



Questionnaire Design

Kongmany Chaleunvong

GFMER - WHO - UNFPA - LAO PDR

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Questionnaires in Clinical Research

- Much of the data in clinical research is gathered using questionnaires or interviews.
- The validity of the results depends on the quality of these instruments.
 - Good questionnaires are difficult to construct; bad questionnaires are difficult to analyze.
- Difficult to design for several reasons:
 - Each question must provide a valid and reliable measure.
 - The questions must clearly communicate the research intention to the survey respondent.
 - The questions must be assembled into a logical, clear instrument that flows naturally and will keep the respondent sufficiently interested to continue to cooperate.

Quality aims in survey research

Goal is to collect information that is:

- **Valid:** measures the quantity or concept that is supposed to be measured
- **Reliable:** measures the quantity or concept in a consistent or reproducible manner
- **Unbiased:** measures the quantity or concept in a way that does not systematically under- or overestimate the true value
- **Discriminating:** can distinguish adequately between respondents for whom the underlying level of the quantity or concept is different

Steps to design a questionnaire

1. Write out the primary and secondary aims of your study.
2. Write out concepts/information to be collected that relates to these aims.
3. Review the current literature to identify already validated questionnaires that measure your specific area of interest.
4. Compose a draft of your questionnaire.
5. Revise the draft.
6. Assemble the final questionnaire.

Designing questions and instruments

- **open ended question**
- **closed or fixed alternative question**

Step 1: Define the aims of the study

- Write out the problem and primary and secondary aims using **one** sentence per aim. Formulate a plan for the statistical analysis of each aim.
- Make sure to define the target population in your aim(s).

Step 2: Define the variables to be collected

- Write a detailed list of the information to be collected and the concepts to be measured in the study. Are you trying to identify:
 - Attitudes
 - Needs
 - Behavior
 - Demographics
 - Some combination of these concepts
- Translate these concepts into variables that can be **measured**.
- Define the role of each variable in the statistical analysis:
 - Predictor
 - Confounder
 - Outcome

Step 3: Review the literature

- Review current literature to identify related surveys and data collection instruments that have measured concepts similar to those related to your study's aims.
- Saves development time and allows for comparison with other studies if used appropriately.
- Proceed with caution if using only a subset of an existing questionnaire as this may change the meaning of the scores. Contact the authors of the questionnaire to determine if a smaller version of the instrument exists that has also been validated.

Step 4: Compose a draft

- Determine the mode of survey administration: face-to-face interviews, telephone interviews, self-completed questionnaires, computer-assisted approaches.
- Write more questions than will be included in the final draft.
- Format the draft as if it were the final version with appropriate white space to get an accurate estimate as to its length – longer questionnaires reduce the response rate.
- Place the most important items in the first half of the questionnaire to increase response on the important measures even in partially completed surveys.
- Make sure questions flow naturally from one to another.

Compose a draft...

- Question: How many cups of coffee or tea do you drink in a day?
- Principle: Ask for an answer in only one dimension.
- Solution: Separate the question into two
 - (1) How many cups of coffee do you drink during a typical day?
 - (2) How many cups of tea do you drink during a typical day?

Compose a draft...

- Question: What brand of computer do you own?
 - (A) IBM PC
 - (B) Apple
- Principle: Avoid hidden assumptions. Make sure to accommodate all possible answers.
- Solution:
 - (1) Make each response a separate dichotomous item
 - Do you own an IBM PC? (Circle: Yes or No)
 - Do you own an Apple computer? (Circle: Yes or No)
 - (2) Add necessary response categories and allow for multiple responses.
 - What brand of computer do you own? (Circle all that apply)
 - Do not own computer
 - IBM PC
 - Apple
 - Other

Compose a draft...

- Question: Have you had pain in the last week?

Never Seldom Often Very often

- Principle: Make sure question and answer options match.

- Solution: Reword either question or answer to match.

