THE PITFALLS OF THE INVESTIGATOR

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30.1 ABSTRACT

Two interviewer-related factors influence the results of surveys and must be considered in the interpretation of the data:
1. Technical errors of data-collection
2. Cognitive influences

Interviewers need specific personal characteristics and technical skills when working with varying social groups, such as the elderly. Training and supervision of interviewers may reduce the number of pitfalls. In addition, appropriate experimental design is necessary to more correctly appraise the nature and magnitude of the pitfalls of interviewer-related influences. However, the more sophisticated survey techniques and instruments are used, the more the object changes showing new characteristics. Therefore, it is recommended that the interviewers' influence be taken into consideration during data analysis and interpretation.

30.2 INTRODUCTION

However carefully conducted, every survey contains errors which reduce its power of analysis and interpretation. These errors can be differentiated between sampling and non-sampling errors [1]. Non-sampling errors can occur at any stage of the survey procedure such as survey design, questionnaire development, field data collection, data processing, analysis and reporting, whereas sampling errors are related to the sample design and size.

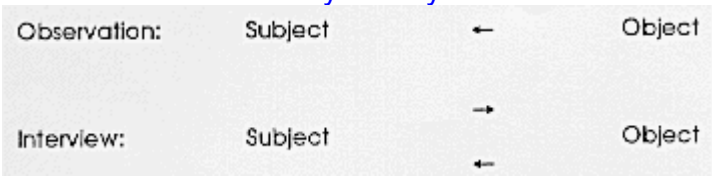
The following commentary refers to pitfalls which are related to interviewers and lead in particular to non-sampling errors. These problems may often occur in surveys conducted in developing countries where local interviewers usually possess a less formal education and are sometimes not so well prepared for their tasks compared with external interviewers who may be better educated but are unable to fully appreciate the cultural conditions of the surveyed

population. For instance, in a survey carried out in West Sumatra, Indonesia using medical and nutrition students from local educational institutions as interviewers, nearly 20% of the questions asked by the non-local supervisors concerning formal school education of community members were answered differently [2]. To resolve the discrepancy, a more extensive survey was conducted where it was found that some community members were ashamed to inform the external supervisors about illiteracy. In the case of the elderly, in the SENECA study it is recognised that interviewer-related differences may have occurred particularly in data collection by questionnaires [3].

30.3 CHARACTERISTICS OF DATA COLLECTION PROCEDURES

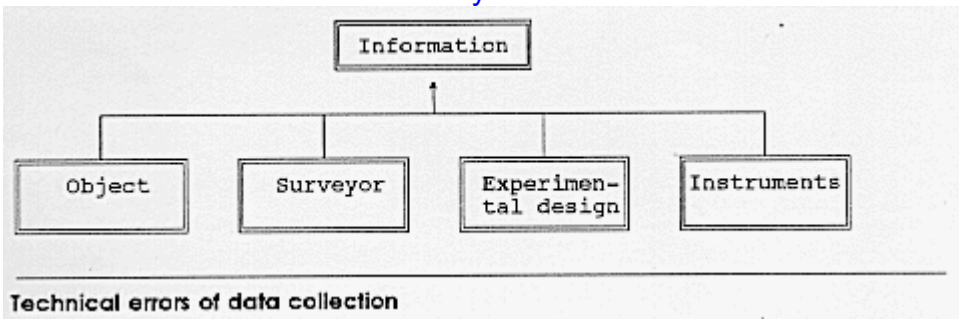
In general, individual data collection originates from interviewer-independent and interviewer-dependent information. Figure 30.1 illustrates a case of data collection carried out by an interviewer (subject) who compiles passive information from an individual (object). This procedure occurs in observational studies. In the lower example the interviewer sends specific information to the individual with the objective of gaining particular information back. This active form of data collection may occur by carrying out questionnaires or interviews.

Figure 30.1. Data collection carried out by surveyors.



Both types of data collection depend on the nature and quality of instruments utilised during a survey. The type of instrument has to be carefully chosen with regard to the object, the experimental design and the skills of the interviewers. According to Figure 30.2 the quality of information collected is dependent on four elements: the object to be surveyed, the interviewer, the experimental design and the instruments used. However, this paper will concentrate on the influences a interviewer may have on the outcome of a survey.

