

Survey Questionnaire Development for Research in Obstetrics and Gynaecology

Wan Shi TEY¹, Kok Hian TAN²

ABSTRACT

An overview of the development process of survey research is outlined, with sources of biases highlighted. Examples from OBGYN research are used to illustrate the concepts.

Keywords: Questionnaires, Surveys, Scale, Research Design, Methodology

INTRODUCTION

A well-designed questionnaire aids in the scientific inquiry of understanding people's knowledge, beliefs, attitudes and behaviours. This method is especially useful in describing the topic-of-interest (descriptive), or identifying relationships between different issues (analytical) when it may be difficult to carry out experiments to investigate the underlying phenomena. In recent years, the development of standardized scales¹ as common instruments has also greatly aided in the comparability and reliability of survey data. For research in obstetrics and gynaecology (OBGYN), various types of surveys have been employed as part of a formal research

or conducted as preparatory work for future studies. Both questionnaires and scales have been used extensively to measure trends in medical conditions², physicians' attitudes towards health issues³⁻⁴, hospital culture⁵, education⁶⁻⁸, as well as patients' perspectives on the quality of care⁹, quality of life¹⁰ and cost-effectiveness¹¹. However, the lack of proper questionnaire development and reporting throws the validity of findings into questions¹²⁻¹⁵ and authors face the risk of poor validity as well as rejection in publishing their findings. As journals place increasing importance on high quality survey researches¹⁶, it is imperative for researchers to understand how to conduct surveys in a reliable and unbiased manner.

PLANNING & LITERATURE REVIEW

A clear research objective in the beginning will determine the scope and nature of the survey. Does your research question require you to develop a standardized scale or are you collecting descriptive data as preparatory work for future research? Depending on your aim, it will affect the method of population sampling, data collection and analysis¹⁷⁻¹⁸. Doing a literature review of existing validated and published questionnaire may also help save the time in developing a new questionnaire from scratch. Table 1 lists some of the commonly used questionnaires in OBGYN research, categorized according to what they measure which readers might find useful. There are also published guidelines to help one decide the method of population sampling and how to conduct a sample size calculation.

¹ Division of Obstetrics & Gynaecology, OBGYN Academic Clinical Program, KK Women's & Children's Hospital, 100 Bukit Timah Road, Singapore 229899

² Division of Obstetrics & Gynaecology, KK Women's & Children's Hospital, 100 Bukit Timah Road, Singapore 229899

Corresponding Author:
Prof Tan Kok Hian
Division of Obstetrics & Gynaecology
KK Women's & Children's Hospital
100 Bukit Timah Road
Singapore 229899
Email: tan.kok.hian@singhealth.com.sg

CONSTRUCTING EFFECTIVE QUESTIONS

The art of asking questions is often underestimated. From the way questions are formulated and asked, to the font size or colors of the survey, how a survey is designed may have a profound effect on whether and how they are answered^{12-13, 19-21}. To avoid jeopardizing the tremendous effort put into data collection and analysis, below are several recommendations to keep in mind when crafting survey questions:

(i) Literature Review

Investigate and brainstorm the relevant questions to ask for the topic of interest. For the less experienced researchers, it may be good to check with subject matter experts to ascertain that questions asked are valid. In a paper that reports the Needs Assessment of Expectant Asian Parents on Maternity Confinement Helpers²², although the survey helped to identify the ideal profile for a confinement helper in Asia, it may be better if the questionnaire also ask the reasons why one hires a confinement helper or not. This may identify critical aspects that parents are looking out for, versus optional aspects in a confinement helper.

(ii) Response Format

Keeping in mind the possible ways each respondent might answer, determine which format (open-ended, closed-ended or mixed-format) questions are best suited for your research needs. For a closed-ended question, all reasonable responses should be listed and the categories should not overlap (exhaustive and mutually exclusive). In the same survey on maternity confinement helpers, respondents were asked on the number of children they have and their annual household income of the respondents were asked. For the number of children, options provided were: (i) 0, (ii) 1, (iii) 2, (iv) 3, (v) 4, (v) 5. The options are not exhaustive and a respondent with 6 or more children might then choose to skip the question. As a result, we risk losing important feedback from parents with 6 or more children. Suggestions for improvement include making the question open-ended i.e. respondents can write down a number of their choice or having option (v) as ≥ 5 . Similarly, for the question on annual household income, while the question specified the amount in Singapore Dollars (SGD), the options provided (i) $\leq 50,000$, (ii) $\leq 100,000$, (iii) $\leq 200,000$ and (iv) $>200,000$. A person with an annual household income of \$48,000 would have been able to tick options (i), (ii) and (iii). This may be confusing and might impair the survey's ability to detect differences between income groups.

