3. METHODOLOGY

3.1 INTRODUCTION

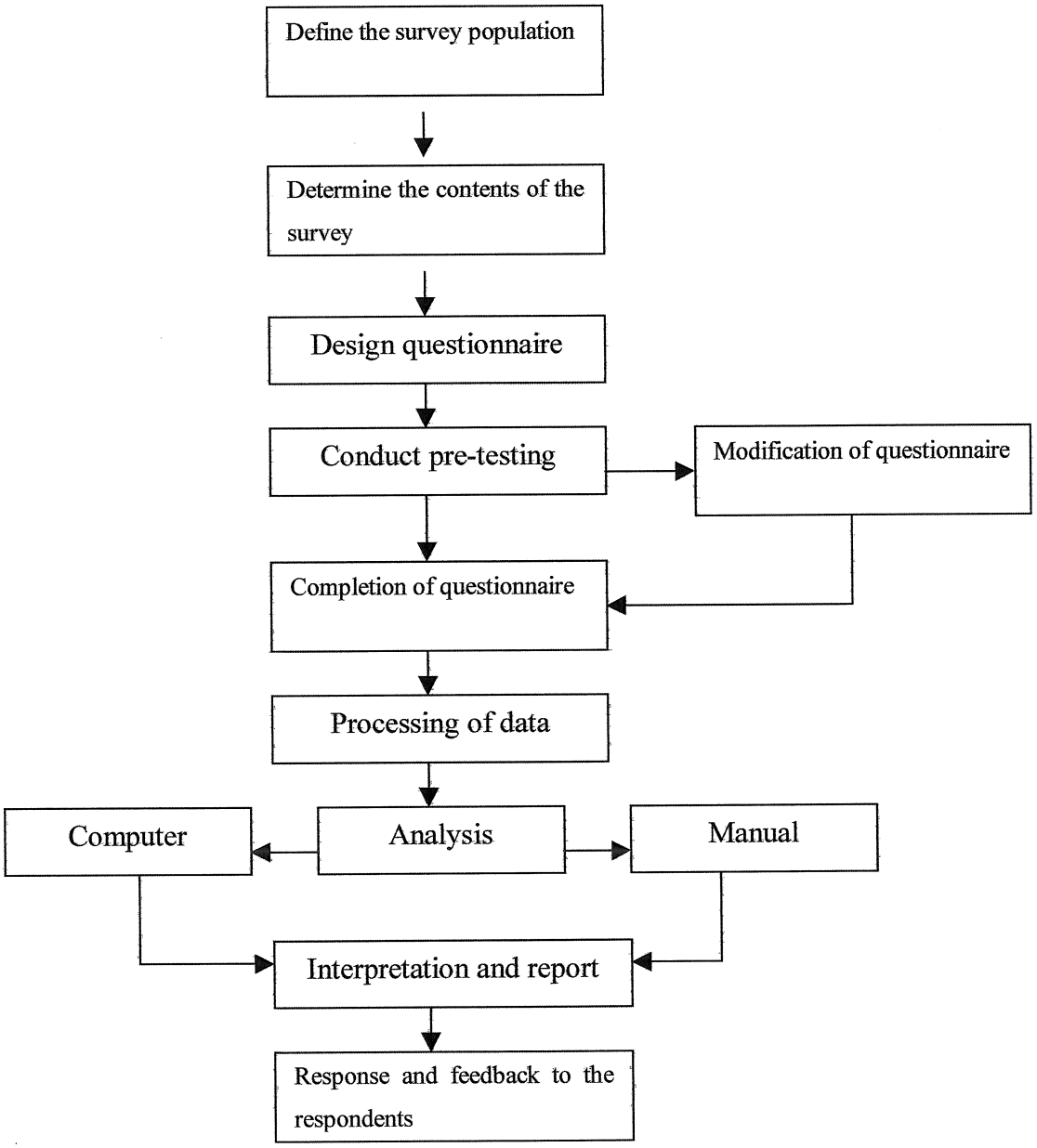
Early detection, screening and intervention of infants with hearing loss, is part of a highly specialized field with ongoing technological improvements. Pediatricians, who consult with infants on a daily basis, need the necessary skills to recognize the early signs of an infant or a child with a possible hearing loss. The maintenance of a positive attitude among team members, as well as teamwork is also crucial to ensure efficient referrals and intervention of infants with hearing loss.