Figure 30.2. Factors which influence survey information.



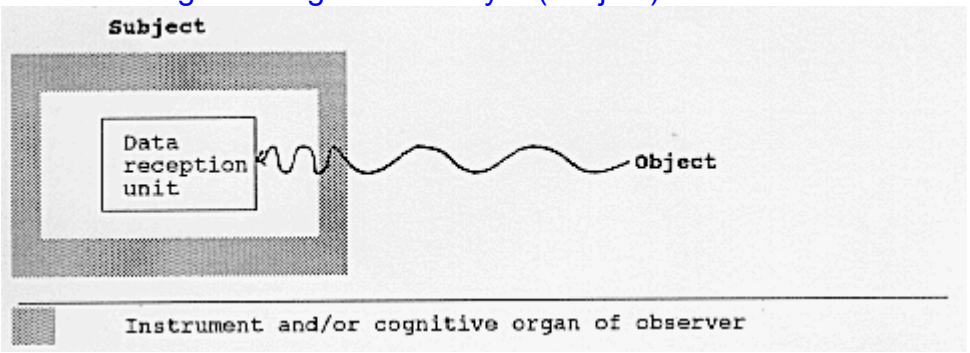
30.4 TECHNICAL ERRORS OF DATA COLLECTION

Several manuals, handbooks and guidelines offer detailed descriptions about nutritional and health research methodologies and the use of instruments, such as equipment and questionnaires. The Euronut-SENECA protocol [4], in particular, outlines data collection procedures for the elderly. Notwithstanding all efforts to streamline survey methodology development, standardisation of methodological procedures and training of interviewers, it has to be acknowledged that inter-observer differences still may exist.

30.5 COGNITIVE INFLUENCES

The process of information collection was described idealistically in Figure 30.1 because information gathering by the interviewer is not a passive process. According to Figure 30.3, information sent from the object passes an instrument of measurement and/ or cognitive field which influences the captured information. This field can act as a filter which reduces the quantity of information and/ or classifies information which in turn influences not only the quantity but also the quality of information. Then, however, the data reception unit may interpret the information gained differently.

Figure 30.3. Information distortion by influences from instruments and/ or cognitive organ of surveyor (subject).

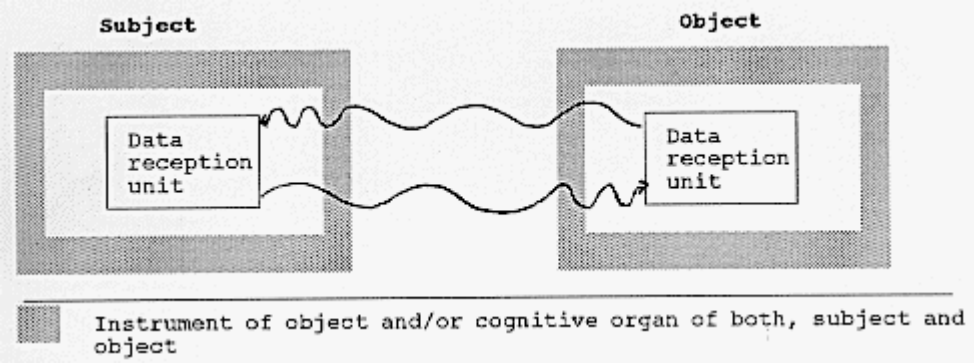


30.5.1 Instrument and/ or cognitive organ of observer

Surveys in which human beings are observed, however, derive a specific quality since the examined person holds the same structural set-up as the observer. As well as the observer, the object possesses a cognitive filter which interferes with the process of data reception. This is particularly relevant in the case of questioning. Information which is passed in the form of questions to the interviewed persons is qualified by the cognitive filter of the person and then new information is sent back according to their ability and willingness. Consequently, interviews carry an even higher risk of information distortion than observations.

