

CHAPTER 1

INTRODUCTION AND ORIENTATION

Aim: To introduce the problem addressed by this study, to provide the rationale thereof, to describe the terminology used, and to present an overview of the content and organisation of the study

“Blindness separates people from things, deafness separates people from people”

Immanuel Kant (German philosopher)
Translated by Helen Keller (Keller, 1910)

1.1. INTRODUCTION

Audiology is a dynamic profession, characterised by continued and rapid growth, in which traditional practices are constantly reviewed in a quest to improve efficacy and accountability. Screening for hearing loss, however, is not a new development in the field of audiology; in fact, it is as old as the profession itself (Northern & Downs, 2002:259). The relatively invisible nature of hearing loss and an innate desire among audiologists to intervene as early as possible has provided the impetus for implementing hearing screening programmes to identify children for further testing for at least the past 60 years (Northern & Downs, 2002:259). Mass hearing screening of school children in the United States of America was already implemented on a large scale in 1927 (Downs, 2000:286). This process of identifying the section of the population at highest risk for hearing loss is an inherent component of audiological practice and serves as the first step toward providing effective audiological services to the paediatric population.

The screening of children and infants for hearing loss is a steadily evolving process that has accelerated exponentially over the last 10 years (Gravel et al., 2000:131). Until recently the average age at which a child with a moderate to profound sensori-neural hearing loss was identified in the United States has remained at 30 months (Harrison & Roush, 1996:60; JCIH, 2000:10). This seems to be also true of other countries. For example, Bamford and Davis (1998:1) report that 24% of children with congenital permanent hearing loss in the UK are not identified before they have turned 3½ years old. Even though a number of different methods of detecting hearing loss were tried out earlier, it was only during the early 1990s that significant progress was made in reducing the average age at which significant hearing loss is identified (Mauk & White, 1995:6). Children with milder hearing loss were frequently identified only at 3 to 4 years of age, whilst those with a unilateral or high frequency hearing loss were identified even later, by age 5 to 6 (Elssmann, Matkin & Sabo, 1987:15). This was primarily due to a lack of systematic screening programmes and the limitations of subjective behavioural screening methods. Fortunately the emergence of more accurate and rapid means of screening for hearing loss has resulted in a new population with very unique needs that have to be met by the audiologist: – the neonate and the infant with a hearing loss (Parving, 2003:154).

The quiet birth of paediatric audiology in the 1940s and its slow but steady growth over the last five decades has therefore culminated in the reality of delivering services to the youngest and most vulnerable population, making preventative audiology a viable endeavour in current times (Northern & Downs, 2002:v). Early detection and intervention for hearing-impaired infants has become an increasingly important aspect of neonatal care and has expanded the audiological scope of practice significantly as a form of secondary prevention (Diefendorf, 1999:43; Parving, 2003:154). This change has produced a multitude of new challenges in the delivery of effective and accountable services to newborns and young infants. It has also resulted in large-scale research initiatives to address the rising tide of questions regarding the improvement of methodologies for identification of and intervention for hearing loss (Mason et al.,

1997:91-102; Lutman et al., 1997:265-276; Davis et al., 1997:1-177; Vohr et al., 1998:353-357; Arehart et al., 1998:101-114; Prieve & Stevens, 2000:85-91; Spivak et al., 2000:92-103; Prieve et al., 2000:104-117; Dalzell et al., 2000:118-130; Gravel et al., 2000:131-140; Finitzo et al., 1998:1452-1460; Folsom et al., 2000:462-470; and Martineau et al., 2001:276).

Most of this research was conducted in developed countries such as the USA and the UK (Mencher & DeVoe, 2001:19). In the developing countries of the world throughout Asia, South America and Africa, where an estimated two-thirds of the world's population with hearing loss reside (WHO, 2001a:1), the problems of hearing loss are often even more pronounced because of additional barriers such as low socio-economic levels, paucity of accessible healthcare, inadequate resources, ignorance and the absence of regular screening programmes for ear disease (McPherson & Swart, 1997:2; Jacob et al., 1997:134; Olusanya, 2000:167; Gell et al., 1992:646). In addressing the obstacles posed to audiological service delivery for newborns and young infants in developing countries, use must be made of the large knowledge base of international research efforts to initiate and guide context-specific, locally relevant, innovative research endeavours.

The global challenge to improve the health status of *all* people must reach those communities in developing contexts that most often experience the direst need for services (Kritzinger, 2000:6; WHO, 1981). In contrast, the Western world will soon see most newborns enrolled in hearing screening programmes. According to Downs (2000:293), developed countries should now extend their expertise to developing countries so that – to paraphrase the declaration by the Milan Newborn Hearing Systems Conference of 2000 – *all new citizens of the world will have a greater opportunity and better quality of life into the next millennium*. It was this visionary goal to provide a better future for children with hearing loss that led to the development and implementation of universal newborn hearing screening (UNHS) programmes in the developed countries. It is this same purpose and vision that must now spill over into the developing world, driven and

guided by the wealth of knowledge from existing early hearing detection and intervention (EHDI) programmes.

