MODULE 3

FORMULATING YOUR QUESTIONNAIRE

Prof Oluwadiya K S
www.oluwadiya.com
College of Medicine,
Ekiti State University, Ado-Ekiti, Nigeria

According to Wikipedia, a questionnaire is a research instrument consisting of a series of questions (or other types of prompts) for gathering information from respondents. In our own case, the questionnaire will be designed for the statistical analysis of the responses in other to achieve the objectives of our research. Questionnaires can be used as the sole research instrument, for example in cross-sectional studies, or as parts of trials and epidemiological survey.

Questionnaire research are very popular because they are easier and cheaper to run that many other types of quantitative research. However, because they are not subjected to the same strict guideline as randomized trials, many of the reported studies have numerous methodological issues. When inappropriate methodologies are used rigours are not adhered to, inevitably the data collected are of poor quality and this will lead to misleading conclusions and inappropriate recommendations. In this module, I aim to present a practical guide for formulating well-designed questionnaires that will produce good quality data.

Before you begin

There are certain questions to answer before you start formulating your questionnaire.

Question 1: Are you familiar enough with the study area and the target area to be able to formulate the range of responses expected from them? Aspects of this question will be answered by a review of literature which you must have done in preparing your research proposal. When this information is not available, then you should first use a qualitative approach such as focus group discussion to scope the target information.

Question 2: Is a questionnaire appropriate for the study? For you to use questionnaire for a study, respondents must be able to give meaningful answers which will answer the research questions. Many research questions cannot be answered by questionnaire research, you may need to use other research methods. Examples of research questions which may not be suitable for questionnaire design include:

- ***Study of prevalence of diseases***: For example, you may want to study the prevalence of a disease e.g. osteoporosis in a community. A questionnaire may not be appropriate for this kind of research because respondents may have the condition without knowing it, or if they have the condition, they may not admit it if it is stigmatizing. The appropriate design would be a cross-sectional survey using diagnostic instruments.
- ***Study of professional behaviours*:** For example, knowledge and attitude of orthopaedic surgeons about back pain. This type of researches may not be suitable for questionnaire design because what professionals e.g. doctors say they do may not be the same as what they actually do, especially when they think their practice is being judged by others. The appropriate study would be a direct observation or analysis of medical records.

Question 3: Is there an existing questionnaire? Using an existing questionnaire for your research will save you time and resources. In addition, you will be able to compare your findings with those from other studies and describing your methodology will be easier as you only need to give an outline (supported by your reference) in your paper.

There are many sources of standardized questionnaires. The most convenient source is the internet. Just use a search engine (Google, Bing, Yahoo etc.), or a database (PUBMED) to for your search strings. Read through the abstracts to determine if questionnaire were used for the study described in the paper. If the questionnaire is not available on the paper, you may e-mail the author for a copy of the questionnaire. Most authors are only too glad to oblige you. However, you should be aware that some questionnaires are commercial and you must pay for them.

Once you identify an existing questionnaire, you can't just use it for your research unless it is adapted for use in the target population. For it to be used in the target population, such a questionnaire must be both valid and reliable.

A valid questionnaire measure what it claims to measure. A questionnaire developed in a different country, culture or time may not be valid for your study. For example, the item "I like going to gay parties" may have been a valid measure of the respondent's sociability in the 80s, but nowadays, this would be interpreted differently. In a similar way, the item "

A questionnaire is said to be reliable when its results are consistent across repeated samples and among different researchers. The consistencies are because the items in the questionnaire are understood and interpreted the same way by all potential respondents in the population. Therefore, any differences in results are due to differences between participants.

There are standard ways of assessing the reliability and validity of questionnaires. We will be looking at these later in the paper.

Questionnaire Design

The first step in the design of your questionnaire is to identify the goal of your questionnaire: What are the main objectives of your questionnaire and what kind of information do you want to gather with your questionnaire. This will be dependent on

- The objectives of your study: The items of the questionnaire should be developed to deliver the objectives of the study. What are the things you need to know from the respondent to meet the research objectives? A questionnaire that is not guided by the objectives of the study will inevitably overlook important issues and ask useless questions. Such a questionnaire may lack logical flow and cause respondents to lose interests. Of course, this will lead to poor quality data and problems with analysis of the data. Sometimes, you may already have an idea about the kind of information you want to collect, you will still need to build on this by studying the literature. If literature search does not supply the required information, you may have to do a qualitative research such as focus group discussion to derive the required information.
- The hypotheses that you want to test: The hypothesis must guide your questionnaire in a similar way to the objectives of your study.

