KWAME NKRUMAH UNIVERSITY OF SIENCE AND TECHNOLOGY, KUMASI, GHANA

COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF HEALTH PROMOTION AND EDUCATION

DETERMINANTS OF HEARING LOSS AND ITS EFFECTS ON STUDENTS ACADEMIC PERFORMANCE AMONG JUNIOR HIGH SCHOOL CHILDREN IN BIBIANI ANHWIASOBEKWAI DISTRICT OF GHANA

BY

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JUNE, 2016

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DECLARATION

With the exception of references from literature which has being duly being acknowledged, I hereby do declare that this work has never been submitted, either in whole or part to any institution for the award of any kind. The work presented here was done by me, a student of the KNUST SCHOOL OF PUBLIC HEALTH.

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(Head of Department) Signature Date

DEDICATION

This study is first dedicated to the Almighty God, my family and all others for their support in various forms.

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ABBREVIATION/ ACRONYMS

AHRF……Area Health Resource File

AJM……...American Journal of Medicine

ASHA……American Speech- Language-Hearing Association

BABD……Bibiani Anhwiaso Bekwai District

BCG…… Baccille Calmette-Guerin

BECE……Basic Education Certificate Examination

CSOM…..Chronic Suppurative Otitis Media

DB……Decibel

ENT……...Ear Nose and Throat

EPI...……. Expanded Programme of Immunization

HL……. Hearing Loss

Hz……. Hertz

JHS……Junior High School

KATH……Komfo Anokye Teaching Hospital

KHz……KiloHertz

NIDC.……National Institute on Deafness and Other Communications Disorders

NSAIDS…...Non-Steroidal Anti Inflammatory Drugs

OM..……Otitis Media

……Responsive to Oxygen Species

R/C……. Roman Catholic

SNHL.……Sensori-Neural Hearing Hearing Loss

TB……. Tuberculosis

UNHS..…. Universal Neonate Hearing Screening

ABSTRACT

The study was aimed at assessing the determinants of hearing loss and its effects on students' academic performance. School based cross-sectional hearing function using screening Audiometer. Simple random and systematic sampling techniques were used to select 400 learners. Data were gathered through the use of questionnaires, physical examination, audiometry and documentation. Data Entry Screens were developed in EXCEL for Data Entry. This applied to the quantitative data collected. The study discovered that, prevalence rate of hearing loss among respondents was high with 31% right ear loss ,26% left loss and 19.5% having either unilateral and bilateral hearing loss. It was revealed that exposure to excessive sounds or noise, reddened and painful ear, itching ear infections, primary school attended and students' educational level were determinants of hearing loss. Subsequently, teachers' assessment of their children's hearing revealed that one cannot rely on what children and teachers say regarding their hearing status. Slight hearing impairment cannot be detected by another person but by the use of audiometer. It also revealed that children with hearing loss were 1.63 times more likely to be graded poor to average academically by their teachers, than normal hearing students. This was however shown to be statistically insignificant. In conclusion, hearing loss prevalent rate among respondents was high. Hearing loss was by acquired causes. The study recommended that, parents and children should be educated about the harm in prolonged noise exposure and poorly treated otitis media infections. Hearing assessment should be made part of the school health program me in addition to external ear physical examination done. Health directorate in the district must effectively monitor and evaluate hearing loss mitigation programmes in order to ascertain its success and challenges in order to provide the requisite support when and where needed.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURE

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Background of the Study

Hearing loss, hard of hearing, or impairment is one of the most pertinent issues that are being discussed in the world. This has resulted in the need to acknowledge the concept (Hearing Loss) and find an integrated approach to remedy it. As World Health Organization (WHO, 1995) states, hearing impairment denotes the inability to hear either partially or totally. Hearing loss may be inherited, and causes like maternal rubella or complications at birth, certain infections like meningitis, chronic ear diseases, the use of ototoxic drugs, and exposure to excessive noise etc. Burden of hearing loss is great and is growing in health and economy.

Recent data from World Health Organization (WHO, 2014) suggests that uncorrected hearing problems is one of the reasons of sensorineural hearing loss in children. The world Health Organization (WHO) reports an increasing trend in the figure of global numbers of persons with disabling hearing loss over the last 18 years. This number was originally estimated at 42 million in 1985, then increased to 120 million in 1995 at the time of the last World Health Assembly Resolution on prevention of hearing loss and 2005 was 278 million. The most recent figure is 360 million people which is approximately 5.3 percent of the world's population of which 32 million are children and 328 million are adults (WHO, 2014).

At any age, disabling hearing loss has profound impact on interpersonal communication, delay in language acquisition, social isolation, psychological wellbeing, quality of life, stigmatization, educational disadvantaged, and economic independence

(Bolajoko *et. al.*, 2014). Undetected hearing loss remains a serious problem among school children (Bess *et. al.,* 1998). It has a considerable consequence on a child's involvement and education in class and this can detrimentally affect a juvenile's education, profession and socio-economic position in life. Sensorineural hearing loss is the most recurrent neurological insufficiency affecting majority of people in the world (Resnikoff *et. al.*, 2008).

Hearing loss has consequences like failure to understand speech sounds, which frequently brings about inability to communicate effectively with the environment and also language acquisition and disadvantage in economy and school as well (WHO 2003). Additional effect of hearing loss or impairment is the financial cost incurred due to the burden of the disease which subsequently affects social and economic development in the communities and nations or countries.

In emerging countries, kids with hearing problems and deafness hardly receive any education. Grown-ups with hearing loss also have a much challenging in getting better employment. Among the ones who get employed, a greater proportion is in the junior levels of employment equated to the broad-spectrum workforce (WHO 2005). Cost in the communications disorders in the United States of America ranges from 176 and 212 billion in 1999 which is about 3percent of the gross national product (Reuben, 2000).

Current production of hearing aids and cochlear implants in the world meets not more than 10% of the people suffering from hearing loss especially in the developing countries. Out of about 40 people who suffer hearing loss and needs hearing aid or cochlear implants in the developing countries, only one person can afford (WHO 2014).

In terms of the age category recently WHO figures estimated that, out of the 360 million people who suffers hearing loss in the world, 91 .1% are adults while 8.9% are children under 15years (WHO 2014).

Several factors accounts for non-correction of hearing loss and these include lack of awareness and appreciation of the problem, non-availability or lack of ability to pay for audio logical facilities, inadequate delivery of inexpensive hearing aids including cochlear implants and cultural disincentives to compliance (Resnikoff *et. all*., 2008).

It is only recently that hearing problems have gained prominence as a major cause of hearing loss. Hearing loss have thus been included in the World Health Organization General Assembly Resolution of 15th May, 1985 pertaining to hearing problems, in which it was stated; …"the attainment of health for all requires increased activity for the prevention of hearing loss" and " further that …."in the developing countries most of the hearing loss which occurs in excessive prevalence in some communities, results from causes that can be prevented at the primary health level" or is…."reversible or remediable".

Determining classroom communication and academic performance of learners with hearing loss was central to this study. As rightly noted by Ekwama (2003), classroom communication is one of the most important aspects to consider when discussing the successful teaching and learning of learners with hearing loss. It is important to discuss classroom communication because it is the very aspect where the disability poses the greatest challenge for the learners and teachers. The result of such a challenge is persistent poor academic performance. Realizing that to some extent classroom communication

exists between teachers and learners; it became necessary to determine classroom communication on the academic performance of learners with hearing loss.

Findings over the years (Katwishi, 1995) have shown that learners with hearing loss have consistently trailed behind their hearing counterparts in academic achievement. In learning organizations, achievement is measured by how well a learner meets the standard set out by the management and the institution itself. The emphasis on academic achievement is made to recognize, appraise, track and inspire the progress of learners in schools of various institutions.

As rightly stated by World Education Services (2011), areas of success and failure or letdown in a learners' educational life need to be appraised in order to raise progress and make whole use of the learning progression. As a result, discussions of active education for learners with hearing loss have turned towards classroom communication and the experiences of these learners in the different types of classrooms and schools in which they are registered. However, not much is known about the classroom communication and academic performance of learners with hearing loss.

Education of learners with hearing loss worldwide has been one of the most controversial topics. This is because it has been difficult to come up with an agreed upon communication technique that best suits learners with hearing loss. Concerning classroom communication, Salamanca Framework article 21 for Action (1994) mention that due to the particular communication requirements of learners with hearing loss, their schooling may be more rightly delivered in special schools, classes or units in typical or mainstream schools.

1.2 Problem Statement

Hearing loss is a core public health problem and remains a challenge to global and national health. Increase in incidence of hearing loss has devastating effects on the individual, society and the nation as a whole because if these people require living a normal life as possible, they frequently require different types of treatment, specialized education and collective services. In countless cases hearing loss results in cheap work productivity, poor academic performance in schools and work places. So apart from outlays to individual person, hearing loss also leads to cost to society and the nation (Blanchfield *et. al*., 2001).

Concerning the prevalence of persons with disabilities, (WHO, (2005) estimates that, approximately 600 million people (ten per cent in any country) in the world experience loss of various kinds including hearing loss. For the purpose of this study, the term "hearing loss" is used as a cover term that refers to all grades of hearing loss, from least to profound.

Many schools in Ghana do not ensure that children are screened for hearing disorders before admission. A preliminary investigation into about 10 schools in the Bibiani Anhwiaso Bekwai District indicated that there is no such program in the district. Thus, most children are faced with hearing challenges resulting in reduction of learning capacity and in some cases leading to hearing loss which is avoidable through primary health care. Hearing problems can have instant and long term implications in children including lost opportunities in education and employment coupled with an impaired quality of life.

An effective way of managing the problem of hearing loss is to make available information on the magnitude, pattern, and risk factors associated with it, such data is

important for prioritizing, planning appropriate intervention, predict needs, monitor outcomes and support credible economic analyses such as cost effectiveness. It has therefore become necessary that a study be conducted on hearing loss among school children in BABD in order to generate relevant knowledge for policy makers and health educators and promoters.

1.3 Research Questions

1) What is the prevalence or occurrence of hearing loss among the Junior High School children in the district?
2) What are the determinants of hearing loss among the Junior High School children diagnosed with hearing loss in the district?
3) What are the effects of hearing loss on the educational performance among the hearing impaired JHS children in the district?

1.4 General Objective

The general objective of the study is to assess the determinants or causes of hearing loss and its effects on students' academic performance.

1.4.1 Specific Objectives

1) To estimate the prevalence of hearing loss among Junior High School children.

2) To identify the determinants of hearing loss among school children diagnosed with hearing loss.

