

PREVALENCE OF HEARING IMPAIRMENT IN THE PHILIPPINES

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CHAPTER I

INTRODUCTION

Hearing loss is included among the diseases/disorders that burden the majority of the world's population. Global statistics shows an increase in the prevalence of this disease yearly and it has continuously affected the quality of life and productivity of majority of the general population. It has long been known that such a health problem exists and that it can actually be prevented, however, efforts to reduce cases of hearing impairment tends to be minimal and at present not given that much of a priority. Locally, the exact prevalence of hearing impairment in the general population is yet to be established. Several surveys have already been conducted among special populations, therefore it is about time that the nationwide burden of this disease be known for appropriate action and intervention.

The Individuals with Disabilities Education Act (IDEA), formerly the Education of the Handicapped Act (P.L. 94-142), includes "hearing impairment" and "deafness" as two of the categories under which persons specifically children with disabilities may be eligible for special education and related services programming. While the term "hearing

impairment" is often used generically to describe a wide range of hearing losses, including deafness, the regulations for IDEA define hearing loss and deafness separately.

Hearing impairment is defined by IDEA as "an impairment in hearing, whether permanent or fluctuating, that adversely affects a person or child's educational performance." while deafness is defined as "a hearing impairment that is so severe that the child is impaired in processing linguistic information through hearing, with or without amplification." Thus, deafness may be viewed as a condition that prevents an individual from receiving sound in all or most of its forms. In contrast, a child with a hearing loss can generally respond to auditory stimuli, including speech.

Hearing impairment includes a range of difficulties with hearing, including deafness. People may be born with reduced hearing or may lose all or part of it due to accident or illness. It can range from mild to profound, and some people may be able to hear certain frequencies but not others, so that increased loudness does not necessarily result in greater clarity. Some people may rely on lip/speech reading to communicate, and some may rely on sign language or a combination of both while many others may prefer the use hearing aids.

Effects of hearing loss to an individual varies and usually dependent on the degree of hearing loss. A person with a mild loss may have no difficulty hearing in quiet one-to-one situations, but may have problems in groups, where there is background noise, or where the sound comes from a distance. A person with a moderate loss may hear normal conversation only very faintly, and will have difficulty understanding speech sounds at distances greater than a 1 meter. High-pitched speech sounds, such as *s, f, p, t, k*, may be difficult to detect, and they are likely to hear little in open spaces. A person with severe hearing loss may be unable to hear a normal speaking voice even at very close range. Speech sound will not be clear, though they may understand vowel sounds if they are loud enough. A hearing aid may help some people to hear voices or judge the pitch or loudness of their own voice. A person with profound loss may have no awareness of loud sounds in their immediate environment, and will not be able to hear normal speaking voices. Hearing aids may help them to a degree, but they will rely heavily on speech reading or sign language.

There are three types of hearing loss namely conductive, sensorineural and mixed. Conductive losses are caused by diseases or obstructions in the outer or middle ear.

Conductive hearing losses usually affect all frequencies of hearing evenly and do not result in severe losses. A person with a conductive hearing loss usually is able to use a hearing aid well or can be helped medically or surgically.

Sensorineural hearing losses result from damage to the delicate sensory hair cells of the inner ear or the nerves which supply it. These hearing losses can range from mild to profound. They often affect the person's ability to hear certain frequencies more than others. Thus, even with amplification to increase the sound level, a person with a sensorineural hearing loss may perceive distorted sounds, sometimes making the successful use of a hearing aid impossible.

A mixed hearing loss refers to a combination of conductive and sensorineural loss and means that a problem occurs in both the outer or middle and the inner ear. A central hearing loss results from damage or impairment to the nerves or nuclei of the central nervous system, either in the pathways to the brain or in the brain itself.

Hearing loss and deafness affect individuals of all ages and may occur at any time from infancy through old age. The U.S. Department of Education (2002) reports that, during the 2000-2001 school year, 70,767 students aged 6 to 21 (or 1.3%

of all students with disabilities) received special education services under the category of "hearing impairment." However, the number of children with hearing loss and deafness is undoubtedly higher, since many of these students may have other disabilities as well and may be served under other categories.

Background of the Study

Global Statistics

World Health Organization (WHO) estimates show that there are 250 million persons worldwide with disabling hearing impairment in 2000, this comprises about 4.2% of the world's population and 2/3 of which comes from developing countries such as Singapore, Thailand and Philippines among others. In terms of age category, the WHO estimates showed that among the 250 million, 222 million comprise the adult population while those under the age of 15 were at 28 million.

Prevalence of hearing impairment has been increasing for the past years. In 1985, the incidence of hearing loss was at 42 million and in 1995, it increased to 120 M worldwide while the latest survey done in 2001 showed a further

increase to 280 million cases of individuals with hearing loss.

The WHO also conducts surveys on the top leading cause of global burden of disease in terms of the disabling adjusted life year or DALY computed using the formula years of healthy life lost due to premature mortality + years lived with disability. In the year 2000, estimates showed that hearing loss in adults ranks #15 and topping the list were respiratory infections, perinatal infections and HIV/AIDS, in general. Further dividing the WHO regions in South East Asian Region and Western Pacific Region, it was found out that hearing loss ranks #11 hearing loss in adult having a percent total DALY of 2.1% for the South East Asian Region and #10 (2.3%) for the Western Pacific Region.

Among the 10 leading causes of YLD global estimates in 2000, hearing loss ranked second having a percentage YLD of 4.7% while in terms of gender, hearing loss in adults males ranked third having a YLD of 4.8% and ranked second (4.6%) among female adults. Further proving that indeed, hearing impairment is more prevalent among males than females.

US statistics

According to NIDCD, in 1989, about 28 million people in the United States (U.S.) have some degree of reduced hearing sensitivity. Out of this number, 80% were found to have irreversible hearing loss. It was also estimated that 1 in every 1000 infants born in the U.S. has a severe or profound hearing loss.