1.2. DEVELOPMENT OF INFANT HEARING SCREENING

UNHS programmes are now mandated in 39 of the 50 states of the USA and other states have legislation pending (Rabbitt-Park, 2003:1). Europe produced a consensus statement on neonatal hearing screening in 1999, listing ten consensus points (Lutman & Grandori, 1999:95-96). This statement proposed UNHS as the least expensive and most efficient programme when used in parallel with 7 to 9 month behavioural testing. More recently, in 2000, Britain's Minister of Health announced the introduction of UNHS in 20 initial pilot programme sites throughout the United Kingdom (Russ, 2001:525). The implementation of these programmes has only become possible during the last decade due to the considerable progress with and development of screening methods for the detection of hearing loss during infancy (Mauk & White, 1995:11; Lutman, 2000:371-373).

Recommended screening protocols reveal the growth in new technologies that are applied in an effort to improve the practicality, validity and cost efficiency of early identification programmes for infants with hearing loss (White et al., 1995:10-11). Behavioural observation hearing screening tests were conducted initially for babies at risk for hearing loss as specified by a High-Risk Register (HRR) developed and compiled by Downs and Sterrit (1964:69) and Downs and Hemenway (1969:72). The HRR approach was an attempt to focus attention on those infants most likely to have significant hearing loss, rather than to screen every baby. The at-risk infants were thus screened by means of behavioural observation procedures. This type of observation audiometry for the high-risk population did not prove reliable in detecting hearing loss in infants, primarily due to inattention or erratic responses to sound being characteristic of newborns and young infants (Arehart et al., 1998:102; Kile, 1993:156). All behavioural observation screening tests were characterised by the same limitations, namely

that only severe-to-profound losses were identified (Downs, 2000:289). Although the Joint Committee on Infant Hearing (JCIH) in 1982 stated that neonates could be screened by observing a behavioural *or* electrophysiological response to sound (JCIH, 1982:1018), electrophysiological techniques such as oto-acoustic emissions (OAE) and automated auditory brainstem response (AABR) only began replacing behavioural techniques in the early 1990s when these technologies became more readily available (Downs, 2000:202).

The development and implementation of electrophysiological screening techniques resulted in UNHS becoming a feasible reality and the JCIH released a new position statement in 1994. This statement endorsed the universal detection of infants with hearing loss as early as possible, with identification not later than 3 months, and intervention not later than 6 months of age (JCIH, 1994:6). Based on the findings from working groups that recommend acceptable protocols for use in state-wide UNHS programmes, the characterisation of auditory performance and intervention strategies following neonatal screening, and the empirical evidence to date, the JCIH considers that accepted public health criteria have been met to justify the implementation of UNHS (JCIH, 2000:10).

The implementation of these screening programmes, however, encompasses a much more comprehensive approach than the hearing screening itself. It must be an integrated system (White, Behrens & Strickland, 1995:12), referred to as EHDI programmes (JCIH, 2000:10), that provides a seamless transition for infants and their families through the process of screening, diagnosis of hearing loss, medical diagnosis of hearing loss and related disorders, and intervention (JCIH, 2000:10). Screening constitutes only a single, though very important, component of an EHDI programme. The basic model of service delivery in early intervention comprises four basic components (Fair & Louw, 1999:15), which include an early identification and screening programme; an in-depth assessment and evaluation strategy; the design, planning, direct delivery and monitoring of treatment programmes; and case management and administration.

Figure 1.1 illustrates these components as a series of phases according to the population size that accompanies each phase.