3) To assess the effects of hearing loss on the educational performance of school children with hearing impairment.

1.5 Justification of the Study

There have been few studies and reviews with regards to this subject. This study will fill information gap and address the need for a comprehensive database on the occurrence of hearing loss amongst the school children.

This research will also help deepen awareness among policy makers, opinion leaders, health planners and health professionals in order to plan appropriate interventions for management of audio logical problems among children.

The information that will be provided by this research will complement the efforts undertaken by the Healthcare providers and Ear, Nose and Throat care planning agencies (Ministry of Health, Ghana Health Service,) in achieving World Health Organization General Assembly Resolution of 15th May, 1985 pertaining to hearing problems, in which it was stated;" the attainment of health for all requires increased activity for the prevention of hearing loss".

It is also hoped that the findings may enhance classroom communication between teachers and learners with hearing loss. In addition, the findings may motivate policy makers and curriculum planners to place due emphasis in the curriculum on the

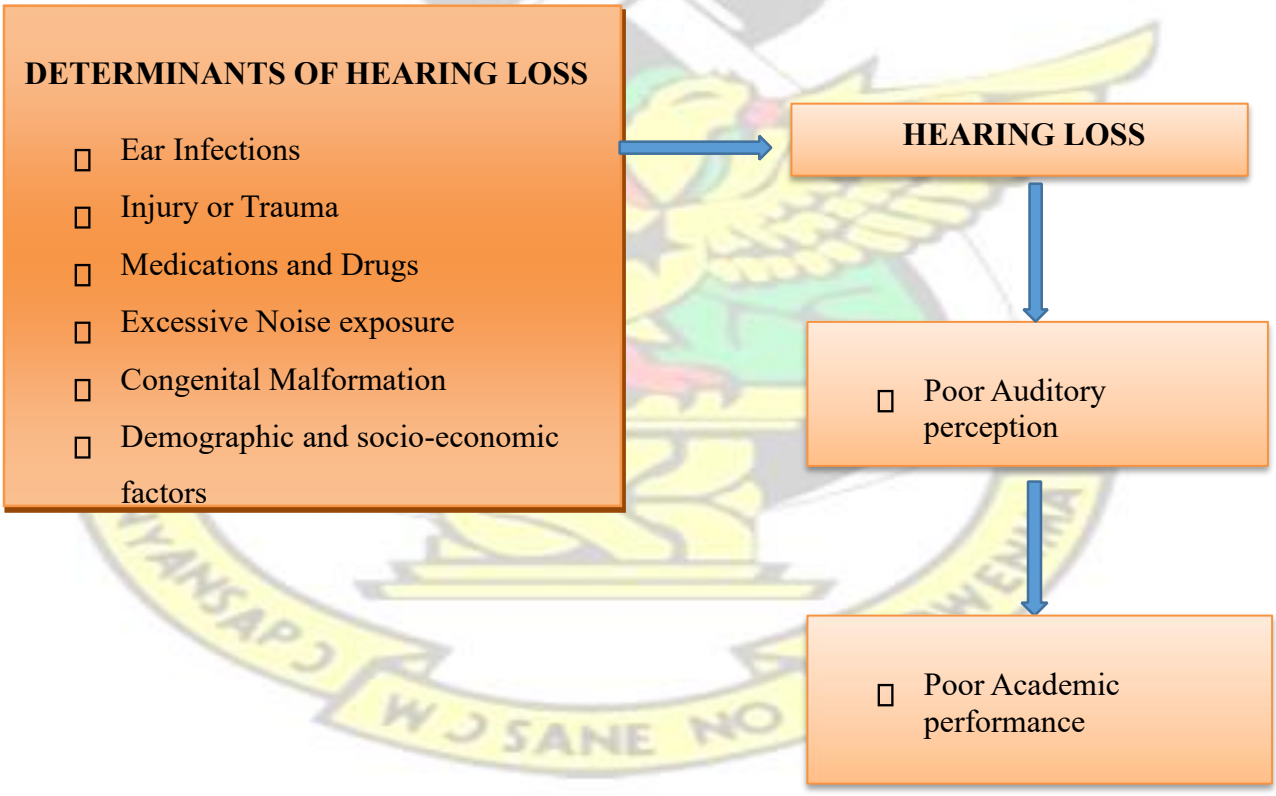
importance of classroom communication towards the improvement of the academic performance of learners with hearing loss

The information that will be provided by this study will be useful to other researchers who will want to do further studies on this subject. The information will also notify the need for increased ear, nose and throat care services to this segment of the population.

1.6 Conceptual Framework of the Study

Conceptualizing hearing loss and students' academic performance

Figure 1. Conceptual Framework



Source: Author's Construct (2015)

Hearing loss can be affected by a quantity of ear diseases caused by viral, bacterial or parasitic infections such as chronic suppurative otitis media which causes hearing loss in especially children which has adverse effects on their academic performance.

Also, untreated infections during childhood due to difficulty in accessing health care facilities, poor personal hygiene and overcrowding cause deafness among children. Infections like meningitis, encephalitis, measles, mumps and other viral infections etc. cause hearing loss which negatively impacts on the academic performance of students.

Again, congenital hearing loss which is present at birth and emanate from genetic or non-genetic (acquired) factors usually from pregnancy, maternal infections during pregnancy like rubella, prematurity of pregnancy, birth injuries, toxins from drugs and alcohol consumed by the mother during pregnancy, lack of oxygen (anoxia) etc. cause hearing loss which affects the academic performance of students.

Moreover, foreign bodies, impacted wax, injuries or trauma such as head injury, sudden loud ear noise or acoustic trauma, tumors in the brain and ears can also induce an eternal sensory-neural hearing loss that prevents the aural nerve from transferring signals to the brain hence causing ear loss. This loss affects the academic performance of students.

Subsequently, individuals' exposure to prolonged or excessive noise affects their hearing organ and thus could lead to hearing loss. This situation thus effects negatively on the communication capacity of students and their academic performance.

Hearing loss is caused by drugs such as ototoxic medications and dose dependent drugs such as gentamicin, aspirin etc. which effects on the hearing organ of an individual and hence causes hearing loss.

1.7 Scope of the Study

Context wise, the study will be limited to the prevalence of hearing loss and its effects on academic performance among junior high school students. In terms of geographical coverage, the study will focus on Bibiani Anhwiaso Bekwai District.

1.8 Organization of the Study

This study will be divided into six main chapters which will be organized as follows. Chapters one will deliberate on the nature and background of the research problems. It will identify the research topic, its objectives, rationale, and scope of the study. Chapter two will deal with appropriate literatures reviews related to prevalence, determinants and effects of hearing loss on academic performance. Third chapter describes the profile of the study area and will discuss the methods and techniques that will be used for data collections. Fourth chapter will dedicate to the main findings and results of the data collections in relation to the hearing loss. Chapter five will deal with the discussion of the main results that will be computed in chapter four. Sixth chapter will delineate with deduction that will be drawn from the research and make applicable commendations to the district and Regional health directorate and significant others based on the results.

1.8.1 Operational definition of terms

For the purpose of this study, key terms are used as follows:

Hearing: the awareness of sound, made possible by vibratory variations in air pressure on the ear drums

Hearing loss: A generic term used to identify anyone with a hearing loss regardless of the degree of loss.

Prevalence: Occurring, accepted or practiced commonly or widely

Academic performance: The result of learning; the amount to which a learner, teacher or institution has attained their educational objectives and goals. Academic performance is normally measured by checkups, examinations or continous assessment.

BABD; Bibiani Anhwiaso Bekwai District.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This part presents important related studies in line with the recognized objectives of the study. This section has outlined four cardinal issues relating to hearing and hearing loss. Notably; the nature and occurrence or prevalence of hearing loss, determinants of hearing loss, effects of hearing loss on academic performance and finally strategies to address the effects.

2.1 Overview of Hearing Loss

This subsection of the literature review hinges on the contemporary definitions on hearing loss. The concept of hearing loss has been variously defined. This study acknowledges the need to conceptualize hearing before moving on to hearing loss since the later emanate from the former. According to Collins, (2000), hearing is the capability to distinguish sounds. Sound happens over a wide-ranging spectrum of frequencies.

The ear of a human very is sensitive to a frequency band inside that spectrum conveyed in intensities or decibels (dB). Any frequency capable of being heard by humans is termed audio or sonic. Frequencies typically range between 20 and 20,000 Hz (Hertz). Frequencies that are higher than audio are known to as ultrasonic, whereas frequencies lower than audio are termed as infrasonic (Collins, 2000). Inability to hear sound frequencies in the usual range of hearing is known as hearing loss.

There are different definitions of hearing loss, therefore, comparison amongst various studies is challenging and may be null and void. Definitions used by every study must all the time be checked before trying to make such comparisons. The World Health Organization (WHO) explains disabling hearing loss in grown-ups as a longlasting unassisted hearing threshold level (normal frequencies 0.5, 1, 2, 4 kHz (kiloHertz)) for the best ear of 41 dB or greater (WHO, 2001: WHO, 1997).

Children below 15 years of age, disabling hearing loss is described as permanent unassisted hearing threshold level (normal for frequencies 0.5, 1, 2, 4 kHz) for the best ear of 31 dB or more. WHO categorizes hearing loss into five ranks, as shown in Table 2.1 Categories of hearing loss ranges from "no loss" to "profound loss" according to the threshold. Thus, for both grown-ups and youngsters "disabling hearing loss" means the unchanged as moderate or poorer hearing loss.

TABLE 2.1: WHO Grades of Hearing Loss

Rank of Loss	**Audiometric ISO value (average of 500,1000,2000,4000 Hz)**	**Loss Description**
0 (no loss)	25 dBHL or less (best ear)	No or very minimal hearing problems. One is able to hear wh Ispers
1 (Slight loss)	26-40 dBHL (best ear)	One is able to hear and replicate words verbal normal speech at 1 meter
2 (moderate loss)	41-60 dBHL (best ear)	A person is able to hear and replicate words with elevated speech at 1 meter
3 (severe loss)	61-80 dBHL (best ear)	One is able to hear certain words when screamed into the best ear
4 (Profound loss including Deafness)	81 dBHL (best ear)	Unable to hear and appreciate even a screamed speech

Source: (Collins, 2000).

The acoustic or auditory passageway consist of the outer ear, the middle ear and the inner ear, followed by the acoustic nerve or auditory nerve ending upward in the hearing Centre's inside the auditory cortex (Medscape, 2012). The outer ear comprises of the pinna, ear canal and the tympanic membrane or eardrum. Sound passes through the ear canal, hitting the tympanic membrane or eardrum which causes it to move in and out or vibrate. The middle ear is a channel after the tympanic membrane that consist three tiny bones known as ossicles. The ossicles is linked to the tympanic membrane at one end and oval window at another end which fastens to the inner ear.

