

**PREVALENCE OF SPEECH DISORDERS IN SCHOOL
CHILDREN FROM CLASS ONE TO CLASS SIX IN OFFINSO
MUNICIPALITY IN ASHANTI REGION**

BY

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DECLARATION

I, Alexander Marfoh, author of this thesis, “*Prevalence of Speech Disorders in School Children from Class One to Class Six in Offinso Municipality in Ashanti Region,*” do hereby declare that, apart from reference to past and current literature duly cited in this thesis, the entire research work presented in this thesis was done by me as a student of the Department of Eye, Ear, Nose and Throat, School of Medical Sciences, and KNUST. It has neither in whole nor in part been submitted for a degree elsewhere.

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DEDICATION

I dedicate this work to my beloved wife, Anita Marfoh, and three children (Adwoa Tiwaa - Marfoh, Kwabena Mpiani - Marfoh and Alexander Kwadow Marfoh Jnr.).

To my cherished mother, *Lydia Adwoa Tiwaa Badu*, who washed my infant head when sleeping on my cradle bed and tears of joy affectionately shed.

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DEFINITION OF TERMS

Aphasia: An acquired impairment of language due to damage to the language – dominant hemisphere, typically the left.

Articulation of Speech: Production of speech sounds.

Apraxia of Speech: An impairment of motor planning for the movement for speech so that voluntary control for speech is disrupted

Cerebral Palsy: A developmental motor disorder related to brain injury.

Cleft Lip and Cleft Palate: A congenital fissure or absence of tissue of the lip, premaxilla, hard palate, and or velum.

Cluttering: A disorder of fluency characterized by rapid speech breaks in fluency, and faulty speech articulation of speech.

Disfluency: A breakdown in the flow or fluency of speech due to repetition, prolongations or blocks of sound, syllables or words

<i>Dysarthria:</i>	An impairment of motor control for speech caused by weakness, paralysis, slowness, incoordination, or sensory loss in the muscle groups responsible for speech.
<i>Fluency:</i>	The rhythm and flow of spoken (or signed) language.
<i>Hemisphere:</i>	Literally, half circle. In reference to brain anatomy, it indicates the half of the cerebrum or cerebellum to each side of midline.
<i>Incidence:</i>	The number of new cases that appear in a population over a set period of time.
<i>Language:</i>	The coding of meaning into a system of arbitrary symbols that are recognized by members of the community. Language may be spoken, written, or manual (signed).
<i>Prevalence:</i>	The total number of cases present in a population in a given period of time.
<i>Screening:</i>	The detection of individuals at risk for a condition (e.g., speech disorder)

Speech–Language Pathologist: A professional who specializes in the diagnosis and treatment of communication and swallowing disorders.

Speech–Language Pathology: It is a programme that evaluates a large range of communication and swallowing disorders. These include speech disorders: Articulation disorders, Fluency disorders and voice disorders.

Stuttering: The involuntary repetition, interruption, and prolongation of speech sounds and syllables, which the individual struggles to end

Tongue Thrust: Abnormal tongue positioning, particularly during swallowing, that may have an adverse effect on the anterior dental bite.

Voice: The production of sound by vibration of the vocal folds.

LIST OF ABBREVIATIONS/ACRONYMS

ADPR:	Annual District Performance Report
ASHA:	American Speech –Language –Hearing Association
CCC:	Certificate of Clinical Competence
C P:	Cerebral Palsy
ENT:	Ear, Nose, and Throat
GFTA:	Goldman-Fristoe Test of Articulation
KATH:	Komfo Anokye Teaching Hospital
KNUST:	Kwame Nkrumah University of Science and Technology
MDE:	Municipal Director of Education
NCHS:	National Center for Health Statistics
NIH:	National Institutes of Health
NIDCD:	National Institutes of Deafness and Other Communication Disorders
PAT:	Photo Articulation Test
SFA:	Speech Foundation of America
SLP:	Speech and Language Pathologist
SMS:	School of Medical Sciences
SODA:	Substitution, Omission, Distortion and Addition
SPSS:	Statistical Package for Social Sciences
WHO:	World Health Organization

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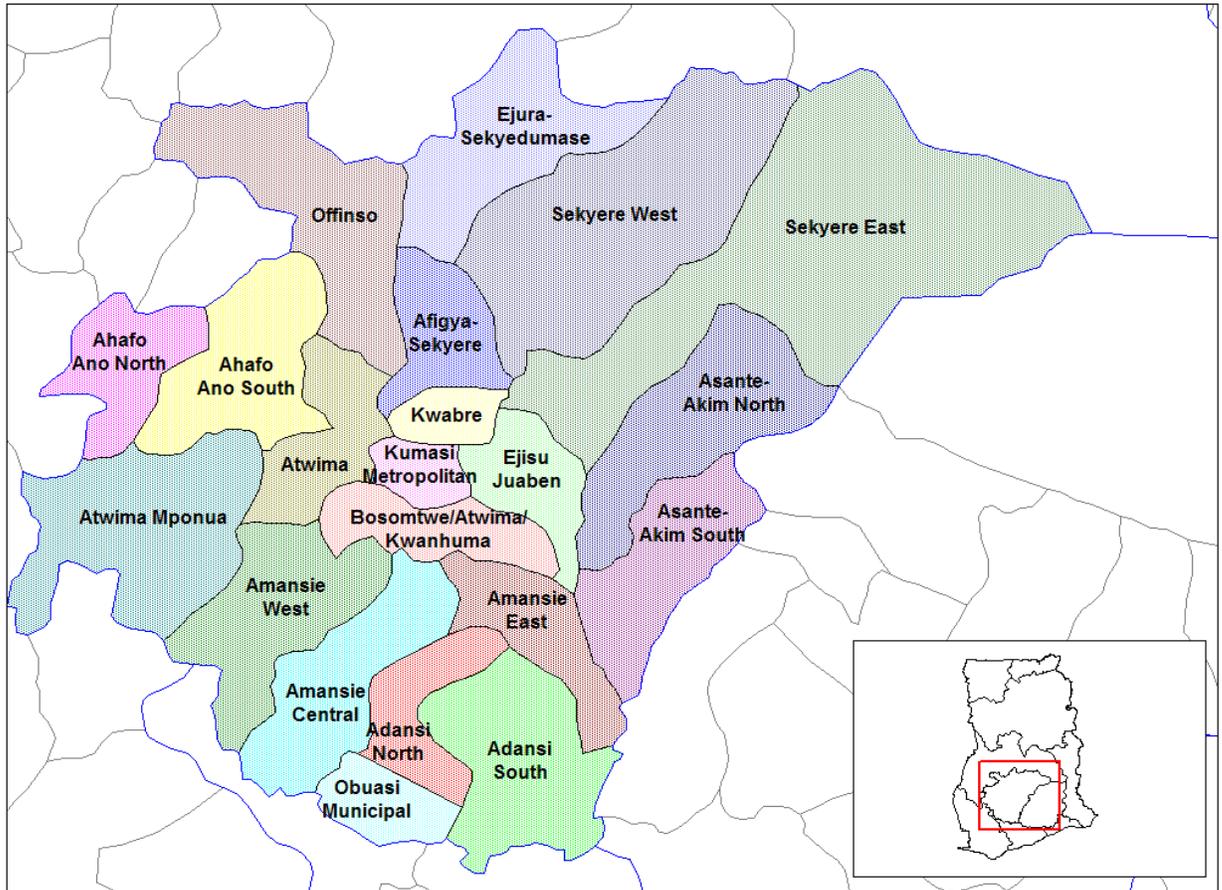
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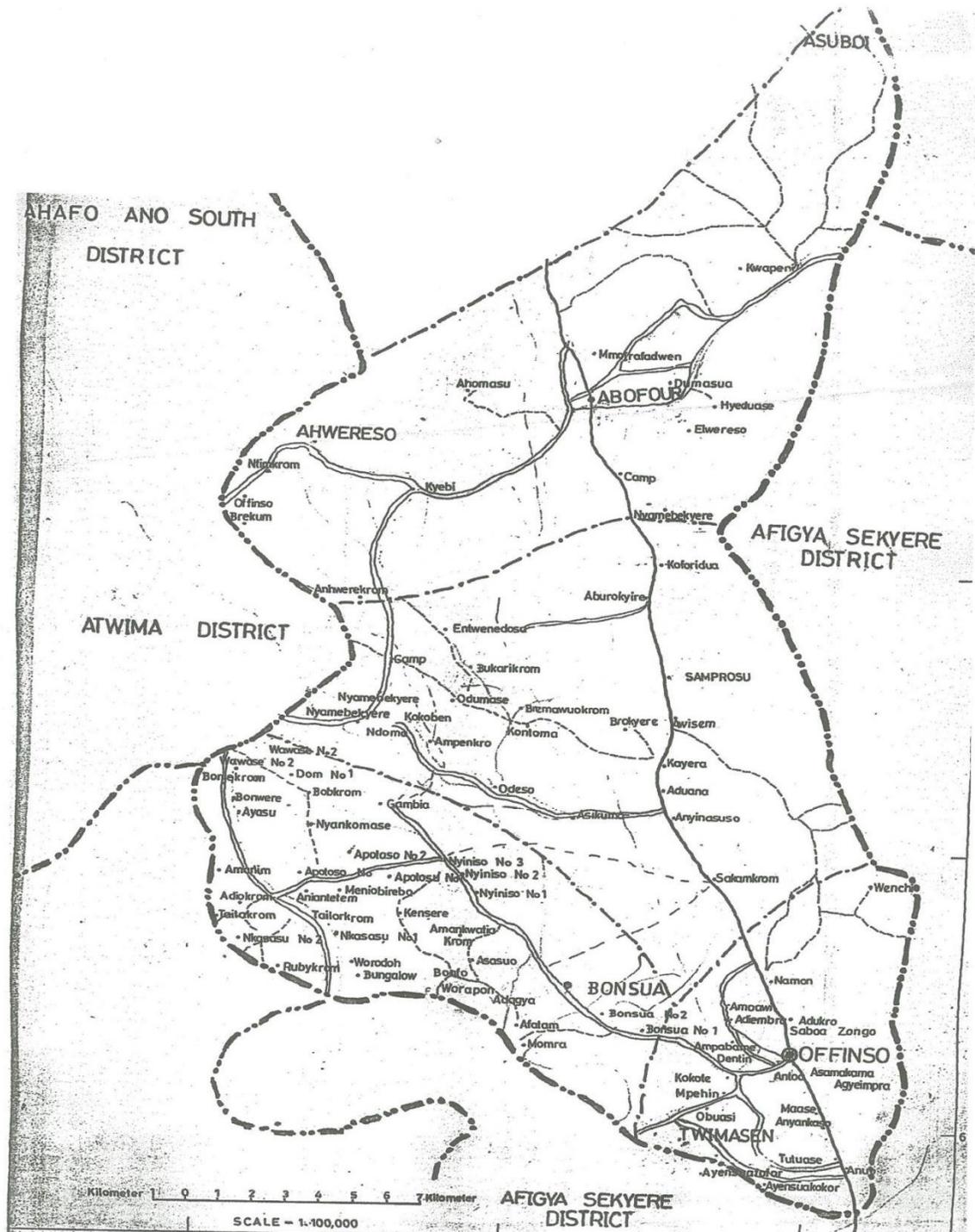
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MAP OF ASHANTI REGION