Open-ended questions may offer insights and is often a useful supplement to a quantitative survey. As demonstrated in the survey by Tan et al⁵, the qualitative questions help to bolster the claim of a positive change in the academic culture the survey was measuring. The qualitative comments also helped to capture the thinking process and opinions of ground staff which may serve as useful resource for subsequent survey development. However, it may be more challenging to collect responses and analyse the results.

(iii) Avoid ambiguous questions

It is also important to consider if the question conveys what it is intended to ask. While it is good to be brief, one has to take care that clarity is not compromised. For instance, double-barreled questions conflate more than one issue in a single question and are therefore difficult for respondents to make an accurate response. In a paper on Primary Healthcare Doctors in Jakarta Lack Knowledge on Emergency Contraception²³ (EC), one of the questions asks if "EC is rational and effective". Respondents might have difficulty responding to this question if they agree that EC is rational but ineffective, or vice versa. Perhaps a better way of asking would be to break the two parts into one question separately. Clarity of the question may also be improved by expanding on what the question means by rational and effective. Does the question refer to EC's rationality/effectiveness as a regular mode of contraception or does it refer to EC's rationality/effectiveness as an abortifacient? Given that the authors reported that EC is not a well-understood topic and there are substantial number who thinks that EC is an abortifacient ($>30\%$), researchers may find it worthwhile to elaborate on what they mean as respondents may be unclear on how to interpret the question.

Another way to improve on clarity is to avoid the use of double negatives. For instance, "Do you **not** disagree that research is not useful?" may be misread as "Do you disagree that research is useful". By having a clearly defined objective for each question, survey designers might be able to avoid ambiguity in their questions.

(iv) Unconscious biases

Finally, survey designers need to be aware of unconscious bias of both designers and survey respondents. Depending on how we ask the question, respondents may have a tendency to want to agree with us. For instance, when researchers pose leading questions like "Do you agree that overworked medical students should be given more time protection?" it biases the responses in favour of more time protection. A more neutral way of

phrasing would be “Do you agree that medical students should be given more time protection?”

Beyond the designer’s own bias, survey respondents may also be subjected to the acquiescence bias and social desirability bias. Acquiescence bias refers to the tendency for respondents to agree with the questions regardless of the content of the item. In a survey on internal medicine residents’ apparent satisfaction with their training, residents rated higher levels of satisfaction in a positively worded survey compared to a negatively worded survey²⁴. The way to reduce the bias is to pose positive and negative statements in a random order for the survey. By phrasing certain questions negatively, it forces the respondents to pay more attention to answering the questions accurately.

People also have a natural tendency to answer in a socially positive manner which may not correlate with how they actually behave. Studies have found that although clinicians generally proclaim that they comply with practice guidelines in surveys, actual objective compliance rates are lower, suggesting some degree of social desirability effect²⁵. In such cases, indirect questioning²⁶ that ask how the respondent think others will feel or act about the issue may be more effective such as “Doctors I know comply with practice guidelines in surveys” on 5-point scale. Alternatively, seek ways to measure behaviours directly rather than rely on subjective feedback.

TESTING AND VALIDATION

Because of the many potential for errors and biases, it is generally good to conduct pilot testing before rolling out the surveys. The participants in the pilot testing should be representative of the survey target population. This helps to assess for any comprehension difficulties and emotional reactions. For instance, although the questions may be valid, a long survey with more than 50 questions may cause participants to experience fatigue or boredom and reduce accuracy of their responses. In particular, research tools like attitude scales need to go through rigorous testing on reliability and validity to ascertain their psychometric properties. This would require additional data collection on related concepts that will correlate positively and negatively with the concept that we are measuring, and then performing a **factor analysis** to determine the number of factors, subscales, internal consistency of the questions and whether the questions could be further refined.