The in and out movement of the tympanic membrane causes the ossicles to shake which, in turn, generates movement of fluid within the organ of corti in the inner ear. The to and fro movement of the fluid in the organ of corti or cochlea, causes variations of the hair cells inside the organ of corti so that electric impulses are sent from the inner ear to upwards to the hearing nerve or acoustic nerve into the brain for interpretations of sound. Hearing loss consist of three main types: sensorineural hearing loss, conductive and mixed hearing loss depending on the area of the hearing system is affected (Angelis, 2012)

Conductive hearing loss happens when sound waves are not able to be conducted proficiently via the outer ear canal to the tympanic membrane and the three tiny bones of the middle ear. It typically involves a decrease in sound waves in the middle ear and it can be corrected through surgery or medical interventions. Sensorineural hearing loss (SNHL) also happens when there is an injury to a hearing nerve passageway or damage to the cochlea within the inner ear connecting to the brain. It is often not medically or surgically corrected which most of the time make it permanent. Those suffering from this type of loss find it very difficult to hear sound either faint or loud (Angelis, 2012).

2.2 Prevalence of Hearing Loss

The WHO (2008) projected, more than 360 million people all over the world have problem with disabling hearing loss which constitutes 5.3% of the total world population, roughly 183 million grown-up men exceeding 15 years old whereas 145 million women plus 32(9%) millions of these figures are youngsters. According to WHO, these figures are anticipated to be twice by the year 2030 and 2050. It is measured as the most occurrence impairment in the world.

2.2.1 Prevalence or Occurrence in the world among Children

Hearing loss in children is unevenly circulated all over the world. Studies in the emerging countries especially population wise are unusual, mostly among children and infants are not scientifically screened for hearing problems. Prevalence in children with hearing loss seems to be considerably greater in middle- and low-revenue countries more than in high-revenue countries, representing the universal need for responsiveness to hearing problems. Nearly 32million of youngsters in the world's populace have some grade of hearing loss. Studies done by Shield, (2006) indicate that fifty per cent of the affected ones have disabling hearing loss (Shield, 2006).

Sub-Saharan Africans, South and East Asia people remains the world areas with the greatest occurrence or prevalence of hearing loss in both grownups and youngsters. Explanation to this is due to high grades of pre- and post-natal infantile infections like chronic otitis media, rubella, meningitis, use of ototoxic drugs, measles, and excessive noise exposure (Colin, 2000). Between 15-20 high occurrence or prevalence's in children are considered to be due to greater rates of infections like Acute or chronic otitis media,

and meningitis. Excessive noise exposure, and ototoxic drugs use in the low revenue countries also increase the prevalence of hearing loss.

According to Blanchfield et. al., (2001), as many as 738,000 individuals in the U.S. have severe to profound hearing loss. Of these, almost 8% are under the age of 18.

The absence of a complete health care structure, especially audiological and hearing care at primary and secondary levels of health care, absence of trained professional at all levels, deprived personal cleanliness and overcrowding, poor availability to medications and lack of additional prevention interventions. Lack of active national planning programmes for hearing care services, little resource distribution in this area also contribute for these high prevalence rates of hearing loss in youngsters in low and middle revenue countries (Shield, 2006).

Prevalence of hearing loss among youngsters in Europe is also not well defined, owing to the fact that, the countries has its own grouping or ranking for hearing loss. As a result, data comparison from numerous studies is problematic. Furthermore, majority of work have concentrated on prevalence among the aged from 65 years and over and there are rare thorough reports on the occurrence or prevalence of hearing loss of different ranks among youngster or children. There is clearly indication of knowledge gap and appreciative way of how hearing loss disturbs children that desires to be addressed (Shield, 2006).

Standardized processes needed when gathering and reporting epidemiological data on hearing impairment among children and adults is essential. As a result, WHO delivered a classification on hearing loss and endorses countries to practice standard audiometric within population based studies (Collins, 2000). WHO has established a review protocol, Ear and Hearing Conditions Survey Protocol, so that standardize certain aspects of survey

method can be ensured in addition to hearing ranks. In emerging or developing countries more than 12 reviews have been piloted in developing countries based on this standardized protocol (Stevens *et. al.*, 2011).

Shield, (2006) described that 19 per cent men and 13 percent women over 16 years of age in UK report suffering from hearing loss (Shield, 2006). More than half of the European countries population studied were greater than the 10% usual prevalence rate frequently considered the universal prevalence of hearing loss.

According to Hear-it.com (2011); Professor Adrian Davis from British MRC Institute of Hearing Research evaluates that "*the total number of people suffering from hearing loss of more than 25 dB will exceed 700 million worldwide by 2015. Davis's statistics suggest that more than 900 million people worldwide will suffer from hearing loss of more than 25 dB in 2025. Of those 900 million hearing impaired in the world in 2025, some 90 million will be Europeans. Generally, more is known about the incidence and prevalence of hearing loss in Europe and the United States due to the development of the healthcare systems. This sophistication allows for better record keeping and facilitates more accuracy than in underdeveloped countries where data is scarce."* (Hear-it, 2012).

All-inclusive, the different types of studies and approximations indicates that hearing loss is more common than formerly believed that young adult and youngsters are also affected.

2.3 Determinants of Hearing Loss

In this section the traditional and non-traditional determinants of hearing loss and the individual determinants are discussed below.

2.3.1 Ear Diseases and Infections

Parasitic infections, viral and bacterial are some of causes of hearing loss. Infections in the middle ear are significant causes of hearing loss for several children all over the world. For instance, chronic suppurative otitis media remains the commonest effect of hearing loss among children in emerging or developing countries (WHO, 1986). Youngsters are more predisposed to ear infections than grown-ups because the Eustachian tube, being the passage between the middle ear and the pharynx or back of the throat is smaller and horizontal compared to adults own. This makes it more simply obstructed by inflammation from infections in the ear, adenoid, and tonsillar enlargement which blocks the Eustachian tube and weakens aeration and drainage in the middle ear, therefore inhibiting drainage of infected fluids (WHO, 2004).

2.3.2 Chronic suppurative otitis media (CSOM)

This is middle ear infections which are caused by chronic bacterial, and it is a main cause of hearing loss in low- and middle-revenue countries. It is associated with perforation of the ear drum and can lead to demise from complications like meningitis and brain abscess (WHO, 2004; 1996 and Smith *et. al.*, 1988).

According to the World Health Organization, *"High rates of chronic otitis media have been attributed to overcrowding, inadequate housing, poor hygiene (through transmission of the pathogens by physical contact with a contaminated individual, inhalation of infected droplets, or contact with an infected surface), lack of breastfeeding, poor nutrition, passive smoking, anecdotally to wood-burning smoke, high rates of naso-pharyngeal colonization with potentially pathogenic bacteria, and inadequate or*

unavailable health care. Poverty is a major risk factor in developing countries and certain neglected populations." (WHO, 48: Rupa *et al*., 217).

Because of user-friendliness of ear care services with appropriately competent staff together with topical and broad spectrum antibiotic treatments, chronic otitis media has significantly reduced in high revenue countries. Nevertheless, it continues to be a serious public health concern in several low- and middle-revenue countries.

2.3.3 Childhood Untreated infections

The problem of access to health care services and additional factors like overcrowding and deprived or poor personal hygiene causes lots of children in developing countries to develop problems with their hearing as a result of infections like meningitis, measles, viral encephalitis, influenza chicken pox, and mumps etc. In the supposed "meningitis belt" now in the sub-Saharan Sahelian areas of Africa, epidemics of meningococcal infections that affect the menningis occurs frequently, as such most fighters are left with permanent ear hearing loss with additional neurological sequelae (Smith, 1988).

2.3.4 Congenital hearing loss

Congenital hearing loss simply means hearing loss that is present at the time a child is born or preset at birth. It can be inherited or non-inherited (acquired) factors. Acquired factors recognized to cause hereditary or congenital hearing loss are associated to gestation, birth delivery and maternal diseases/ infections throughout pregnancy, example like rubella (German measles), herpes simplex virus, born before date or

prematurity, Low birth weight usually below 2.5kg, Brain and facial abnormalities, injuries at birth, Substances including drugs and alcohol taken by the pregnant mothers , Problems associated with severe jaundice or discoloration in the newborns frequently as a result of maternal-fetal blood incompatibility, pregnancy induced diabetes, deficiency of oxygen etc. (Lin and Liux, 2012).

Hearing loss as a result of hereditary deficiency can be existent at birth and can also develop later in future. Most hearing loss as a result of genetic defect can be termed as autosomal recessive or dominant, associated to X-chromosome patterns. Both parents with autosomal recessive hearing loss transfer the recessive gene and carry it alongside to their children. Inter marriages among cousins, particularly head or first cousins, in certain societies or groups of people contribute to this type of genetically inherited syndromes (Angelis, Lin and Liux, 2012).

Hearing loss associated with autosomal dominant happens when an odd gene from either one of the parent causes hearing impairment though the corresponding gene from the other partner is normal. Other abnormal hereditary syndromes like down, usher, treacher collins, and Alport syndrome etc embrace hearing loss as fragment of the syndrome (Angelis, 2012).

2.3.5 Trauma and Injuries

Head injury, sudden loud noise also known as acoustic trauma, tumors in the brain, ear, and other surrounding organs can produce sensori-neural hearing loss. The hearing or auditory nerve then is not capable to send electrical signals as in the form of sound waves to the brain for interpretations.

2.3.6 Prolonged or excessive noise Exposure

Prolonged or excessive noise exposure to high intensities of noise is one of the most common cause of hearing loss in grownups and youngsters but hearing loss in the old age is mostly potentiated by noise and has the greatest prevalence in the aged (ASHA, 2012; Newton, Alberti and Smith, 2012) Prolonged exposure to noise in an excessive period and intensity causes loss of the hair cells within the organ of corti to be destroyed gradually and subsequently death occurs as a result due to ischemia of the hair cells called cellia, thereby increasing metabolic action leading to unnecessary responsive to oxygen species (ROS). (Henderson *et. al., 2006*).

Prolonged excessive exposure to high intensities of noise example during loud concerts and continual use of head or earpieces contributes to hearing loss. It is also an actual problem for military men and women especially those exposed to noise bombings, hunters also face same problems since exposure to fire rifle is a concern, pilots and other industrialized personnel especially those in low and middle income countries are more likely to be lacking of accessible protections, laws and regulation to implement. This type of hearing loss can temporary or permanent. Another name for this loss can be called temporary threshold shift or permanent threshold shift.