In terms of hearing disability, 83 out of every 1000 children in the U.S. have what is termed an educationally significant hearing loss according to the U.S. Public Health Service, 1990 published in a journal entitled *Healthy People 2000*. Furthermore, among every 1000 school-age students in the U.S., it was found out that 7 have bilateral and 16-19 have unilateral hearing losses that may significantly interfere with their education (Berg, F.H. , 1985)

In 1993, American Speech-Language-Hearing Association claimed that 10 in 1000 school age students have permanent sensorineural hearing loss and approximately 30% of children who are hard of hearing have a disability in addition to a hearing loss. (Wolff, A.B., & Harkins, J.E. 1986)

A research entitled "The Severely to Profoundly Hearing Impaired Population in the United States: Prevalence and

Demographics" showed that approximately half a million Americans are severely to profoundly hearing impaired and require special educational assistance, social services, and other resources in order to function in a hearing society.

Based on the research results, seniors represent 54% and those aged 18 to 64 represent 38% of the severely to profoundly hearing impaired population. Although children under 18 years of age represent the smallest portion of the severe to profound hearing impairment group, approximately 8%, the prevalence of severe to profound hearing impairment among children is thought to be under-reported. Estimates of children under 3 years old with this level of hearing loss is difficult since early diagnosis through infant hearing screening is not generally available. The study further estimates that 5/10,000 infants have severe to profound hearing loss.

The results indicate that most of the severely to profoundly hearing impaired population are, on average, poorer than other Americans. Fifty-three percent of the study population has a family income of less than \$25,000 compared to 35 percent of the general U.S. population. In terms of education, of the severely to profoundly hearing impaired

population, about 44% did not graduate from high school, compared to only 19% in the general population. Forty-six percent of these hearing impaired students graduated from high school and reported some college attendance, compared with 60% of the general population of students. Only 5 % of the severely to profoundly hearing impaired students graduated from college compared with 13% of the general population.

Although the labor force participation of the severely to profoundly hearing impaired population over 65 is similar to the general population, many of the working-age adults in this group are not in the labor force. Specifically, 42% of those with severe to profound hearing impairment between the ages of 18 and 44 years are not working. Moreover, about 54% of those aged 45 to 64 years were unemployed at the time of the survey.

Asian Statistics

According to the WHO estimates, 2/3 of those with hearing loss come from developing countries such as Indonesia, India, Myanmar, Sri Lanka, Thailand and Philippines. Most common ear and hearing problems among these nations were congenital

hearing impairment, otitis media, noise-induced hearing loss, ototoxic hearing loss and aging hearing impairment. A survey was conducted to determine cause of hearing loss or ear disease among developing countries and results showed that in India, among the known causes of hearing loss, ear wax ranked first (15.9%), non-infectious (aging) second (10.3%) and chronic OM third with 5.2% prevalence rate. In Indonesia, ear wax ranked first (13.2%), non-infectious ranked second having a 4.1% prevalence rate and chronic OM (3.6%) ranked third. In Myanmar, top three causes of hearing loss or ear disease were ear wax (9.0%), chronic OM (6.0%) and non-infectious (5.0%), respectively. In Sri Lanka, of the known causes, non-infectious causes ranked first at 9.2%, ear wax (2.9%) and serrous OM at 2.1%. Hearing disability in Thailand was estimated at 13.6%. Individuals' having moderate hearing loss (41-60dB) was 11.4%, while those experiencing severe hearing loss (61-80dB) was 1.7% and those who were deaf were estimated at 0.5%. according to the country's livebirth registry, there are 38 million babies born per year and among these newborns, the ratio of those who were born deaf were 2-4 per 1000 livebirths.

Philippine Statistics

One of the most recent surveys done on hearing impairment/loss among Filipinos is the Philippine Disability Survey which is a collaborative study which aims to determine the prevalence of disability in the country, distribution according to age and sex and type of disability and status of rehabilitation and rehabilitation needs.

The study categorized disabilities into moving, speaking, hearing, mental and seeing. Percent distributions of the types of disability are as follows: moving disability (39%), speaking (10%), hearing (33%), mental (10%) and seeing (8%). Prevalence of different types of disability by age groups showed that disability was most prevalent among the following age groups: 70 and above (16.18%), 60-69 (3.66%) and 50-59 (1.45%).

As part of the disability being assessed by the study, it was found out that the prevalence of hearing impairment nationwide using the screening and functional assessment tools developed by the study was 2.04% while for hearing disability, results showed a 1.10% prevalence rate.

Furthermore, hearing disability was found to be the 2nd highest form of disability next to moving disability.

In 1997 according to the DOH National Registry, hearing impairment was said to be 17% or 97,957 per 577,345. A similar survey in 1995 by the Philippine Consensus of population showed that prevalence rate of hearing diseases were estimated to be 12.55% or 115,357 per 919,292 individuals. At that time, based on the criteria set by the Employees' Compensation Commission of the Department of Labor and Employment, cases of hearing loss were categorized into partially deaf-7.57%, totally deaf-2.50%, poor hearing ability-2.48%

Another recent survey regarding hearing loss at the workplace entitled "Risk factors in TNWs associated with NIHL" conducted from 2000-2002, showed that the prevalence of hearing loss among Filipino workers for both ears was 42.4%, 12% on the right ear only, 12.1% on the left ear only and 65.5% of these were primarily due to noise-induced hearing loss. Further analysis of the data collected using logistic regression showed that risk factors include age (30 years old and above), perception of noise at the workplace (noisy-very noisy), exposure to noise, annual examination in

company and need for workers to speak loudly. Protective factors include educational attainment (HS/E and C/PG), ability to localize sounds, presence of noise reduction methods, medical history of hearing loss.

