level measures. Ratio-level measures offer maximum information and give you more choices when analysing data.

Choosing an appropriate rating scale

To collect interval-level data using a closed-ended question, a rating scale is often used. Respondents choose a point on the scale that best reflects their beliefs or behaviours. There are two main types of rating scales.

- **Unipolar scale** – prompts a respondent to think of the presence or absence of a quality or attribute. For example, it may include the choices: not at all satisfied, slightly satisfied, moderately satisfied, very satisfied, and completely satisfied. Five choices is considered the optimal number for this scale to be reliable and valid.

- **Bipolar scale** – characterised by a continuum between two opposite end points. For example, it may include the choices: strongly disagree, disagree, slightly disagree, neither agree nor disagree, slightly agree, agree, strongly agree. This scale measures both the direction (side of the scale) and intensity (distance from the centre) of the respondent's position on the concept of interest. Seven choices is considered the optimal number for this scale to be reliable and valid.

If you are unsure about the best labels to use for your rating scale, many good sources are available, for example <https://hr-survey.com/PfRatingScales.htm>. Most online survey software also includes suggestions.

There is no fixed rule about the order of rating scales, i.e. whether negative responses are on the left or right. However, once you choose, be consistent throughout the survey.

Piloting your questions

When you have developed your questions, it is good practice to pilot them on a small target audience sample. This is particularly important for self-administered surveys, as it allows you to identify and fine-tune any questions that are ambiguous, easily misinterpreted or problematic in some other way. Piloting ensures your survey collects correct information.

Example 6

Interview questions: Amy and John have opted for a small number of closed-ended questions at the start of each interview. These easy questions will put respondents at ease as they collect demographic and situational information like the respondent's position, how long they have worked with the group, their age and so on. Open-ended questions follow to gain a deeper understanding of respondents' experience with wild dogs and landholder reporting behaviour.

Survey questions: The landholder survey contains mainly closed-ended questions, with a small number of open-ended questions so landholders can identify additional issues that have not been considered, and/or contribute their knowledge to the project.



To avoid confusion, Amy and John will define what they mean by the term 'wild dog' at the start of the survey. Easier-to answer questions will also be at the beginning, to collect information about landholders and their properties. General questions will follow about wild dogs and the problems they create, before more specific questions asking about reporting, potential drivers and barriers. Amy and John will collect as many variables as possible as ratio measurements (Figure 1) or opt for 5-point unipolar interval scales where feasible (Figure 2).

A. What is your current age?

B. In which age category do you belong?
 18 - 25 years 36 - 45 years 56 - 65 years
 26 - 35 years 46 - 55 years Over 65 years

Figure 1. Option A allows age data to be collected as a ratio measure whereas Option B allows only a nominal measure.

A. In the past 5 years have you reported wild dog attacks?
 Yes No

B. In the past 5 years how often have you reported wild dog attacks?
 Never Rarely Sometimes Often Very often

Figure 2. Option A only collects a nominal measure whereas Option B is a 5-point unipolar frequency scale, allowing an interval measure.

Table 4: Examples of different approaches for measuring intention to participate and current participation, using Amy and John's example of wild dog reporting.

Approach and Measure	Question	Response options
Closed-ended		
Nominal-level	Do you intend to report any wild dog damage that occurs on your property? Have you reported wild dog damage on your property?	Yes / No
Interval-level	What is the likelihood you will report wild dog damage in the coming year? How important do you regard the reporting of wild dog damage on your property?	Not at all likely, Slightly likely, Somewhat likely, Likely, Very likely Not at all important, Slightly important, Somewhat important, Very important, Extremely important
Ratio-level	How many times did you report wild dog damage this year?	0, 1, 2, 3, 4, 5 etc
Open-ended	What are your intentions around reporting wild dog damage this year?	

Measuring current behaviour and intention

Understanding the current behaviours and intentions of a target audience is an important step in designing behaviour change interventions (Hine, McLeod & Driver, 2022). Although intentions alone are not necessarily accurate indicators of performance – good intentions don't always translate into desired behaviours – they indicate that people are aware of what behaviours are required and that there may be barriers to their adoption.