As time goes on, the area of the cochlea where the cellia or hair dysfunction occurs originally is associated to the noise intensity that affects it, partially due to straight mechanical destruction. Over-stimulation of the cellia or hair cells causes extreme generation of permitted radicals, which might remain for some time after the original trauma to the inner ear.

2.3.7 Ototoxic Medications and other chemicals toxic to The Ear

Some drugs and medications are considered harmful to the ear in certain amount being low or high index as they may cause damage or injury of hair cells in the organ of corti. More than 200 drugs or medications are known to be ototoxic medications these are drugs that are included in medicines that are normally used to treat serious diseases and infections. (Henderson D *et. al., 2006;* McKeage, 1995; Rybak *et. al., 2007;* Chen *et. al., 2006;* Curhan *et. al.*, 2012 and Gürkov *et. al.*, 2008). Hearing loss associated to these drugs are mostly dependent on the dosage administered, but some of these drugs can occasionally be reversed when the drug treatment is withdrawn examples are quinine, salicylates, antibiotics, loop diuretics etc.

At times, however, the damage is not reversible. Ototoxic drugs believed to cause irreversible damage comprises all generally used aminoglycoside broadspectrum antibiotics, example streptomycin, kanamycin and neomycin etc. These drugs affect the organ of balance and cochlea though streptomycin has a superior cause on the earlier and neomycin performances largely on the latter (Newton, Alberti and Smith, 2012).

Amplified sensitivity to hard of hearing known to cause by aminoglycosides example amikacin can be genetically acquired from mother. Certain drugs known to be used to treat cancers like cisplatin, carboplatin can have effects on the cochlear in the inner ear which is related to aminoglycosides. Audiometric thresholds increased have been testified in certain studies in 75–100% of clients treated with cisplatin (Henderson *et. al.*, 2006) Ototoxicity in cisplatin results from the manufacture of reactive or responsive oxygen species (ROS) inside the cochlea, irresistible endogenous antioxidant mechanisms and producing permanent free–radical-related apoptosis of cochlea external hair cells. (McKeage, 1995).

Hearing loss of this nature generally affects both ears, permanent and is mainly severe in children with central nervous system malignancies and in grownups that has cancers in the head and neck, where base of the skull and brain could be exposed (McKeage, 1995).

Cochlear deadliness is mainly as a result of death of external hair cells of the organ of Corti (Rybak *et. al.*, 2007). The external hair cells as part of the cochlear where high intensity of noise are noticed die initially but continuously lesser frequencies are also affected. Inner hair cells are also lost later afterwards.

There are some medications recognized to cause reversible hearing loss and salicylate pain killers, erythromycin, quinine, and loop diuretics, furosemide, bumetanide etc are considered to be part. (Gürkov *et al.,* 2008), National Institute on Deafness and other communications disorders (NIDCD, 2012) and (Salvador *et. al.*, 2005).

Numerous industrial substances comprising, p-xylene, toluene, styrene, ethylbenzene, trichloroethylene have remained associated with poisonous or ototoxicity. Effects of diluents or solvents may be caused by exposure to high frequencies of noise levels and may make noise encouraged hearing loss poorer. Injury occurs chiefly in the middle frequency range of hearing (Morata *et. al.,* 1994; Campo & Maguin, 2007 and Morata, 1998).

2.3.8 Impacted Earwax on Hearing

Cerumen or earwax is a brownish or yellowish substance produced in the ear canal of humans and other animals (AHRF, 2008). It keeps the skin of the human ear canal from bacteria, fungi and insects' infection. It also greases, cleans and provides some protection

from foreign bodies from entering the ear (AHRF, 2008). Excessive wax may block the passage of sound waves in the ear canal, which may cause conductive hearing loss. According to Oliveira, (1997) estimated that 60–80% of hearing loss in school children are caused by impacted wax. A study done by Lamptey *et. al,* (2004) among school children for hearing loss at sunyani in the Brong Ahafo Region of Ghana revealed 32.2% of the children either have one ear or both ears blocked with impacted wax causing hearing impairment.

2.4 Effects of Hearing Loss on Academic Performance

Academic performance or achievement is the result of education- the amount to which a learner, teacher or institution has attained their educational objectives which is usually measured by checkups or examinations and continuous assessment (ward *et. al.*, 1996). The influence of poor auditory perception on the initial growth of a child's language, theoretical and social- emotional competence can be pervasive.

When a child has a poor auditory perception as a result of hearing loss of initial onset even of moderately mild degree, the development of communication, educational and social achievement, which at a later age limit professional choices (Ross, 1991)

Hearing loss directly influences a child's capacity to interconnect children cultivate language and speech by earshot and reproducing sounds In their environment; because there is poor auditory perception hence, a child that cannot earshot all the sounds in Environment has trouble appreciating, connecting, and learning about the world. These children may be having an imperfect attention span. They may also have problems

following guidelines or demonstrate signs of tiredness as the school day progresses Many children with poor auditory perception in one ear do fine in school and their performance remains genuine by the loss. Nonetheless, studies have recommended that 25-35% of children with unilateral hearing loss are at danger for failing a grade in school (Bess, 1998). Another studies by Bess and Yoshinaga-Itano (1998) concluded that hearing loss and poor auditory perceptionof any degree left undetected, being mild in both ears (bilateral) and one ear (unilateral), badly affect speech, language, auditory perception, academic performance, and psychological development.

A number of studies have concluded that 1 in every 2 or 3 school-aged children with mild degrees of both ears hearing loss (bilateral) or one ear hearing loss (unilateral) have academic or educational, social and behavioral problems (Bess, 1998, Leiu, 2004, Oyler, 1987). The impact of hearing loss on academic performance as investigated by Oyler (1988) using 54,000 students came out that 106 students had unilateral hearing loss and review on their academic achievements showed unilateral hearing loss places a child at risk for academic failure especially when it is severe to profound or when its involved the right ear.

Hearing loss is not distinct common incidence among school children, nevertheless can also have additional severe significances more than what is normally comprehended. Described in the Journal of the American Medical Association, the occurrence of one-sided or two sided hearing loss in youngsters from 6 to 19 years was originate to be approximately 15 percent using a standard of 16 dB or extra in both the high and the low intensities or frequencies (Niskar *et. al*., l998).

Nisker *et. al.,* (1998) continue to say that depending upon the severity and magnitude of the hearing loss, it could be accountable for lacking or hindered talking and

linguistic skills, worse academic endeavors, and more unpredictable psychosocial alteration. However, the effects of hearing loss in children not only befall children who have moderate to profound loss, nonetheless may also be existent in children with one hearing problem(unilateral), slightest, or fluctuating conductive problems as well, because children with lesser grades of the losses might not openly show any seeming language or academic problems because these children are able to respond to face_ _to face communication but it is only when group presentation or thorough assessment is measured on a particular child, that lacks in a number of dimensions develop seeming as exposed in a study piloted by (Bess, Dodd_Murphy, & Parker 1998).

Furthermore, an investigation that ensured a representative sample of school children in study gave a prevalent rate of hearing loss as 11.3% and out of that, 5.4% had sensorineural hearing loss, and the rest had both mixed and conductive hearing loss, when they matched the academic and everyday status of those with hearing loss with their normal hearing colleaques, it came out that 37 percent of those with hearing dysfunctioning failed at minimum one grade, equated to a 2% failure percentage by their normally hearing colleagues. Also practical evaluations showed poorer rankings for stress, lack of self-honor or respect and public support for hearing impaired children (Bess, 1985).

Tharpe and Bess also found out that children with hearing loss were branded as cognitively sluggish, not bright, distracted, violent, or be naughty in their various institutions. Bess and Tharpe (1998) appraised the case histories of 60 School children suffering from HL with specific attention to the academic and common obstacles and discovered that 35% had failed at least one grade and this fraction was more than 10times greater than the normally hearing population, in which only 3.5% of the youngsters with

normal hearing had ever remained retained in a grade. Bess' study proposes that kids with hearing loss could not hear discreet speech sounds as follows "s," "sh," "f," "t," and "k." Hence, these are not included in their language or communications,

2.5 Prevention Strategies of Hearing Loss

2.5.1 Preventing exposure to excessive noise

Noise-induced hearing impairment is avoidable but is most of the time not prevented, mainly in low revenue or developing countries. The prevalence of noiseinduced hearing loss at the industries and other work places can be eliminated by means of effective presentation of engineering preventive measures and hearing protection packages. The use of ear plugs and special earmuffs when openly or exposed to high intensities of noise, turning down the volume of ear and headphones, designing reduced amount of loud machines, reducing noise contamination from automobile traffics, airplanes, manufacturing companies or industries, trains, all protective measures that can be used to mark a change (Shield, 2006).

All Countries should pass regulations and laws to decrease noise contamination in the workplaces and authorize satisfactory compensation, decrease public and other environmental noise birthplaces. Noise contamination or pollution must be supervised with sanctions imposed. Construction design needs to consider the audiological atmosphere for both persons with hearing defects and normal hearing persons. Adolescent, young grown-ups, and children must be educated on risk of exposing to high intensitie or levels of noise in concerts and clubs, from individual sound system, can irreversibly destroy their hearing; ear muffs must be readily accessible to all persons and role models

like musicians should set examples to make prevention of avoidable noise-induced hearing loss stylish (Ruben, 2012).

2.5.2 Preventing hearing loss associated to infectious diseases

Vaccination against vaccine avoidable or preventable infections more particularly measles, rubella, meningitis give way to decreasing the burden of hearing problems as sequalae of diseases eg mentioned above which is recognize to cause permanent hearing damage. According to Morris and Leach (2012) "*the largest gains in the prevention of severe to profound sensorineural hearing loss have come from the measles and rubella vaccines, and the protein-conjugated bacterial meningitis vaccines (targeting Hemophilus influenzae type b (Hib), pneumococcal and meningococcal disease)* (Ruben, 2012). *Most of the mild and moderate conductive hearing loss in the world is associated with otitis media. To some extent, OM is a vaccine preventable disease. In the future, the development of otitis media vaccines (or combinations of vaccines) that reduces colonisation and protect against common respiratory bacterial and viral pathogens has the potential to dramatically reduce the frequency of mild and moderate hearing loss in young children.*"

The Expanded WHO Programme of Immunization (EPI) cited in 1974 comprises measles vaccine and BCG, together will decrease hearing loss then latter through prevention of TB and meningitis affecting hearing loss and a decrease in the use of all drugs that are poisonous to the ear (ototoxic drugs).