- How often have you had pain in the last week?

Never Seldom Often Very Often

Compose a draft...

- Question: Where did you grow up?
 - Country
 - Farm
 - City
- Principle: Avoid questions having non-mutually exclusive answers.
- Solution: Design the question with mutually exclusive options.
 - Where did you grow up?
 - House in the country
 - Farm in the country
 - City

Compose a draft...

- Question: Are you against drug abuse? (Circle: Yes or No)
- Principle: Write questions that will produce variability in the responses.
- Solution: Eliminate the question.

Compose a draft...

- Question: Which one of the following do you think increases a person's chance of having a heart attack the most? (Check one.)
 Smoking Being overweight Stress
- Principle: Encourage the respondent to consider each possible response to avoid the uncertainty of whether a missing item may represent either an answer that does not apply or an overlooked item.
- Solution: Which of the following increases the chance of having a heart attack?
 - Smoking: Yes No Don't know
 - Being overweight: Yes No Don't know
 - Stress: Yes No Don't know

Compose a draft...

- Question:
 - (1) Do you currently have a life insurance policy? (Circle: Yes or No)
 - If no, go to question 3.
 - (2) How much is your annual life insurance premium?
- Principle: Avoid branching as much as possible to avoid confusing respondents.
- Solution: If possible, write as one question.
 - How much did you spend last year for life insurance? (Write 0 if none).

Step 5: Revise

- Shorten the set of questions for the study. If a question does not address one of your aims, discard it.
- Refine the questions included and their wording by testing them with a variety of respondents.
 - Ensure the flow is natural.
 - Verify that terms and concepts are familiar and easy to understand for your target audience.
 - Keep recall to a minimum and focus on the recent past.

Step 6: Assemble the final questionnaire

- Decide whether you will format the questionnaire yourself or use computer-based programs for assistance:
 - SurveyMonkey.com
 - Adobe Live Cycle Designer 7.0
 - GCRC assistance
- At the top, clearly state:
 - The purpose of the study
 - How the data will be used
 - Instructions on how to fill out the questionnaire
 - Your policy on confidentiality
- Include identifying data on each page of a multi-page, paper-based questionnaire such as a respondent ID number in case the pages separate.

Assemble the final questionnaire

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- Group questions concerning major subject areas together and introduce them by heading or short descriptive statements.
- Order questions in order to stimulate recall.
- Order and format questions to ensure unbiased and balanced results.

Assemble the final questionnaire

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- Include white space to make answers clear and to help increase response rate.
- Space response scales widely enough so that it is easy to circle or check the correct answer without the mark accidentally including the answer above or below.
 - Open-ended questions: the space for the response should be big enough to allow respondents with large handwriting to write comfortably in the space.
 - Closed-ended questions: line up answers vertically and precede them with boxes or brackets to check, or by numbers to circle, rather than open blanks.
- Use larger font size (e.g., 14) and high contrast (black on white).

Enhance response rate

- When writing questions and assembling the final questionnaire, edit with a view towards saliency: apparent relevance, importance, and interest of the survey to the respondent.
- Consider either pre-notifying those in your sample or sending reminders to those who received the survey (if self-administered). Studies have shown that making contact with the sampled individuals increases the response rate.
- If possible, offer an incentive.

Non-responders

- Understanding the characteristics of those who did not respond to the survey is important to quantify what, if any, bias exists in the results.
- To quantify the characteristics of the non-responders to postal surveys, Moser and Kalton suggest tracking the length of time it takes for surveys to be returned. Those who take the longest to return the survey are most like the non-responders. This result may be situation-dependent.

Conclusions

- You need plenty of **time!**
 - Design your questionnaire from research hypotheses that have been carefully studied and thought out.
 - Discuss the research problem with colleagues and subject matter experts is critical to developing good questions.
 - Review, revise and test the questions on an iterative basis.
 - Examine the questionnaire as a whole for flow and presentation.