The second step is to decide what you are measuring: This too will be dependent on your objectives. Examples of things you may be aiming to measure include:

- Attitude

- Knowledge
- Skills
- Behaviors
- Practices
- Perceptions

The questions will be greatly influenced by the information you are trying to gather.

The third step is to choose your question types: There are six commonly used types of questions for questionnaires:

i. **Dichotomous question**: This is a question with two mutually exclusive choices. It could be a "yes/no" question an "agree/disagree" question. It is the quickest and simplest question to analyze, but it limits the respondent's options and is not very sensitive unless it is dealing with unambiguous issues e.g. Are you a male?
ii. **Open-ended question**: This question allows the respondent to respond in their own words. They capture feelings and ideas, but are very difficult to analyse. They also depend on the respondents' writing skills. But importantly, it is the only type of question that addresses the issue of "why".
iii. **Multiple choice question**: This is ideal for gathering demographic information. It consists of three or more categories which require a single answer or multiple answers.
iv. **Ordinal scale question**: Respondents are asked to rank a range of items or choose from an ordered set. For example, you might ask your respondents to order five things from least to most important.
v. **Rating scale questions**: These are Likert type questions that provide a scale that gives an equal number of positive and negative choices, for example, ranging from "strongly agree" to "strongly disagree.
vi. **Ratio scale question**: This respondent responds to the question in a measurable way. You use this when you want to ask about age, income weight and other measurable variables.

Selecting the question type is a very important part of your questionnaire design. The most common mistake people make here is to use an ordinal or rating scale questions for a measurable (ratio scale) variable. For example, using age group for age. Ratio scale variables are far more powerful and easier to use during analysis than other scales. In addition, ratio scale answers can be categorized to ordinal scale (if there is any need to) anyway you want in the software you use for analysis.

The fourth step is to develop the questions for the questionnaire: The questions should be clear, concise and direct. This will ensure that your respondents are not confused and that their responses are correct. Here are some guidelines:

- **Ask only one question at a time**: Avoid double-barreled questions which may confuse the respondents. This may be obvious as in the question "Do you like massage or exercise for treating pain?" in a yes/no type question. On the other hand, it may be subtle as in the question, "Have you stopped taking analgesics for your pain?" because the question assumes the respondent has been taking analgesics. What if he/she had not?
- **Avoid biased or loaded questions**: These questions prompt the respondents to answer the questions in a certain way. For example, the question "Do you take your drugs regularly as a good patient should?" is prompting the respondent to answer in the affirmative.

- **Avoid ambiguity**: For example, "How many members are there in your family?" is ambiguous because the respondents may not know if the question is referring to the immediate or extended family. Other examples; “Do you regularly take over the counter analgesic for pain?” The respondents' understanding and interpretation of the term 'regularly' will differ. Some may consider that regularly means once a day, others may think twice a week is regular, “What is your income?” may be interpreted as daily wage, weekly pay, monthly salary or annual income.
- **Take memory into consideration**: The respondents should be asked questions about things he is likely to clearly remember.
- **Be sure to provide all logical alternatives**: Consider the following two sets of questions:
    i. A yes/no question: “Would you use massage for treating your back pain if you have access to it?” and
    ii. A multiple-choice question: “If massage is available in addition to the drugs you are currently using to treat your back pain, would you:
        A. Continue using only the drug
        B. switch to massage and use massage only
        C. use both methods

  Both types of questions will yield dramatically different responses among the respondents as the first question is almost certain to obtain a larger number of positive responses than if the second.

- **Avoid asking long questions**: The fewer words in a question the better.
- **Determine if you will include “I don’t know” or “Not applicable” answer types:** This improves the flexibility of your responses, but it may lead to missing data if the answer type is not treated as a recognized analyzable response.
- **Provide opportunity for respondents to add their comments:** Ask for “Any additional comments or suggestions?” either for the whole survey or for individual questions where applicable.

The fifth step is to arrange the questions in the questionnaire in a logical order: Questions must flow in a logical order so that one leads naturally to the other. Respondents should not be required to return to some subject they thought they gave their opinions about earlier. This can be disconcerting. Other things to consider are:

- **Opening questions**: These should be easy to answer and non-threatening. That is why many authorities advice that demographic data should be the first sets of questions that should be asked in any questionnaire. If respondents find the first set of questions difficult to understand or embarrassing in some way, they are likely to stop drop the questionnaire immediately. If, on the other hand, they find the opening questions easy and pleasant to answer, they are encouraged to continue.
- **Group similar questions together:** This also helps the “flow” of the question
- **Number each question.**
- **Proof read:** Eliminate all spelling errors. Format the questionnaire to look professional.

