

## Epidemiological study methods

### Data collection methods

#### Part II

### Other Quantitative Data Collection Methods

#### 2) Proxy interviews

When it is not possible to interview the subject personally, it might be better to interview another person instead rather than abandoning the interview. This person must be close to the subject and who knows enough about him/her to provide the information needed. Proxy interviews are appropriate when the patient is dead (such as a case in a case control study), very sick, mentally ill or a child. In these situations the respondent will not be the subject but proxy (surrogate) respondents.

The main problem with proxy respondents is information bias. Proxy respondents may not be able to answer certain questions about the subject, or may provide information which is not true. This is more true in retrospective studies where information is collected from proxy respondents about exposures and outcomes of the past. This information bias could lead to over- or under-estimation of the effect size. To minimize this bias, a less complex questionnaire must be considered, and efforts must be made to interview the most knowledgeable people about the subjects. In a case-control study, it may be better to consider balancing proxy interviews between cases and controls. If available a sample of proxy responses may be compared with an objective data source to give a feeling about the quality of information obtained.

#### 3) Existing records

These are data which have been recorded for other purposes before the study. They include medical records, pharmaceutical records, disease registry, birth and death certificates and environmental records related to human health. Using existing records may look attractive for researchers because of their advantages, but we should also be aware of their limitations which may lead to information and selection bias.

##### *Strengths*

- Low cost
- Less time
- Provide objective data on past exposures
- Less prone to recall bias
- Prospectively recorded
- High response rate
- Medical records are usually more accurate than oral information.

##### *Weaknesses*

- Usually information is not uniform, no standard procedures used
- May not be representative leading to selection bias.
- Recorded by different people

- Incompleteness and inconsistency
- May be recorded but not used i.e. not exposed
- May be used i.e. exposed but not recorded
- Little control by investigator
- Records may not cover the time period of the study

#### **4) Diaries**

A diary is a detailed prospective recording of exposures kept by a subject. Diaries can be used to measure some aspects of health and lifestyle exposures including food intake (food diaries), alcohol consumption, smoking, physical exercise, use of medications, certain signs and symptoms, health consultations etc.

##### *Strengths*

- Highly accurate
- Prospectively recorded (no telescoping)
- Good detail
- No need to summarize terminology e.g. often, usually

##### *Weaknesses*

- Feasible for current exposures only
- Requires training
- Requires motivation
- Difficult to get a representative sample
- Lower participation rate

#### **5) Physical examination and clinical measurement on human body**

A lot of physical and clinical measurements are available on human body which might be used in various research projects. Each of these methods will have their own uses, advantages and limitations. Therefore, it is important to decide which ones best suit your research and for this you might have to do a proper literature review. These measurements include:

1. Anthropometric measurements such as height, weight, arm circumference, head circumference.
2. Clinical signs of disease which are observed during clinical examination of the patient such as fever, rash, enlarged lymph nodes etc.
3. Clinical tests such as chest X-ray, ultrasound scans, lung function test, ECG, biopsies etc.
4. Biochemical and microbiological tests such as various blood tests, urine culture, sputum culture etc.

These tests are objective measurements with good sensitivity and specificity and, if properly done, they ought to be independent on the subject and the investigator. However, there are still some limitations in their use. When using these measurements the following considerations should be kept in mind:

1. Accuracy of the method
2. Sampling the correct site
3. Sampling at the appropriate time
4. Blinding the investigator to minimize information bias
5. Bioavailability of the material to be tested
6. Practical feasibility
7. Cost

## **6) Measurements in the environment**

Many diseases are related to exposure to physical, chemical and biological factors in the environment such as sound pollution, dust, UV light, CO<sub>2</sub>, heavy metals etc. Depending on the nature of your research, you might want to quantify some of these or other exposures which might be potential risk factors for the outcome of your study. Your choice of which factors to study will depend on the objectives of the study, the exposures, the environment, availability of assessment methods and the cost. Like clinical measurements these are objective and accurate methods with good sensitivity and specificity. However there are still limitations such as of cost, need for expertise and feasibility.