MAP OF OFFINSO MUNICIPALITY



ABSTRACT

The current research reports the prevalence of speech disorders in school children from class one to class six in the Offinso Municipality in Ashanti Region of Ghana. A cross-sectional research designed to recruit 900 respondents from 58 government primary schools in the municipality was used in the data collection. The aim of the study was to find out the occurrence of speech disorders among the sample population at a given point in time, which was then used to determine the prevalence of speech disorders in the municipality. The procedure adopted included training in the data collection process, teacher identification, screening tests, confirmation by speech pathologists and ENT doctors. Of the 900 respondents, 144 were diagnosed as having speech disorders with a prevalence of 0.16. There were more boys observed with speech disorders than girls. The arrangement of prevalence of speech disorders was significantly different according to gender. It was not possible to test the association of speech disorders by class level due to the small numbers in the majority of cells. There was an overall falling prevalence of speech disorders with class level. Of the 144 respondents diagnosed with speech disorders, the majority of the respondents 109 (representing 75.6%) had articulation disorders while the minority of the respondents, 7 (representing 4.8%) exhibited voice disorders. The frequent causes of speech disorders were vocal cords nodules and hearing impairment. These results have important inferences on the need of resource development for prevention and rehabilitation of speech disorders. Finally most of the findings are preventable if appropriate measures are taken.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Speech is the means by which people communicate, and share thoughts and ideas. It is a common code shared and understood by the people in a community, and learned by children through social interactions (Kumin, 2003). Speech is important for verbal children to succeed in life. The ability to communicate is an essential life skill for all children and young people and it underpins a child's social, emotional and educational development. It is a key skill for future employment opportunities and defines who we are and how others perceive us (Bercow, 2008).

However, when children have disorders of speech, it may present with some immediate and long-term challenges. Speech disorders may affect social and emotional well-being, cognition, and behaviour (Bryan, 2004). Speech disorders have a negative impact on academic achievement during school years, and affect vocational choices later in adulthood (Ruben, 2000). People with speech disorders are more likely to be unemployed or be situated in a lower income as than are people without disorders (Ruben, 2000). The unemployment rate of people who are unable to speak intelligibly is high (75.6%); the cost of speech disorders to the U.S. "communication-dependent economy" is said to be between 2.5% and 3% of the Gross National Product (Ruben, 2000). Disorders of speech development are progressively being accepted as a major health problem among young children with widespread and lifelong implications (Ruben, 2000).

The causes of speech disorders are diverse. In spite of the growing importance of speech disorders as a health problem, there are no reliable data on the prevalence of speech disorders among school children in the Offinso municipality. The planning of health services for speech impaired children depends on adequate prevalence data. Prevalence data is needed for predicting at risk population and intervention purpose.

1.1.1 Estimated Prevalence

In one of the largest studies undertaken on the prevalence of voice disorders, Duff *et al.* (2004) studied rates of voice disorders in 2,445 preschool children (1,246 males and 1,199 females) aged between two and six years living in Illinois. Using three diagnostic indicators (i.e., teacher identification, parent identification, and investigator screening), voice disorders characterized by hoarseness were identified in 95 children, or 3.9% of the sample. No significant differences for age, gender, or race were identified.

According to, Akif Kilic, *et al.*, (2004), the prevalence of vocal nodules among 617 school-aged children in Turkey was 30.4% (13.3% minimal lesions, 14.3% immature nodules, 2.6% mature nodules, and 0.2% vocal polyps). Powell, *et al.*, (1989) had earlier conducted a mass screening of 847 children aged 6–10 years in rural schools in the United States. Of these, 203 children were identified to have a voice disorder. Follow-up testing was conducted one and four years later and 39.9% and 38% respectively were found to have persisting voice disorders.

Milutinovic (1994) compared 362 children aged 12–13 years living in rural and urban areas of Serbia. Many more children living in urban areas (43.67%) were reported to have voice problems as compared to children living in rural areas (3.92%). Darley (1979) brought out research findings on 12,500,000 participants that indicated voice disorders found in 1,000,000 children, which represented 8%.

Stuttering is reported to begin in the third (3rd) and fifth (5th) year of life for approximately 4% to 5% of children (Andrews, 1964; Yairi & Ambrose, 1999). Approximately 80% of children who stutter recover without treatment, with 50% of these recovering within one year of onset (Andrews, 1964; Yairi & Ambrose, 1999). Mansson (2000) conducted a whole population survey of all 1,042 children born in a 2-year period (1990–1991) on the island of Bornholm in Denmark. The children were screened at three years of age, when 4.99% were determined to stutter. The known total incidence (assessed in subsequent follow-up studies over a 9-year period) was 5.19%, and a male–female ratio of 2.8:1 was reported.