Figure 30.4. Information distortion by influences from instruments and/ or cognitive

organ of interviewer (subject) and surveyed individual (object).



30.5.2 Instrument of object and/ or cognitive organ of both, subject and object

A third factor of possible interference in the communication process is background noise. As sometimes occurs in radio transmissions, background noise may cause information to be misunderstood, or all or part of the information may not be understood at all.

Figure 30.5. Information distortion by influences from instruments and/ or cognitive organ of surveyor (subject) and surveyed individual (object).

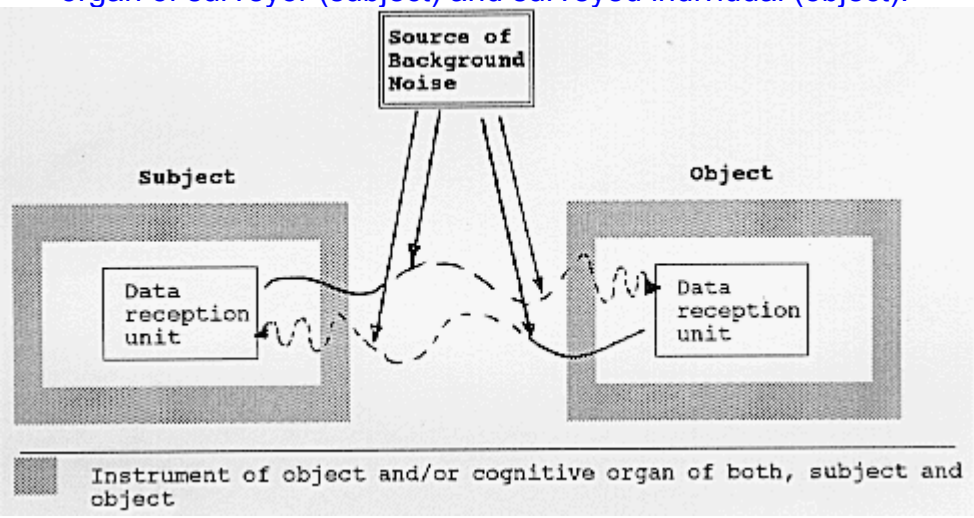


Table 30.1 gives some examples of observer-related pitfalls which can influence data collection in surveys of the elderly considering three sources of disturbances. Factors such as values and norms, emotional stress caused by diseases, loneliness, or decreasing brain function may bias information gained from older individuals.

Table 30.1. Some examples of pitfalls which may influence data collection in surveys of

the elderly.		
Cognitive pitfalls of studied elderly	**Cognitive pitfalls of interviewer**	**Background noise pitfalls**
Different age and socio-cultural-related values and norms	Emotional stress working with people suffering under emotional stress	Information from house-hold members
Emotional stress caused by diseases, loneliness, etc.		Insecurity of usage of
Decreasing brain function	survey techniques	

Research data which are related to cognitive information from the elderly are prejudiced by the fact that late in life the performance of the human brain suffers attrition of certain neurons and undergoes chemical alterations. These changes may cause a noticeable decline in cognitive functions of individuals. The Framingham Study, which repeatedly assessed the health of a large group of subjects of varying ages, estimates the prevalence of dementia, including Alzheimer's disease, as the leading cause of declining cognitive functions; 0.4% in the 60-64 year old age group, increasing to 10.5% in the 75-79 year old age group [5]. However, socio-geographical differences may exist. In developing countries where the ageing process may happen earlier due to more unfavourable environmental conditions, a higher prevalence of dementia must be considered.

The risk of interviewer-related errors may be higher, working with social groups who have a greater risk of being ostracised, such as street kids, ill people, and socially stigmatised groups. This same risk may also occur with the elderly. As a result, the interviewers' influence on data quality may require special attention, even in surveys involving the elderly. Elderly individuals may be sceptic, depressive, in pain, etc. which may bias the mood of the interviewer. Some elderly could be disappointed by the attitudes of society and consequently live in social isolation. This may lead to emotional reactions ranging from rejection of the interviewer on the one hand, to extreme affection on the other. However, in both cases the information collected may be heavily biased.