In general, if the underlying dimensions are not known, an exploratory factor analysis (EFA) may be performed. In the development and validation of Body Image in the Pelvic Organ Prolapse Questionnaire (BIPOP)²⁷, the pilot testing involved 10 women who went through a series of questionnaires in addition to the BIPOP and the questions were further refined through EFA. Subsequently, the testing was extended to a larger pool of 200 women to ascertain the validity and reliability of the questionnaire. In contrast, if the researcher has certain hypotheses about the underlying number of factors or dimensions about the survey, a confirmatory factor analysis (CFA) is performed. In assessing the Psychometric properties of the Prenatal Health Behavior Scale in mid- and late pregnancy²⁸, the authors performed a CFA to confirm the previously proposed two factors model in understanding health behaviours: health-promoting and health-impairing behaviours.

Before conducting a validation study, researchers may wish to consult a statistician on how to best conduct the study. For researchers who are adopting certain scales for their study, they should also check if the instruments have been properly validated. A brief discussion of reliability and validity can be found in Supplement 1.

ADMINISTRATING SURVEY

Different mode of data collection may have a profound effect on the results¹². In addition to traditional methods of postal questionnaires, face-to-face interviews and telephone interviews, the use of online surveys has also been gaining prominence. However, each method has its own pros and cons¹⁷⁻¹⁸. It has been noted that while self-administered electronic surveys may be cheaper and easier to administer, it can suffer from low response rate²⁹ which may cast doubt on the reliability and quality of the survey. Researchers should investigate which mode of survey administration best serves their research needs rather than what is most convenient³⁰.

In a national survey on how obstetricians and gynaecologists treat abnormal uterine bleeding and their attitudes of the treatment options³¹, the researchers employed a sequential mixed method approach in which all potential respondents with email were sent a web-based survey, while those who did not respond and those without a valid email were sent postal questionnaires. This method has shown to be comparable to postal surveys³² and helps to reduce nonresponse error³³. Other measures to increase response rate reported were to send

pre-notification letters before sending out the survey and reminders subsequently. In general, an acceptable response rate for internet surveys is 40% and above, and more than 60% for postal surveys³⁰.

Having a cover letter that explained informed consent and a brief summary of the survey's purpose may help motivate the respondent to finish the survey. The cover letter should also include information about the respondent's confidentiality and how to contact the researcher should they have questions or feedback regarding the survey¹⁶.

Lastly, examine whether there are any significant characteristics between those who agreed to participate and those who rejected. In Singapore's context, an elderly respondent might not be educated in English and may find an English survey about post-menopausal women incomprehensible. If the bias is unavoidable, the limitation should be reported.

REPORTING RESULTS

Beyond discussion about the insights obtained from the survey, sufficient details must be reported to allow other researchers and clinicians to critically appraise and interpret survey findings. Although there are no clear standard criteria for reporting survey research, several

journals have highlighted published checklists^{16-18, 29} which helps them to determine the quality of the manuscript. As much as possible, methods and materials of the survey research should be made available such that another researcher could replicate the study. As gleaned from the report by Matteson et al³¹, such details include ethics approval, sample size calculation before the survey administration, detailed explanation of survey method, question formulation, sending out the surveys, response rate, data verification and analysis. Definitions on how the results are interpreted should also be clearly defined as in Tan et al⁵.

CONCLUSION

Research involving surveys or questionnaires merits rigorous design and analysis. Proper design of questions or by adopting available validated instrument will enable researchers to gather reliable and unbiased data. By understanding the research process, the common pitfalls and essential psychometric properties, researchers can design and conduct their research more efficiently without compromising on the quality of findings. Researchers should also report their methods and results fully which will help readers to interpret the results meaningfully. Limitations of the survey should also be discussed in the report.