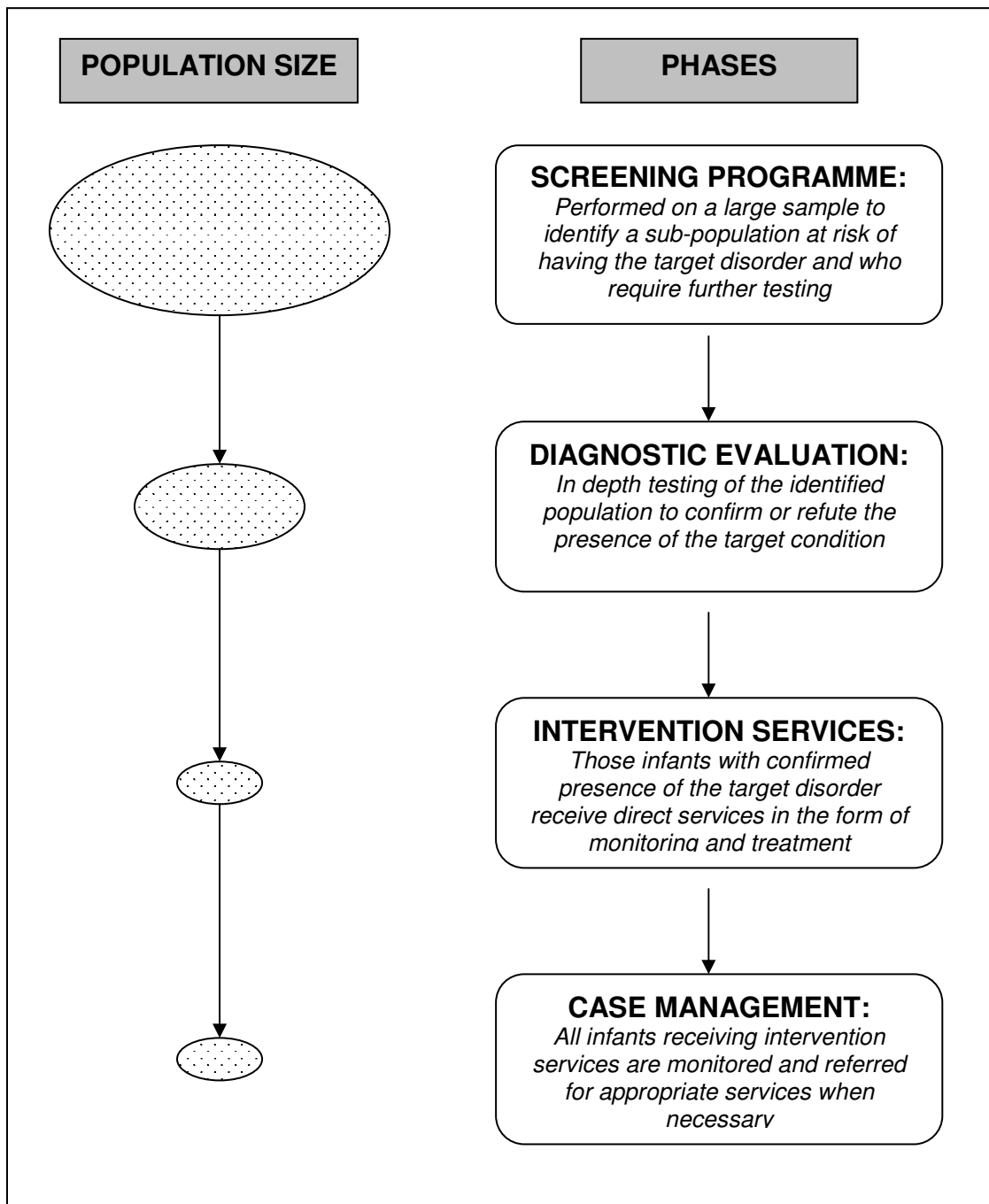


FIGURE 1.1 Phases in the Early Hearing Detection and Intervention (EHDI) process

The above process of early intervention commences with the screening of a target population, which provides a foundation on which the other components must build. Hearing screening is a filtering process that serves to divide a population into two groups. The one group has a sufficiently high probability of presenting with a hearing loss and warrants referral for diagnostic testing. The second group has a low probability of presenting with hearing loss and consequently does not merit the expense, inconvenience or risk of diagnostic testing (Lutman, 2000:367).

Public health programmes pertaining to infant hearing aim to optimise the provision of treatment for infants with hearing loss as well as for their families (Lutman, 2000:367). However, to sustain such a process of screening within a comprehensive EHDI system requires a consistent and substantial amount of funding to meet the multiple needs of a programme (White et al., 1995:12). The question that beckons is whether the expenditure of resources is justified by the outcome and benefit of EHDI programmes for the individual and society.

1.3. IMPORTANCE OF EARLY DETECTION OF AND INTERVENTION FOR HEARING LOSS

Newborn hearing screening (NHS) programmes have been established throughout the United States of America and are being implemented in many countries worldwide (Yoshinaga-Itano, 2002:61). The expenditure of financial, technological and human resources involved in the implementation of widespread infant hearing screening programmes such as UNHS can be justified by three basic facts emerging from a wealth of research (White, 2002:1). Firstly, hearing loss occurs more frequently than any other birth defect. Secondly, undetected hearing loss has serious negative consequences for the infant involved, and thirdly, there are dramatic benefits associated with the early identification of hearing loss. The importance of these facts is elucidated in the following paragraphs.

Hearing loss occurs more frequently than any other birth defect, with a prevalence of newborn and infant hearing loss estimated at 1.5 to 6.0 per 1 000 live births (Northern & Downs, 2002:267). Mehl and Thomson (1998:3) compare the incidence of bilateral hearing loss in newborn infants in Colorado with other existing screening programmes in the United States. Their findings indicate that the incidence of phenylketonuria, combined immunodeficiency disease, maple syrup urine disease, neonatal hyperthyroidism, cystic fibrosis and hemoglobinopathy varies between 0.3 and 50 in 100 000 live births, compared to bilateral sensori-neural hearing loss which occurs in 260 of 100 000 live births. Hearing screening does not only yield the highest returns among these diseases, but is also more responsive to intervention once the problem has been identified (Northern & Downs, 2002:267). If unilateral and conductive losses had been included, the prevalence of hearing loss would have risen even more significantly. Furthermore, not all hearing losses in children manifest at birth, and hearing loss due to progressive types of impairments and as a result of postnatal diseases such as meningitis account for further hearing losses among infants and young children (Fortnum et al., 2001:1). Another type of hearing loss involves conductive hearing losses of varying degrees caused by otitis media. The latter constitutes the most common childhood disease, with 75% to 95% of children presenting with at least one episode before they reach school age (Klein, 1994:133; Curotta, 1997:27) and most common during the first two years of life (Northern & Downs, 2002:65). The occurrence of hearing loss, therefore, is frequent enough to warrant mass screening.

Apart from the high incidence of hearing loss among infants as compared to other birth defects and diseases, **undetected hearing loss has serious negative consequences**. Hearing loss holds substantial morbidity for the individual, both economically and socially, for the family, and for society in its productivity and socialisation (Mauk & White, 1995:6; Carney & Moeller, 1998:64; Diefendorf, 1999:45). Delays in diagnosis and intervention of hearing loss in infants may result in children failing to keep up pace with their normal hearing peers in language, cognition and social-emotional development. It may ultimately even lead to fewer employment opportunities in adulthood (Gallaudet University

Center for Assessment and Demographic Study, 1998:75). According to Diefendorf (1999:45), failure to detect hearing loss at an early stage has a negative impact on the cognitive, communicative, academic, social and literate development of a child. The negative consequences of late identification do not only have an impact on social-personal development, but also places an economic burden on families and ultimately on the government. In the United States the average deaf person's income after high school is reported to be 30% lower than the average hearing person's, and the combined expense of deaf education and loss of productivity results in an average lifetime cost of more than \$1 million per severe to profoundly deaf individual (Mohr, Feldman & Dunbar, 2000:1).