Herd immunity is so much important in a country as such until coverage has attained 80%, Rubella immunization should not be presented so that herd immunity within a country is achieved. This is because rubella vaccine commenced earlier before herd

immunity produced effect called paradoxical effect for which many women attaining child giving age and are succeptible to rubella infection age will be given the opportunity for natural defense through infection during infancy therefore growth in incidence and prevalence of congenital rubella syndrome.

In the medium and low revenue countries, females who have attained child bearing age are screened for rubella succeptibility and given the vaccine before they get pregnant. Rubella vaccine being live attenuated is risky to pregnancy since it can lead to tetratogenicity to the unborn child. There it is given immediately after baby is born. Additional infections which have effect on hearing are being researched into example like HIV and *Cytomegalovirus* infection.

2.5.3 Screening

Worldwide neonatal screening programmes for neonates are very costly if completely implemented, and even in low and medium revenue countries there were assessments of the cost-efficiency and effectiveness plus cost-benefits analysis. The expenditure has disallowed introduction of universal neonates hearing screening (UNHS) in most countries. Several of the advanced countries and little developing countries have introduced universal neonate hearing screening (UNHS). Directed neonatal screening is most common in low and medium revenue (developing) countries (Ruben, 2012).

. In low- and middle-revenue countries, because of the difficulty in accessing to health care services, and it is not most of time feasible to introduce the screening. Child delivery mostly happens at maternity homes and traditional homes because health care facilities are occasionally at quite a few hours before reaching. The only thing so common is School

screening in advanced countries but fewer common in low and medium countries. Screening crusades for grown-ups and aged are though missing in most countries equal in advanced countries which needs to be implemented or introduced (Ruben, 2012).

2.5.4 Raising ototoxic drugs awareness and campaign

Small amount of people, additional with few health care expert, are aware that drugs and medications like non-steroidal anti-inflammatory drugs (NSAIDs) (e.g. ibuprofen and some analgesics, antibiotics lie gentamicin, streptomycin, anti-malarial treatment like quinine, chemotherapy agent, cisplatin additional to some diuretic medications and some industrial chemicals can have temporary or irreversible hearing loss. The American Journal of Medicine researchers published work that came out that consistent users of NSAIDs and are over 50 or earlier were more likely to have hearing loss by 61% compared to those who were not consistent or regular users (Morata, 1994).

Some of the prevention includes continual awareness creation through education and crusades or campaigns among the universal public, those with problem of hearing, health care expertise, and law makers. This must be in line with an enforceable pharmacological licensing, dissemination and clinical trying or testing programme (Ruben, 2012).

2.5.5 Genetic counseling

Some of the strategies to prevention comprises of genetic counseling for people who have inherited causes of hearing loss, upgraded primary ear and aural care services including more specialized personnel the area of ear care, improved ante-natal and perinatal care, nutritional supplementation in places where serious nutrients are deficient

(e.g. iodine), more extensive availability, accessibility, and affordable hearing aids and services that will fit and followed up.

2.5.6 Raising awareness creation among decision makers

Though hearing loss is measured as the most prevalent or occurrence of chronic loss universally, awareness creation of the issue amongst law makers or decision makers is very rare due to the fact that data from well-conducted, population-based epidemiological surveys are rare, particularly from low and medium revenue countries. The entire population incidence and prevalence must be monitored extending from children to aged would be helpful to implement suitable actions for prevention and apportion funding for research in the direction of better management and rehabilitation.

2.5.7 Therapies

Until now hearing loss (sensorineural) is not treatable but research into acoustic hair cell and nerve renewal has made significant progress. Cochlear implants, hearing aids and additional hearing amplification structures, more particularly in schools, can benefit person to improve partially his/her communication skills and auditory skills. Aural rehabilitation is important to deliver suitable exercise on how to best practice these devices and recover auditory capacity (Ruben, 2012).

2.5.8 Audiological Rehabilitation

Aural rehabilitation is the procedure of providing exercise and management to recover hearing for people with hearing impairment. Audiological rehabilitation services emphasis on adjusting to hearing problem to make the greatest usage of hearing

assistances, discovering assistive devices, managing dialogues and extra hearing tactics, and taking contol of communication among children and grownups. Aural rehabilitation emphasis on returning a ability that is lost.

Conversation in very young children such as speaking and appreciating it may not be present and it is a prerequisite skill that should be trained in the first place. The facilities and services that needs to be provided will be determined by the child's personal needs and these factors needs to be followed: age, onset of the loss, and the time loss was revealed, others like level of hearing loss, whether loss is permanent or temporary, whether the child had ever used hearing aid before and lastly but not the least guarantee or commitment and ability of the blood relation (mother and father). When hearing loss is detected early enough, the use of audiological aids and cochlear implants are very serious for the improvement of language, speech, and communication abilities in youngsters with hearing problems (Ruben, 2012).

A study done by WHO, (1997); Campo & Maquin, (2007) indicated that children whose hearing loss is recognized before they develop language about the age of six months and gets audiological aids (hearing aid) or implants have been found out to be having same language abilities like normal hearing children who are at the same age group (WHO, 1997; Campo & Maguin, 2007).

In the less advanced countries the charge or cost of hearing aid is unreasonable for most individuals with permanent hearing loss because of their state as such cannot afford it and even health care providers. Data on this issue is scarce in the less advance countries. Therefore, the cost of alleviating this entire burden nationally and globally is to make

primary Health care strong especially at the Ear, Nose and Throat care services units and department without forgetting to make services more affordable and accessible.

2.6 Chapter Summary

The literature review was dedicated to review relevant related studies in line with the objectives of the study. From the review both current and pertinent issues have been discussed. Notably; the nature and prevalence of hearing impairment, determinants of hearing impairment, effects of hearing loss on academic performance and finally strategies to address the effects. The literature review has showed that a lot of work has been done in several countries especially in Europe and America however only paucity of study had been done in Africa and Ghana in particular. Therefore, this present study aims to fill a knowledge gap in literature by assessing the determinants of hearing loss and its effects on students' academic performance in the Bibiani Anhwiaso Bekwai District in Ghana.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This section presents the study method, sampling procedure, data gathering technique, data analysis procedure, ethical considerations and the limitations of the research.

3.1 Profile of the Area of Study

`Bibiani Anhwiaso Bekwai District is located between latitude 6 degrees north and 3" north and longitudes 2 degree west and 3 degrees west forming the north-eastern part of the Western Region of Ghana. Bibiani is the District capital. The district is bounded on the north by the Atwima District in the Ashanti Region, west by sefwi Wiawso, south by Wassa Amenfi and east by the Denkyira north in the central Region and Amansiie East in the Ashanti Region respectively.

The total land area of the district is 873km square. The size of the district is 73sq.km and that of the national (Ghana) is 238,537sq.km. It is realized that the population density growth rate of 3.1 %(2000-2005) for the district is greater than the national rate 2.6 %(2000-2005). The district has a total of 237 registered basic schools in various communities in the district. The religious organization have contributed by way of their social responsibilities to the District by establishing a total of 88 schools representing 37% of total basic schools in the district.

This is made up of 113 kindergartens, 113 primaries, 68 junior secondary school (JSS), 3 senior secondary school, and 2 vocational schools. The Bibiani Anhwiaso Bekwai District has total number 956 teachers. 56% of this number is trained. Most of the untrained teachers 44% teach at the pre-school and primary schools level.

3.2 Methodological Approach and Design

The researcher adopted a descriptive cross-sectional design. This study design was employed because the data were collected from a population at one particular point in time (Junior High School students). The study assessed the occurrence of hearing loss among the sample population at a given point in time, which was then, used to determine the prevalence of hearing loss and its effects on their academic performance of the school children.

3.2.1 Quantitative research methods

In effect, basically, quantitative research is concerned with quantities or numbers, statistics, and the associations between events. In this study quantitative instruments were used to show relationship between the hearing loss and students' academic performance. Among the reasons for chosen the above design include; quantitative researchers attempt to stay detached from the study, and from the sample (Example in studies that involves human beings). They try to maintain impartiality – that is not to influence it with their personal values, feelings, and experiences. And are the hallmarks of the researcher.

3.3 Population of the study

According to Sampson (2012), the population is the group of individuals to which the results or conclusions, discussion of the results, and the inferences of the research is generalized. The population of the study consisted of all junior high school students within Bibiani Ahwiaso Bekwai District.

3.3.1 Sample Size of the study

Gall *et. al*. (1996) defined a sample as a selection from the population that the researcher wants to study. The total sample size consisted of 400 respondents. The learners were chosen because they had characteristics that are representative of the principal target group.

The sample size was found to be 400 students and was calculated as follows:

Sample size equation, Maccor (2015), $\frac{Z\alpha^2 \times p \times q}{d^2}$

Zα = 1.96 (C.I: 95%)

P= Expected prevalence

q= 1- p d= deviation

5%

P (Prevalence in literature review) =15%
d (deviation) = 5%

The sample size was found to be 176

Design effect was taken as 2.0; and accordingly the sample size was computed to be 352 students. The sample was increased by 15% to approximately 400 for reasons such as non-response and recording error.

3.4 Sampling procedure/ Technique

Sampling referred to the technique used to select a particular number of individuals or things from a population (Mertens, 1998). In addition, Gall *et. al.*, (2003) pointed out that it was only when a target population had been identified that a sampling procedure could be used. Probability sampling was used in selecting the four Junior High School from the Bibiani Anhwiaso District using simple random method. A census list for all the Junior High schools in the district was obtained from the district education office.

The schools enumerated were Bibiani District Assembly "A" JHS, AngloGold Bibiani Limited JHS, Brightest and Best JHS and District Assembly "B" JHS. The desired number of students or learners from JHS one and two were selected from each school using random and systematic sampling because it contributes to internal validity of data (Truthfulness).

Rationale behind the adoption of the above sampling techniques include: Using these method each component in the population has a recognized and same probability of being selected.

Again the techniques were applied because the known population is reasonably homogeneous, (students) this is because sample elements are evenly scattered over the population.

3.5 Instruments and procedure for data collection

The instruments and methods used for gathering data for this study were questionnaires and physical examinations using audiometry.

3.5.1 Questionnaires

Questionnaires were prepared and administered to learners that were selected for the research. Questionnaires were given to learners because it enabled the researcher to use the same question items to all respondents. Once the respondents are selected and time and venue is allocated to the researcher, questionnaires were administered. The researcher assumed the role of facilitator by explaining the questions so that the respondents could follow through as they answered. Upon completion of the questionnaires, the researcher scanned the questionnaires in order to ascertain which respondents had difficulty writing and answering the questions. This was observed from the illegible handwriting and gibberish writing that did not make sense.