Table 1: List of Questionnaires Used in OBGYN Research

| Instrument | Description |
|--|---|
| Anxiety State-Trait Anxiety Inventory ³⁴ Pregnancy-Related Anxiety Questionnaire – Revised ³⁵ / Pregnancy-Related Anxiety Questionnaire – Revised 2 (PRAQ-R2) ³⁶ | 40 questions to assess trait and state anxiety 10 items to assess and identify pregnancy-specific anxiety in nulliparous women/parous women |
| Depression Edinburgh Postnatal Depression Scale ³⁷ Beck's Depression Inventory ³⁸ | 10 items measuring postnatal depression 21 items assessing characteristic attitudes and symptoms of depression |
| Stress Perceived Stress Scale ³⁹ Prenatal Distress Questionnaire ⁴⁰ Abbreviated Scale for the Assessment of psychosocial status in pregnancy ⁴¹ | 14 items measure degree to which lives are unpredictable, uncontrollable, and overloading in the last month 12 items assessing the worries and concerns that a woman has about different aspects of pregnancy, including physical and emotional symptoms, relationships, body image, and mothering ability 28 item scale developed from 5 scales: STAI trait anxiety subscale, Rosenberg's Self Esteem scale, Pearlin's Mastery scale, CES-D, and Schar's Subjective Stress scale |
| Others Hyperemesis Beliefs Scale ⁴² Parental Health Beliefs Scales ⁴³ Pregnancy Unique-Quantification of Emesis ⁴⁴ Prenatal Health Behavior Scale ²⁸ Body Image in the Pelvic Organ Prolapse Questionnaire ²⁷ Pregnancy and Childbirth Questionnaire ⁹ Pittsburgh Sleep Quality Index ⁴⁶ The Safety Attitudes Questionnaire ⁴⁷ Prenatal/Postnatal care knowledge ⁴⁸ ICIQ Vaginal Symptoms (ICIQ-VS) questionnaire ⁴⁹ Edmonton Symptom Assessment System (ESAS) ⁵¹ | 16 questions assessing patients' beliefs and perceptions of hyperemesis gravidarum 20 items measuring mother's perceived control over their children's health 3 items on nausea, vomiting and retching to quantify the severity of condition 20 items assessing health behaviours exercise, sleep, diet and smoking during pregnancy 10 items measuring the effect of pelvic organ prolapse on a woman's evaluation of her own body image 25 items evaluating the quality of care as perceived by women who recently gave birth 10 questions assessing sleep quality 40 questions (and 20 additional questions) measuring Safety Attitudes based on Teamwork Climate, Safety Climate, Job Satisfaction, Stress, Recognition, Perception of Management and Working Conditions. 19 items that test prenatal and postnatal care knowledge 14 items to assess a comprehensive range of vaginal symptoms and sexual matters and their impact on quality of life, in particular those of pelvic organ prolapse 9 items to evaluate level of symptom distress in the palliative care setting |

Supplement 1: Understanding Reliability and Validity of Questionnaires

Reliability refers to the ability of the questionnaire to demonstrate consistent results:

- (i) Across different time points for the same participant (Test-retest reliability)
- (ii) Across different question items that are measuring the same issue (Internal consistency)

Essentially, with a reliable questionnaire, any differences in results may be confidently understood as differences between participants, rather than the inconsistencies in how the questions are phrased or due to different interpretations. In general, if Cronbach α lies above 0.70, an instrument may be deemed as reliable⁵⁰.

| Cronbach Alpha | Internal Consistency |
|----------------|----------------------|
| >0.90 | Excellent |
| 0.80-0.89 | Good |
| 0.70-0.79 | Moderate |
| <0.70 | Poor |

However, a reliable questionnaire may not be a valid one such as when doctors over-report their compliance with practice guidelines even though the survey may yield

consistent results across different participants each time. Hence, a valid questionnaire measures what it is intended to measure and can be demonstrated through:

- (i) Does the questionnaire contain all the relevant questions to the issue? (Content Validity)
- (ii) Do the results have a high/low correlation with related/unrelated issues? (Construct Validity)
- (iii) Do the results predict known behaviours due to those beliefs/thoughts/attitudes? (Criterion Validity)

Ideally, there should be moderately strong to strong correlation between related issues, with negative correlation for opposites such as a scale on happiness and sadness. Unrelated issues should have low correlation. If correlations are very strong, it may be that both are measuring the same underlying phenomenon. The researcher may need to verify how the issues are distinctively different.

| Size of Correlation | Interpretation |
|---------------------|-------------------|
| 0.80-1.0 | Very Strong |
| 0.60-0.79 | Strong |
| 0.40-0.59 | Moderately strong |
| <0.40 | Weak |

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