In an Australian telephone survey, Craig, *et al.*, (2002) determined the prevalence of stuttering in the population to be 0.72%. Higher prevalence rates were reported for younger children (1.4%–1.44%); the lowest rate was reported for adolescents (0.53%). The incidence or risk of stuttering (obtained by combining prevalence data with reports of recovered stuttering) was estimated to be 2.8% in children aged 2–5 years, 3.4% in children aged 6–10 years, and 2.1% in adults aged 21–50 years.

Winzer (1996) work showed that, children in lower classes had more voice disorders than children in middle and upper classes. Boys stutter more than girls in the early years in school. Besides, prevalence of learning disabilities was over 37,000 students (Smith 1998). In Smith's account, language impairments was 47% and speech impairments was 53%, comprising voice disorders 4%, stuttering disorders 2% and articulation disorders 47%. Winzer (1996) also gave approximately 75% as articulation disorders among children. Clefts occur in one out of 750 live births.

Data from the Eighteenth Annual Report to Congress on the implementation of IDEA (US Department of Education) cited in Smith (1998) indicated that during the 1994–1995 school years, 2.3% of the entire school age was identified as having a disability because of speech or language impairment or both. Estimates indicate that 53% of the students seen in schools by Speech and Language Pathologists have speech impairments and 47% have language impairments. Articulation problems have been cited as more common during the pre-school and elementary or basic school years especially at age six, the first year in basic one up to grade four and may linger till 8th grade or more for some children unless intervention is given.

An American study reported that in a population of 242 children with learning disabilities between 8 and 12 years of age enrolled in a school system in Alabama, a speech, language or hearing problem was exhibited by 96.2% (233) of the 242 children studied. Language deficits were found in 90.5%, articulation deficits in 23.5%, voice disorders in 12%, and fluency disorders in 1.2% of the students with learning disabilities (Gibbs, 1989).

There is currently no national or district statistics available on prevalence speech disorders in Ghana. Available data at Komfo Anokye Teaching Hospital (1994 – 1997) showed that 623 of patients seen at the ENT department had various types of speech disorders (Osei -Bagyina, 2000). In another research conducted by Gadagbui (2007) with her students on 120 pupils who were randomly selected from the Methodist Primary A, B, C & D from Basic 1 – 6 within the age range of 5 – 8 years, 46% of the pupils had speech/language, pronunciation, spelling and reading problems. Reading problems were characterised by lack of pronunciation, difficulties of identification of letters and their own names. Some could not match letters with sounds. Spelling difficulties were also noted. Speech and language problems were also marked by misarticulation of the letters /l, r/ (Gadagbui, 2007). This misarticulation of letters could however be due to an influence from the first language of the participants.

It has been identified that speech disorders are major burden in the Offinso Municipality. Despite the scarcity of reliable and comprehensive statistics from the municipality, there was ample evidence that the risk for speech disorders seemed to be increasing. However, accurate figures were not yet available, and were therefore needed. Studies have been conducted in other African and non-African countries about the prevalence of speech disorders. It would be important to study the case of Offinso because of the perceived impression that a lot of children from this municipality report to the KNUST ENT with speech related difficulties. This will enhance the development of appropriate treatment approaches toward remediating the speech difficulties. The current study aimed at determining the prevalence of speech disorder in school children from class one to class six in the Offinso Municipality of Ashanti Region.

1.2 STATEMENT OF PROBLEM

Prevalence of Speech disorders has been researched over the years in other countries. In Ghana, although the prevalence rate has not been established, evidence from special schools shows that there are about 5,000 school children having speech disorders and/or hearing loss (Gadagbui, 2014). This number excludes pupil enrolled in schools for communication impairment, intellectual disability, and others in inclusive educational settings in the country (Gadagbui, 2014).

In fact, in the Offinso Municipality, there has not yet been any studies' regarding the prevalence of speech disorders. It is hoped that is study will address the current position of the area. However, the existing figures are not yet available and are urgently needed for assessment and treatment.

1.3 RESEARCH OBJECTIVE

1.3.1 Main Objective

The aim of this study was to find out the prevalence of speech disorders in Offinso Municipality.

1.3.2 Specific Objective

The present study anticipated achieving the following objectives:

- i. To determine prevalence of speech disorders in the Offinso Municipality;
- ii. To determine prevalence of speech disorders by type in the Offinso municipality;
- iii. To determine prevalence of speech disorders by gender in the Offinso municipality;

- iv. To determine prevalence of speech disorders by class level in the Offinso municipality;
- v. To determine possible associated factors to speech disorders in the Offinso Municipality.

1.4 RESEARCH QUESTIONS

The current thesis anticipated asking the following research questions for investigation.

- i. What is the prevalence of speech disorders in the Offinso Municipality?
- ii. What is the prevalence of speech disorders by type in the Offinso municipality?
- iii. What is the prevalence of speech disorders by gender in the Offinso municipality?
- iv. What is the prevalence of speech disorder by class level in the Offinso municipality?
- v. What are the possible associated factors to speech disorders in the Offinso Municipality?

1.5 RATIONAL FOR THE STUDY

The study of the prevalence of speech disorder in Offinso Municipality could be justified on several grounds:

Firstly, many authorities have emphasized that data on the prevalence or incidence of speech disorders in a particular population is of considerable value for those involved in planning and implementing speech and language remediation programmes within that population (Milisen, 1971; Quirk Report, 1972). Certainly such data is an important prerequisite for providing services which cater adequately to that particular community,

and is essential if provision is made to examine the effectiveness of the provisions in terms of the subsequent community adjustment of service graduates.

Secondly, the study will help in the funding of impact database required for future needs and developments. It is very important to improve data gathering methods because databases are essential for the assessment of the total burden of speech disorders and their contribution to burden of disease estimates. There is thus a huge need for more acceptable data especially in Offinso Municipality.

Again, comprehensive epidemiological data will be required in order to carry out economic analysis studies in Ghana, particularly of costs of the burden of speech disorders and the cost-effectiveness of different intervention approaches. The result of the current study will encourage, assist and justify the allocation of resources to developing Offinso Municipality with regard to prevention and treatment as well as facilitating individuals with speech disorders.

Moreover, the research will help improve awareness of speech disorders in the municipality. The research will highlight the gravity of the problem in the municipality and its effect on individuals. It will qualify, quantify and assess the cost of speech disorders to the society. The data will be used to design intervention strategies as well as policies directed towards prevention. The study will help to raise awareness amongst opinion leaders, health planners, decision makers, and general public.

Furthermore, the study will help develop a public health approach to speech disorder problems in the municipality. This will motivate health planners and health professionals to re-orientate their thinking and activities along a public health path to address the situation of speech disorders in the municipality. Unfortunately, there is shortage of personnel in the field of speech disorders in the municipality and Ghana as a whole not only at a research level, but also in terms of programme implementation.

Finally, prevalence figures assist in the planning of service delivery by informing decisions about resource allocation. Prevalence data can also be used to calculate the level of impact of intervention and can indicate the boundaries between impairment and typical development (Law *et al.*, 2000). The current study has provided data on the prevalence of speech disorders in the municipality.

1.6 SCOPE OF THE STUDY

This study will consider the prevalence of speech disorders in respect to articulation disorders, voice disorders and fluency disorders. The main study variables were derived from the objectives of the study, conceptual framework and literature review.

1.7 PROFILE OF STUDY AREA

Offinso Municipality is one of the new municipalities created in Ashanti Region in 2008. It was part of the then Offinso District which was decoupled variously as Offinso North District and Offinso Municipal. The municipality shares common boundaries with Offinso North in the North, Afigya Kwabre in the East and south, Atwima Nwabiagya and Ahafo Ano South Districts in the West. The 1960, 1970, 1984 and 2000 population

census put the population of the then Offinso District which comprised of now Offinso Municipal and Offinso North at 43972, 56319, 104815 and 138190 respectively. The growth rate was 5%. Based on the 2000 population census, the population of Offinso Municipal was estimated at 120,585 with a growth rate of 3.5%. The 2000 population census indicated that about 48% of the population were males and 52% were females resulting in a male to female of 1:1.08. The census also revealed that children under 15 years accounted for about 46.6% of the total population, the economically active persons (15 – 64 years) accounted for 47% and the elderly (65 years and above) accounted for 6.4% of the total population. The Municipal Education Directorate headed by the municipal Director of Education is responsible for education services delivery at the municipal level. The Director has a team of professional and support staff to assist to provide education services. For the purpose of easier and effective administration and supervision, the district is divided into six (6) circuits or cluster. Each circuit is manned by the circuit supervisor who has an office at the circuit centre provided by the District Assembly. The municipal has 58 government primary schools and 28 private primary schools. English language is the official language in Ghana, but in the Offinso Municipality, as in other municipalities or districts in the Ashanti Region, the families are mainly Twi-speaking, middle or upper class, and dual-parent.