According to Ear and Hearing Health Care: Our Responsibility presented by the Secretary General, Hearing International, among the 33M Filipino children which comprises 45% of the total population, 1.4M were estimated to have hearing impairment.

Based on the Ear and Hearing Disorder Survey having a sample size of 3,431, most common ear and hearing disorders include ear wax (70.3%), dry perforation (5.6%), chronic OM (10.2%) and serrous OM (8.6%). Moreover, prevalence of disabling hearing impairment is 20.7% according to the results of this particular survey.

According to the DECS-NHC survey conducted among 15,381,796 children for the SY 1997-98, top three leading ailments include dental caries, pediculosis and common colds. Otitis media which is a common cause of hearing loss among children, ranked #8 with a prevalence rate of 12.23%.

Based on the 10 leading ailments among grade 2 in Mandaluyong City released by NCP-SHA, impacted cerumen ranked #4 among the 10 leading ailments having a prevalence rate of 28.48% while hearing impairment ranked #5 with a prevalence rate of 24.44%.

There have been many studies conducted determine the status of hearing loss globally and locally, however, even the WHO, an international organization which is concerned on global health issues, is convinced that data regarding hearing impairment are inadequate since it is believed that data coming from such researches/surveys will increase the awareness of health professionals, policy-makers and the general population on the importance of reducing hearing impairment which was said to be 50% preventable. These data can also determine relevant needs and priorities for development of action plans and health policies/regulations which will help in the selection of strategies for its prevention and control.

Research Question

What is the prevalence of hearing impairment in the Philippines?

Research Objectives

General objective: To determine prevalence of hearing impairment in the Philippines

Specific objectives:

1. To determine the demographic profile of the respondents in terms of:
 - 1.1. Regional classification
 - 1.2. Age
 - 1.3. Gender

2. To determine hearing problems experienced by the respondents

3. To determine the family history of the respondents predisposing them to hearing impairment

4. What is the general health of the respondents in terms of:
 - 4.1. History of previous illnesses
 - 4.2. Medications taken

5. To determine employment history of the respondents in the predisposing them to hearing impairment
6. To determine recreational activities predisposing them to hearing impairment
7. To identify most common ear problems/infections prevalent among Filipinos
8. To determine the degree of hearing loss among Filipinos

CHAPTER II

METHODOLOGY

This chapter covers the method of research that was used in this study, the sample and the sampling technique, the sources of data, the research instrument and techniques, and the statistical treatment of the data.

Research Design

The study used a cross-sectional design which aimed to determine the status of hearing impairment in the country, in general. The study assessed the presence of hearing impairment among the sample population at a given point in time, which will then be used to determine the prevalence of hearing impairment of the general population. Representative samples from the 3 major regions of the country (Luzon, Visayas and Mindanao) was chosen randomly using an appropriate sampling design to ensure representativeness of the data collected. Respondents coming from these regions were assessed for the presence or absence of the disease under consideration (ear and hearing impairment).

Research Locale

The Philippines is an archipelago of 7,107 islands and stretches from the south of China to the northern tip of Borneo. The country has over a hundred ethnic groups and a mixture of foreign influences which have molded a unique Filipino culture. The country is divided into three geographical areas: Luzon, Visayas, and Mindanao. It has 17 regions, 79 provinces, 115 cities, 1,500 municipalities, and 41,972 barangays. Manila is the capital of the country. The people are divided geographically and culturally into regions. Tribal communities can be found scattered across the archipelago.

To represent the three major islands of the country, Ilocos region and Benguet province were randomly chosen to represent Luzon. For Visayas, Siquijor and Iloilo were selected while Bukidnon and Davao were randomly selected to represent Mindanao.

Study participants

Using a statistical software, the computed sample size of the study was 5,971 having a confidence level value of 99%.

This will include children and adult respondents coming from the randomly chosen regions, municipalities and barangays. All households which belonged to the selected barangays were asked to participate in the survey irregardless of age.

Sampling Design

A three-staged stratified cluster random sampling with the region of the country as the stratifying variable was used as the sampling design. In each of the 17 regions, provinces and cities constituted the primary sampling units, secondary sampling units were the municipalities, tertiary sampling units were the barangays. The sample of the study were all households included in select barangays.

Based on the sampling design, study has chosen 1 region each from Luzon, Visayas and Mindanao, which represented the entirety of the general population. From the chosen region, 1 province/city was randomly selected and from the chosen province/city, 2 municipalities were randomly selected. From these municipalities, all the barangays (clusters) which included all households/residents in the barangay were included in the study.

Data Collection Method Used

Upon selection of the participating regions, provinces, municipalities/cities and barangays, the research investigator asked for approval from the regional, provincial and municipal offices on the conduct of the study in their respective areas. Upon approval, field interviewers, audiologists and ENT doctors were assigned to the selected barangays to accomplish the research instruments/tools through interviews and ear and hearing examinations among the study participants. After the examinations, data collected were edited in the field by the field interviewers to check for completeness and inconsistencies. After the editing, the data were collated and sent to the central office for encoding and analysis. (See Appendix B.)

Interview

Upon selection of study participants, they were asked by trained field interviewers with regards to their demographic profile, medical history, exposure to environmental and occupational factors and their common ear and hearing complaints. The data collected

described the characteristics of the study participants and provided relevant case history of the sample population. For the children, their parents or guardians were asked instead regarding their demographic profile and case histories.

Ear Examination

After the interview, study participants underwent ear examination performed by ENT doctors. An examination form was provided to determine the presence or absence of outer, middle and inner ear infections using otoscopic examination. All findings were recorded in the examination form provided. All those had any form of ear infections were not be allowed to proceed to the audiometric examination.