In South Africa, a developing country, a high degree of multi-cultural and multi-lingual factors influence effective intervention of infants and children. There appears to be a lack of early diagnosis and referrals of infants and children with hearing loss as well as a lack of sufficient funds and manpower to meet the needs of all infants, children, families and medical personnel.

The research question and setting, which motivates this study, has been elaborated on in Chapters 1 and 2. In short, the need for pediatricians in South Africa is to continuously upgrade their knowledge with regards to the ongoing technology in screening and intervention of infants with a hearing loss. In a process of identifying the needs of the pediatricians, as well as giving answers to their questions concerning hearing impairment and early referrals of all infants and children with risk factors might prove useful in solving the problem of 'finding an infant or child too late' for the most effective intervention.

The aim of this chapter is to describe the methodological approach implemented in the conduction of the research component of this study (See figure 3.1).

Figure 3.1: A schematic representation of the survey process



Source: Swanepoel & Prinsloo (1998)

3.2 AIMS OF THE RESEARCH PROJECT

The aims of this study are:

3.2.1 Main aim:

The main aim of this study is to investigate Pediatricians' knowledge and attitudes regarding the diagnosis and intervention of infants and children with a sensorineural hearing loss.

3.2.2 Sub aims:

The following sub aims have been formulated in order to achieve the main aim:

1. Determining the biographical and educational background of the respondents.
2. Determining high-risk indicators that may cause sensorineural hearing loss amongst babies and children.
3. Determining the pediatricians' knowledge regarding the symptoms and characteristics infants and children with sensorineural hearing loss may display.
4. Determining the pediatricians' knowledge regarding early identification of a hearing loss;
5. Determining the management procedures (referral procedures), followed by pediatricians, of infants and children with sensorineural hearing loss;
6. Determining the knowledge and attitude regarding the intervention methods (amplification systems) available for infants and children with sensorineural hearing loss (this includes hearing aids, as well as cochlear implants);
7. Determining the attitudes of pediatricians regarding the role and efficiency of audiologists in terms of diagnosis and intervention of infants and children with sensorineural hearing loss;

8. Determining the needs of pediatricians for additional information regarding diagnosis and intervention of infants and children with hearing loss.

3.3 RESEARCH DESIGN

The research design includes a plan or structured framework of how the research process will be conducted in order to solve the research problem (Babbie & Mouton, 2001; Thyer, 1993). For this research project, a quantitative approach is followed. This approach is the "*numerical representation and manipulation of observations for the purpose of describing and explaining a phenomena that those observations reflect*" (Babbie & Mouton, 2001).

For the purpose of this study, an explorative, descriptive research design is used (Leedy & Ormrod, 2001). Such a research design provides quantitative information regarding the specific characteristics of the respondents and the specific programmes in which they are established (Kritzinger, 2000; Neuman, 1997). It is also an excellent method that is available for measuring the attitudes and orientations of a large population (Uys, 1995). According to de Vos (1998) the following requirements are important when using a quantitative-descriptive research design:

- A questionnaire as data collection method.
- Respondents are selected by means of randomized sampling methods.

The research design is also a guideline within which a choice about which data collection methods has to be made (de Vos, 1998). A survey is the most widely used data gathering technique. Survey research is especially appropriate for describing a large population; thus selecting a chosen group considering generalization of the results on the total population (Babbie & Mouton, 2001). It also produces quantitative information about the respondents believes, opinions, characteristics and behavior (Neuman, 1997).

This study has only one uniform source of data gathering, namely the questionnaire, since the researcher is interested in the extent to which the respondents hold a particular attitude or perspective (Babbie & Mouton, 2001).

3.4 RESPONDENTS

The pediatricians, who provide the data for analysis by responding to the survey questionnaire, are referred to as respondents (Babbie & Mouton, 2001). The selection criteria and procedure of relevance to the respondents that are used for this study as well as a thorough description of the respondents are subsequently explained.

3.4.1 Selection criteria

The following criteria were chosen for the selection of respondents in order to separate those who are eligible for the study from those who are not.

3.4.1.1 Qualifications

Firstly, only pediatricians registered with the *South African Medical Association* (SAMA) are used for this study. The tertiary instance where the pediatrician obtained his/her qualifications is not of importance. It is of importance though that the pediatrician, is currently practicing during the period of the research, whether in a clinic, a private practice or in a hospital. Pediatricians, who moved to another province, other than Gauteng, or currently practicing overseas, or retired, are not included in this study.