1.8 ORGANIZATION OF WORK

This thesis is divided into six main chapters organized as follows:

1. Chapter one discusses the nature and background of the research problem. It identifies the research problem, its objectives, justification, scope and limitation.

2. The second chapter covers relevant literature review related to prevalence of speech disorders.
3. Chapter three discusses methods and techniques used for data collection.
4. Chapter four is devoted to the main results and findings of the data collected in relation to the speech disorders.
5. Chapter five deals with the discussion of the main results enumerated in chapter four.
6. Chapter six deals with conclusions drawn from the study and makes appropriate recommendations to the Municipal Education Directorate.

1.9 CONCEPTUAL FRAMEWORK

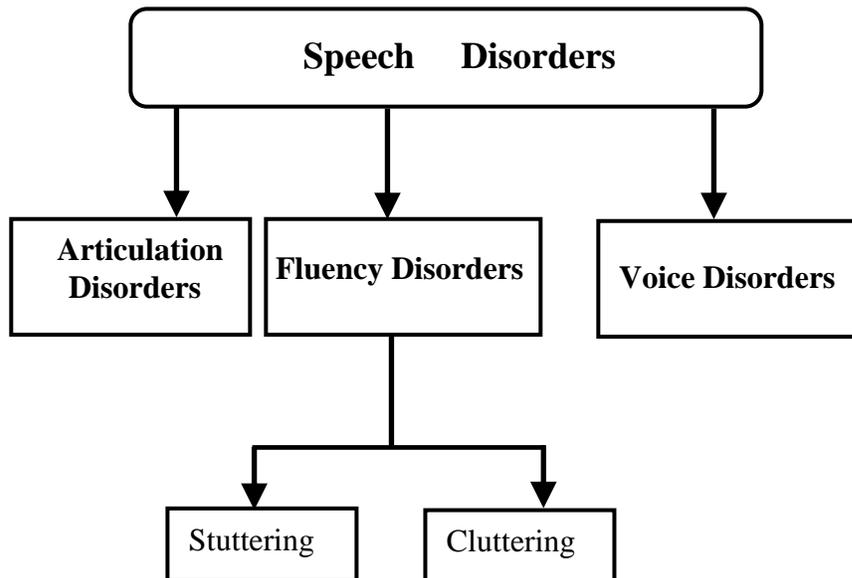


Fig. 1.1 The conceptual framework for Speech Disorders

Source: Author's construction 2015.

1.10 EXPLANATION OF THE CONCEPTUAL FRAMEWORK

Assessment of the prevalence of speech disorders could be achieved by identifying respondents who have articulation disorders, voice disorders and fluency disorders. Articulation disorders are the way the sounds of words are produced. Voice disorders may alter the pitch, quality, or loudness of the voice. Fluency disorders occur when the normally smooth flow of speech becomes interrupted.

CHAPTER TWO

REVIEW OF RELEVANT LITERATURE

2.1 INTRODUCTION

This chapter reviewed relevant literature on the topic under study. In this section, prevalence studies and the types of speech disorders that were restricted to articulation, fluency and voice disorders were discussed. Next, the common causes of the speech related disorders were also discussed and examined within the context of the current study.

2.2 PREVALENCE STUDIES

Prevalence is defined as the total of cases in a population at a specified time. Prevalence is often confused with, incidence (Mosciki, 1984) A prevalence study is the sum of affected individuals current in the population at an exact time divided by the number of individuals in the population at that time. (Gordis, 2000). For instance, if we are interested in knowing the prevalence speech disorders in a certain community on a certain date, we might visit every household in that community and use structure questionnaire and physical examinations, to determine how many people have speech disorders on that date. The number becomes the numerator for the prevalence rate. The denominator is the population in the community on that date. (Gordis, 2000).

Prevalence Studies can be viewed as a portion through the populace at a time and also determined the one who has the illness and who does not. But in so doing, we are not

determining when the disease developed. Prevalence studies do not take into account the duration of the disease. Therefore, the numerator of prevalence contains a combination of persons with diverse duration of illness, and does not involve an amount of risk to measure risk. Incidence must be used as this includes new cases or events (Gordis, 2000).

In the medical and public health literature, the word prevalence is often used in two ways. They are point prevalence and period prevalence. Point prevalence according to (Gordis 2000) is the prevalence of the sickness at a time whereas period prevalence is the number of people who had the sickness at a time during a certain period, such as during a single calendar year. Selected people may have contracted the disease throughout that period, and others may have had the disease before and died during that period. The important point is that every person represented by the numerator had the disease at some time during the period specified. In the medical and public health, both point and period prevalence are important and useful measure of the burden of disease in the community. It is therefore valuable for planning health services. Again, it is important for making future projections and it estimates the changes that are likely to take place in the disease burden in coming years (Gordis, 2000).

In the current study, point prevalence was used to measure the burden of speech disorders. Studies were involved that projected the prevalence of speech disorders in school children from class one to class six in Offinso Municipality in the overall populace. The research needed to present facts about the amount of respondents and the

diagnostic samples, and the definition of case status had to be determined either by standardized measures of speech disorder to use clearly defined clinical judgment.

2.3 PREVALENCE OF SPEECH DISORDERS IN CHILDREN

There have been many surveys of speech disorders in children. Some of the surveys are as follows. In the first place, a British national child development study, Calnan & Richardson (1976; 1977) reported that 24.6% of all 11-year-old children had some speech or language problems according to one of three assessment modes. More stringent criteria reduced this figure to 16.5%. Calnan and Richardson used teachers, doctors, and a speech teacher in their assessment but found poor agreement among those sources. Syntactic production and comprehension abilities were not assessed. For instance, the authors found that teachers' reports of speech problems correlated best with academic difficulties; but because the teachers were aware of which students were having school problems, they may have more readily identified those students as having speech and language problems.

Bax and Hart (1976) reported a 5% prevalence rate for speech -language disorders, based on a study of 44 English children, 4 ½ years of age. This was not a random representative survey, but was restricted to a particular geographic area in which the three highest social class groups were overrepresented in comparison with the census figures (34.4% vs. 5%). According to Bax and Hart (1976) it was not possible to estimate what the prevalence figure would be in a more representative sample.

Again, Pronovost (1951) reported a figure of 7.8% for articulation defects in 87,228 speech handicapped individuals of all ages in New England. But, no information was provided regarding the criteria that were used to define articulation problems, and the results were based on reports from nurses, teachers, doctors, and speech teachers, with rates varying from 1.9% for doctors to 13% for the speech teachers. So, the actual figure remained unknown.

Besides, Mills and Streit (1942) found that 33.4% of 1,196 individually tested children from first through third grades were found to have speech defects. Ten examiners were used, and, though not all were equally well prepared, they all had at least one year of training. Mills and Streit (1942) focused on speech defects, and 24.7% of the children were noted to have "dyslalia." Also, because the survey was conducted to provide data that would be helpful in securing a speech correctionist, there existed a strong possibility of bias. So, the results appeared to be inflated and probably unreliable.

Also, Morley (1965) reported on the prevalence of articulation problems in a sample of children born in Newcastle-upon-Tyne. Speech pathologists who visited the homes assessed the children's speech at 3 ½, 4 ¾, 6 ½, and 9 ½ years. At 3 ½ years, 19% of the children were considered to have some form of disordered speech development; 17% were judged to have an articulation defect persistent to age 4, and 3% to age 6 ½. It was hard to determine the accuracy of these results. There was no description of the criteria used by the speech pathologists to determine speech/articulation defects in the children, the reliability of diagnosis among the speech pathologists, if assessed, was not reported.