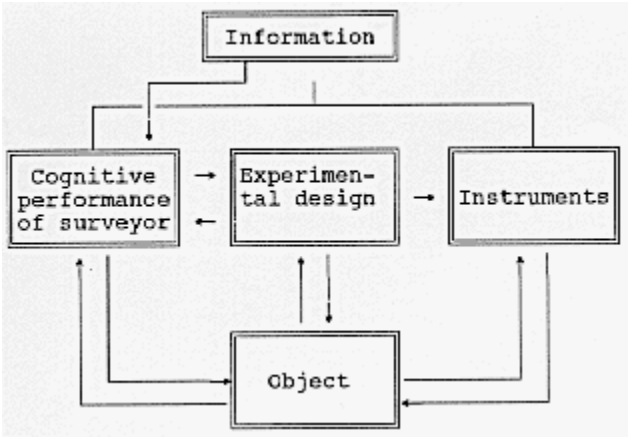
Interviewers may not always have sufficient patience to work with individuals who are sometimes not willing nor able to follow the requirements of survey methodology. This may be reinforced even further if the interviewer feels insecure about the correct usage of survey techniques. Background noise pitfalls occur, for instance, when information from other household members bias survey data, particularly if data collection is not carefully carried out. If several household members are joining an interview, it may be difficult for the interviewer to collect information from the older individuals as occasionally other family members may try to impose their opinions. Furthermore, it is possible that the interviewed elderly will answer the questions as they are expected to do so. This is especially evident when elderly family members

are dependent economically and/ or socially on other members of the household.

Since the search for reality is object-related, study design should avoid or at least minimise observer-related influences. Therefore, in high quality research an adequate amount of time and money must be allocated for training interviewers, calibration of equipment, and permanent monitoring of measurements. In 15 nutritional baseline surveys conducted in tropical countries, about 15% of the GTZ-assisted project budget was used for quality control measures. The SENECA Study is a well implemented example of quality control involving nutritional gerontological research. An exciting example of unexplainable phenomena was described in an IUNS-UNU workshop of the "Food Habits in Later Life" project [1]. Scandanavian elderly showed skinfold thicknesses which were found to be greater than in any other elderly population group. However, it also showed that the Scandinavian population studied had contradictorily low BMI. These unusual findings were observed by two independent teams: a Swedish study group from IUNS and a Norwegian study group from SENECA. It seems very unlikely that both independent studies experienced technical failures with measuring equipment such as callipers. Furthermore, as the Scandinavian interviewer of each survey team was trained independently by the two research groups (IUNS and SENECA) it seems doubtful that in both studies only the Scandinavian interviewers received the wrong orientation. However, it is possible that Scandinavians have different fat patterning related, for example, to high intakes of animal fat. It is also feasible that a cultural interviewer-instrument-interaction led to this unexpected finding.

Perhaps the Scandinavians employed persons who, for fear of causing pain to the population group being measured, used their instruments in a different manner. However, in order to verify whether those data are interviewer (calliper and/ or interviewer) or object-dependent, a cross-check study, could be conducted in Scandinavia by a team whose equipment for skinfold measurement has already been used in other surveys where no unexpected data were collected. Conversely, the teams which recorded the contradictory data in Scandinavia could take skinfold measurements of the population groups previously examined by the other team and subsequently compare their findings with the earlier collected data. Of course, such a cross-checking procedure would be cumbersome and expensive.

Figure 30.6. Relationship of factors that influence survey information.



Considering all the above mentioned factors which may influence data collection, it should be noted that, according to Figure 30.6, a far more complex relationship exists between the factors than shown in Figure 30.2. In general it has to be accepted that every measurement will influence an object, therefore it will never be possible to gain information from an unobserved reality. As a result, the following two points deserve attention:

1. Interviewer-related pitfalls must be kept to a minimum, but they can never be excluded.
2. Interviewer-related pitfalls must always be considered in data analysis and interpretation.

Based on these two conclusions, the following recommendations should be considered during planning and implementation of surveys:

1. Application of standardised survey methods and procedures which have been utilised successfully in studies of the elderly. (The SENECA Manual of Operations provides useful examples of survey methodologies [4].)

