

# Designing and validating a research questionnaire - Part 1

Priya Ranganathan, Carlo Caduff<sup>1</sup>

Department of Anaesthesiology, Tata Memorial Centre, Homi Bhabha National Institute, Mumbai, Maharashtra, India,

<sup>1</sup>Department of Global Health and Social Medicine, King's College London, London, United Kingdom

## Abstract

Questionnaires are often used as part of research studies to collect data from participants. However, the information obtained through a questionnaire is dependent on how it has been designed, used, and validated. In this article, we look at the types of research questionnaires, their applications and limitations, and how a new questionnaire is developed.

**Keywords:** Patient health questionnaire, questionnaire, survey, survey method

**Address for correspondence:** Prof. Carlo Caduff, Department of Global Health and Social Medicine, King's College London, Strand, London WC2R 2LS, United Kingdom.

E-mail: carlo.caduff@kcl.ac.uk

**Received:** 13-05-23, **Accepted:** 16-05-23, **Published:** 03-07-23.

## INTRODUCTION

In research studies, questionnaires are commonly used as data collection tools, either as the only source of information or in combination with other techniques in mixed-method studies. However, the quality and accuracy of data collected using a questionnaire depend on how it is designed, used, and validated. In this two-part series, we discuss how to design (part 1) and how to use and validate (part 2) a research questionnaire. It is important to emphasize that questionnaires seek to gather information *from other people* and therefore entail a social relationship between those who are doing the research and those who are being researched. This social relationship comes with an obligation *to learn from others*, an obligation that goes beyond the purely instrumental rationality of gathering data. In that sense, we underscore that any research method is not simply a tool but a situation, a relationship, a negotiation, and an encounter. This points to both ethical questions (what is the relationship between the researcher and the researched?)

and epistemological ones (what are the conditions under which we can know something?).

At the start of any kind of research project, it is crucial to select the right methodological approach. What is the research question, what is the research object, and what can a questionnaire realistically achieve? Not every research question and not every research object are suitable to the questionnaire as a method. Questionnaires can only provide certain kinds of empirical evidence and it is thus important to be aware of the limitations that are inherent in any kind of methodology.

## WHAT IS A RESEARCH QUESTIONNAIRE?

A research questionnaire can be defined as a data collection tool consisting of a series of questions or items that are used to collect information from respondents and thus learn about their knowledge, opinions, attitudes, beliefs, and behavior and informed by a positivist philosophy of the natural sciences that consider methods mainly as a set

### Access this article online

#### Quick Response Code:



#### Website:

www.picronline.org

#### DOI:

10.4103/picr.picr\_140\_23

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** WKHLRPMedknow\_reprints@wolterskluwer.com

**How to cite this article:** Ranganathan P, Caduff C. Designing and validating a research questionnaire - Part 1. *Perspect Clin Res* 2023;14:152-5.

of rules for the production of knowledge; questionnaires are frequently used instrumentally as a standardized and standardizing tool to ask a set of questions to participants. Outside of such a positivist philosophy, questionnaires can be seen as an encounter between the researcher and the researched, where knowledge is not simply gathered but negotiated through a distinct form of communication that is the questionnaire.

## STRENGTHS AND LIMITATIONS OF QUESTIONNAIRES

A questionnaire may not always be the most appropriate way of engaging with research participants and generating knowledge that is needed for a research study. Questionnaires have advantages that have made them very popular, especially in quantitative studies driven by a positivist philosophy: they are a low-cost method for the rapid collection of large amounts of data, even from a wide sample. They are practical, can be standardized, and allow comparison between groups and locations. However, it is important to remember that a questionnaire only captures the information that the method itself (as the structured relationship between the researcher and the researched) allows for and that the respondents are willing to provide. For example, a questionnaire on diet captures what the respondents say they eat and not what they are eating. The problem of social desirability emerges precisely because the research process itself involves a social relationship. This means that respondents may often provide socially acceptable and idealized answers, particularly in relation to sensitive questions, for example, alcohol consumption, drug use, and sexual practices. Questionnaires are most useful for studies investigating knowledge, beliefs, values, self-understandings, and self-perceptions that reflect broader social, cultural, and political norms that may well diverge from actual practices.