Tuomi and Ivanoff (1977) also evaluated the prevalence of speech disorders in 899 kindergarten and grade 1 children in public schools near London, Ontario. Using an initial screening consisting of repetition of 16 words, followed, if that was failed, by several standardized articulation tests; they found the prevalence of articulation problems to be 24.5% in the kindergarten children and 16.5% in the grade 1 students. The superficial and subjective nature of the initial screening made these figures dubious.

Moreover, Irwin (1948) found the prevalence of speech disorders among 6,000 Cleveland, Ohio, children (kindergarten to grade 6), assessed by speech specialists, to be 10%. However, though cases were categorized into "stuttering, articulation, aphasia, and voice," no breakdown of the percentage in each category was given. Also, there was no sign that standardized methods or standardized tests were used. The rate of speech problems was found to be 7.7% in grades one to six, so that the rate in kindergarten was probably higher than the 10% figure quoted. Finally, seven different testers were used, and no information was reported on interrater reliability or the criteria used to define a case.

According to, Milisen (1971) children from kindergarten through fourth grade had articulation defects of 12 – 15% and no attempt was made to critically examine the validity of the studies upon which these data were based.

Perhaps the best rigorous and methodologically sound survey conducted to date is that of Hull, *et al.*, (1971). Their survey was a representative one in which trained testers with acceptable reliability reported an overall prevalence of 31.6% for moderate and 2% for

extreme articulation problems in children from grade 1 to grade 12. When the results were limited to grade 1 only, the corresponding figures were 52.9% and 9.7%. It was hard to be sure what criteria were used to define deviation in articulation, though it seemed that the criteria may have been too liberal.

Furthermore, Irwin, *et al.*, (1974) stated a 21% rate of articulatory defects in 15,000 grade 1 children in St. Louis. Yet, this figure could not be used as an estimate of the occurrence of articulation disorders. The respondents were taken from a special (education) district in St. Louis, and the extent to which the results were generalizable to the population at large was not known. In addition, the 21% figure applied to those respondents who were found to produce at least one phoneme defectively in one position; this did not seem to be a justifiable definition of an articulation disorder. The 82% recovery rate by the third grade suggested that the majority of the children originally detected had developmental misarticulations; when proportion for recovery was subtracted from the original figure, a rate of 3.8% remained.

Peckham (1973) found out that children in her sample population had some grade of speech disorders of 10 to 13%. Though, neither standardized tests nor trained speech pathologists were used to collect the data. The Bureau of Education for the Handicapped projected the occurrence of speech handicaps in school-aged children to be 3.5%, but no information was available on the method used to obtain that result (Elliot, 1978).

The National Center for Health Statistics (NCHS) conducted its 1977 interview survey on a probability sample of 41,000 homes throughout the United States. In the under-17

age category they reported incidence rates for speech disorders of 1.98% for males and 1.05% for females. These estimates were obtained by asking respondents if they or anyone in their family presently stuttered, stammered, or had any other speech defects. This self report method most certainly resulted in an underestimate of the true prevalence, because it was likely that only the most obvious impediments would have been reported.

Fundudis, *et al.*, (1979) did a study on the psychological development of speech-retarded and deaf children in England. The study, though well executed, was limited by its initial definition of speech retardation. The definition was so broad that only children with the more severe forms of delay were considered speech retarded. Children with mild and moderate articulation problems, as well as those with delays or disorders primarily of syntax, were missed altogether. According to Fundudis, *et al.*, (1979), the study was a crude and arbitrary method, which did not lend itself to systematic classifications of speech disorders. Certainly, the study purportedly assessed speech retardation, the definition used resulted in the inclusion of language impairments as well, because no distinction was made between a speech production problem and an expressive language disorder. So, the precise occurrence of speech-only disorders could not be determined. Still, because of the methods used, the 4% figure was probably an underestimate.

Stewart, *et al.*,(1979) cited numerous studies of speech disorders founded on questionnaire responses of school officials in United States public schools. The reported occurrence estimate of 2.5% – 2.9% must be viewed as an artifact of the methods used, because the children were not themselves tested.

There is a scarcity of research statistics on the occurrence of speech disorders in Ghana specifically in the Offinso Municipality. From this work, it was clear that the occurrence of speech disorders in school children in Offinso Municipality could provide valuable data for the provision of speech related services.

2.4 TYPES OF SPEECH DISORDERS IN CHILDREN

2.4.1 ARTICULATION DISORDERS

It is frequently difficult to isolate a specific cause of articulation problems in children. The majority of young children who have difficulties pronouncing words basically do not differ emotionally, mentally, or physically from their age-peers. (Elena & Pelagie, 2004). In most cases of developmental articulation disorders, children's success in communicating is limited by their skill to make them understood. Their design of articulation errors may make them sound younger than they are. The type of articulation disorder would be classified as a developmental phonological disorder, perhaps related to central nervous system factors that are yet unknown. Disorders of speech articulation affect about 3.8 percent of 6 (six) year old children. Boys are identified by way of having articulation difficulties slightly more frequently than girls. (Shriberg, *et al.*, 1999).

There is extensive difference in the reported occurrence rates of speech disorders. Law *et al.*, (2000) showed that there was more variability in the occurrence rates for speech disorders compared to language delay. Among the studies reviewed, prevalence

estimates ranged from 6.4% (Beitchman *et al.*, 1986) to 43.9% (Dudley & Delage, 1980). These data were derived from a variety of different types of studies, and there were numerous reasons to explain this variation; a range of designs, both cross-sectional and longitudinal, were employed (e.g., Beitchman *et al.*, 1986; Calnan & Richardson, 1976; Campbell *et al.*, 2003; Peckham, 1973). Varying age cohorts were studied. Higher prevalence rates were stated for newer ages. For instance, 15.6% of 3 year olds according to Campbell *et al.*, 2003 and lower prevalence rates were reported in grown-up children according Shriberg *et al.*, 1999 which is about 3.8% of 6-year-olds. Some samples were not representative of the entire population and some were clinic-referred samples (e.g., Aithal, 1985; Bax & Hart, 1976; Broomfield & Dodd, 2004; Stewart, *et al.*, 1986) and varying definitions, classification systems, and measures were used (Campbell *et al.*, 2003 and Beitchman *et al.*, 1986).

Studies were shown in diverse countries (e.g., Harasty & Reed, 1994; Kirkpatrick & Ward, 1984), Britian (e.g., Broomfield & Dodd, 2004), United States (e.g., Shriberg *et al.*, 1999) and Canada (e.g., Beitchman *et al.*, 1986), where there may be differential categorization of dialectal variants and speech-sound errors (such as /f/ for th).

Regrettably, few epidemiological data of the occurrence of articulation disorders have been shown on samples that are representative of the population. Cross-sectional longitudinal data concerning a wide age range (0 – 14 years) are available from the “1995 Australian Health Survey,” which was conducted on 12,388 children (Keating *et al.*, 2001). On the basis of parent report, the overall prevalence rate reported for this

survey was 1.7%. Rates varied across ages and according to gender, with a peak prevalence being 7.4% for boys at 5 years and 1.9% for girls at 4 years. In the Offinso Municipality, the prevalence of articulation disorders before this work was unknown and it became known after the study.

2.4.2 FLUENCY DISORDERS

The area of fluency disorders has been one of the liveliest areas within the profession of speech–language pathology. Principal among disorders of fluency is the phenomenon of stuttering. The numerous definition of stuttering reflects a wide range of perspectives that experts have brought to bear in trying to understand stuttering disorder of communication. Really, developmental, familial, psychological, neurological, and motoric factors all appear to interact in cases of stuttering (Elena & Pelagie, 2004).

Conture (1990) noted that there is no behaviour that children who stutter display that normal child never exhibit. The normal developing children sometimes experience breakdowns in speech parameters; there is a much more normal flow of speech than is observed in a child who stutters. The age of 4½, children usually repeat utterances only when they wish to emphasize something (Curlee, 1980).