Early identification of hearing loss can significantly reduce the negative consequences of hearing loss for the individual, the family and society (Bamford & Davis, 1998:1; Yoshinaga-Itano, Coulter & Thomson, 2001:527; Diefendorf, 1999:45). **The dramatic benefits of early detection and intervention for infants with hearing loss** have been demonstrated convincingly. Numerous research studies clearly indicate that infants who are identified with hearing loss soon after birth have an important and measurable advantage over later identified peers (Yoshinaga-Itano, 1995:118; Yoshinaga-Itano & Apuzzo, 1995:124; Yoshinaga-Itano et al., 1998:1170; Carney & Moeller, 1998:67 Moeller, 2000:8). Language is the key to communication and the acquisition and production of language are perhaps the most important achievements in any child's development (Northern & Downs, 2002:127). This becomes even more relevant in the case of a child with a hearing loss. According to Yoshinaga-Itano et al., (1995:118) the language abilities of hearing-impaired children, identified before 6 months of age, are significantly improved compared to children identified after 6 months of age. Infants identified early with a hearing loss have the opportunity to develop language and maintain language skills within the normal range of development commensurate with their cognitive development during early childhood, whilst late-identified children indicate persistent 2 to 4-year delays in language development (Yoshinaga-Itano, 2000:311; Yoshinaga-Itano, 1995:118).

The high incidence of hearing loss and its devastating effects, if left undetected, weigh heavily in light of the proven advantages that early detection holds for the individual and the community. This has provided the impetus for changing legislation in the USA (and elsewhere in the world, for example in the UK (Russ, 2001:525)) to allow for the implementation of UNHS as part of a comprehensive EHDI programme. Unfortunately the momentum for implementing such widespread EHDI programmes has not carried over to the developing world. Although governmental and non-governmental agencies throughout developing countries have begun to initiate programmes to prevent childhood hearing loss or to offer rehabilitation (McPherson & Swart, 1997:3), little and slow progress toward addressing hearing loss has been reported in Third World countries (Olusanya, 2000:167; Newton et al., 2001:230; Rao et al., 2002:105). Prevalence and epidemiological data on hearing loss is scarce and a comparison of available studies is difficult due to significant variations in methodologies (Bastos et al., 1995:2; Gopal et al., 2001:100).

In general, non-life-threatening diseases such as hearing loss and deafness are neglected in terms of institutional support, research funding and political advocacy (Olusanya, 2000:167). This is despite an ethical obligation of society to provide early intervention for young children with disabilities and those at risk for developmental delays (Kritzinger, 2000:4). South Africa faces these difficult realities as it endeavours to comply with one of the basic responsibilities of the audiologist: that of implementing widespread screening of infant hearing.

1.4. INFANT HEARING SCREENING IN SOUTH AFRICA: A NEW DIRECTION

The last decade has witnessed large-scale changes in the South African socio-political arena. These developments have not only been political but have also brought about changes in national health, education and welfare policy (Kritzinger, 2000:86). An ongoing paradigm shift in the profession of speech-

language therapy and audiology in South Africa has mirrored these political changes in order to address an imbalanced service delivery, redress teaching programmes and focus its research endeavours on the specific needs of the context (Hugo, 1998:5; Uys & Hugo, 1997:24). The shift has not only reflected the national changes in South Africa, but has also been stimulated by international trends and developments in healthcare, education for learners with special needs, and views on people with disability (Dennill, King & Swanepoel, 1999:2; Kritzinger, 2000:85).

The use of traditional institution-based models of service delivery in the field of speech-language therapy and audiology has proved ineffective in reaching the majority of vulnerable and disadvantaged communities of South Africa (Moodley, 1999:4). As a result, there is a trend to transform towards a community-based service delivery model for speech-language pathology and audiological services to meet the unique needs of the broader South African community (Uys & Hugo, 1997:27). This type of model fits the South African government's current policy for a comprehensive, equitable and integrated National Health System (Department of Health, 1997:5). The restructured National Health System mandates transition in service delivery from institution-based services to community-based services to provide for the health needs of the whole South African population (*White Paper on an Integrated National Disability Strategy*, 1997:22&26).

Currently, however, screening programmes for infants in general, as well as in the particular case of hearing, are not a common practice in South Africa and are not meeting the needs of the South African population (Swanepoel et al., 2004:634). To date, very little contextual, community-based research has been reported for infant hearing screening (McPherson & Swart, 1997:18-19; Swanepoel et al., 2004:634). In 1995, the Departments of Otolaryngology, Logopedics and Paediatrics at the University of Cape Town, South Africa, produced a consensus statement regarding the practicality of implementing hearing screening programmes similar to those in the USA (Prescott, 1995:7-8). At that time it was agreed that UNHS programmes would not be economically

feasible in South Africa because of the then relatively high number of false-positive results, which would lead to extensive numbers of diagnostic assessments. Three main recommendations were however made, namely to disseminate information to caregivers regarding developmental milestones; to train medical personnel regarding the implications of hearing loss; and to perform hearing screening at immunisation clinics using trained health workers (Prescott, 1995:8).