Audiometry

Upon passing the ear examination, they underwent an audiometric examination using an assessment tool using a portable audiometer. For children aged 2 years and below, behavioral audiometry was used to assess their hearing loss while for the rest of the age group,

pure tone audiometry (air conduction) was used to determine the degree of hearing loss. Audiometric findings will determine the presence or absence and the degree of hearing impairment among the sample population. The degree of hearing impairment will be based on the criteria developed by the World Health Organization (WHO).

Research Instrumentation

The study used three different forms/tools for data collection. Research instruments used were all standardized questionnaires thereby, allowing the researchers to utilize these tools without testing its reliability and validity.

The forms/tools will include the following:

Hearing Loss Questionnaire (For Field Interviewers).

This form/tool is currently being used at the Hearing and Dizziness Center, University of Sto. Tomas Hospital, Espana Manila to determine the case history of the respondents.

Examination form (For ENT doctors)

This tool/form assessed the ear status of the study participants. Presence and absence of ear infections/diseases were determined using this form. Otoscopic examination was primarily done by ENT doctors. Contents of the form included examination of the outer, middle and inner ear for both ears.

Audiometric form (For Audiologists)

The audiometric form was accomplished by trained audiologists. This form/tool assessed the hearing threshold of the respondents in decibel at 250 Hz, 500 Hz, 1Khz, 2Khz and 4Khz. Included in the form is the WHO criteria for hearing impairment which will determine the degree of hearing loss of the respondent ranging from normal to profound hearing loss depending on the computed average for the 500 Hz, 1Khz and 2Khz frequencies.

Statistical Analysis

Analysis of the data is very important in all research studies therefore, appropriate statistical treatment for each of the problem stated is very important in order to draw relevant and significant conclusions. The study used EpiInfo6, a statistical software used by health researches, to encode and analyze data collected.

Frequency and percent distribution, mean and standard deviation were obtained using EpiInfo6 to determine the prevalence of ear and hearing impairment in the country.

Percentage was used to compare the frequencies of responses for each item to be determined by the computation of the total number of population

$$\% = \frac{\text{Frequency}}{\text{Total population}}$$

Arithmetic mean was computed as follows:

$$\mu = \frac{\sum n}{\text{total number of respondents}}$$

CHAPTER III

RESULTS AND DISCUSSION

This chapter is focused on the presentation, analysis and interpretation of the data that were gathered in the survey that deals with the profile, hearing problems, general health, family history of hearing loss, lifestyle activities and degree of hearing loss of the study participants. The collected data were tallied and analyzed using prescribed statistical tools and are presented in table form.

Table 1. Demographic Profile

	Freq	Percent	Cum
Region			
Luzon	2020	33.9	33.9
Visayas	1803	30.3	64.2
Mindanao	2130	35.8	100.0
Age			
0-2	531	8.9	8.9
3-10	1338	22.5	31.4
11-20	819	13.8	45.2
21-30	682	11.5	56.7
31-40	730	12.3	69.0
41-50	669	11.2	80.2
50-60	495	8.3	88.5
Above 60	689	11.6	100.0

Gender			
Male	2311	38.8	38.8
Female	3652	61.2	100.0

Among the 5,953 respondents, 2,130 or 35.8% came from Mindanao, 2,020 or 33.9% came from Visayas and 1,803 or 30.3% came from Luzon.

Out of 5,953, 531 or 8.9% belonged to the 0-2 age group, 1,338 or 22.5% were 3-10 years old, 819 or 13.8% under the 11-20 age group and 682 or 11.5% were 21-30 years old. Seven hundred thirty or 12.3% belonged to the 31-40 age group, 669 or 11.2% from the 41-50 age group, 495 or 8.3% were 50-60 years old and 689 or 11.6% were 60 years old and above. Mean age is at 29 years old.

Among 5,963, 2,311 or 38.8% were males while 3,652 61.2% were females.

Table 2. Hearing Problems

	Freq	Percent
Hearing is not the same for both ears	2292	38.5
Trouble hearing	1389	23.3
Ringing in the ears	1167	19.6
Dizziness	774	13.0

Ear aches	626	10.5
Fullness/Stuffiness/Pressure	609	10.2
Ear discharge	409	6.9
Fluctuation	383	6.4
Rapid/Sudden hearing loss	226	3.8
Balance problems	111	1.9
Recent change in hearing	108	1.8

Out of 5,953 respondents, 2,292 or 38.8% experienced hearing not the same for both ears, 1,167 or 19.6% experienced trouble hearing and 1,167 or 19.6% complained of ringing in the ears. Seven hundred seventy-four or 13.0% experienced dizziness, 626 or 10.5% had ear aches, 609 or 10.2% experienced fullness, stuffiness or pressure in ears and 409 or 6.9% complained of ear discharge.

Other experienced hearing fluctuation (383 or 6.4%), rapid or sudden hearing loss (226 or 3.8%), balance problems (111 or 1.9%) and recent change in hearing (108 or 1.8%).

Among those who answered that their hearing is not the same for both ears, 1,865 perceived that they had better hearing on the left ear while 303 had better hearing on the right ear.

Among those who answered that they experienced fullness, stuffiness or pressure, 202 respondents felt it on the right ear, 201 on the left ear and 206 felt it on both ears.

Among those who answered that they experienced ear aches, 244 felt it on the right ear, 238 on the left ear and 144 felt it on both ears.

Among those who answered that they experienced ear discharge, 147 experienced it on the right ear, 156 on the left ear and 106 experienced it on both ears.

Table 3. Injury to the Ear

	Freq	Percent
Auto or driving accident	128	2.2
Head injury or skull fracture	115	1.9
Injury to the ear	85	1.4
Exposure to explosion or blast	44	0.7

Out of 5,953, 128 or 2.2% had auto or driving accident, 115 or 1.9% had head injury or skull fracture, 85 or 1.4% experienced injury to the ear and 44 or 0.7% experienced exposure to explosion or blast.

Among those who had answered they had previous injury to the ear, 26 had injured their right ear, 43 their left ear and 16 injured their both ears.