2.4.2.1 STUTTERING IN THE POPULATION

Speech Foundation of America (SFA) (1987) defines stuttering as a speech disorder branded by extreme spontaneous disturbances or blockings the speech, mainly when such disturbances contain of repetitions of a sound, and when they are conveyed by

avoidance struggle behaviour. According to Johnson (1955), stuttering is what speakers do when they expect stuttering to occur: dread it, tense in anticipation of it, and attempt to avoid doing it.

According to the National Institutes of Deafness and Other Communication Disorders (NIDCD) of the National Institutes Health (NIH) about 2 million Americans stutter (1992). The estimated figure corresponded to a prevalence of approximately 0.8 percent. The figure was comparable to estimates of 0.8 percent derived by Hull, *et al.* (1976), 0.7% by Young (1975), and 0.8 % by Morley (1952).

Although less than one percent of the population may be identified as stutterers at any given time, the percentage of people who stutter varies across the life span. Morley (1972) followed approximately 1,000 children in Newcastle-upon-Tyne for fifteen years to examine various aspects of development. The incidence of stuttering identified throughout the period was about 4%, or one in 25 children. NIDCD estimated that one in 30 children went through a period of disfluency that lasted a minimum of six months.

Stuttering is typically first identified before the age of 5 and many resolve to normal fluency before puberty (Morley, 1972; Wingate, 1976). Wingate (1976) summarized fourteen studies and concluded that approximately 80 percent of children recover from stuttering. Although there has been some dispute about the exact number, it seems that majority of respondents, who stutter at an early age, stuttering will disappear before they graduate from high school. Curlee (1980) reported that if the occurrence of stuttering

among the overall populace does approximate 4%, a recovery rate of 80% would account for a 0.7 % prevalence of stuttering.

In some respects, stuttering is an equal opportunity disorder. It affects people of all racial and socioeconomic backgrounds. Yet, it does appear that some individuals are at higher risk for developing the disorder than others. Stuttering affects more boys than girls. NIDCD (1992) estimated that four times as many boys as girls stutter as compared to girls. Others have placed the male: female ratio at 3:1 (Hull *et al.*, 1976) or 2:1 (Morley, 1972; Yairi & Ambrose, 1992). These differences may reflect, in part, the different age groups examined in these studies. The male: female ratio tends to increase with older ages, which has led some to suggest that girls may show higher rates of recovery with age than boys (Yairi, *et al.* 1996).

In addition to the surplus of males among individuals identified as stutterers, a family history of stuttering increases an individual's risk for the disorder. Although the population prevalence for stuttering is thought to be around 0.7 to 0.8 percent, the prevalence among the relatives of an individual who stutters is much higher (Andrews & Harris, 1964; Howie, 1981; Kidd, 1980; Yairi & Ambrose, 1992, Yairi, *et al.* 1996). Yairi and Ambrose (1992) reported that almost half (46.6%) of their sample of young children who stutter had parents or siblings who also stuttered at some time. If blood relatives in the extended family were considered, two-thirds (66.3%) of the respondents had a positive family history for stuttering. In fact, the form of family aggregation for stuttering may signal the presence of a single major gene that contributes to expression of the disorder (Yairi *et al.*, 1992). However, the actual components that contribute to

the development of stuttering may be more complex. Some have suggested that genetic factors may confer a risk for stuttering but certain environmental factors are needed to trigger the disorder (Andrews *et al.*, 1983; Howie, 1981).

Research regarding the prevalence, onset, and natural history of stuttering is limited and difficult to interpret (for a review, see Packman & Onslow, 1998). Information regarding the prevalence of stuttering is derived from a limited number of studies. Some knowledge has been gained from retrospective parent report, often many years later (Yairi & Lewis, 1984).

The majority of published theses have used self-selected or refereed samples of stutterers that almost certainly do not represent the population of children who begin to stutter. Stuttering is reported to begin in the third and fourth year for approximately 4% to 5% of children (Andrews, 1964; Yairi & Ambrose, 1999). Approximately 80% of children who begin stuttering recover without treatment, with 50% of these recovering within one year of onset (Andrews, 1964; Yairi & Ambrose, 1999). Mansson (2000) conducted a whole population survey of all 1,042 children born in a 2-year period (1990–1991) on the island of Bornholm in Denmark. The children were screened at three years of age where 4.99% were determined to stutter. The known total incidence (assessed in subsequent follow-up studies over a 9-year period) was 5.19%, and a female to male ratio of 1: 2.8 was reported.

In an Australian telephone survey, Craig *et al.*, (2002) determined the occurrence of stuttering in the population to be 0.72%. More occurrence rates were stated for younger

respondents (1.4% to 1.44%); the lowermost rate was recounted for adolescents (0.53%). The risk of stuttering (obtained by combining prevalence data with reports of recovered stuttering) was estimated to be 2.8% in children aged 2–5 years, 3.4% in children aged 6–10 years, and 2.1% in adults aged 21–50 years. However, data on the prevalence of stuttering for younger children in Ghana specifically Offinso Municipality is scarce.

2.4.3 VOICE DISORDERS

Voice disorders can be described as problems connected to resonance pitch, loudness, and vocal quality. Voice difficulties may stem from congenital defects, disease, vocal misuse, laryngeal trauma and aging effects on the voice. Oates (2004) reviewed the multiple methods used to describe voice disorders including self-report; perceptual, acoustic, and physiological measurement; and direct laryngeal examination. A functional versus organic dichotomy for the classification of voice disorders is frequently used, although there is no universally agreed classification system. Oates (2004) emphasized that etiological and diagnostic confusions abound, and together these make the conduct of prevalence and natural history studies extremely difficult. There is little data on the occurrence of voice disorders in children.

The exact amount of individuals who experience voice disorders in the population is not known. For children respondents, the occurrence of voice disorders has been projected to range from 3 (Hull, *et al.*, 1976) to 23.4 % (Silverman & Zimmer, 1975). Aronson (1990) suggested that approximately 6% of children have voice disorders at any given moment in time. Duff *et al.*, (2004) studied rates of voice illnesses in 2,445 children (made up of 1,246 males and 1,199 females) aged between two and six years living in

Illinois. By using teacher identification, parent identification, and investigator screening as the diagnostic indicators, voice disorders categorized by hoarseness were recognized in 95 respondents, or 3.9% of the sample. No substantial changes for race, age and gender, were identified.

The occurrence of voice sicknesses in children is often projected between 6% and 9% (Boyle, 2000; Hirschberg *et al.*, 1995). Yet, other sources recognize ranges of 2% to 23% (Deal, *et al.*, 1976; Silverman & Zimmer, 1975). According to Leeper (1992), 38% of elementary school children were known as having chronic hoarseness. Inappropriately, it is assessed that the huge majority of children with voice illnesses are never seen by a speech and language therapist (Kahane & Mayo, 1989), and children with voice illnesses only make up between 2% and 4% of an Speech and Language Pathologist caseload (Davis & Harris, 1992).

Akif Kilic, *et al.*, (2004) work showed occurrence of vocal nodules among 617 school going children in Turkey to be 30.4% (13.3% insignificant lesions, 14.3% immature nodules, 2.6% mature nodules, and 0.2% vocal polyps). Mass screening of 847 respondents aged 6 to 10 years in countryside schools in the United States was done by Powell, *et al.*, (1989). Of these, 203 children were identified to have voice disorder. After one and four years, follow-up testing was conducted and 39.9% and 38% were found to have persisting voice disorders. Milutinovic (1994) compared 362 children aged 12–13 years living in rural and urban areas of Serbia. Many more children living in urban areas (43.67%) were reported to have voice problems as compared to children living in rural areas (3.92%).

Few studies have acknowledged the kind of laryngeal pathologies that are known to school going children. Dobres, *et al.*, (1990) defined the occurrence of laryngeal pathologies and their delivery across race, age, and gender, in a paediatric sample and also gathered information on 731 patients seeking treatment. The greatest recurrent laryngeal pathologies were as follows: vocal fold paralysis, vocal nodules, subglottic stenosis, laryngomalacia, and functional dysphonia. The pathologies were greater in males than in females. The dissemination of pathologies within the races sampled are Asian, African American and Caucasian.