3.4.1.2 Geographical area

Secondly, all the participants who took part in this study, must currently be practicing in Gauteng province, since it is demographically more convenient for the researcher in terms of reaching the respondents. The geographical area is also limited to the Gauteng area in order to increase the return rate of the responses (Mulder, 1998). This is a practical criterion to conserve resources (Fink, 1995).

3.4.1.3 Language ability

Thirdly, all the respondents must be able to speak either Afrikaans or English, since the questionnaires are only composed in these two languages.

3.4.1.4 Willingness

Lastly, it is important that all the respondents are willing to cooperate in this study.

3.4.2 Selection procedures

Firstly, a research proposal was submitted to the University of Pretoria and the Ethics Committee in order to obtain permission for the research to be conducted (Appendix A).

In order to gather the needed information, a part (in this study, Gauteng Province) of the total amount of the pediatricians in South Africa will be used. Strydom and Venter (2002:199) defines sampling as *"a small portion of the total set of objects, events or persons"*, and provide the following rationale for the use of sampling: *" The observation or study of a phenomenon in its entirety would be tedious and time-consuming and would produce a massive amount of data, which by implication would be difficult to process, analyse and interpret."* Saranttakos (2000:139) is of the opinion that viability is the most important underlying rationale for sampling, and states: *"A complete coverage of the total population is seldom possible...even if it were theoretically possible to identify, contact and study the entire relevant population, time and cost considerations usually make this a prohibitive undertaking."*

- Sampling is a process of systematically selecting cases for the inclusion in a research project (Neuman, 1997). The sampling for this study as the crux of the larger population is limited to all pediatricians in Gauteng. The researcher decided to use all the names on the list provided by SAMA, since she is compelled to use only the volunteers as participants.

The above selection procedure and method of work are in line with Babbie and Mouton's (2001:169) requirements for a valid sampling method namely: "*To provide useful descriptions of the total population, a sample of individuals from a population must contain essentially the same variations that exist in the population*".

3.4.3 Description of the respondents

This section describes the respondents involved in the study in terms of the following groups:

- Original list of pediatricians selected for the sample
- Subjects not participating in the study
- Actual respondents

Originally all 257 subjects on the name list of SAMA were approached to participate in the study. In table 3.1 the possible reasons for not participating in the study are given.

	Immigrated, retired or practicing outside Gauteng	**Not interested**	**Personal and contact details incorrect**
Total of 257 subjects			
Approximate amount not used in the study	10	130	50

Table 3.1: Reasons for not participating

In the end only 47 pediatricians returned the questionnaire who all met the selection criteria as set out in 3.4. Taking into account that of the original 257 subjects only 200 could officially be used (50 subjects were non-existing on the list) the anticipated 30% return rate was almost achieved.

3.5 MATERIAL AND EQUIPMENT

Data was collected in the form of a composed questionnaire that will be used as research material (see appendix D). The questionnaire has been composed in such a manner that it serves as the point of departure in answering the main aim as well as the sub aims (Mouton 1996). The questionnaire serves as an instrument to obtain data, as well as a measurement instrument (Leedy & Ormrod, 2001). Each questionnaire was accompanied by a cover letter (see appendix B) and an instruction sheet (see Appendix C).

3.5.1 Cover letter

In the absence of personal contact and interaction with the respondents, the goal of the cover letter is to explain the research project, and thereby obtain the respondents' cooperation (Leedy, 1997). The cover letter describes the value and the potential of the study, and this serves as encouragement for respondents to participate in the study and to complete the questionnaire.

3.5.2 Instruction sheet

This page follows with the necessary guidelines for the completion of the questionnaire. The guidelines include the way in which the questionnaire must be completed as well as the time allocated for the questionnaire's completion. The instruction sheet also contains the terms and definitions of relevance in the questionnaire. By using the instruction sheet any vagueness will be clarified. This is a way of increasing the validity and reliability of the study.

3.5.3 The questionnaire

3.5.3.1 Motivation for the use of the questionnaire as data collection instrument

A questionnaire as data collection instrument is used in this study because of all the benefits it holds (Neuman, 1997). The questionnaire serves as a tool to achieve the aims of the study.

A questionnaire allows great volumes of data to be collected from different sources, simultaneously, and within a specific time frame (Bailey, 1994). Hence, a questionnaire is timesaving and relatively cheaper than other forms of data collection (Neuman, 1997). By assuring the anonymity of the respondents, they are encouraged to express the feelings and opinions freely and honestly (Sellitz, 1971). Accordingly the researcher can obtain reliable and a representative reflection of the total population (Strydom & Venter, 2002.).