Table 4 details ways to measure intention to participate and current participation. Always consider why you are collecting information, and how it will be used to answer your research question.

Measuring barriers and drivers

Barriers are factors that impede performance of a behaviour; drivers are factors that encourage or support it.

A helpful model to categorise these driver and barrier factors is the Capability, Opportunity, Motivation-Behaviour (COM-B) model (Michie, Atkins & West, 2014). In this model, factors that influence behaviour are divided into three groups:

1. Capability – an individual's physical and psychological capacity to engage in a behaviour
2. Opportunity – external physical and social factors that enable a behaviour to occur
3. Motivation – internal factors (reflective or automatic) that energise or direct a behaviour

Using these categories to identify the type of driver or barrier helps select better intervention techniques (more on this in the next chapter or see Hine et al. 2022).

Table 5 contains closed-ended questions covering all three categories. It is usually best to collect responses to these questions at an interval or ratio level, to allow for more robust analysis of the data.

If you suspect you've missed some important factors, you can follow up your closed-ended questions with an open-ended question. For example, 'What are the benefits of reporting wild dog damage?' or 'What do you think is preventing other landholders from reporting wild dog damage to local authorities?'. This might turn up new barrier or driver factors you hadn't considered and allow respondents to contribute their knowledge to the research.

Questions lie at the heart of every community survey. What you ask and how you ask it play a huge role in what you find. Wording must be carefully considered.



Table 5: Examples of barrier and driver questions that Amy and John could ask about wild dog reporting, using the COM-B classification.

COM-B	Components	Question example Please rate your agreement with the following statements (Rating scale: 1 = Strongly disagree, 7 = Strongly agree)	
CAPABILITY			
Physical	Possess the physical skill, the capacity to maintain physical effort or overcome physical limitations	I find it difficult to operate the Wild Dog Scan app on my phone's small screen	
	Psychological	Knowledge, including awareness of the issue, why it is important and knowing how and when to do behaviours	I am unable to identify damage caused by wild dogs I do not know who to contact if I see wild dog damage on my property I did not know that I should report wild dog damage to the LLS
		Cognitive / interpersonal skills	I do not find it easy to communicate with other landholders
		Memory / attention	I commonly forget to report a sighting when I regain phone coverage
	Behaviour regulation	I am not confident that I can use Wild Dog Scan correctly	
OPPORTUNITY			
Physical	Time	Current reporting methods are too time consuming	
	Resource availability	I do not have access to a smart phone or computer to use Wild Dog Scan	
	Accessibility	Mobile phone coverage is poor where I live I am unable to contact my LLS during normal business hours	
	Affordability	Having a smart phone is too expensive	
	Environmental context	I do not have livestock that are vulnerable to wild dog attacks	
	Environmental context	I do not have livestock that are vulnerable to wild dog attacks	
Social	Interpersonal influences	My family and friends would expect me to report wild dog damage	
	Social cues / norms	Most of my neighbours do not report wild dog damage on their properties No-one I know uses Wild Dog Scan	
	Institutional regulations / restrictions	It is not a legal requirement to report wild dog damage on my property I would report wild dog damage if the LLS made it mandatory	

COM-B	Components	Question example Please rate your agreement with the following statements (Rating scale: 1 = Strongly disagree, 7 = Strongly agree)
MOTIVATION		
Reflective	Conscious intentions / goals / plans	I intend to report wild dog damage whenever I see it
	Beliefs / attitudes about issue	It is not my responsibility to report wild dog damage I am reluctant to report because I do not want the dogs to be hurt
		Social / professional role identity
	Beliefs about consequences / past experiences	There is no point reporting as the LLS does not act anyway I am reluctant to report because I will be forced to undertake control activities I do not want to do There is no direct benefit to me if I report wild dogs
Automatic	Emotional reactions	I feel guilty when I do not report wild dog activity on my property
	Habit	I do not report as I have always handled the problem myself
	Inhibitions	I am concerned about privacy issues regarding authorities coming on to my property

Key recommendations

When designing your community survey it is important to:

- Select a delivery method that complements your circumstances and the characteristics of your target audience.
- Carefully consider the wording and order of the survey questions to avoid errors and biases in the responses.
- Always pilot your survey questions to identify and fix any problems before paying for your survey.
- Select appropriate question formats and measurement scales for your data analysis plan.