The sixth step is to include an introductory section: This should be made up of the following sections:

- Purpose of the study and potential benefit to the community
- Why it is important for the respondents to fill the questionnaire

- Promise of confidentiality
- Informed consent: Sometimes, passive consent is assumed if the respondent complete and returns the questionnaire.

Sometimes, the introductory section is also referred to as cover letter.

The seventh step is to conduct expert validation: At this stage, experts are invited to systematically review the content of the questionnaire. This will improve the overall quality and representativeness of the questionnaire.

The eighth step is to conduct a pilot study: Despite the efforts at the validation stage, some questionnaire items may still be problematic. So, there may still be issues of validity which can only be solved by pilot-testing the questionnaire. During pilot testing, members of the target population complete the survey. The purpose of pretesting the questionnaire is to determine:

- whether the questions have been placed in the right order
- whether the wording of the questions will achieve the desired results
- whether the questions are understood by the respondents
- whether additional questions are needed
- whether some questions should be eliminated
- whether the instructions to respondents are adequate
- Whether the questions have the right statistical structure: the data obtained from the pilot test is then reviewed to evaluate item range and variance, assess score reliability of the whole scale and review item and composite score correlations. Statistical tools for this include Cronbach's alpha which assesses the reliability of the questionnaire. The other thing that pilot study allows you to do is to check for the dimensional structure of the questionnaire by doing factor analysis.

The final step is to collect the data

The popularity of questionnaires for survey arise not only from the ease with which most of them can be derived, but also from the versatility of their application to respondents. Generally, questionnaires are filled in any of the following three ways:

i. Directly by the respondents. This can be sent to the respondents through mails, e-mail, Internet, or delivered by hand.
ii. Administered by interviewers: Strictly speaking, this is called schedule. A schedule is a situation where the questionnaire (often called proforma in this scenario) is filled in by an interviewer (often called an enumerator) who is specially appointed for the purpose.
iii. A combination of the two in which the forms are filled by respondents but interviewers are available to help.

Some differences between questionnaires and schedules

	Questionnaire	**Schedule**
Cost	Relatively cheap since no field staff	Relatively more expensive since money must be spent in training, paying and transporting enumerators
Rate of response	Usually low. Questionnaires are either not returned or	Usually high because forms are filled by enumerators

	some items in the questionnaires are left unanswered.	who are able to get answers to all questions.
Identity of respondents	Not always clear because there is no way of verifying who filled the form	Identity of respondent is known
Situation	Can be used only when respondents are literate and cooperative	Can be used even when respondents cannot read
Spread	Unlimited: can cover the whole country, continent or the world	Limited by the difficulty in and cost of sending enumerators over a relatively wider area
Accuracy	Lower, because when respondents do not understand some items, they won't have anyone to explain to them and may fill it with incorrect data	Higher as enumerators can remove the difficulties faced by respondents in correctly understanding the questions
Additional methodology	Not possible	Observation method can be included as an additional methodology

Conclusion

I have tried to present a concise guide to designing a questionnaire for residents in surgery. However, the methodology presented here is not the only way to design and develop a high-quality questionnaire as questionnaire design in psychology and the social sciences may be more involved and intricate. Furthermore, some questionnaires, especially when it involves assessment of skills need not include all the steps enumerated here as the items being measured are usually straightforward. Generally, speaking, when doing a survey, researchers are faced by five main errors:

i. Sampling Error: How representative is the group being surveyed?
ii. Frame Error: How accurate is the list from which respondents are drawn?
iii. Selection Error: Does everyone have an equal chance of being selected to respond?
iv. Measurement Error: Is the questionnaire valid and reliable?
v. Non-response Error: How is the generalizability of findings jeopardized because of subjects who did not reply?

A well-designed questionnaire will reduce measurement error and non-response error.

Further Reading

i. Petra M Boynton, Trisha Greenhalgh. Selecting, designing, and developing your questionnaire. BMJ 2004; 328 doi: https://doi.org/10.1136/bmj.328.7451.1312 (Published 27 May 2004)
ii. http://www.fao.org/docrep/W3241E/w3241e05.htm#piloting the questionnaires
iii. Timmins F (2015) Surveys and questionnaires in nursing research. Nursing Standard. 29, 42, 42-50

Next Topic: Collecting your data: Sampling techniques

See you next week.