## TYPES OF RESEARCH QUESTIONNAIRES

Research questionnaires may be classified in several ways:

### Depending on mode of administration

Research questionnaires may be self-administered (by the research participant) or researcher administered. *Self-administered (also known as self-reported or self-completed) questionnaires* are designed to be completed by respondents without assistance from a researcher. Self-reported questionnaires may be administered to participants directly during hospital or clinic visits, mailed through the post or E-mail, or accessed through websites. This technique allows respondents to answer at their own pace and simplifies research costs and logistics. The anonymity

offered by self-reporting may facilitate more accurate answers. However, the disadvantages are that there may be misinterpretations of questions and low response rates. Significantly, relevant context information is missing to make sense of the answers provided. *Researcher-reported (or interviewer-reported) questionnaires* may be administered face-to-face or through remote techniques such as telephone or videoconference and are associated with higher response rates. They allow the researcher to have a better understanding of how the data are collected and how answers are negotiated, but are more resource intensive and require more training from the researchers.

The choice between self-administered and researcher-administered questionnaires depends on various factors such as the characteristics of the target audience (e.g., literacy and comprehension level and ability to use technology), costs involved, and the need for confidentiality/privacy.

### Depending on the format of the questions

Research questionnaires can have structured or semi-structured formats. *Semi-structured questionnaires* allow respondents to answer more freely and on their terms, with no restrictions on their responses. They allow for unusual or surprising responses and are useful to explore and discover a range of answers to determine common themes. Typically, the analysis of responses to open-ended questions is more complex and requires coding and analysis. In contrast, *structured questionnaires* provide a predefined set of responses for the participant to choose from. The use of standard items makes the questionnaire easier to complete and allows quick aggregation, quantification, and analysis of the data. However, structured questionnaires can be restrictive if the scope of responses is limited and may miss potential answers. They also may suggest answers that respondents may not have considered before. Respondents may be forced to fit their answers into the predetermined format and may not be able to express personal views and say what they really want to say or think. In general, this type of questionnaire can turn the research process into a mechanical, anonymous survey with little incentive for participants to feel engaged, understood, and taken seriously.

## STRUCTURED QUESTIONS: FORMATS

Some examples of close-ended questions include:

1. Single-choice response  
e.g., Please indicate your marital status:
  - Single
  - Married

- Divorced
  - Widowed
  - Prefer not to say.
2. Multiple-choice responses  
e.g., Describe your areas of work (circle or tick all that apply):
- Clinical service
  - Teaching
  - Administration
  - Research
  - Other.
3. Rating scales
- Likert scale: COVID-19 vaccination should be made mandatory:
    - Strongly agree
    - Agree
    - Neutral
    - Disagree
    - Strongly disagree.
  - Numerical scales: Please rate your current pain on a scale of 1–10 where 1 is no pain and 10 is the worst imaginable pain
  - Symbolic scales: For example, the Wong-Baker FACES scale to rate pain in older children
  - Ranking: Rank the following cities as per the quality of public health care, where 1 is the best and 5 is the worst.
    - Paris
    - Mumbai
    - London
    - New York
    - Singapore.
4. Matrix.

A matrix questionnaire consists of a series of rows with items to be answered with a series of columns providing the same answer options. This is an efficient way of getting the respondent to provide answers to multiple questions. The EORTC QLQ-C30 is an example of a matrix questionnaire.<sup>[1]</sup>

For a more detailed review of the types of research questions, readers are referred to a paper by Boynton and Greenhalgh.<sup>[2]</sup>

### USING PRE-EXISTING QUESTIONNAIRES VERSUS DEVELOPING A NEW QUESTIONNAIRE

Before developing a questionnaire for a research study, a researcher can check whether there are any

preexisting-validated questionnaires that might be adapted and used for the study. The use of validated questionnaires saves time and resources needed to design a new questionnaire and allows comparability between studies.

However, certain aspects need to be kept in mind: is the population/context/purpose for which the original questionnaire was designed similar to the new study? Is cross-cultural adaptation required? Are there any permission needed to use the questionnaire? In many situations, the development of a new questionnaire may be more appropriate given that any research project entails both methodological and epistemological questions: what is the object of knowledge and what are the conditions under which it can be known? It is important to understand that the standardizing nature of questionnaires contributes to the standardization of objects of knowledge. Thus, the seeming similarity in the object of study across diverse locations may be an artifact of the method. Whatever method one uses, it will always operate as the ground on which the object of study is known.