The Capability, Opportunity, Motivation-Behaviour (COM-B) model provides a useful framework for ordering your potential barrier and driver factors.

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three

Making sense of your data

Data handling

Answering any research question gives you information or data. The first step to analysing this data is to organise and store it in a structured, easy-to-access manner. This will vary depending on whether you collected quantitative data (usually stored in a spreadsheet or similar) or qualitative data (typically transcribed, coded and filed, usually in text files or logs). Additional considerations include:

- **Data analysis software:** Many data analysis software packages support quantitative and qualitative approaches. SPSS and R are commonly used for quantitative analysis and basic statistical tests can be run in spreadsheet programmes like Excel. Minichiello, Aroni & Hays (2008) provide a good summary of popular packages for qualitative analyses, including NVivo, Atlas TI, HyperResearch and Max QDA.
- **Data security:** Privacy and confidentiality is key when dealing with personal information. Applications for ethics approval stipulate data storage and privacy and confidentiality practices, for your participants' responses. Minimum requirements include password-protected computers and cloud-storage programs for digital information, and locked cabinets for hard copies with access only by named researchers. You should store identifying data separately to responses.
- **Data screening:** It is important to screen your data for anomalies like obviously incorrect values (for example a respondent's age of 150, or a property area of 0.05 ha). Also look for 'flat-liner' responses to rating questions (i.e., when a respondent's answer is the same, for example strongly disagree, to every question). Data may also be missing when respondents only complete some of the questions. If missing data or occurrence of anomalies is low overall (<5%), it may be appropriate to drop the individuals' answers from the analyses for a particular item (known as listwise deletion). If missing data or anomalies are substantial, you may need to remove the respondent entirely from the survey sample, although this may cause bias and reduce statistical power. An alternative is to use a statistical method that can impute missing data. For help, consult a textbook, your statistical software manual or seek guidance from a statistician.



Answering any research question gives you information or data. The first step to analysing this data is to organise and store it in a structured, easy-to-access manner.



Qualitative data analyses

Qualitative data analyses can be very complex, and many excellent resources describe the fundamentals in detail (for example Minichiello et al., 2008, Richards, 2009). We will discuss three general steps.

Step 1: Developing and applying codes – Coding is putting data into categories. A ‘code’ can be a word or short phrase that represents a theme or idea. A wide range of non-quantifiable elements can be coded; such as events, behaviours, activities and meanings. Codes can be pre-determined or developed as you work through responses.

Step 2: Identifying themes, patterns and relationships – Using the codes specified in the previous step, a range of techniques can identify common themes, patterns and relationships in the responses:

- Word and phrase repetitions – scanning the data for words and phrases most commonly used by respondents,
- Primary and secondary data comparisons – comparing the findings of your research with the findings of a literature review and discussing differences between them
- Search for missing information – discussing aspects of the issue not mentioned by respondents, although you expected them to be
- Metaphors and analogues – comparing your research findings to phenomena from a different area and discussing similarities and differences

Step 3: Summarising your results. Link your results with your research aim and objectives. When summarising results, use noteworthy quotations directly from the responses in order to highlight major themes and possible contradictions.

Quantitative data analyses

Many excellent textbooks and websites are dedicated to the enormous range of statistical tests that can explain your quantitative data and answer your research questions (see Cooksey, 2007; Howell, 2013). In this section we concentrate on fundamental analyses that specifically address research questions about understanding current behaviours and identifying barriers and drivers.

It is important to distinguish between exploratory data analysis and hypothesis-driven data analysis. To perform a hypothesis-driven analysis, you must be clearly state your null hypothesis (e.g. landholders reporting behaviour is related to their age) and be very specific about the analyses you wish to perform. On the other hand, exploratory data analysis is less subjective, motivated by questions such as “How can I describe or explain the variation in my data set?”

The first step is to understand your data. Start with descriptive statistics which can offer interesting insights without any complex calculations.