Table 4. Medical Family History

	Freq	Percent
Family history of high blood pressure/heart disease	783	13.2
Family history of hearing loss/ear problem	633	10.6
Not Normal birth	554	9.3
Not normal pregnancy	535	9.0
Family history of diabetes	241	4.0
Anyone in the family born deaf	51	0.9
Anyone in the family using HA	7	0.1

From the 5,953 respondents, 783 or 13.2% had family history of high blood pressure/heart disease, 633 or 10.6% had family history of hearing loss or ear problem and 554 or 9.3% were not given birth normally. Five hundred thirty-five or 9.0% of the respondents had an abnormal pregnancy, 241 or 4.0% had family history of diabetes, 52 or 0.9% had a family member who was born deaf and 7 or 0.1% had a family member using hearing aid.

Table 5. Medical History of the Respondents

	Freq	Percent
Measles	2721	45.7
Mumps	2301	38.7
Frequent colds/sore throat	1800	30.2
High fever	1740	29.2
High blood pressure	617	10.4
Arthritis	549	9.2
Allergy	482	8.1
Kidney disease	338	5.7
Blackout or fainting spells	333	5.6
Convulsions	234	3.9
Heart disease	232	3.9
Unconsciousness	219	3.7
Scarlet fever	122	2.0
Diabetes	120	2.0
High cholesterol	102	1.7
Malaria	73	1.2
Facial paralysis	32	0.5
Tumor	26	0.4
Venereal disease	26	0.4
Meningitis	12	0.2

Among the 5,953 respondents, 2,721 or 45.7% had measles, 2,301 or 38.7% had mumps, 1,800 or 30.2% had frequent colds/sore throat and 1,740 or 29.2% had high fever. Six

hundred seventeen or 10.4% had high blood pressure, 549 or 9.2% had arthritis, 482 or 8.1% had allergy and 338 or 5.7% had kidney disease.

Out of 5,953, 333 or 5.6% had blackout or fainting spells, 234 or 3.9% had convulsions, 232 or 3.9% had heart disease, 219 or 3.7% had experienced unconsciousness and 122 or 2.0% have had scarlet fever.

Other illnesses include diabetes (120 or 2.0%), high cholesterol (102 or 1.7%), malaria (73 or 1.2%), facial paralysis (32 or 0.5%), tumor (26 or 0.4%), venereal disease (26 or 0.4%) and meningitis (12 or 0.2%).

Table 6. History of Hospital Admissions/Operations

	Freq	Percent
Ever been admitted in a hospital	1108	18.6
Any other operation	210	3.5
Ear operation	19	0.3
Ever been advised for an operation	9	0.2
Complications	4	0.1

Out of 5,953 respondents, 1,108 or 18.6% have been admitted in a hospital. Two hundred ten or 3.5% had operations other

than an ear operation, 19 or 0.3% underwent a previous ear operation and 9 or 0.2% had been advised for an operation. Four or 0.1% had history of past complications.

Table 7. Medications Taken

	Freq	Percent
Intravenous medication	164	2.8
Currently under medication	122	2.0
Quinine/ mycins/aspirin	65	1.1
Habit-forming drugs	5	0.1

Out of 5,953 respondents, 164 or 2.8% underwent intravenous medication while 122 or 2.0% was under medication. Sixty-five or 1.1% had taken quinine/mycins/aspirin while 5 or 0.1% had taken habit-forming drugs.

Table 8. Employment History

	Freq	Percent
Need to raise voice to be heard	123	2.1
Use of hearing protection	20	0.3
Type of hearing protection		
Ear muff	1	0.0
Ear plugs	5	0.1
Headphones	1	0.0
Otosol wax	1	0.0

Daily wearing of hearing protection	5	0.1
Instructed on the proper use of hearing protection	8	0.1

Most of the respondents were farmers, housewives, factory workers, drivers or government employees. Length of employment ranged from 3 months to 60 years. Among these workers, 123 or 2.1% need to raise their voice to be heard and 20 or 0.3% used hearing protection while at work. Among those using hearing protection, 5 or 0.1% used earplugs while 1 respondent each used ear muffs, headphones and otosol wax. Five or 0.1% used hearing protection at a daily basis and 8 respondents or 0.1% were instructed on the proper use of hearing protection while at work.

Table 9. Recreational Activities

	Freq	Percent
Motorcycles	466	7.8
Loud music	272	4.6
Tractors/farm equipment	267	4.5
Band or orchestra	124	2.1
Other loud vehicles	96	1.6
Fireworks	74	1.2
Hunting or shooting	67	1.1
Hammering	62	1.0
Powerboats	59	1.0

Powertools	48	0.8
Chainsaw	42	0.7
Flying	22	0.4
Use of noisy tools at home or anywhere except at work	7	0.1
Racing cars	6	0.1
Water skiing	1	0.0

Out of 5,953 respondents, 466 or 7.8% were exposed to motorcycles, 272 or 4.6% to loud music and 267 or 4.5% were exposed to tractors or farm equipment. One hundred twenty four or 2.1% were exposed to loud vehicles, 74 or 1.2% to fireworks, 67 or 1.1% hunting or shooting and 62 or 1.0% were exposed to hammering. Among 5,953 respondents, 59 or 1.0% were exposed to powerboats, 48 or 0.8% were exposed to powertools, 42 or 0.7% were exposed to chainsaw, 22 or 0.4% were exposed to flying, 7 or 0.1% used noisy tools at home or anywhere except at work, 6 or 0.1% were exposed to racing cars and 1 was exposed to water skiing.