It must be taken into account that there are specific limitations and disadvantages associated with a questionnaire. The following disadvantages are applicable to this study:

(i) a relatively low response rate (de Vos, 1998);
(ii) representative address lists are difficult to obtain and are sometimes outdated (Fowler, 1993);
(iii) little, if any, control over the circumstances under which the questionnaire is being completed (Neuman, 1997).

Regardless of the abovementioned disadvantages associated with a questionnaire, it was still decided that the questionnaire was the most appropriate data collections instrument for this specific study. The underlying reason for this decision is that the questionnaire is still the instrument that is the most used in social-scientific research (Alreck & Settle, 1985).

3.5.3.2 Design of the questionnaire

The questionnaire is designed for obtaining data from the respondent's population. "*This instrument may have two parts: an 'attitude' section, in which participants are invited to respond to a series of opinion statements; and a 'coding' section, in which they are asked to provide a minimum of organisational and demographic information*" (Hofmeyer and Maitland, 1984:39).

The questionnaire is then presented to a representative group of pediatricians in order to:

- Determine whether the coding section is accurate;
- Determine whether the instructions regarding completion of the questionnaire have been understood;
- Determine whether the individual questions are unambiguous; and
- Evaluate the appropriateness of the response scales (Swanepoel & Prinsloo, 1998).

The questionnaire is an instrument with open and/ closed questions or statements to which a respondent must react (de Vos, 1998). During the design of the questionnaire it is important to use only questions relevant to the research aims (Fink, 1995). The content of the questionnaire will be structured according to the sub aims. Furthermore, the importance of deciding on the specific question type for this study is crucial (Neuman, 1997). It must be taken into account that the respondents have limited time and a busy schedule, therefore emphasis is placed on closed questions. Therefore, questions can be answered in a quick yet accurate manner (Leedy & Ormrod, 2001). To ensure that the questionnaire is complete and comprehensive, the researcher made use of multiple categories (de Vos, 1998).

The questions in the questionnaire consist of the following:
Open-ended questions: write any answer in open space. It is also useful to provide an open-ended question section, where the respondents are invited to make general comments. Valuable information can be obtained from response to this section.

- Closed-set questions: offer opportunity to select (according to instructions) one or more response choices from a number provided.
- Multi-choice questions: this type of question is utilized to obtain information that can logically be divided into categories.
- Statements: used to obtain data of a subjective nature e.g. about dispositions, attitudes and opinions (agree/disagree) (de Vos, 1998).

3.5.3.3 Content of the questionnaire

The content of the questionnaire was compiled through similar studies done by Lemmer (2002), Mulder (1998) and Moolman (1997). These studies served as basis for the formulation of the questions, and adaptations were made for the current research. The questionnaire consists of 18 questions that are divided into seven categories namely:

(i) **Biographical information:**

These questions include information with regard to the respondent's academic background. This includes university of graduation and years of specializing as a pediatrician.

Also included in this section is the previous information and knowledge the respondents received on the specific topic, surrounding sensorineural hearing loss. The reason that this was included is that pediatricians should be aware of the current technologies available for assessment and intervention, services available for these infants and children, the fast and efficient manner of referral to relevant professionals and aspects surrounding hearing loss (causes, symptoms etc.). Without sufficient knowledge, pediatricians may not be able to act early enough or as an effective team member. By obtaining information regarding the respondents' background and knowledge on sensorineural hearing loss, the researcher is able to make the necessary correlation and comparisons between the other questions.

(ii) Risk factors which may cause, or lead to sensorineural hearing loss:

Hearing loss is a 'silent, hidden' handicap because it cannot be seen. Unfortunately, routine medical care seldom includes a proper evaluation that can identify infants and children with a possible hearing loss (Northern and Downs, 2002). The ear and hearing mechanism is extremely complex, and hearing loss can be associated with problems in each part of the ear. The ear is also interwoven with the rest of the body and can be influenced or destroyed by a variety of causes. Therefore knowing about disorders or factors that might lead to a possible hearing loss leads to a better understanding of hearing loss.