Example 7

In their stakeholder interviews, Amy and John asked interviewees to identify the main factors preventing landholders from reporting wild dogs. The pair then identified common themes and coded the responses with terms they developed while working through the responses. Common themes included 'wild dogs not a problem on their property', 'they didn't know who to report to' or 'they believed they would be forced to conduct wild dog control activities they were against'.

To summarise their findings, Amy and John graphed how often each theme was mentioned (Figure 3).

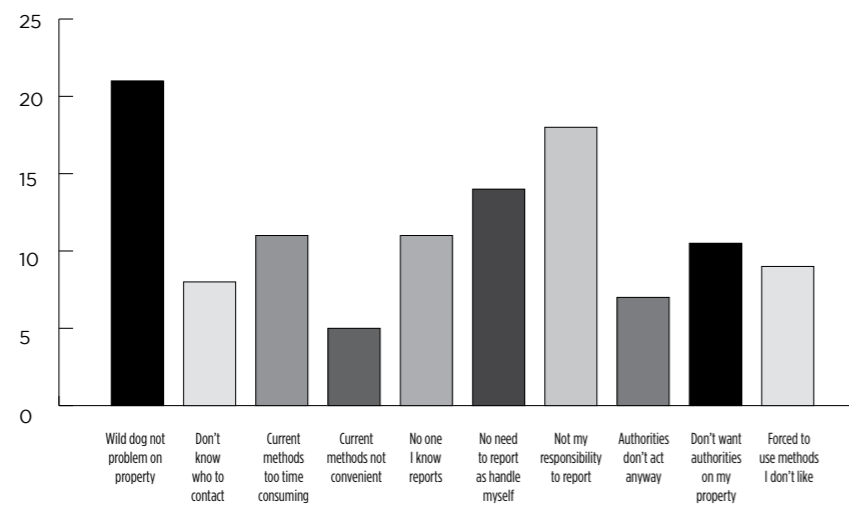
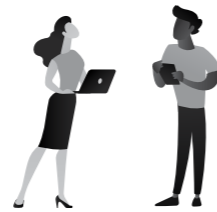


Figure 3. Frequency of the identified themes for barriers to landholder reporting of wild dog impacts.

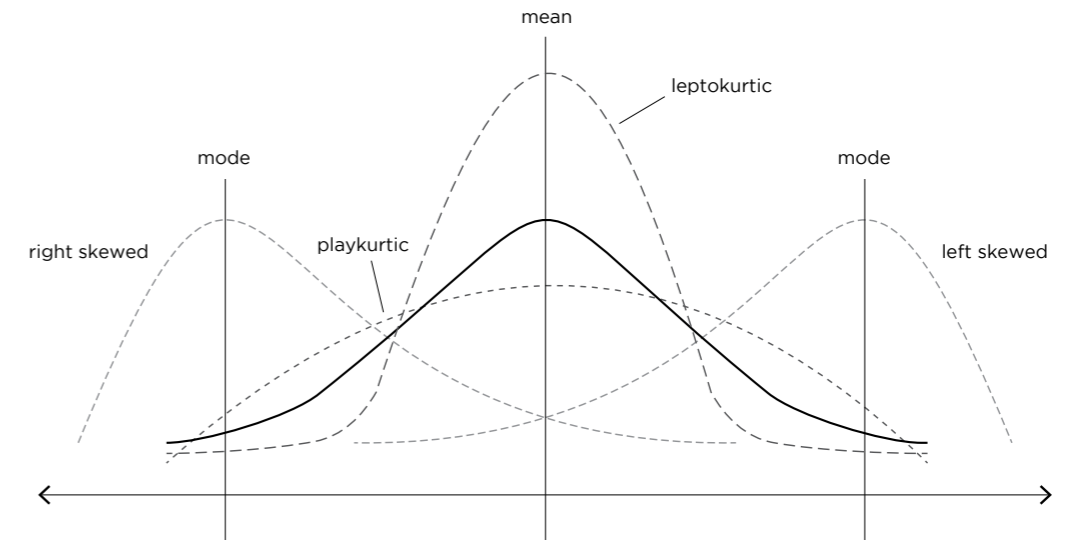


Figure 4. General forms of data distribution

Univariate analysis

This refers to exploring each variable individually. For example, you might be interested in the age of respondents, the size of their properties, or their participation in reporting behaviour.