A survey conducted into neonatal hearing screening performed in six state-subsidised hospitals in 1997 revealed that there was an absence of standard procedures for performing screening; personnel were not sufficiently utilised; there was a lack of training programmes for personnel; few efforts were made to adapt screening procedures for better sensitivity; no control of follow-up cases occurred; and very little networking existed between audiologists and nurses (Höll, 1997:51). The survey indicated that 86% of responding hospitals used behavioural screening techniques, though in an inconsistent manner and with inadequate follow-up infrastructure (Höll, 1997:51).

Despite these hindrances, the necessity of developing and implementing screening programmes in developing contexts remains a very important objective (Prasansuk, 2000:211). The fact that the majority of children with hearing loss live in developing countries emphasises the necessity for effective and accountable screening programmes in these contexts (WHO, 1997:5). This is particularly true of South Africa, a country characterised by pockets of developed areas but where the majority of the population live in poverty in urban, peri-urban and rural areas (Fair & Louw, 1999:14). Although epidemiological data for developmental risk conditions in South Africa is incomplete and difficult to obtain, it is clear that there is an increased prevalence of risk conditions for infants and young children in developing communities (Kritzinger, 2000:13; McPherson & Swart, 1997:18-19). It is a growing concern, therefore, that relatively few infants with hearing loss are being detected early (Swanepoel et al., 2004:634).

In an effort to transform the South African health system and to promote health and development by preventing disease and disability, the South African government proposed a preventative approach in the *White Paper for the Transformation of the Health System in South Africa* (Department of Health, 1997:5-6). This prevention also includes preventing secondary complications, such as developmental delays in language for infants and children with hearing loss. In addition, this paper emphasises the need for Essential National Health Research (ENHR). The *White Paper on an Integrated National Disability Strategy* (1997:22&26) furthermore calls for “early identification of impairments and appropriate interventions” within the primary healthcare system, while it also announces “free access to assistive devices and rehabilitation services... to all children under the age of six”. It is clear that South African governmental policy guidelines favour the philosophy of screening for hearing loss in infants – it is only the implementation of such policy that is left wanting (HPCSA, 2002:3).

The Professional Board for Speech, Language and Hearing Professions of the Health Professions Council of South Africa (HPCSA) is in accord with these ideals of government and has recently produced a Hearing Screening Position Statement (HSPS) Year 2002. In this statement it accepts the Year 2000 position statement of the Joint Committee on Infant Hearing (USA) as the definitive document on infant hearing screening (HPCSA, 2002:1). The South African position statement advocates the use of electrophysiological measures for targeted (risk-based) newborn/infant hearing screening as the first step toward further diagnostic assessments. It also advocates family-centred intervention programmes through integrated, interdisciplinary Provincial and District Health Systems (DHS). It poses targeted screening as an intermediate step towards UNHS of 98% of neonates/infants by 2010. Furthermore, by 2005 the necessary technology should be available at Maternal and Child Health (MCH) clinics in the community to enable infants who attend their first immunisation to have their hearing screened as part of the total service package (HPCSA, 2002:5).

This screening model proposes the use of electrophysiological techniques such as OAE and AABR to screen infants on the HRR. Although the Joint Committee

on Infant Hearing (USA) no longer recommended the HRR for screening purposes because such programmes would identify only 40% to 50% of infants with hearing loss, the committee did accept that it may be useful where lack of resources are limiting the development of UNHS (JCIH, 2000:21). An additional advantage of including risk indicators is that normal hearing at birth may not preclude delayed onset or acquired hearing loss. Risk indicators help identify infants who should receive on-going audiologic and medical monitoring and surveillance (JCIH, 2000:21). These statements have led the HPCSA's Professional Board for Speech, Language and Hearing Professions in South Africa to recommend in its position statement on screening that public sector institutions should invest in appropriate technology for risk-based NHS to ensure that all socio-economic levels of society have access to hearing screening and the benefits of early intervention. The Board recommends that hearing screening take place in well-baby nurseries, at discharge from the neonatal ICU, or at the 6-week immunisation clinic.

This position statement has provided the impetus and framework for guiding contextually relevant research for screening practice in South Africa. Although identification of hearing loss through screening is only the first step toward delivering services to infants with hearing loss, it provides the thrust for the implementation and maintenance of diagnostic, intervention and management components of EHDI programmes. Kenworthy (1990:328) aptly remarks that "...only through comprehensive identification will the need for early intervention programs be realized".

1.5. STATEMENT OF PROBLEM AND RATIONALE

"South Africa has the needs of a developing country whilst at the same time she possesses the potential and reach of a developed nation" (Whiston, 1994:234). It is this unique combination of First World benchmarks that can stimulate creative initiatives to produce contextually relevant solutions for the delivery of hearing services to South Africa's youngest and most vulnerable population: its neonates

and infants. South Africa should therefore follow in the footsteps of developed countries and act as a pioneer for developing countries.

This strive toward a first-class health service for all is reflected in the fact that the Hearing Screening Position Statement Year 2002 (published by the Professional Board for Speech, Language and Hearing Professions of the Health Professions Council of South Africa (HPCSA)) accepted the JCIH Year 2000 position statement as a definitive document for hearing screening in South Africa. The South African position statement embraces the same aim as the JCIH statement, namely: *The Early Hearing Detection and Intervention Programme (EHDI) for individuals identified with hearing loss is to ensure optimum, cost effective solutions to enable persons to communicate effectively, thereby allowing maximum habilitation or rehabilitation of the individual's capabilities and potential, to secure their full participation in, and contribution to, society and the country's economy* (HPCSA, 2002:1).