Table 10. Basic Ear Assessment Results

	Freq	Percent
Wax	787	11.9
Perforation	304	5.1
Otorrhea	130	2.2
Inflammation	42	0.7

Fungi	35	0.6
Ear Pain	28	0.5
Foreign body	27	0.4
Malformation	7	0.1

Out of 5,953 examined, 787 or 11.9% had ear wax, 304 or 5.1% had perforated eardrum, 130 or 2.2% had otorrhea and 42 or 0.7% had inflammation of the ear canal. Thirty-five or 0.6% had fungi, 28 or 0.5% experienced ear pain, 27 or 0.4% had foreign body in the ear canal and 7 or 0.1% had auricle malformation (0.1%).

Table 11. Cause of Ear Disease or Hearing Impairment

	Freq	Percent
Wax	613	10.3
Chronic suppurative	133	2.2
Acute otitis media	64	1.1
Serous otitis media	41	0.7
Infectious conditions	26	0.4
Non-infectious conditions	21	0.4
Otitis Externa	9	0.1
Genetic conditions	1	0.0

Out of 5,953 examined, common causes of ear disease or hearing impairment were as follows: wax (613 or 10.3%),

chronic suppurative otitis media (133 or 2.2%), acute otitis media (64 or 1.1%), serous otitis media (41 or 0.7%), infectious conditions (26 or .04%), non-infectious conditions (21 or 0.4%), otitis externa (9 or 0.1%) and genetic conditions (1 or 0.0%).

Table 12. Hearing Assessment for Children

	Yes	No	Not done
A child searches for the sound direction	1073	17	16
A child can point to a parent/brother and can speak simple words	831	82	193
A child can answer question on his/her name	661	104	341
Child reflexly blinks to loud noise	1049	19	38

Out of 5,953 respondents, 1106 or 18.6% underwent hearing assessment for children aged 6 months to 3 years old.

Among 1,106 children examined, 1,073 of the children searched for the direction of the sound (localization) while 17 did not respond to the sound presented.

Among 1,106 children examined, 831 of the children were able to point to a parent or any family member and were able to speak simple words such as "bye-bye" while 82 were not able to do the task.

Out of 1,106 children examined, 661 were able to answer the question about his/her name while 104 were not able to do the task.

Among 1,106 children examined, 1049 were able to reflexly blinked in response to a loud sound while 19 did not respond to the loud sound.

Table 13. Degree of Hearing Loss for the Right Ear

	Freq	Percent
Normal	2607	54.0
Mild	1573	32.6
Moderate	384	8.0
Severe	178	3.7
Profound	84	1.7

Among 5,953, 4,826 or 81.1% underwent pure tone audiometry.

Out 4,826 examined, 2,607 or 54.0% had normal hearing, 1,573 or 32.6% were found to have mild hearing loss, 384 or 8.0%

had moderate hearing loss, 178 or 3.7% had severe hearing loss and 84 or 1.7% had profound hearing loss.

Table 14. Degree of Hearing Loss for the Left Ear

	Freq	Percent
Normal	2759	57.2
Mild	1413	29.3
Moderate	372	7.7
Severe	188	3.9
Profound	94	1.9

Out 4,826 examined, 2,759 or 57.2% had normal hearing, 1,413 or 29.3% were found to have mild hearing loss, 372 or 7.7% had moderate hearing loss, 188 or 3.9% had severe hearing loss and 94 or 1.9% had profound hearing loss.

CHAPTER IV

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

This chapter presents the summary of findings, the conclusions and the recommendations that evolved as a result of the study that was conducted.

In summary, the results of the study were as follows:

1. Demographic profile of the respondents

1.1 Equal distribution of respondents were selected from the three major regions of the country at approximately 35% each.

1.2 Most of the respondents belonged to the 3-10 years old age group at 22%, followed by 11-20 at 13% and 31-40 years old at 12%.

1.3 Mean age of respondents was at 29 years old.

1.4 Majority of the respondents were females at 61%.

2. Hearing problems experienced by the respondents
 - 2.1 Out of 5,953 respondents, 2,292 or 38.8% experienced hearing not the same for both ears, 1,167 or 19.6% experienced trouble hearing and 1,167 or 19.6% complained of ringing in the ears.
 - 2.2 Among those who answered that they experienced fullness, stuffiness or pressure, 202 respondents felt it on the right ear, 201 on the left ear and 206 felt it on both ears.
 - 2.3 Among those who answered that they experienced ear aches, 244 felt it on the right ear, 238 on the left ear and 144 felt it on both ears.
 - 2.4 Among those who answered that they experienced ear discharge, 147 experienced it on the right ear, 156 on the left ear and 106 experienced it on both ears.
3. In terms of injury to the ear, 128 or 2.2% had auto or driving accident, 115 or 1.9% had head injury or skull fracture, 85 or 1.4% experienced injury to the ear and 44 or 0.7% experienced exposure to explosion or blast.

4. From the 5,953 respondents, 13% had family history of high blood pressure/heart disease and 10% had family history of hearing loss or ear problem, 4% had family history of diabetes and 0.9% had a family member who was born deaf.

5. Past illnesses of the respondents include measles (45%), mumps (39%), frequent colds/sore throat (30%), high fever (29%), high blood pressure (10%), arthritis (9%), allergy 8%) and kidney disease (6%). Other illnesses include blackout or fainting spells (6%), convulsions (4%), heart disease (4%), unconsciousness (4%) and scarlet fever and diabetes (2%), respectively.

6. Out of 5,953 respondents, 19% had been admitted in a hospital, 3.5% had operations other than an ear operation while 0.3% underwent a previous ear operation

7. Approximately 3% underwent intravenous medication while 2% was under medication at the time of the survey. Sixty-five or 1.1% had taken quinine/mycins/aspirin while 5 or 0.1% had taken habit-forming drugs.