- For numerical variables, you can calculate the mean, median, mode and variance, and know the minimum, maximum and range. For categorical variables, the frequencies for each response item can be calculated.
- Plotting a histogram (with help from a statistician), will visualise the distribution of the data. This will help determine the types of statistical tests that can be used. A normal distribution (Figure 4) is required for parametric tests, whereas non-parametric tests are used when distribution is not normal. Other important aspects to consider include the symmetry of the curve (skewness) and the sharpness of the peak (kurtosis). The data may need to be corrected if either of these aspects are evident. Most statistical textbooks can tell you when skewness or kurtosis indicate that your data needs correcting. Alternatively, seek guidance from a statistician.

Bivariate and multivariate analysis

After looking at each variable separately, the next step is to investigate potential associations between pairs or groups of variables. This can be done with standard statistical tests.

- For two or more numerical variables (for example property size and number of reports), a correlation coefficient such as the Pearson coefficient (used for normal data) or Spearman's coefficient (used for non-normal data) can be calculated. Values range from 0 (no correlation) to 1 (exact correlation). Values less than 0.3 indicate a weak correlation, values between 0.3 and 0.5 a moderate correlation and values greater than 0.5 a strong correlation.
- For two or more categorical variables (for example, location of respondent and level of wild dog damage), a chi-squared test can be conducted. This will help determine whether a significant relationship exists between geography and the wild dog problem.
- When they have one categorical variable and one or more numerical variables (for example, main enterprise of property and number of reports), the significance between them can be determined with a t-test, or Analysis of Variance (ANOVA). Consult a statistical textbook to help determine the most suitable tests or seek guidance from a statistician.

Multiple regression

Regression analysis is commonly used to predict the value of a variable (referred to as the dependent variable) by modelling the relationship between it and another two or more variables (predictors). For example, how well do income from livestock production, amount spent on wild dog management activities and time spent monitoring vulnerable animals, predict the likelihood of reporting. Using regression, helps determine the proportion of variance in reporting that can be explained by these three predictors, and also which is a better predictor of reporting – livestock income, amount spent on wild dog control or time spent monitoring.

Audience segmentation analysis

Audience segmentation divides a target population into subgroupings called segments, usually based on a combination of demographics, values, beliefs and behaviours. It is commonly used to target specific groups of interest for intervention design (for example, landholders who are not participating in reporting because they see no direct benefit). A range of sophisticated statistical approaches exists for this type of analysis, including latent profile analysis, factor analysis or principal components analysis. We advise seeking guidance from a statistician before tackling these types of analyses.

You can segment your audience in multiple ways, depending on your focus. We suggest two different approaches when using our framework to develop interventions:

1. Segment on current participation in the desired behaviour (for example, participation in a particular pest animal control activity), then identify the COM-B profiles for each behavioural segment. This helps determine the best intervention tools for each segment. For example, in a study of participation in Western Australian pest animal management activities, McLeod & Hine (2019) found four distinct landholder segments:
 - i. those that did not participate
 - ii. those that only conducted control activities by themselves
 - iii. those that only participated in group control programmes
 - iv. those that participated in a combination of individual and group programmes.

McLeod and Hine then identified COM-B profiles for each segment to determine what was driving or impeding each of these group's actions.

2. Segment on COM-B for a large group of non-participants. There are usually many reasons for people not performing a particular behaviour. By segmenting a seemingly homogenous behavioural group (i.e. non-participants), you can determine if they are all the same. This enables you to further identify and target sub-groups within a large segment. For example, in the study described above, non-participating landholders were further segmented by their COM-B profiles and six subgroups were identified, each with a distinct COM-B profile:
 - i. Unaware, Unskilled, and Unmotivated
 - ii. Aware but Unskilled and Doubtful
 - iii. Unskilled and Time Poor
 - iv. Disinterested
 - v. Skilled but Dismissive
 - vi. Capable but Unmotivated

Next step – making use of the results

If the focus of your research is to measure current behaviours and intentions, the next step is to use these results to prioritise which behaviour(s) to target in your interventions, using methods like the behaviour prioritisation matrix or the Impact-Likelihood matrix (see Hine, McLeod & Driver, 2022).