However, this type of programme has so far remained nothing but an ideal of the South African healthcare system, because very few programmes have previously been implemented to identify infants with hearing loss. As a result, only limited contextually relevant research has been conducted to steer the implementation of effective and accountable early hearing detection programmes in South Africa. The first step in developing such early detection and intervention services is to document the need within a specific context and to describe the population in need of these services (Mencher, 2000:178; Kritzinger, 2000:17; White et al., 1995:12). Knowledge regarding the epidemiology of congenital and acquired hearing loss, in addition to an understanding of the context and culture being served, forms the basis for the planning and provision of widespread paediatric hearing health services within current healthcare infrastructures (Parving, 2003:154; Mäki-Torkko, 2003:188; Fortnum, 2003:155). The South African government recognises the need for relevant research as one of the objectives for restructuring the health sector (Department of Health, 1997:28). Essential National Health Research (ENHR) as recommended in the *White Paper on the Transformation of the Health System* (Department of Health, 1997:28) must

provide a contextually relevant empirical foundation to serve as guiding framework concerning the practicality, validity and cost-efficiency of infant hearing screening within the South African context (Mencher, 2000:178; White et al., 1995:12; Fortnum, 2003:155).

The South African Hearing Screening Position Statement Year 2002 recommends three different contexts wherein screening should be implemented, namely the well-baby nursery, at discharge from the neonatal intensive care unit (NICU) or at MCH clinics, using as platform the 6-week immunisation clinics that form part of the MCH service delivery package. The well-baby nursery and NICUs are established and internationally recognised screening contexts abundantly reported on (e.g. Hess et al., 1998:81-89; Cox & Toro, 2001:99-104; Finitzo, Albright & O'Neal, 1998:1452-1460). MCH clinics, however, have not yet been investigated as a hearing screening context (Kennedy et al., 1998:1963). In terms of South African primary healthcare policy these clinics are established to provide accessible community-based services (Dennill, King & Swanepoel, 1999:36-39). The MCH 6-week immunisation clinic will therefore provide an integral and essential hearing screening context (National Health Plan for South Africa, 1994:19-20). Since many births in South Africa, especially in the rural areas, occur at MCH clinics or at home with the help of midwives, screening in the well-baby nursery or NICU only will fail to identify significant numbers of infants (Olusanya et al., 2004:299).

The investigation of the MCH clinic as a hearing screening context is a priority if the benchmarks stated by the South African Hearing Screening Position Statement Year 2002 are to be followed. It is therefore necessary to assess and describe a hearing screening programme at MCH clinics. This will provide empirical data to address the dearth of research on infant hearing screening in South Africa to contribute to future programmes being based on contextually applied research. The question that arises is:

Are early hearing detection programmes at MCH clinics in a developing peri-urban South African community a feasible option?

1.6. ADDRESSING THE PROBLEM

In an attempt to address the question about the feasibility of implementing early hearing detection programmes in South Africa, this study will conduct both a theoretical and an empirical investigation. Figure 1.2 illustrates this problem-solving process.