## **Qualitative Data Collection Methods**

### **1) Qualitative interviews**

Qualitative interviews are open interviews with research subjects where there are no structured questionnaires such as those used in quantitative research. The interview has broad objectives and is not entirely led by the interviewer but could follow the priorities of the respondent. There are two types of qualitative interviews, unstructured and semi-structured. Unstructured interviews are similar to informal interviews where the interviewer has no pre-set question list; he has a broad objective for conversation but the conversation will be open to follow the respondent's ideas and concerns. In a semi-structured interview, the interviewer has a set of issues, or open-ended questions which he tries to get answers for. The conversation is therefore not totally open and the interviewer has to keep it focused around the issues to obtain the respondents' answers about them.

Qualitative interviews could be done with normal people, key informants and influential people in the community. These interviews are usually tape-recorded and transcribed later. They require high interviewing skills, neutrality, and the ability to build rapport with people.

#### ***Strengths***

- They build rapport with the community
- They provide in-depth information on several topics
- They provide information on the socio-economic context
- They discover language and cultural characteristics of the community

### ***Weaknesses***

- They are costly and time-consuming
- The sample is small, not representative
- They require more skills than quantitative interviews
- Data processing and analysis are difficult

## **2) Observation**

Observation as a qualitative method is the situation where an observer watches a community and its members and records his observations about certain issues of interest. Observation methods are useful to study behaviors. Observation could be *structured observation* where the observer has a pre-coded instrument for data collection about details of certain behaviors. In *unstructured observation* there is no such pre-coded instrument. Observation could also be divided into *participant observation* and *non-participant observation*. In participant observation the observer enters the community living and interacting with them in order to observe them from inside. In non-participant observation, the observer watches the community from outside and records his observations without much interaction with the people.

### ***Strengths***

- They study actual behaviors rather than reported ones
- They built rapport with the community
- They can study temporal sequence of events
- Some observation methods (structured observation) can quantify study items

### ***Weaknesses***

- They require more time
- They can cause reactivity because of being observed
- They require skills and motivation from observers
- Data processing and analysis are time consuming
- They are not feasible for some behaviors e.g. sexual behaviors

## **3) Focus groups**

A group of 6-12 people talk about issues important for them and to the investigation under guidance of a moderator who stimulates the discussion with his skills and keeps the discussion focused on the issues of interest. Participants should all be encouraged to speak without anyone being allowed to dominate the talks. A focus group usually lasts at least an hour until the moderator believes that all participants have expressed their views. The comfortable group setting will encourage people to express their opinions and talk more freely about feelings, beliefs, and attitudes. Researchers will gain information about the values, concerns, and needs of the community.

Apart from the moderator, there should be another observer, the recorder, who takes notes of the talks and non-verbal cues. The recorder should note down all the answers honestly in the original language and should also capture emotions, attitudes and other

non-verbal gestures. This person should be a very good observer and fast in note taking. The discussion of a focus group is usually tape-recorded.

### **Strengths**

- They encourage debate on the issues
- They are easy and quick
- They provide a range of data on knowledge, attitude and behavior about the issues
- They are useful as exploratory research for preparation of the study and its feasibility

### **Weaknesses**

- They don't provide information on quantities
- They may not represent all the community
- They are not good for sensitive issues
- Skills needed for moderation and note-taking
- Data processing and analysis are difficult

## **Improving validity of qualitative research methods**

There is a lot of criticism of validity of qualitative methods. Some people think that the results are merely impressions and opinions of a certain number of participants which are also subject to bias by the researchers involved. The results are therefore not generalizable to the whole community. In addition, the results are not reproducible as for example you cannot obtain the same results from repeating a focus group with the same people. In spite of these criticisms qualitative methods are invaluable methods of research when used properly for the right objective. Certain measures can help improve validity of these methods including measures during selection, conduct and analysis.

During selection:

1. Random selection of participants
2. Choosing participants from a larger population of the community
3. Including all major sections/diversities of the community
4. Avoiding choosing the most accessible people

During conduct

1. Triangulation i.e. using more than one method
2. proper training of interviewers, moderators and observers

During analysis

1. Conceptual analysis
2. Validation with the respondent
3. Systematic analysis, use computer software
4. Quantitative summaries
5. Proper presentation of results

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Further reading

- Field trials of health interventions in developing countries, edited by P Smith and R Marrow
- Principles of exposure measurement in epidemiology by BK Armstrong et al.
- Actions speak: the study of hygiene behavior in water and sanitation projects. Edited by MT Boot and RH Marrow.