If the focus of your research is to identify the drivers and barriers for a particular behaviour, the next step is to link your COM-B results to the most appropriate behaviour change tools (refer to Table 3 in Hine et al, 2022), and begin designing the final intervention.

Take the time to share your results with other practitioners through written reports or scientific publications and conference presentations; or workshops, blogs and less formal discussions with colleagues. Human behaviour change is a complex process and our knowledge about what works in what contexts is gained iteratively through a continuous loop of learning and improvement. This can only occur when researchers and practitioners share knowledge and expertise.



Key recommendations

When analysing your data, it is important to:

- Organise and store it in a secure, structured, easy-to-access manner compatible with your chosen data analysis software.
- Screen your data to remove any obviously incorrect responses and handle any missing data issues appropriately.
- Consult a statistician or a textbook if you are unsure of correct procedures.
- Take the time to report and share results with your stakeholders and other practitioners.

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Further resources

The Centre for Invasive Species Solutions (CISS) has developed a website that provides community engagement resources around pest animal and weed management. It contains many resources tailored for practitioners involved in coordinating community-led action.

Three of these resources offer guidance for practitioners developing and delivering intervention strategies.

1. *Behaviourally Effective Communications for Invasive Animals Management: A Practical Guide* (<https://community.invasives.com.au/#guides>): An effective communication strategy is vital to connect with your target audience. This manual, written specifically for practitioners, outlines the key principles for developing and evaluating effective communications using best-practice behaviour change theory. For each principle, it summarises the key literature and provides examples of how to apply it in the invasive species context.
2. *Designing Behaviour Change Interventions for Sustainable Land Management: A Practical Guide* (<https://community.invasives.com.au/#guides>): This manual, written specifically for practitioners, outlines the four key principles for developing and evaluating effective interventions using best-practice behaviour change theory. For each principle, it steps through the process based on key literature and provides examples of how to apply it in the invasive species context.
3. *Invasives Action Tool* (<https://community.invasives.com.au/#portal>) This resource provides a range of tools for the practitioner to develop their knowledge and skills in engaging the community more effectively, deploying the science of behaviour change and communicating more strategically. It brings together the knowledge of leading engagement specialists from the US and Australia, and provides a complete suite of interactive lessons and activities so practitioners can plan, execute, evaluate and iterate their

own projects as they learn. It includes a team function where team members can share, communicate and work together to create a finished project.

Other online tools include:

1. *Biosecurity Behaviour and Market Research Knowledge Base website* (<https://portal.biosecurityportal.org.au/>): This site is a collection of published papers on audience behaviour and attitudes related to biosecurity practice in Australia. It covers topics from emergency response programs to social attitudes and understanding of biosecurity.
2. *Tools of Change website* (<https://toolsofchange.com/en/home/>): This site provides practitioners with an extensive, freely-accessible collection of social marketing planning tools and resources to change behaviour in health, safety and sustainability.
3. *Human Behaviour Change for Animals (HBCA) website* (<https://www.hbcforanimals.com/>): HBCA is a social enterprise company based in the UK. This site provides information, tools, resources, services and products to assist the application of behaviour change and practice in the fields of animal health, welfare, protection and conservation.
4. *Community-Based Social Marketing website* (<http://www.cbsm.com>): This site provides a comprehensive introduction to community-based social marketing and how it is being applied to foster sustainable behaviour across such diverse fields as conservation, transportation, waste reduction and water efficiency.
5. *Australian Federal Government Behavioural Economics Team (BETA) website* (<https://behaviouraleconomics.pmc.gov.au>): This site provides examples of projects that have applied behavioural insights, based on behavioural economic theories, to improve outcomes from public policy and administration.



“Designing Community Surveys for Behaviour Change Research: A Practical Guide” introduces key principles for developing effective community surveys. Importantly, the guide offers practical advice for designing and implementing surveys and analysing the data they generate.

This book is intended for natural resource management organisations and practitioners that work with the general public and interested stakeholders on sustainable land management.