3.5.2 Physical Examination

After the interview, the study participants were subjected to otoscopy examination to determine the presence or absence of outer, middle ear abnormalities. All findings were recorded in the examination forms. Participants with any form of ear infections were not allowed to the audiometric examination because it is a contraindication to undergo such examination.

3.5.3 Audiometry

The audiometer used was Qualitone (special instrument MPLS, MN55416) Screening Audiometer AS208 (INTERCOUSTICS) and screening audiometer AS608 (intercoustics). The purpose of the screening explained to them. A quiet room and van which is already sound proof was brought from Komfo Anokye teaching hospital for the test where the average noise level is about 41DB. All respondents were brought into the test room and the van in groups of twenty-five and instructed and presented with question on signs of possible hearing problems.

Respondent with any ear discharge and pains were excluded from the examination. Audiometric screening was carried out at three frequencies 1000Hz, 2000Hz and 4000Hz. The degree of hearing loss was based according to WHO criteria. For each ear, "pass" meant that subject has responded to all three frequencies. Failed also meant subject were not able to respond to any of the three frequencies and all results were recorded on the record sheet.

3.5.4 Pre-Testing of data collection instrument

The data collection instruments were pre-tested using a total of 30 JHS students from Akropong R/C School at Atwima Ngwabiagya District because it shares boundary with BABD. This was done to increase the validity and the reliability content of the study. A systematic sampling method was deployed to select the 30 students. Only the first and the second year's students were covered in the pre-testing. This is because the third years were writing to complete their BECE. Hence, they were excluded. The aftermath of the pre-test led to re-structuring of the data collection instruments with regards to the items

contained in the questionnaires e.g. parent education, professional background, income sources amongst others. The reliability and the validity protocols as posited by Leedy and Ormrod, (2005) were due followed to ensure completeness, accurate and dependable outcome.

3. 6 Data Analysis techniques

As Strydom *et. al.*, (2005), analysis of data is defined as finding responses by method of understanding or interpret the data and results. To interpret is to make meaning and find answers. Raw data cannot be explained because it's meaningless as such very difficult to understand. Before data is interpreted, it must first of all be described and analyzed. Examination or analysis explains the categorization, ordering, manipulating and summarizing data to attain solutions to research questions. The main reason behind analysis is to decrease data to an understandable and interpretable form in order to find relationships between the research problems so that it can be verified and draw conclusions on them. Interpretation precedes the results so that it can be analyzed, making inferential relevant to the research relationship studied and conclusions drawn about these relationships. For the purpose of this study, Data Entry Screens were developed in Excel for Entry. This useful to the quantitative data collected. STATA Version 12 was used for the analysis. Frequency distribution one and two were obtained.

Regression analyses were used to analyze data. This is due to its modified features.

Reliability

Leedy and Ormrod (2005) describes reliability of a measurement device is the degree to which it produces reliable results when the representative under study has not been changed. To ensure reliability or consistency of measurement device or instrument, the researcher first implemented standardizes the device from one unit or person to other to ensure the instrument is reliable because the instruments or device used were based on their previous experience on assessing hearing loss and their results were projected to be trustworthy or credible. Bases on the credibility of designated respondents, equal answers or results would undoubtedly be given to a new independent researcher. Furthermore, unclear terms and definitions were not included in interviews to prevent confusion.

3.7 Ethical considerations

The following ethical issues which were considered are explained below:

Permission to conduct the study

Bell (1993) pointed out that no researcher could demand access to an institution, organization or to materials. Therefore, the researcher sought permission to conduct the study using an introductory letter from the University. This letter was handed over to the Education Standards Officers who introduced the researcher to the head teachers. The head teachers then authorized the respondents to partake in the study.

Informed consent

Respondents in the work were knowledgeable about the nature, as well as the purpose of the study, and informed consent was sought before interviewing and

administering questionnaires to them. The educational institutions were fully aware of the study and were very cooperative and participated fully.

Confidentiality and anonymity

As stated by Neuman (2000), an investigator had an ethical obligation to maintain confidentiality of data, which included keeping client or units' information confidential from others on the ground and masking members' designations in field notes. It is contrary to this background that respondents were also assured of high levels of confidentiality. False name was used to guard the anonymity or namelessness of the respondents in all transcriptions and reports. In addition, the respondents were informed that the information gathered was purely for academic purposes.

3.8 Limitation of Study

In this study, the emphasis was on attempting to present the actual prevalence of hearing loss amongst the school children. It drew the attention of policy makers, advocates and significant others or groups to the situation at hand. This research did not address areas like management of hearing loss. The data were collected from JHS children (JHS one and two) who reported their perception on hearing loss. The study was cross-sectional and the conclusion may be hypothesis.

Sample size was possibly in adequate to enable firmer findings on the association with academic performance,

3.9 Chapter Summary

Logical sequence and procedures for carrying out the study have been described. These include issues of research design, data, and sampling techniques of the study. Combinations of methods would be used to achieve the study objectives. This would make it possible to do in-depth analysis to achieve reliable results. The next chapter presents the result of the field survey.

CHAPTER FOUR

RESULTS

4.0 Introduction

This part presents the quantitative analysis of the data collected on assessing the determinants of hearing loss and its effects on academic performance among students. The academic performance of those diagnosed with hearing loss were also assess to establish a causal relationship between the two (hearing loss and academic performance). The details of the analysis are presented below.

4.1 Background (sociodemographic and economic) characteristics and hearing impairment of the students

Total of 400 students were sampled from the schools selected within the district school census list. Among the 400 students enumerated, 202 (50.5%) were female and 198 (49.5%) were males with none of the students absent on the day of examination. The total number of first year students were 177 (44.3%) whiles second years were 223(55.7%). 246(61.5%) students attended public primary school whiles 154(38.5%) students attended private primary school.

The mean age of the students was 14.7 with standard deviation of 1.16. Christians were 91% out of the students' sample whiles 9% being Muslims. Total number of 78 students had a favorite subject and out of that 53.9% liked Arts and other subjects' whiles 46.1% liked science. Among the mothers who attended school, 34.6% attended school beyond JHS, 48.7% had up to JHS whiles 16% had no education. Among the fathers who also attended school, 55.1% had education beyond JHS, 40% had up to JHS, and 5.13% had

no education. Among the total number of students screened, 119 (29.8%) of their parents possessed a car whiles 281(70.2%) do not have a car.

Students who had a family member with hearing loss were 141 (35%). Out of the total number of students with hearing loss, 42.3% of family members had a family history of hearing impairment whiles 57.7% of their family do not have family history of hearing loss. Table 2 shows the sociodemograhic and economic characteristics and hearing loss.

Table 4.1. Background (sociodemographic and economic) characteristics and hearing impairment among the school children in BABD (N-400)

		Hearing impairment				
		Yes	No	OR	95% CI	P-value
Gender	Male	41(52.6%)	157(48.8%)	1.16	0.71-1.91	0.55
	Female	37(47.4%)	165(51.2%)	1.00		
Age	<15yrs	32(41.0%)	133(41.3%)	0.99	0.60-1.64	0.96
	>=15yrs	46(9.0%)	189(58.7%)	1.00		
Educational level	First year	25(32.1%)	152(47.2%)	0.53	0.31-0.89	0.02
	Beyond 1st year	53(68.0%)	170(52.8%)	1.00		
Religion	Christian	71(91.0%)	293(91.0%)	1.00	0.42-2.39	0.99
	Moslem	7(9.0%)	29(9.0%)	1.00		
Favorite subject	Arts & others	42(53.9%)	178(55.3%)	0.94	0.57-1.55	0.82
	Sciences	36(46.1%)	144(44.7%)	1.00		
Primary school attended	Public	57(73.1%)	189(58.7%)	1.91	1.10-3.31	0.02
	Private	21(26.9%)	133(41.3%)	1.00		
Mother's highest educational level	Beyond JHS	27(34.6%)	83(25.8%)	1.62	0.77-3.20	0.28
	Up to JHS	38(48.7%)	174(54.0%)	1.09	0.54-2.18	
	None	13(16.7%)	65(20.2%)	1.00		
Father's highest educational level	Beyond JHS	43(55.1%)	165(51.2%)	1.89	0.63-5.69	0.52
	Up to JHS	31(40.0%)	128(39.8%)	1.76	0.57-5.39	
	None	4(5.13%)	29(9.0%)	1.00		
Parents possession of a car	Yes	17(21.8%)	102(31.7%)	0.66	0.33-1.08	0.09
	No	61(78.2%)	220(68.3%)	1.00		

Family history of hearing impairment	Yes	33(42.3%)	108(33.5%)	1.45	0.87-2.41	0.15
	No	45(57.7%)	214(66.5%)	1.00		

4.2 Prevalence of hearing loss among the students

The overall prevalence rate of hearing loss in both male and female was 19.5%. The prevalence rate was slightly high among male students (20.7%) compared with female students (18.3%). Out of the number of student with hearing loss, (31%) had right unilateral hearing loss, (26.3%) also had left unilateral hearing loss and 19.5% had hearing loss in either one of the ear hearing loss. Hearing loss among the students according to their educational levels was 14.1% being in their first year whiles 23.8 also in their second year. Final years were out of school by then.

4.3 Determinants of Hearing Loss

4.3.1 Bivariate analysis

The possible determinants influencing hearing loss, using bivariate analysis was performed. In the bivariate analysis, hearing loss was found to be associate with five variables (Reddned painful ear infections with p value and odds ratio 2.20 <0.01, Itching ear infections with p value as <0.01 and odds ratio 2.10, and Prolonged noise exposure with p value and odds ratio as <0.01 and 2.16 respectively, educational level of students with p value0.01 and odds ratio1.95, and primary school attended with p value 0.02 and odds of 0.52. There was no statistically significant association between hearing loss and exposure to ototoxic drugs use, family history of hearing loss, congenital abnormality, and lastly children's own perception of hearing impairment on themselves. Table 3 below shows bivariate analysis of hearing loss and their determinants.