(iii) Characteristics of infants and children with a hearing loss:

Hearing loss which is undetected in infants and young children leads to delays in their optimal development. There is a great variation within this population (babies and children with a hearing loss) depending on the age of onset of the hearing loss. The age of onset and the causes of the hearing loss will help to determine the possible influence the sensory impairment will have on the individual. It is important to take the following factors into account when a hearing loss is suspected and to be aware of all the possible symptoms namely:

- Atypical general development
- Decrease in babbling patterns
- Decrease in social interactions
- Inconsistent/ or no reaction to sound

(iv) Determination of the respondents' knowledge regarding the early identification of hearing loss:

Technological advances in instrumentation and test protocols have recently been made, yet in many communities hearing screening programmes have not been established or communities are unaware of such programmes (Blake and Hall, 1990). This causes unnecessary time lags between the identification of the hearing loss and intervention. Within every discipline there are tasks that cannot be easily modified. Therefore teamwork and further education, regarding a better understanding of hearing impairment and its implications

are crucial. This will assist professionals with the correct identification methods of undetected hearing loss and to make the necessary appropriate referral options.

(v) **Determining the knowledge of the respondents concerning the possible intervention methods namely amplification systems (hearing aids and cochlear implants) and intervention procedures:**

The most important type of intervention is fitting an infant or a child with amplification (Northern and Downs, 2002). Amplification technology is rapidly developing, and pediatric evaluation and hearing aid fitting includes the coordinated effort of many people, including the pediatrician.

(vi) **Determining the knowledge of the respondents with regard to the referral procedures followed in terms of evaluation and intervention:**

See point (iv).

(vii) **Determining the impression of the pediatricians regarding the role of the audiologist during hearing evaluation and intervention:**

The traditional role of the audiologist, which included hearing measurements and amplification, significantly broadened to a participatory role in the early intervention process. In order to plan an early intervention, a sharing of professional roles and responsibilities are required. The audiologist has always been the professional person involved with the rehabilitation of a person with hearing loss.

(viii) **By analyzing all the information a needs analysis is determined (including diagnosis, intervention and facilities available).**

The content of the questionnaire depends on the specific information needs of the study. According to Hofmeyr and Maitland (1984:38), "*it is possible to survey attitudes both towards the organisation as a whole and towards specific policies and practices. Further, one can conduct a general inquiry into particular subject areas.*"

It is important to carry out a fairly comprehensive survey in terms of areas covered. The reason for this is that many areas may have an impact on the quality of service delivery during early diagnosis and intervention (Swanepoel & Prinsloo, 1998).

It is essential, when embarking on a comprehensive study, to determine the areas of interest and concern, that is the content of the study (Swanepoel & Prinsloo, 1998). On the basis of this information, it is possible to formulate unique items which specifically address the issues and problems that pediatricians may experience relevant to early diagnosis and intervention (Swanepoel & Prinsloo, 1998).

3.5.3.4 Completion of the questionnaire

On completion of the questionnaire the respondents are informed of the survey that is going to be conducted (Swanepoel & Prinsloo, 1998). Telephone calls are made before sending the questionnaire. This communication is essential to promote respondent confidence in the research.

To gain further confidence and cooperation of the respondents, it is also important to guarantee the anonymity of those being surveyed. This is done by clearly stating in the cover letter or on the questionnaire, that the respondent will remain anonymous (Swanepoel & Prinsloo, 1998).

Questionnaires are faxed or posted to the practice of the respondent, with a week's time for the completion of the questionnaire. A follow-up call is made after the week. Adopting this procedure ensures a large percentage of returns. It is important however, to make the completion of questionnaires voluntary, and this should also be communicated to respondents in advance (Swanepoel & Prinsloo, 1998).

3.6 DATA COLLECTION PROCEDURES

The study consists of a preliminary study as well as the main study.

3.6.1 Preliminary study

The preliminary study was carried out to ensure that the questions are clear, precise and free from bias (Leedy, 1997). The questionnaire in its semi-final form is to be thoroughly tested before utilizing the main investigation. This gives the researcher the opportunity to identify any problems in the questionnaire. Any errors can be changed and modified immediately (de Vos, 1998). The accuracy and applicability of the instrument is therefore tested. The time and effort taken to complete the questionnaire is determined by the preliminary study and in order to determine the reliability and validity of the questionnaire as a collection instrument, the preliminary study is necessary.

A few respondents similar to those in the final survey were chosen to participate in the preliminary study (de Vos, 1998). Two subjects were chosen who met the selection criteria except for the fact of:

- retirement;
- practicing outside the Gauteng Province.

These respondents are contacted telephonically to request their participation in the study. A letter together with the questionnaire stating the purpose of the study is faxed to them. After feedback, changes, if necessary, are made to the questionnaire.

Following the results on the preliminary questionnaires it was concluded that the format of the questions as well as the content was clear. The completion time of the questionnaire was approximately 15 minutes. Regarding these outcomes, it was decided that the data collection procedure for the actual research sample could proceed.