2. Careful choice of survey methods and procedures as well as survey instruments which interfere as little as possible with the cognitive performance of both object and subject. Reconnaissance studies which give qualitative information and can be carried out by rapid appraisal methodology are particularly recommended.

   The objective of the reconnaissance is guided by the requirements of research planning and is designed to rapidly assess the local nutrition situation of rural or urban elderly groups in order to define a joint standardised research methodology [6].

   In particular, this involves:
   - assessment of the overall conditions at the national, provincial and district level relevant to the nutritional situation of the elderly,
   - definition of the geographical location of the urban and rural study sites,

- collection of preliminary information on the nature and importance of nutritional problems and their possible causes in the study sites,
- acquisition of the target groups' opinions on:
  the type, scope, and importance of nutritional problems and possible causes, and the supply of resources in their general surroundings,
- construction of a causal model built on the information obtained to define important variables which might be included in the final research protocol,
- exploration of nutrition related norms and values in order to give research questions a substantive worth, and
- definition of anthropometric and biochemical measurement techniques and equipment. Scrimshaw and Hutardo [7] have published their experience on the utilisation of rapid appraisal methodologies which were used primarily in the fields of nutrition and health. Scrimshaw and Gleason [8], during a workshop setting, collected experiences of further scientists. Gross [6] described a reconnaissance methodology which was used in a pre-study phase of a multicentre study on elderly.

3. Notwithstanding the use of experienced research methodologies and reconnaissance, the implementation of a pilot study is still necessary.
   Shortcomings and unforeseen factors always appear during the course of a survey which, regardless of careful planning, are impossible to detect in advance. However, such unforeseeable problems can be considerably reduced by conducting a pilot study.

   The pilot study has the following objectives [9]:
   - Training the survey workers,
   - Testing the instruments to be used (e.g. interview forms, measuring devices) for reliability,
   - Fine-tuning the scheduling and organisational planning of the main survey.

4. Technical skills are needed by interviewers working with the elderly which include adequate utilisation of survey methods and procedures as well as survey instruments. Such skills are acquired by the interviewers through careful training.

   General guidelines for interviewer training in health and nutrition studies are given, for example, by Peeters and Kröger [10] and Gross et al. [9].

5. However, regardless of careful training programmes, data collection may still be burdened by an interviewer's personal characteristics. As a result, an adequate interviewer selection process is necessary. Personal qualifications may differ for qualitative or

quantitative data collection.

The progress of a survey depends just as much on human qualities as it does on the technical qualifications of the personnel taking part in the survey [9]. In addition to education and occupational experience, an accurate knowledge of the local language is sometimes required. This is desirable to ensure effective communication and also indicates a socio-cultural understanding of the target community. People who speak the same language, know the local customs and are familiar with the problems of the target community will more easily win the confidence of the target groups and as a result are better able to conduct a successful interview. Ideally, the interviewer should originate from the same socio-geographical and cultural area as the target groups. However, exceptions should be made when religion, ancestry, caste or sex have a bearing on the choice of interviewer.

In all societies there are varying degrees of distinct roles for the sexes. These distinctions have to be taken into account in the recruitment of survey workers. As the responsibility for household nutrition generally lies with women, it is recommended that women be engaged as nutritional survey workers. The employment of a interviewer with outstanding personality characteristics has its limitations. For this reason, it is important to study the personalities of the interviewers during the training programme to determine whether such candidates exist. Following this initial observation, personal attributes are limited to more easily recognisable characteristics.

Motivation, ability to make contacts, reliability, ability to take initiative, willingness to learn and the psychic aptitude to work with marginalised groups requires calmness, patience and a friendly nature, with a readiness to also bear disappointments and frustrations.

6. In cases where data are collected by several interviewers, supervision has to be planned and implemented. Data collection should be controlled by taking a parallel sample and if problems occur, advice should be given to the interviewer at the study site. Ideally, one supervisor should be in charge of between four to six interviewers. Supervisors are responsible for the technical quality of the surveys for which either they or the interviewer groups under their charge are responsible. Furthermore, they function as a liaison between institutions with an interest in the survey and representatives of the target groups. A detailed procedure for the supervision of surveys is, for instance, outlined in Gross et al.. [9].