8. Most of the respondents were farmers, housewives, factory workers, drivers and government employees. Length of employment ranged from 3 months to 60 years. Among these workers, only 20 or 0.3% used hearing protection while at work. Among those using hearing protection, 5 or 0.1% used earplugs while 1 respondent each used earmuffs, headphones and otosol wax respectively.
9. Less than ten percent of the respondents were exposed to motorcycles (8%), 5% to loud music and 4.5% to tractors or farm equipment. Two percent were exposed to loud vehicles, 1.2% to fireworks, 1.1% hunting or shooting and 1.0% were exposed to hammering and powerboats.
10. Most common ear problems based on basic ear assessment performed by ENT doctors were as follows: ear wax (12%), perforated eardrum (5%), otorrhea (2%), inflammation of the ear canal (0.7%), fungi (0.6%), ear pain (0.5%), foreign body in the ear canal (0.4%) and 7 or 0.1% had auricle malformation.

11. Most common causes of ear disease or hearing impairment were as follows: wax (613 or 103%), chronic suppurative otitis media (133 or 2.2%), acute otitis media (64 or 1.1%), serous otitis media (41 or 0.7%), infectious conditions (26 or .04%), non-infectious conditions (21 or 0.4%), otitis externa (9 or 0.1%) and genetic conditions (1 or 0.0%).
12. Out of 5,953 respondents, 1106 or 18.6% underwent hearing assessment for children aged 6 months to 3 years old.
13. Among 1,106 children examined, 1,073 were capable of sound localization, 831 of the children were able to point to a parent or any family member and were able to speak simple words such as "bye-bye", 661 were able to answer the question about his/her name and 1049 were able to reflexly blink in response to a loud sound.
14. Among 5,953, 4,826 or 81.1% underwent pure tone audiometric examination.
15. Out 4,826 examined, 54% had normal hearing, 33% were found to have mild hearing loss, 8.0% had

moderate hearing loss, 4% had severe hearing loss and 2% had profound hearing loss on the right ear.

16. Out 4,826 examined, 57% had normal hearing, 29% were found to have mild hearing loss, 8% had moderate hearing loss, 4% had severe hearing loss and 2% had profound hearing loss on the left ear.

Conclusion

1. The study us primarily representing the adult, female population of the country since majority of the study population were females, mean age of respondents is at 29 years old and majority of the study participants were adults.
2. Most of the respondents were farmers, housewives, factory workers, drivers and governments employees since most of the respondents came from rural areas. Therefore, use of hearing protection was not popular among these group since use of such devices were perceived to be a nuisance nor relevant to their jobs.

3. Most prevalent ear problems in a community setting still remains to be earwax and perforated eardrum. Others include otorrhea, inflammation of the ear canal, fungi, ear pain, foreign body in the ear canal and auricle malformation.
4. Most prevalent causes of ear disease or hearing impairment were earwax and otitis media (chronic suppurative, acute or serous). Other include infectious conditions, non-infectious conditions, otitis externa and genetic conditions.
17. From the pediatric patients examined, which was approximately 20% of the study population, majority seemed to have no hearing problems based on the hearing assessment performed by participating audiologists. They were capable of localization and performing activities fit to their age.
18. Among the adult population who underwent audiometric examination, approximately 45% had some degree of hearing loss on both ears ranging from mild to profound.

19. However, out of 5,953 respondents, approximately 36% had some degree of hearing loss on both ears ranging from mild to profound.

Recommendations

1. Equal representation of the pediatric and adult population to be able to determine the prevalence of hearing impairment according to age.
2. Development of a research instrument that would focus more on exposure factors predisposing the target population to the development of hearing impairment which is more or less applicable to the country's setting.
3. Further studies on the relationship between exposure factors and hearing impairment in the community setting since other studies have conducted similar researches on special populations.
4. Assessment questions in terms of screening pediatric patients for hearing loss should be improved to have better projections in terms of hearing impairment among pediatric population.

APPENDICES

**Appendix A: Regional Distribution of Provinces, Cities and
Barangays**

Region	No. of provinces	No. of cities	No. of municipali- ties	No. of barangays
NCR	0	13	4	1,693
CAR	6	1	76	1,176
Region I (Ilocos region)	4	8	117	3,265
Region II (Cagayan Valley)	5	3	90	2,311
Region III (Central Luzon)	7	12	118	3,102
Region IV-A (Calabarzon)	5	10	132	4,012
Region IV-B (Mimaropa)	5	2	71	1,457
Region V (Bicol region)	6	7	107	3,471
Region VI (western Visayas)	6	16	117	4,050
Region VII (Central Visayas)	4	12	120	3,003
Region VIII (Eastern Visayas)	6	4	139	4,390
Region IX (Zamboanga peninsula)	3	5	67	1,903
Region X (Northern Mindanao)	5	8	85	2,020

Region XI (Davao region)	4	5	43	1,158
Region XII (Soccsksargen)	4	5	45	1,194
Region XIII (Caraga)	4	3	70	1,308
ARMM	5	1	99	2,459

REGION CAR (Cordillera Administrative Region)

Province	Income class	Municipalities	Barangays	Registered voters
Abra	3rd	27	303	133,124
Apayao	3rd	7	133	51,289
Benguet	2nd	13	269	303,610
Ifugao	3rd	11	175	89,864
Kalinga apayao	3rd	8	152	102,985
Mountain province	3rd	10	144	81,396

REGION I (Ilocos Region)

Province	Income class	City	Municipalities	Barangays	Registered voters
Ilocos norte	1st	1	22	557	299,583
Ilocos sur	1st	2	32	768	332,177
La union	1st	1	19	576	361,498

Pangasinan	1st	4	44	1,364	1,330,027
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REGION VII (Central Visayas)

Province	Income class	City	Municipalities	Barangays	Registered voters
Bohol	1st	1	47	1,109	619,935
Cebu	1st	6	47	1,203	2,018,719
Negros oriental	1st	5	20	557	606,634
Siquijor	4th		6	134	52,658

REGION VIII (Eastern Visayas)