The data collection and data procedures of the main study are discussed next.

3.6.2 Data collection procedures

The goal of scientific research is to produce knowledge that truly reflects the social world (de Vos, 1998). According to Kerlinger (1986) data collection is the categorizing, ordering, manipulating and summarizing of data to obtain answers to research questions. The goal is to reduce data to intelligible and interpretable form so that the relations of research questions can be studied, tested and conclusions drawn.

This phase includes a series of decisions that is associated with the process of data collection; including, the definition of the population, the selection of the test sample procedure and the method of the data collection (Cloete, 1997:39). For the reliability and validity of the study it is necessary to identify the parameters that were used for the data collection namely the research context (where the research took place), the researcher, the respondents (the people who were questioned or observed) and the process (Cloete, 1997).

The following procedures were followed during the data collection of the respondents:

- A list of addresses of all the practicing and registered pediatricians in the Gauteng Province was obtained through the South African Medical Association (SAMA).
- An initial telephone call was made in order to explain the purpose and nature of the study and to determine the willingness of the respondent to participate in the study.
- A cover letter and a questionnaire was faxed or posted to all the respondents.
- A call was made a week after the questionnaires had been faxed or posted to increase the return rate.

3.6.3 Data analysis procedure

During data analysis the questionnaire is divided into different sections in order to facilitate the eventual processing of data (de Vos, 1998). It entails data being divided into constituent parts to obtain answers to research questions. "*The interpreting of data: to interpret is to explain, is to find meaning*" (de Vos, 1998). The data analysis is an attempt to find correlations (if any) between the newly processed data. These patterns include specific forms in order to organize data (Simmonds en McCall, 1985).

The data retrieved from the questionnaires is processed with a 'Microsoft Word 2000 Excel software'-program in order to organize the data. The Statistical Analysis System (SAS) is used to process the data.

"*Statistics may also be regarded as a method of dealing with data. This definition stresses the view that statistics is a tool concerned with the collection, organisation, and analysis of numerical facts or observations...the major concern of descriptive studies is to present information in a convenient, usable and understandable form.*" (Runyon & Haber, 1980, p.6)

Data analysis is performed to interpret the data obtained. The following medians are used in order to describe the emerging patterns found:

- Frequency distributions are used in order to find a definitive pattern among the facts obtained from the questionnaires.
- Graphic presentation / figures are pictorial devices to illustrate data.

The procedures are visually effective and easy to interpret. Graphic presentation is often of great help in enabling a researcher to comprehend the essential features of frequency distributions and in comparing one frequency distribution with another.

3.6.4 Feedback to respondents

The overriding purpose of this study is to improve performance and output in the form of increased knowledge and a positive attitude.

Hofmeyr and Maitland (1984:40) are of the opinion that: "*The effectiveness of a survey exercise is as much a function of the way in which these areas of agreement and disagreement are handled and communicated, however, as it is of the changes and improvements that are usually made.*"

Feedback should be done as soon as possible after the processing and interpretation of results. The feedback to the respondents will be done in a summarized article (and if possible in a pediatric magazine) with the results obtained during the study. It will also elaborate on the questions asked in the questionnaire and the importance thereof.

3.6.5 Ethical issues

As researcher, it is important to keep the personal information of participating respondents confidential (Fink, 1995). Since personal information of the respondents may appear on the questionnaires, it is important to give the necessary reassurance to the participating pediatricians, that all information will be handled with confidentiality.

During statistical processing of the results, all the questionnaires will be documented with a number and all personal information irrelevant to the study will be detached. This will ensure that no personal information will be displayed.

3.7 SUMMARY

Methodology can be described as the methods, techniques and procedures that are employed in the process of implementing the research design as well as the underlying principles and assumptions constituting their use.

According to Mouton (1996) the research process from a quantitative perspective is as follows:

1. Statement of the problem
2. Conceptualization
3. Operationalization
4. Selection of cases
5. Analysis
6. Interpreting the findings
7. Writing the research report

The above-mentioned process was used as an outline to accomplish the aim of the study. The procedures used to carry out the research were explained in order to ensure the accountability of the study.

"*A wide variety of methods and techniques are used during empirical research. The methods used and their application are depending on the aims and objectives of the study, the nature of the phenomenon being investigated and the underlying theory or expectations of the researcher. This will influence the methods, technique of sampling, data collection methods to the data analysis method.*" (Babbie and Mouton, 2001).