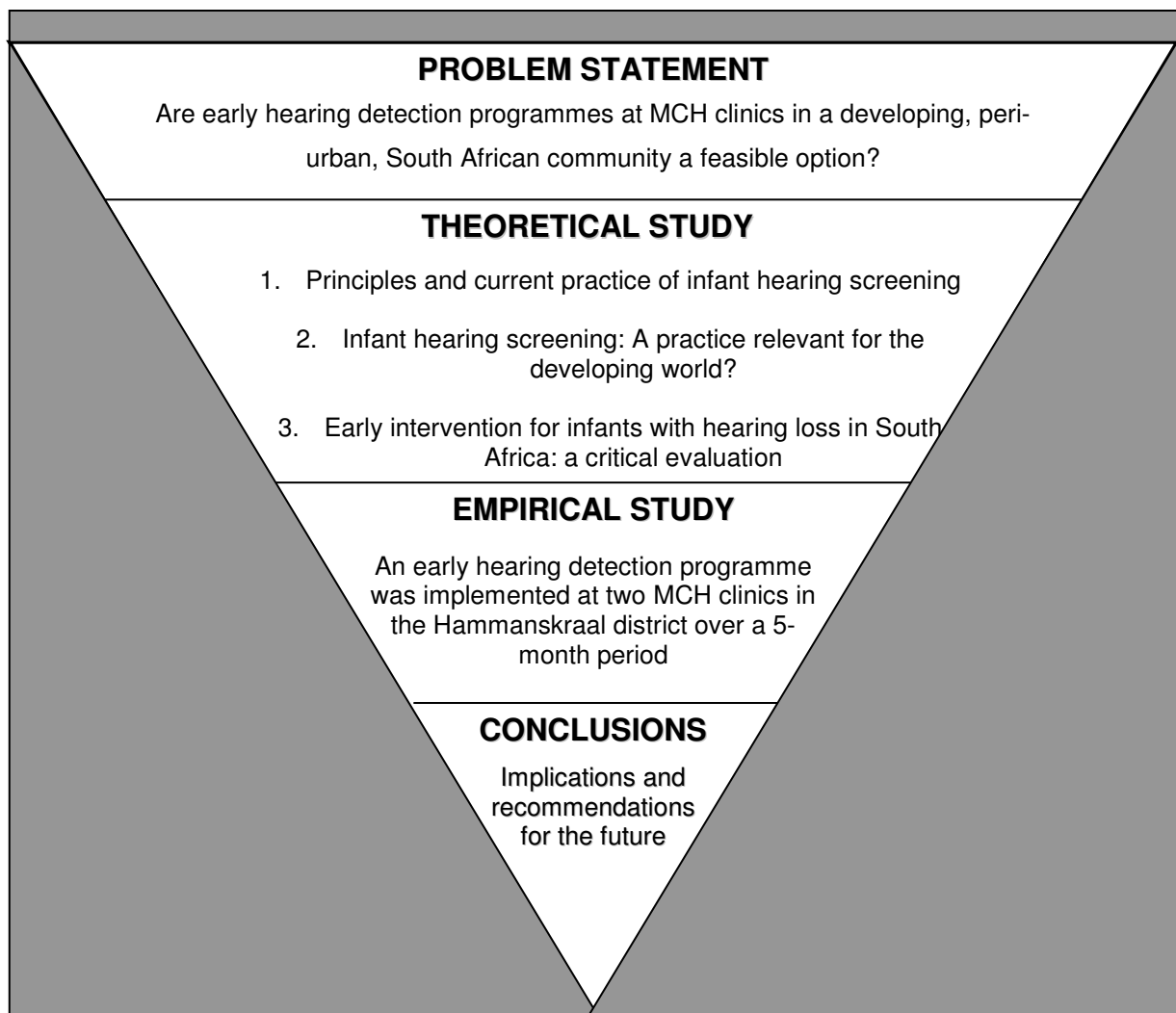


FIGURE 1.2 Problem-solving process used in the research project

The problem statement will be addressed in two phases, first a theoretical and then an empirical phase. The theoretical phase will assess the body of scientific knowledge as it pertains to the research question posed. This will occur in three stages with the first discussion establishing the principles of newborn hearing screening (NHS) and the status of current practice; the second evaluating the relevance of NHS in developing countries, and the third considering EHDI in South Africa. These sections will provide an overview of current literature indicating the standing of EHDI programmes world-wide and more specifically in South Africa, offering insight into areas requiring further study, and discussing the future direction of developments within the field.

The theoretical background will be followed by an empirical investigation based on an actual early hearing detection programme implemented at two MCH clinics in a peri-urban developing community in South Africa. This will provide empirical evidence of the feasibility of such programmes in developing communities in South Africa and serve as a basis from which recommendations regarding future directions can be made.

The objective of the current study is therefore to describe the feasibility of an early hearing detection programme at MCH clinics in a specific developing peri-urban South African community, using a theoretical as well as an empirical approach so that contextually relevant recommendations can be made.

1.7. ORGANISATION OF THE STUDY

A brief outline and description of the organisation of the sections included in this study is provided in Table 1.1.

TABLE 1.1 Outline and description of the sections comprising this study

CHAPTER 1	<i>The first chapter provides the background, rationale and statement of the problem identified by this study; the organisation of the content outlining the chapter contents; a clarification of terminology; and a list of abbreviations used.</i>
CHAPTER 2	<i>Chapter 2 provides the basic philosophy and principles related to widespread infant health screening, and assesses the current status of IHS in the developed world. The chapter supplies the background to and a framework for Chapter 3.</i>
CHAPTER 3	<i>This chapter provides an overview of infant health screening in the context of the developing world to finally conclude with an argument for its relevance in such contexts.</i>
CHAPTER 4	<i>Chapter 4 provides a critical review of the present South African context and the available infrastructure of audiological services for implementing early hearing detection and intervention on a large scale.</i>
CHAPTER 5	<i>This chapter provides a thorough description of the design, criteria, apparatus, collection procedures and analysis techniques implemented in the research methodology to acquire the data according to the sub-aims, in order to address the main aim of the study.</i>
CHAPTER 6	<i>A presentation of the empirical results is provided according to the sub-aims specified for the study. The results are subsequently discussed by integrating information from the current body of knowledge.</i>
CHAPTER 7	<i>This chapter presents conclusions from the theoretical and empirical aspects of the study and recommends a model for early hearing detection at MCH clinics. Finally, a critical evaluation of the study is provided along with recommendations for future research.</i>

1.8. TERMINOLOGY

The following terms are defined and motivated according to their application and meaning as used in this study:

- **Newborn Hearing Screening (NHS)**

This is a general term referring to simple tests of auditory functioning, utilising rapid screening tests, usually AABR or OAE measures, to identify neonates who require additional diagnostic procedures to confirm or reject the

presence of a hearing loss (Stach, 2003:184). The term is used throughout the current study as a general description of any type of screening programme that aims to screen the hearing of newborns. It does not refer to either targeted or universal NHS programmes, unless so specified, but rather to any type of screening programme in which newborns are screened. Newborn refers to an infant in its first four days after birth. The term is used in a similar manner in other reports (Olusanya et al., 2004:288).

○ **Infant Hearing Screening (IHS)**

This general term, similar to NHS, refers to simple tests of auditory functioning, utilising rapid screening tests, usually AABR or OAE measures, to identify infants who require additional diagnostic procedures to confirm or reject the presence of a hearing loss. The term *infant*, as opposed to *newborn*, is used as a general term including newborns and also all children younger than 12 months of age. Since the study focuses on screening at MCH clinics, the term IHS is preferred in the text since most children assessed could not be adequately classified by the term *newborn* or *neonate*.