Province	Income class	City	Municipalities	Barangays	Registered voters
Biliran	4th		8	132	81,958
Eastern samar	2nd		23	597	216,169
Leyte	1st	2	41	1,641	908,480
Northern samara	2nd		24	569	275,476
Western samara	2nd	1	25	951	386,916
Southern samara	3rd	1	18	500	209,556

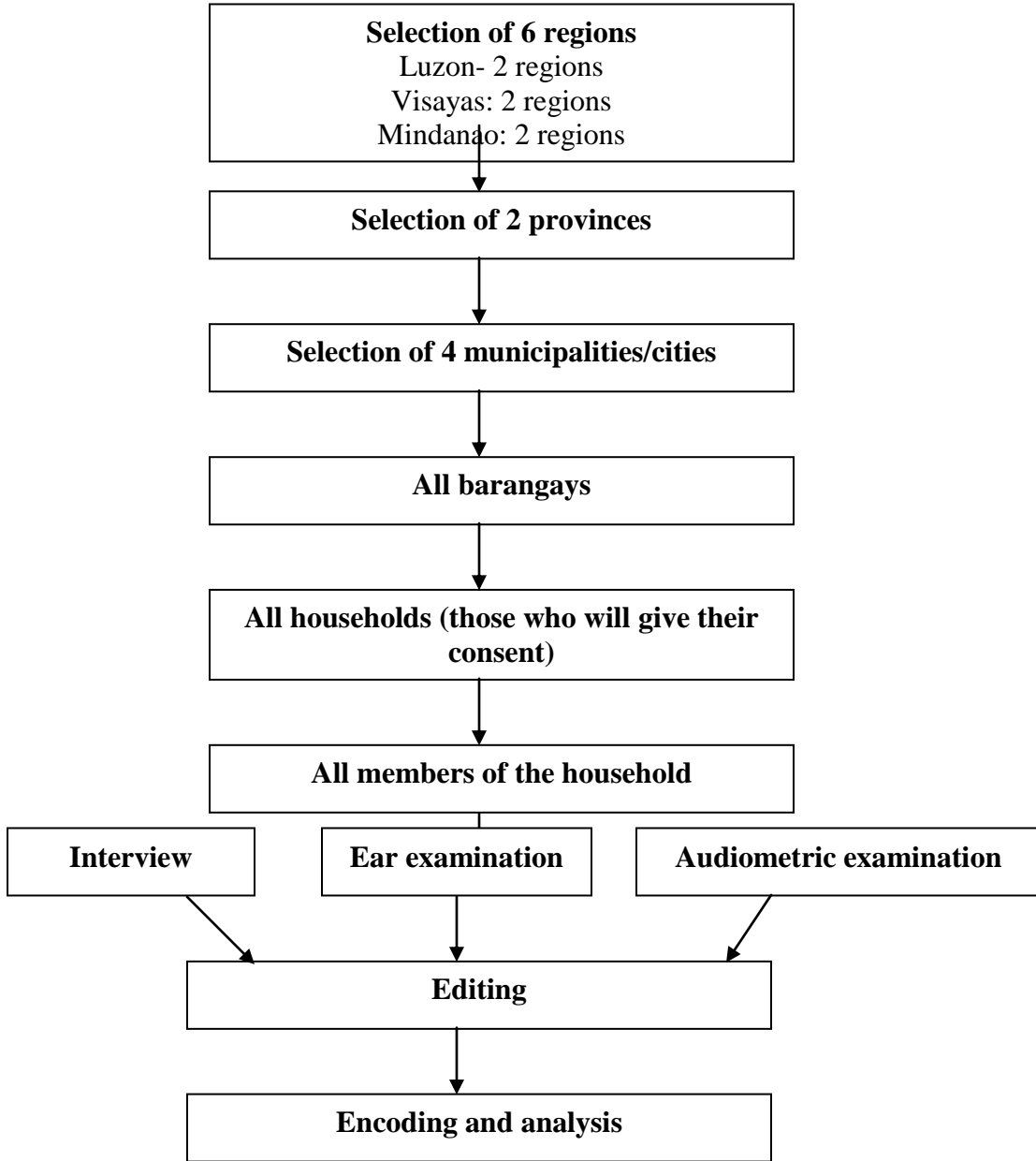
REGION X (Northern Mindanao)

Province	Income class	City	Municipalities	Barangays	Registered voters
Bukidnon	1st	2	20	464	559,530
Camiguin	4th		5	58	53,568
Lanao del norte	2nd	1	22	506	482,480
Misamis occidental	2nd	3	14	490	303,145
Misamis oriental	1st	2	24	502	668,386

REGION XI (Davao Region)

Province	Income class	City	Municipalities	Barangays	Registered voters
Compostela valley	-		11	235	297,595
Davao del norte	1st	3	7	223	425,486
Davao del sur	1st	2	14	517	1,176,758
Davao oriental	2nd		11	183	234,576

Appendix B: Schematic Diagram of the Method of Data Collection



Appendix D: Budgetary Requirements

Expenses	Quantity	Rate	Amount
A. Personnel			
ENT doctors	6	P500/day	P42,000
Audiologists	6	P300/day	P25,200
Field interviewers	6	P250/day	P21,000
Statistician	1	P5,000/month	P20,000
Encoders	2	P250/day	P30,000
Provincial coordinators	12	P1,000	P12,000
B. Transportation and Communication			
Luzon (Land trips)			P10,000
Visayas (airfare + land trips)			P35,000
Mindanao (airfare + land trips)			P35,000
C. Per diem			
Luzon	14 days	250/day	P21,000
Visayas	14 days	300/day	P25,200
Mindanao	14 days	300/day	P25,200
D. Documentation			P15,000
E. Supplies and Materials			P50,000
F. Contingency			P33,100
TOTAL			P400,000

Appendix E: Hearing Loss Questionnaire

**Appendix F: WHO Ear and Hearing Disorders Examination Forms
Version 7.1A**