Even though it has been argued by some scholars that curing voice illnesses in children is needless harmful (Sander, 1989 and Batza, 1970), others scholars too have contended for the opposite opinion (Miller & Madison, 1984 and Kahane & Mayo, 1989). Certainly, Andrews (1991) proposed maturation alone does not meaningfully affect vocal signs. According to Andrews (1991) usual patterns of poor voice used do not go at puberty. This study investigated the prevalence of voice illnesses on school going children in the Offinso Municipality in the Ashanti Region.

2.5 COMMON CAUSES OF SPEECH DISORDERS

2.5.1 COMMON CAUSES OF ARTICULATION DISORDERS

A) Phonological Disorders

The phonological method to articulation disorders knows that the child has some difficulty in mastering the adult phonology of the language. As Dunn (1982) wrote, “the term phonological process is frequently used as a way to describe the systematic simplification observed in child speech”. The articulatory productions of young children who make articulation errors are systematic and seem to be the result of the same processes that normal children use (Ingram, 1981). The children with articulatory errors persist in using simplification processes beyond the time when their age-peers use them (Grunwell, 1980).

A phonological profile of children who are brought to the care of a speech and language therapist can be obtained by examining the features that co-occur with phonological disorders (Ruscello, *et al.*, 1991; Shriberg Best, *et al.*, 1986). About two-thirds of the children referred for services for phonological disorders are boys, the majority of whom have a history of ear infections that may have affected their hearing at some time. Half of the children with phonological problems also have difficulty learning to read. Problems with academics may persist long into the school years, even after speech is no longer an obvious impairment (Shriberg & Kwiatkowski, 1988). Occasionally, a history of phonological disorders can be documented for these children (Lewis, 1990). Though, data on the phonological disorders in Ghana specifically in the Offinso Municipality are scarce.

B) Anomalies of the Oral and Facial Structures

Various acquired or genetic abnormalities of the facial skeleton can cause severe articulation problems. Many of these facial abnormalities are part of a broader pattern of anomalies that are known collectively as syndrome; that is, a certain number of predictable features (e.g., skeletal anomalies, distinctive facial features, motor involvement, cognitive difference) co-occur (Elena & Pelagie, 2004).

Infrequently, tongue problems may contribute to articulation difficulty. Another structural problem of the tongue is that it may appear to be too large (macroglossia) or too small (microglossia). Macroglossia, seen with certain developmental syndromes, has been thought to contribute to poor articulation. At one time, tongue reduction surgery was recommended for these children, but follow up studies failed to document improved articulation (Lynch, 1990).

A tight lingual frenulum is another feature of the tongue that has been blamed for articulation problems. The lingual frenulum is the small group of tissue on the base of the tongue's underside. When it is too tight, forward and upward movement of the tongue tip is restricted. Dental abnormalities have also been blamed for articulation problems. Shelton and colleagues (Shelton, *et al.*, 1975) looked closely at the influence of various dental abnormalities on improvement in articulation therapy, concluding that even children with severe malocclusion could learn to articulate normally. Severe malocclusions, as seen in under bite or over bite, may or may not have an effect on articulation.

C) Cleft Lip and Palate

Estimates of the incidence of cleft lip or palate range between one in 500 to one in 750 babies (Peterson–Falzone, et *al.*, 2001). Clefts range widely in severity. A small defect may involve a partial division in the uvula and a gap within the soft tissues of the velum. Severe clefts may involve both sides of the lip and alveolar ridge (in which the top front teeth are rooted) and a cleft that extends from the velum forward into the hard palate so that the nasopharynx is open to the mouth. For many children, the cleft is part of a syndrome that affects additional aspects of development (Shprintzen, Siegal–Sadewitz, Amato, & Goldberg, 1985). The configuration of the oral and nasal structures of children with cleft lip and palate often lead to altered resonance. The altered oral structures may affect the child’s ability to produce certain sounds normally.

D) Developmental Dysarthria and Apraxia

Children with developmental apraxia of speech are somewhat more difficult to identify. Often, children with developmental apraxia lack the more apparent motor signs that characterize developmental dysarthria. Apraxia has been defined as impairment in the ability “to program, combine, and sequence the elements of speech” (Jaffee, 1984). A child with a pure apraxia of speech would demonstrate relatively normal comprehension of language but be unable to imitate a simple spoken word, despite having no muscular weakness or paralysis (Elena & Pelagie, 2004)

Apraxia of speech is more of a phonetic problem than an overall language problem; however, apraxia creates a marked discrepancy between receptive language and the ability to express language through speech. Often the affected children are forced to struggle at the single-word level. Even when they can produce multiword sentences, their speech lacks the normal prosody. (Elena & Pelagie, 2004)

E) Cerebral Palsy

According to McDonald and Chance (1964), about three in every 1,000 newborns could be classified as having cerebral palsy. Cerebral palsy may occur before birth, during birth, or during the first three years of life. There is often motor delay in many aspects of the child's life: crawling, sitting, standing, walking, chewing-swallowing, self-feeding, and talking.

Often the child with cerebral palsy is so physically active with muscle contractions or unstable head and trunk posture that speaking appears almost impossible. Therefore, the child must first develop some postural control and some control of extraneous movements before work can begin on the fine motor control required for speech (Mysak, 1980). For example, learning to sit erect (with or without support) and keeping the mouth in a controlled, closed position are often prerequisite behaviours for attempting speech (Boone, 1972).

2.5.2 COMMON CAUSES OF FLUENCY DISORDERS

A) Psychological Aspects of Stuttering

According to Blood *et al.*, (1994) and Weber and Smith, (1990), those who stutter can show physiological signs of stress and anxiety. The signs of anxiety associated with speaking ran to the idea that stuttering might be a manifestation of an underlying emotional conflict (Blanton, 1965; Bryngelson, 1971; Glauher, 1958; Travis, 1971). Lee Travis (1971) was one of the strongest proponents of a psychological cause of stuttering.

B) Hereditary Component of Stuttering

The rate of affected family memberships proposes a hereditary constituent. The concordance degree is about 30% for dizygotic twins, 70% for monozygotic twins and 18% for siblings of the same sex (Felsenfeld *et al.*, 2000 and Andrews *et al.*, 1983). According to Andrews *et al.*, (1983).the recovery rate may be the collection of abnormalities experiential in adults reflects impaired recovery rather than the grounds of stuttering.

2.5.3 COMMON CAUSES OF VOICE DISORDERS

A voice disorder occurs when a child has trouble with the volume and pitch, that confuses a hearer from the message. The greatest commonly happening vocal pathology and hoarseness in children are vocal cord nodules (Case, 1984). It is mainly common in young males (Deem & Miller, 2000; Andrews, 1999). Coyle and colleagues (2001) testified that vocal nodules were the supreme everyday diagnosis (74.3%) of the diseases found in the 0 – 14 years group of their study. Vocal cord nodules are developments that

appear on the vocal cord as an effect of vocal misuse. It happens at the stage of the anterior $\frac{1}{3}$ and posterior $\frac{2}{3}$ of the vocal folds (Dworkin & Meleca, 1997; Andrews, 1999; Deem & Miller, 2000). The abusive vocal actions, such as crying, excessive volume, shouting, throat clearing and vocal imitations in children are usually considered as vocal cord nodules (Deem & Miller, 2000; Boone & McFarlane, 2000; Case, 1984)

2.5.4 COMMON CAUSES OF SPEECH DISORDERS

There is currently no national or district statistics available on common causes of speech disorders in Ghana. Available data at Komfo Anokye Teaching Hospital (1996 – 1998) showed that 437 children around the age of Nine months to 5 years 11 months who reported at KATH, KNUST, Department of Eye, Ear, Nose, and Throat (EENT), School of Medical Sciences (SMS) had etiological classification of children and the causal relationship of their problem. (Osei-Bagyina, 2000). Brobby (1987a) found measles (30%) as the most common root of developed sensorineural hearing damage (another etiological, category) followed by convulsion (19%), hypoxia (9.5%), meningitis (8.5%), mumps (3.5%) and tetanus (2.5%). The remaining 27% due to congenital sensorineural hearing loss was caused by rubella 3%, icterus contracted in the first trimester of pregnancy 1.5% and idiopathy 22.5%.