○ **Targeted Newborn Hearing Screening (TNHS)**

This term denotes a specific type of NHS programme that requires only a specified, targeted population to be screened. The target population consists of those newborns who exhibit a risk of having or developing a hearing loss (Olusanya et al., 2004:298). The list of risk factors for hearing loss has been compiled by the JCIH (2000:20) and although additional factors have been suggested (Kountakis et al., 2002:133), it serves as the definitive list. In the current study, this term is used of NHS practice in a range of contexts varying from NHS practice in a single hospital to a nationally legislated programme.

○ **Universal Newborn Hearing Screening (UNHS)**

In contrast to TNHS, this term refers to a NHS programme in which all newborns, both at-risk and non-risk, are to be screened for hearing loss (Olusanya et al., 2004:299). The JCIH (2000:15) recommends that UNHS programmes must screen a minimum of 95% of infants during their birth

admission or before one month of age. In the current study this term refers to NHS practice in a range of contexts, varying from a single hospital to a nationally legislated programme.

- **Early Hearing Detection and Intervention (EHDI)**

The goal of EHDI services is to “maximise linguistic and communicative competence and literacy development for children who are hard of hearing or deaf” (JCIH, 2000:10). According to the National Center for Hearing Assessment & Management (NCHAM, 2004:1) EHDI refers to “the process of screening every newborn for hearing loss prior to hospital discharge, whereby infants not passing the screening receive appropriate diagnostic evaluation before three months of age and, when necessary, are enrolled in early intervention programs by six months of age”. In the current study the term EHDI refers to this same process but is used in a broader sense, referring not only to screening of newborns but also of infants up to 12 months of age as well as diagnostic and intervention services which may exceed the specified cut-off ages. The recommended screening at 6-week immunisation clinics specified by the Year 2002 HSPS requires this broader definition of the term (HPCSA, 2002:5).

- **Developed countries**

In the current study this term refers to countries that have achieved a high degree of industrialisation and that enjoy a high standard of living according to conventional indices of development, including factors such as per capita income, immunisation up-take, and under-five mortality rate (World Bank, 2004:251). This categorisation of countries is used by a variety of organisations such as the World Bank, International Monetary Fund, World Trade Organisation and United Nations (World Trade Organisation, 2004:1; World Bank, 2004:251; United Nations, 2003:1). The term *developed countries* is also synonymous with the term *First World*, which emerged during the rise of communism in the East but has fallen out of use since the demise of communist Russia (Knock, 2002:2). The developed countries are

therefore placed in contrast with the 164 developing countries of the world (World Bank, 2004:251; Olusanya et al., 2004:289).

- **Developing Countries**

This term refers to countries that have not achieved a significant degree of industrialisation relative to their populations, that have a low standard of living, and that indicate a characteristically high population growth (World Trade Organisation, 2004:1; World Bank, 2004:251; United Nations, 2003:1). Other terms sometimes used for *developing countries* include *less developed countries*, *underdeveloped nations* and *undeveloped nations*. The term *Third World* was also used to refer to these countries during the rise of communism in the East, but has fallen out of use since the demise of communist Russia (Knock, 2002:2). A further classification of developing countries has been made by the United Nations for a group called the least-developed countries, which currently include 50 of the 164 developing countries in the world (United Nations, 2004:1; World Bank, 2004:251). This clearly demonstrates that the term *developing countries* does not refer to a homogenous group of countries, but that there are significant differences in development between these countries, and even within the same country (Olusanya et al., 2004:289). Despite these differences, however, this categorisation provides an objective basis that is readily available for comparing various economies of the world. In the current study this term provided a way of drawing comparisons between NHS in regions of the world based on their general socio-economic status (developed and developing countries).

The present study considered South Africa a developing country according to the list of advanced economies specified by the International Monetary Fund (World Bank, 2004:251; United Nations, 2003:1). This is despite the fact that South Africa has a two-tiered economy – one rivalling other developed countries and the other having only the most basic of infrastructures (US Department of State, 2004:3). The reason for this is that the vast majority of South Africans live in developing contexts with a basic socio-economic infrastructure (Woolard & Baberton, 1998:15).

1.9. CONCLUSION

Early identification of hearing loss, which leads to early intervention, is becoming an accepted standard of healthcare in developed countries like the USA. This is primarily due to the high prevalence of congenital hearing loss and the dramatic benefits of early intervention compared to the negative consequences of the late identification of hearing loss. In developing countries like South Africa, however, IHS is not a common practice and very little contextual data is available regarding childhood hearing loss and available screening programmes. A recent position statement by the Health Professions Council of South Africa has attempted to give priority to the practice of NHS. Unfortunately, a dearth of relevant local research to direct the implementation of NHS and a lack of resources are making progress slow. The aim of this study is therefore to provide much needed empirical evidence regarding the status and feasibility of early hearing detection in developing South African communities through MCH clinics.

1.10. SUMMARY

This chapter argued the importance of conducting contextual research regarding the practice of NHS in South Africa. The importance of NHS was explained within an EHDI service delivery model whilst the serious lack of contextual research in South Africa was highlighted. A case was made for urgent contextual research by referring to health priorities set by the government and initiatives launched by the HPCSA. Finally, a research question was formulated for investigation of MCH clinics in a developing peri-urban South African community and a description was given of how the study poses to address the question. Finally, a list was supplied of the terminology used in the study, followed by a conclusion to the chapter.