7. Since interviewer-related effects will always occur, compounding factors should be explored by adequate statistical methods. There are basically three types of variables which can be used for different checks on the reliability of a survey [9,11]:
   - In the case of variables with continuous values (e.g. anthropometric

measurements, biochemical measurements, indices)

- the absolute differences between the single values of the recorded measurements of the interviewers and the supervisor and their standard deviation,
- a paired t-test between the single values of the recorded measurements of the interviewers and the supervisor, and
- the correlation between the recorded measurements of the interviewers and the supervisor should be calculated.
- In the case of variables with binary coded answers (e.g. yes/ no, male/ female, malnourished/ well nourished, presence of disease), the sensitivity and specificity of the surveying of these variables should be calculated.
- In the case of variables with more than two answers, the percentage of deviation between the interviewers and the supervisor should be obtained.

Discriminant analysis is a very appropriate statistical method of identifying unreliable interviewers.

8. Finally, it must be kept in mind that it is impossible to avoid interviewer-related influences. Therefore they always must be taken into consideration during data analysis and interpretation. Investigators are constantly fine-tuning survey techniques with the objective of improving the accuracy of data collection. However, the increasing complexity of survey techniques and procedures has its limitations, since the object is related to survey procedures and instruments. The more sophisticated survey techniques and instruments are used, the more the reality of the observed objective changes. This phenomena is very well known in physics as the uncertainty principle.

   Briefly put, the uncertainty principle states that the simultaneous measurement of two so-called conjugate variables, such as position and momentum, entails a necessary limitation on precision. The more precise the measurement of position, the more imprecise the measurement of the momentum, and vice versa. In the most extreme way, absolute precision of one variable would involve absolute imprecision regarding the other.

   This indetermination is not the fault of the experimentor in physics: it is a fundamental consequence of quantum equations and feature of every quantum experiment. Furthermore Heisenberg declared, the uncertainty principle will never be overcome whenever and as long as quantum mechanic's is valid [12]. Werner Heisenberg's uncertainty principle is not only valid in physics but in a much broader context in science. He showed that our knowledge of nature is fundamentally limited and always will be so - as soon we grasp one part, another part slips through our fingers. It has to be accepted that the more emphasis is given to survey techniques and procedures, the more

we will influence and change the object and thereby gain unrepresentative and falsified information.

30.6 SUMMARY

- This chapter focuses on interviewer-related factors which can influence the results of surveys and which should be considered in data interpretation.

- The following recommendations can minimise observer-related influences on data collection and interpretation:
  a) Apply standard survey methods/ procedures used successfully in other studies.
  b) Reconnaissance studies which give qualitative information and can be carried out by rapid appraisal methodology (e.g. Rapid Assessment Procedures) are particularly recommended.
  c) Implementation of a pilot study is desirable.
  d) An adequate amount of time and money should be allocated for training interviewers.
  e) An adequate interviewer selection process is necessary to find suitable interviewers for the study.
  f) Constantly calibrate equipment and monitor measurements.
  g) Determine the sensitivity and specificity of survey variables.
  h) Explore interviewer related confounding factors in data analysis by using adequate statistical methods (e.g. discriminant analysis).

30.7 REFERENCES

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30.8 LEGEND FOR FIGURES

Figure 30.1 Data collection carried out by surveyors.

Figure 30.2 Factors which influence survey information.

Figure 30.3 Information distortion by influences from instruments and/ or cognitive organ of surveyor (subject).

Figure 30.4 Information distortion by influences from instruments and/ or cognitive organ of interviewer (subject) and surveyed individual (object).

Figure 30.5 Information distortion by influences from instruments and/ or cognitive organ of surveyor (subject) and surveyed individual (object).

Figure 30.6 Relationship of factors that influence survey information.

CHAPTER 30

THE PITFALLS OF THE INVESTIGATOR