Table

4.2:. Determinants of hearing (Bivariate Analysis) among school children in BABD (N-400)

		Hearing impairment				
		Yes	No	OR	95% CI	Pvalue
Sharp painful tooth	Yes	68(87.2%)	274(85.1%)	0.84	0.40-1.74	0.64
	No	10(12.8%)	48(14.9%)	1.00		
Non-bloody discharge	Yes	70(89.7%)	8(10.3%)	0.85	0.38-1.91	0.70
	No	284(88.2%)	38(11.8%)	1.00		
Hearing difficulty	Yes	59(75.6%)	251(78.0%)	1.14	0.64-2.03	0.66
	No	19(24.4%)	71(22.1%)	1.00		
Bloody discharge*	Yes	76(97.4%)	308(95.7%)	0.58	0.12-2.60	0.48
	No	2(2.56%)	14(4.4%)	1.00		
Red and painful ear	Yes	43(55.1%)	235(73.0%)	2.20	1.32-3.66	<0.01
	No	35(44.9%)	87(27.0%)	1.00		
Itching ear	Yes	19(24.4%)	130(40.4%)	2.10	1.19-3.69	0.01
	No	59(75.6%)	192(59.6%)	1.00		
Foreign body in ear	Yes	50(64.1%)	241(74.8%)	1.67	0.98-2.82	0.06
	No	28(35.9%)	81(25.2%)	1.00		
Ear injury	Yes	56(71.8%)	220(68.3%)	0.85	0.49-1.46	0.55
	No	22(28.2%)	102(31.7%)	1.00		
Prolonged noise exposure	Yes	29(37.2%)	181(56.2%)	2.16	1.30-3.61	<0.01
	No	49(62.8%)	141(43.8%)	1.00		
Exposure to ototoxic drugs	Yes	68(87.2%)	280(87.0%)	0.98	0.47-2.05	0.96
	No	10(12.8%)	42(13.0%)	1.00		
Congenital abnormality	Yes	75(96.2%)	306(95.0%)	0.77	0.22-2.69	0.68
	No	3(3.85%)	16(4.97%)	1.00		
Teachers' perception of hearing impairment	Yes	37(47.4%)	139(43.3%)	1.18	0.72-1.94	0.51
	No	41(52.6%)	182(56.7%)	1.00		
Child's own perception of hearing impairment	Yes	36(46.2%)	135(42.1%)	1.18	0.71-1.94	0.51
	No	42(53.9%)	186(57.9%)	1.00		

4.3.2 Multivariate analysis

The multivariate analysis showed that educational level of students, Primary schools attended, Reddened and painful ear infections, itching ear infections and prolonged noise

Table

exposure were independent predictors' variables associated with hearing loss whiles ototoxic drugs was not independent variable. Table 4 below shows multivariate analysis of the determinants of hearing loss.

2.3 : Multivariate analysis of the determinants of hearing impairment

VARIABLE		AOR	95% CI	P-value
Educational level	Yes	1.95	1.17-3.26	0.01
	No	1.00		
Primary school attended	Public	0.52	0.29-0.91	0.02
	Private	1.00		
Red and painful ear	Yes	1.95	1.14-3.33	0.01
	No	1.00		
Itching ear	Yes	1.79	0.99-3.24	0.53
	No	1.00		
Prolonged noise exposure	Yes	1.78	1.04-3.06	0.04
	No	1.00		

4.4: Effects of Hearing Loss on Academic Performance

To analyze the possible effects of hearing loss on academic performance was assessed using four main levels, Teachers grade of child's academic performance, child with record of repeating in a class, delayed entry into primary one and delayed entry into primary six were the main outcome variables. Above average to Excellent were considered academically satisfactory and poor to average was also considered to be unsatisfactory. Children with record of repeating a class, delayed entry into primary one and delayed entry into primary six were dependent variables. Those with hearing loss were 1.63 times more likely to be considered by teachers' average to poor students, however this was not

Table

statistically significant with p value more than 0.05. Table 5 below shows effect of hearing loss on academic performance.

4.4. Effect of hearing impairment on academic performance

		Teacher's grade of child's academic performance				
Hearing impairment		Poor-to-average	Above average-to-excellent	OR	95%CI	P-value
	Yes	58(22.0%)	20(14.7%)	1.63	0.93-2.86	0.08
	No	206(78.0%)	116(85.3%)	1.00		
		Child with record of repeating a class				
		Yes	No	OR	95%CI	P-value
	Yes	18(18.2%)	60(19.9%)	0.89	0.50-1.60	0.70
	No	81(81.8%)	241(80.1%)	1.00		
		Delayed entry into primary 1				
		Yes	No	OR	95%CI	P-value
	Yes	25(17.9%)	53(20.4%)	0.85	0.50-1.44	0.54
	No	115(82.1%)	207(79.6%)	1.00		
		Delayed entry into primary 6				
		Yes	No	OR	95%CI	P-value
	Yes	27(18.1%)	51(20.3%)	0.87	0.52-1.46	0.59
	No	122(81.9%)	200(79.7%)	1.00		

Table

CHAPTER FIVE

DISCUSSION

5.0 Introduction

This chapter discusses results from the preceding chapter on assessing the determinants of hearing loss and its effects on academic performance among students diagnosed with hearing loss. The results were linked to existing literature to collaborate or debunk the findings.

5.1 Prevalence rate of Hearing Loss

The prevalence rate of hearing loss among respondents was high comparatively with previous works (Yamamah,2012; Olusanya, 2000). This stems from the fact that 19.5% out of the four hundred students who were selected randomly for this study were having hearing loss.

The (19.5%) prevalence rate of hearing loss unearthed by the study was high and is in line with Colin, (2000) observation that people from South and East Asia and subSaharan Africa continue to be the world regions with the greatest prevalence of hearing impairment in youngsters or children. This can be described by the high degrees of pre- and post-natal infantile infections like chronic otitis media, rubella, meningitis, measles, use of drugs that are poisonous to the ear (ototoxic drugs) and excessive noise. Shield (2006) on the other hand ascribed the high prevalence of hearing loss in sub Saharan Africa mostly especially to the dearth of a comprehensive or complete health care system, particularly ear and hearing prevention interventions and care at primary, secondary and

tertiary stages, absence of trained staffs at all levels or stages, deprived and poor personal hygiene, overcrowding, poor availability and accessibility to drugs, lack or absence of national policy planning and program for auditory and hearing care including little resource allocation.

The prevalence rate in the present study was higher than the figure 10% reported in the world (shield 2006). It was however in line with UK studies of hearing loss reported which had a higher prevalence more than the worlds own (WHO, 2012; Colin, 2000)

This current studies also reveal higher prevalence (20.7%) in males more than females (18.3%) and is in accordance with (WHO, 2012; AJM, 2010). According America Journal of Medicine, the higher prevalence in males is due to reasons due to noisy male dominated occupations such as constructions and factory works. (AJM, 2010).

5.2 Determinants of Hearing Loss

The results revealed the determinants of hearing loss as solicited from students. A positive association was seen between the prevalence of hearing loss and Reddened and painful ear infections in the present study in the sense that children who had had experienced reddened ear infections were 2.20 times more or extra likely to have hearing loss in either one of their ears than students who had not had the experience in the bivariate analysis whiles in the multivariate analysis students who had had reddened ear infections were 1.95 times likely having hearing loss than those without it. Previous studies have also confirmed a significant correlation between prevalence of ear infection and hearing loss (Smith et al. 1998, WHO. 2004). A reddened ear infection is caused by bacterial in

the central and middle ear, which is a significant cause of hearing loss in low- and middle-revenue countries. Reddened ear infections (otitis media) are linked with perforation of the ear drum and can cause death in the ear drum because of complications like infections of the meninges or brain abscess (WHO, 2004; 1996 and Smith *et. al*, 1988).

Itching ear infections (Acute or Chronic otitis media) was also found to be significantly associated with prevalence of hearing loss in this study. This study reveals students who had itching ear infections were 2.10 times more likely to have hearing loss in one or both ears than those who had no experience of itching ear infections. As stated by WHO, (2004), high rates of itching ear (otitis) have been ascribed to overpopulation, insufficient housing, underprivileged or poor hygiene through transmission of pathogens by bodily contact with contaminated persons, breathing of infected droplets, absence of breastfeeding, insufficient nutrition, Inhalation of second hand smoking anecdotally to wood-burning, high rates of adenoid and tonsillar colonization with possibly pathogenic bacterial and insufficient or lack of health care (WHO, 2004). Reasons of hearing loss due to reddened and painful ear infections, itching ear infections among the students in the district could be due to the fact of improper management of reddened painful ear infections which makes it difficult to control it during infancy and this increase level of hearing loss among the children. For this reasons parent of these children always patronizes any drug, herbs and concoctions to cater for them as treatment.

Prolong noise exposure was significant determinant linked with prevalence of hearing loss in this study because students who had experienced prolonged noise exposure were 2.16 times more likely to have hearing loss in one or both ears than those who had had no experience in the bivariate analysis while multivariate analysis showed

1.78 times more getting hearing loss and is in line with other works done (ASHA,2012; Newton, Alberti and smith,2012). It is thought to lead to hearing loss because exposure to high intensities of noise is the greatest common effect of hearing loss in grownups and children. Excessive exposure to high level and duration of noise leads to progressive loss of the hair cells in cochlear within organ of corti which then finally damage and kills the cochlear. It also leads to ischemia of the innermost ear, and high metabolic activity causing excessive reactive oxygen species generation and fat peroxidation (Henderson *et. al, 2006*).

Reasons to this present study hearing loss is due to prolonged noise exposure intense and or continues exposure of blasting in the mines and the dangers associated with it since the district (Bibiani) is a mining town as such children and the people are not well informed and not abreast with protective devices for people in that environment that could cause noise induced hearing loss as such children getting hearing loss because of intense and continuous exposure of blasting in the mines and the dangers associated with it

Educational level of student was significantly associated with student hearing loss in that students in their first year were 1.95 times likely to be hearing impaired compared with other students beyond first year which means that those in the first year were likely to have been exposed to generational cause as they grew in their academic calendar, More likely to have been exposed to more prolonged noise as a result of the increase in small scale mining in the district since mining poses a lot of risk to hearing.

According to Henderderson, (2006), Prolonged exposure to noise in an excessive period and intensity causes loss of the hair cells within the organ of corti to be destroyed gradually and subsequently death occurs as a result due to ischemia of the hair cells called

cellia, thereby increasing metabolic action leading to unnecessary responsive to oxygen species (ROS). (Henderson *et. al, 2006*). Reasons still hold as said earlier in the prolonged noise exposure by the students.

Another independent variable associated was hearing loss was those who attended public school were less likely to be having hearing impairment. Students who attended primary public schools had 0.52 less likely to have hearing loss than those who attended private primary schools. This could be linked with economic empowerment. Meaning the main occupation in the district is mining and farming. Children with financially challenged parents may not be likely to be mining occupations and may be staying apart from where mining activities are compared with children who attended private primary schools so the noise from blasting of rocks, noise from machines in drilling of ores might have been affected these children. Previous works with (Smith *et. al.,* ***1988*****;** WHO 2004, 1996).