### DESIGNING A NEW RESEARCH QUESTIONNAIRE

Once the researcher has decided to design a new questionnaire, several steps should be considered:

#### Gathering content

It creates a conceptual framework to identify all relevant areas for which the questionnaire will be used to collect information. This may require a scoping review of the published literature, appraising other questionnaires on similar topics, or the use of focus groups to identify common themes.

#### Create a list of questions

Questions need to be carefully formulated with attention to language and wording to avoid ambiguity and misinterpretation. Table 1 lists a few examples of poorly worded questions that could have been phrased in a more appropriate manner. Other important aspects to be noted are:

- Provide a brief introduction to the research study along with instructions on how to complete the questionnaire
- Allow respondents to indicate levels of intensity in their replies, so that they are not forced into “yes” or “no” answers where intensity of feeling may be more appropriate
- Collect specific and detailed data wherever possible – this can be coded into categories. For example, age can be captured in years and later

**Table 1: Examples of poorly phrased questions in a research questionnaire**

Original question	Issue	Rephrased question
Like most people here, do you consume a rice-based diet?	Leading question	What type of diet do you consume?
What type of alcoholic drink do you prefer?	Loaded or assumptive question (assumes that the respondent consumes alcohol)	Do you consume alcoholic drinks? If yes, what type of alcoholic drink do you prefer?
Over the past 30 days, how many hours in total have you exercised?	Difficult to recall information	On average, how many days in a week do you exercise? And how many hours per day?
Do you agree that not smoking is associated with no risk to health?	Double negative	Do you agree that smoking is associated with risk to health?
Was the clinic easy to locate and did you like the clinic?	Double-barreled question	Split into two separate questions: was the clinic easy to locate? Did you like the clinic?
Do you eat fries regularly?	Ambiguous – the term “regularly” is open to interpretation	How often do you eat fries?

classified as <18 years, 18–45 years, 46 years, and above. The reverse is not possible

- Avoid technical terms, slang, and abbreviations. Tailor the reading level to the expected education level of respondents
- The format of the questionnaire should be attractive with different sections for various subtopics. The font should be large and easy to read, especially if the questionnaire is targeted at the elderly
- Question sequence: questions should be arranged from general to specific, from easy to difficult, from facts to opinions, and sensitive topics should be introduced later in the questionnaire.<sup>[3]</sup> Usually, demographic details are captured initially followed by questions on other aspects
- Use contingency questions: these are questions which need to be answered only by a subgroup of the respondents who provide a particular answer to a previous question. This ensures that participants only

respond to relevant sections of the questionnaire, for example, Do you smoke? If yes, then how long have you been smoking? If not, then please go to the next section.

## TESTING A QUESTIONNAIRE

A questionnaire needs to be valid and reliable, and therefore, any new questionnaire needs to be pilot tested in a small sample of respondents who are representative of the larger population. In addition to validity and reliability, pilot testing provides information on the time taken to complete the questionnaire and whether any questions are confusing or misleading and need to be rephrased. Validity indicates that the questionnaire measures what it claims to measure – this means taking into consideration the limitations that come with any questionnaire-based study. Reliability means that the questionnaire yields consistent responses when administered repeatedly even by different researchers, and any variations in the results are due to actual differences between participants and not because of problems with the interpretation of the questions or their responses. In the next article in this series, we will discuss methods to determine the reliability and validity of a questionnaire.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Aaronson NK, Ahmedzai S, Bergman B, Bullinger M, Cull A, Duez NJ, *et al.* The European organization for research and treatment of cancer QLQ-C30: A quality-of-life instrument for use in international clinical trials in oncology. *J Natl Cancer Inst* 1993;85:365-76.
2. Boynton PM, Greenhalgh T. Selecting, designing, and developing your questionnaire. *BMJ* 2004;328:1312-5.
3. Leung WC. How to design a questionnaire. *BMJ* 2001;322:0106187.