Determinants like ear injury and Trauma, Ototoxic drugs and chemicals, congenital and foreign body were not found to be associated in this study even though students who had had experienced with foreign body had 1.67 times more likely getting hearing loss but it was not statistically significant. Therefore this present study on trauma as a determinant was not in line with works reported by (Mckeage, 1995; Rybak et,al,.2007; Chen et, al,.2012 etc)

5.3 Effects of Hearing Loss on Academic Performance (Teachers' Assessment of Children)

The results revealed that those with hearing loss were 1.63 times likely to be considered by teachers' average to poor students, however this was not statistically significant with p

value of 0.08 which is higher than 0.05 and this study was not in line with previous works done by (Bess &Yoshinaga-Itano, 1998; Resinkoff, 2005). Possible reasons could be due to the fact that sample size was not enough to expect significance. Before this study was done, the prevalence size for the District was not known to estimate a true prevalent rate properly, the reason why good significance was not attained.

Children own assessment revealed 1.18 times likely to be considered by themselves hearing impaired whiles Teachers' perception of hearing loss on children also had same odds ratio with p values 0.51 which is far higher than 0.05. This means hearing loss cannot be relied on what teachers and children say because at 26 DB or higher, hearing loss cannot be detected by another person but only audiometer. Therefore, regular assessment on school children by audiometer must be done.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

This last section presents conclusion inferred from the discussion from the previous chapter on the assessment of the determinants of hearing loss and its effects on academic performance among students. The chapter also outlines recommendation for policy makers.

6.0 Conclusion

The prevalence rate of hearing loss among students was high comparatively to previous works since 19.5% of the student population was having hearing loss. Out of the overall, 19.5%, 31% of the children had right hearing loss whiles 26.3% had left hearing loss with 19.5% having either unilateral or bilateral hearing loss.

Hearing loss of respondents was acquired. With the acquired cause, children's vulnerability to infectious diseases like meningitis, otitis media, measles, and prolong excessive noise exposure to the ears caused the hearing loss of children. Children's Eustachian tube, the

Passage between the middle ear and the pharynx is smaller and extra horizontal hence vulnerable to damage. Through excessive noise too, their internal and external hair cells in the organ of corti present in the cochlea of the internal ear cannot self-reconstruct itself as they grow and hence leads to their hearing loss.

Hearing loss affected negatively on students' academic performances as reported by other studies but this present study revealed slightly higher p value than statistically

accepted standard. Since students hearing difficulty or hearing loss did not make them hear clearly and assimilated what they were taught by teachers. Therefore, 19.5% of the students after a performance assessment by their teachers nearly obtained poor to average records. This performance highlights the existence of unidentified challenges of which undetected hearing loss could be part. Hence proper investigation on exposures to determinants must be carried out by authorities with the aid of medical specialist to address the challenges for students with hearing loss to enhance better performance since prevalence of the district is now known

6.1 Recommendation

This recommendation is premised on guiding the major stakeholders; government and its ministry of health, district health and educational directorates, schools and parents/children in the devising and implementation of policy programs aimed at the prevention and mitigation of hearing loss among students in the District in order to ensure excellent academic performance.

Government/Ministry of Health (Policy Makers)

- Government in conjunction with stakeholders must create a hearing impairment prevention and treatment policy with awareness creation as the preeminent in the policy so as to arm people with the requisite preventive measures to acquired hearing loss. This awareness will influence people from refraining from things that could cause hearing impairment.

- Government must show commitment and will to the prevention and management of hearing loss by allocating adequate resources for the implementation of audiological prevention and treatment policy programs such as free screening exercises to identify hearing related problems in children and adults.
- Government must allocate funds into research to unearth effective preventive and treatment measures for hearing loss. In conjunction with the research, government in collaboration with experts must offer tutors of special deaf schools training to equip them with the requisite knowledge and techniques to be employed in tutoring hearing impaired students. Teachers must also be motivated to ensure their dedication and enhanced performance lecturing hearing impaired students.
- Government must task its security agencies to regulate noise making by prosecuting people who make excessive noise especially above the stipulated decibels in public.

District Health Directorate

- As major stakeholders in ensuring optimum health of society at the district or local level, the district health directorate must ensure that the requisite awareness program on the prevention and treatment of hearing challenges is created.
- The study's discovery of an alarming prevalence rate of hearing difficulties among its sample students necessitates the health directorate in conjunction with the district education directorate to conduct a comprehensive and expanded research with regards to the sample population in conjunction with the relevant stakeholders in order to have an apt representation of students in the district with

hearing challenges in order to find ways of mitigating these challenges on the larger sca

- The health directorate in the district must also effectively monitor and evaluate hearing loss mitigation programs in order to ascertain its success and challenges in order to provide the requisite support when and where needed.

District Education Directorate

- The district education directorate must collaborate with the health directorate in devising and implementing hearing loss prevention and mitigation programs in schools in order to avert students hearing challenges.
- The education and health directorates could jointly organize screening exercise in order to unearth undetected hearing loss among students for treatment so as forestall its future consequence on performance.
- Monitoring and evaluation of schools must be effectively and regularly done to ensure that schools execute their functions with regards to the provision of favorable teaching and learning environment for students with hearing loss

Parents and Children

- Parents and children should be educated by ENT specialist personnels about the harm in prolonged noise exposure and poorly treated otitis media infections.
- Children by themselves or preferably through their parents must promptly report any abnormality to their ear to health professionals so that swift treatment could be given them to avoid it degenerating into hearing loss.

SUGGESTIONS FOR FUTURE RESEARCH

- The effects of mining activities on hearing function needs to be further explored (e.g. among miners and people who live close to quarry sites).
- Similarly, the effects of hearing impairment on academic performance require further exploration.

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APPENDICES

QUESTIONNAIRES FOR STUDENTS

Dear Respondent,

I wish to introduce myself to you as a Master of Public Health (MPH) Student of the School of public Health, Kwame Nkrumah University of Science and Technology. As part of the programme, I am required to write a thesis with the tittle; assessing the determinants of hearing loss and its effects on students' academic performance. I would be most grateful if you could please spare some few minutes of your precious time to answer all the questions that follow. You are assured that all the data/information you provide would be treated with utmost confidentiality. I thank you in advance for your co-operation.

Instruction: Please tick (√) where applicable and supply details where required

Section A; covered the background information of the respondents (students)

1. **What is your gender?**

   [ ] Male

   [ ] Female

2. **How old are you?.....**
3. **What is your educational level?**

[ ] First Year

[ ] Second Year

[ ] Final Year

4. Indicate your Religion?

[ ] Christianity

[ ] Islamic

[ ] Traditionalist

Others

(specify)……..…….

5. What is the highest degree your mother attained?

[ ] Junior High School {JHS]

[ ] Senior High School

[ ] Training College

[ ] Elementary

[ ] Graduate

6. What is the highest degree your father attained?

[ ] Junior High School

[ ] Senior High School

[ ] Training college

[ ] Elementary

[ ] Graduate

7. Does any member of your family have ear/ hearing problem? [yes] [No]

Section B:

(i) Assessing the Determinants of Hearing Loss

The following are **Section B:**

(ii) Assessing the Determinants of Hearing Loss

The following are questions on assessing the determinants of hearing loss. Please tick yes or no as apply to your case

8. Have you ever visited Hospital with any of the ear conditions?

a. Very sharp painful tooth [Yes] or [No]

b. Fluid / Discharge in the ear [yes] or [No]

c. Hearing difficulty [Yes] or [No]

d. Blood coming from the ear [yes] or [No]

e. Reddened ear and painful ear [yes] or [No]

f. Itching ear [yes] or [No]

g. Foreign body in the ear [yes] or [No]

h. Parents remove something from the ear [yes] or [No]

i. Injury to the ear/trauma [yes] or [No]

K. HL due to sudden Noise exposure [Yes] or [No]

l. Sudden Noise Exposure [Yes] or [No]

j. Born with it [yes] or [no]

Section C

(i) Effects Of Hearing Loss on academic performance

Please the statements below focus on the effects of hearing loss among students

Answer yes or No.

Class Teacher's assessment of a child

1. **Do you feel this child have hearing difficulty/impairment? Yes Or No**
2. **In general ,how would you grade or assess this child academically?** A. Excellent B. Above Average C. C. Below Average, D. Poor E. Average
3. **Are you aware this child ever repeated in a class before?.....**

Child's Assesement

4. **Do you feel you have hearing difficulty?** Yes Or No
5. **Have you ever repeated in a class before**? yes or No.
6. **Is there a record of repeated position in one of the subjects below over the past two terms?** A, Mathematic B, English C. Religious and moral education D. Basic design and technology E. ICT
7. **At what age did you enter class one?**
8. At what age did you enter class six?
9. What was your position in the last two terms?

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF MEDICAL SCIENCES / KOMFO ANOKYE TEACHING HOSPITAL
COMMITTEE ON HUMAN RESEARCH, PUBLICATION AND ETHICS

Our Ref: CHRPE/AP/268/15

3rd July, 2015.

Miss Cecelia Opoku Agyemeng Jr.
Post Office Box KS10237
KUMASI.

Dear Madam,

LETTER OF APPROVAL

Protocol Title: ***"Assessing the Determinants of Hearing Loss and their Effects on Students' Academic Performance"***

Proposed Site: ***Bibiani-Western Region.***

Sponsor: ***Principal Investigator.***

Your submission to the Committee on Human Research, Publications and Ethics on the above named protocol refers.

The Committee reviewed the following documents:

- A notification letter of 18th May, 2015 from the Bibiani-Anhwiaso-Bekwai District Education Office (study site) indicating approval for the conduct of the study in the District.
- A Completed CHRPE Application Form.
- Participant Information Leaflet and Consent Form.
- Research Protocol.
- Questionnaire.

The Committee has considered the ethical merit of your submission and approved the protocol. The approval is for a fixed period of one year, renewable annually thereafter. The Committee may however, suspend or withdraw ethical approval at any time if your study is found to contravene the approved protocol.

Data gathered for the study should be used for the approved purposes only. Permission should be sought from the Committee if any amendment to the protocol or use, other than submitted, is made of your research data.

The Committee should be notified of the actual start date of the project and would expect a report on your study, annually or at close of the project, whichever one comes first. It should also be informed of any publication arising from the study.

Thank you Madam, for your application.

Yours faithfully,

Rev. Prof. John Appiah-Poku
Honorary Secretary
FOR: CHAIRMAN

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