Mysak(1980) presented the following under prenatal, natal, and postnatal etiological factors: maternal bleeding; blood incompatibilities such as the Rh negative factors; toxemia, anaesthesia and irradiation, placental and cord disturbances; accidents; embryonal and fatal CNS malformations; precipitate or prolonged delivery; breech or

caesarean deliveries; pre-maturity; forceps manipulation and trauma, poisoning (eg., Lead, alcohol), anoxia and neoplasms of the brain, and infections such as mumps, rubella, measles, whooping cough, jaundice, syphilis and respiratory infections. Brobby (1987b) asserted that rubella, tetanus, meningitis, mumps, and measles could be successfully controlled by cheap eagerly accessible and nontoxic immunisation.

2.6 CONTEXT OF THE CURRENT STUDY

Public schools in USA employ 55 percent of all speech–language pathologists and 10 percent of all audiologists, making it the most common work setting for ASHA members (ASHA, 2002a). The initiation of speech and hearing programmes in schools date as far back as 1910 in the Chicago public school system (Paden. 1970). The role of Speech and Language Pathology in assisting students with speech disorders in schools has been widely documented (Justice & Fey, 2004, McCartney, 2004; Prelock, 2000).

However, within Ghana where Offinso Municipality is located, school systems are not a principal employer of Speech and Language Pathologists (SLPs). In the Offinso Municipality where the present study was undertaken, there are no SLPs employed in the education sector, whether in public or private schools. Ghana has only few speech and language pathologists and they are employed in the health sector and in very few private faculties for children with Autism at Accra. Thus, the present investigation into the prevalence of children with speech disorders in the Offinso Municipality. Ghana provides a unique insight into the identification of and provisions made for children with speech disorders within a schooling system where the ultimate responsibility for

appropriate education rests within the education department. The majority of support for these children is provided by classroom and special education teachers within the education system, and not by SLPs.

In collaboration with the department of ENT at KATH, Ghana, extensive data were collected between 2013 and 2014. The data collection provided a unique opportunity to examine the prevalence of stuttering, voice disorders, and articulation disorders as identified by teachers and confirmed by speech-language pathology report.

Accordingly, the goals of the present investigation were twofold:

1. To report Offinso Municipality teachers' approximations of the occurrence of three speech disorders (, voice, articulation and stuttering) in 58 government primary schools in Offinso Municipality.
2. To consider the links among the occurrence of speech disorders and the following variables: class level, gender, and types.

2.7 CONCLUSION

The literature review has indicated that a lot of work has been done in several countries but the available data in Ghana especially in the Offinso Municipality is sparse.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

The objective for this research was to examine the prevalence of Speech Disorders in School Children from class one to class six in Offinso Municipality in Ashanti Region. The chapter describes the approach employed in undertaking the research. It includes the study design, study population, sampling design, data collection techniques, and research instrument and data analysis.

3.2 STUDY DESIGN

The study design used for the research was a cross-sectional research design. It is a type of observational study that analyses data collected from a population. It is a representative subset, at a specific point in time. The design was intended to control the rank of speech disorders in school children from class one to class six in the Offinso Municipality. The study measured the incidence of speech disorders in school children from class one to class six among the sample population at a given point in time, which was used to regulate the incidence of speech disorders in school children from class one to class six in the Offinso municipality. Representative samples from six (6) clusters or circuits which are *Abofour "A" circuit*, *Abofour "B" circuit*, *Offinso "A" circuit*, *Offinso "B" circuit*, *Offinso "C" circuit*, and *Offinso "D" circuit*, were chosen randomly to ensure fairness in the data collected. Respondents found to have speech disorders were assessed through interview and clinical examination to identify the cause of the speech disorders. The survey method was used because prevalence studies have their strength in presenting a snapshot picture of the situation at hand.

3.3 STUDY POPULATION

The study was conducted among class one to class six children attending 58 government primary schools in Offinso Municipality of Ashanti Region. A total of 900 children attending 58 government primary schools in the municipality during 2013/2014 academic year were considered in this investigation. There were 400 males and 500 females. The children ranged from class one to class six. The target population in this study consisted of all respondents with speech disorders attending the 58 government primary schools in the municipality. For this study, the population was also the sample. Statistical formula was used to compute sample size of 900 having a confidence level value of 99%. This included children respondents from the randomly chosen circuit for government primary schools in the municipality.

3.4 SAMPLING DESIGN

The sampling design employed for this research was cluster random sampling. Cluster sampling is a procedure in which the whole population of notice is divided into clusters, and a random sample of these groups is selected. This was done by numbering all the government primary schools in each circuit into sub-cluster. Cards corresponding to the total number of government primary schools in each sub-cluster was selected and numbered. The numbered cards were put in a box and shuffled thoroughly before picking the first sample unit. Reshuffling continued and after each shuffling, a card was picked until the required number for the sample was obtained. This design was used because the 58 government primary schools in the municipalities were unevenly distributed into six clusters or circuits. The sub-clusters or circuits (which were *Abofour "A" circuit, Abofour "B" circuit Offinso "A" circuit, Offinso "B" circuit, Offinso "C"*

circuit, and Offinso “D” circuit,) made up the six clusters in all. A ratio of the total sample was selected from each cluster by a random technique to obtain the required total sample. The ratio was based on the size of each cluster. The selected sample sub-sets was related to the size of the total cluster.

3.5 DATA COLLECTION TECHNIQUES

Upon assortment of the selected schools, written or verbal feedback was asked from the Municipal Director of Education on the conduct of the study in the respective schools. Upon approval, field assistants made up of staff of ENT units from KATH were assigned to randomly selected schools of the various circuits.

A four phase procedure was used to find students with speech disorders. The four phases were intended to upsurge the ability of identification of pupils. The first phase was an information session that was presented for every head teacher and his assistant head teacher within the school municipal to train them in the data gathering process.

The next phase was where the head teachers trained every teacher within the 58 government primary schools concerning the purpose and identification approaches of the research throughout a staff assembly in the second term of the academic year. The teachers were obligatory to find all school children in their class with possible evidence of a speech illness within two weeks. The teachers included in the identification of children with speech disorders acted as a screen to recognize potential respondent in need of intervention. The procedures adopted for this research explained classroom teachers to the documentation of children with speech disorders and consequently initiated support mechanisms for interventions to be enacted.

Another phase of documentation involved the head teachers in 58 government primary school reviewing the teacher's endorsements using supporting documentation. E.N.T. doctors and speech-language pathologies report was required as supporting documentation for confirmation of a speech disorders.

The final stage was evaluated by the researcher with a number of screening examinations, comprising the Goldman-Fristoe Test of Articulation (GFTA), and Photo Articulation Test (PAT). Goldman-Fristoe Test of Articulation (GFTA) is an orderly means of measuring an individual's articulation of the consonant sounds of Standard American English (Goldman & Fristoe 2000). It affords a wide choice of information by selection both spontaneous and imitative sound production, containing single words and conversational speech (Goldman & Fristoe 2000). The Photo Articulation Test according to Pendergast et al. (1969) provides a means of rapidly evaluating articulation performance in children aged 3–12 years. A total of 23 consonants in medial, final and initial, positions and 18 vowels were examined. The final score reflected the total number of errors on tongue sounds, lip sounds, and vowel sounds.

Checklists for voice disorders, and stuttering, were also administered at final Stage. The voice disorder checklist was taken from Wilson (1979) and contained the valuation of both spontaneous speech and number of repetition. The stuttering checklist also called for the scrutiny of spontaneous speech as well as letter, word repetition and number. These tests were selected to screen for speech disorders because of their ease of administration, the total time of administration being approximately 30 minutes. In

addition, they are well-standardized and well-accepted instruments that provide measures of articulation.

3.6 RESEARCH INSTRUMENTS

Different tools were used in the data collection process. The research instruments employed were all regulated tools with good test validity and reliability. The research tools consisted of the following:

- a.) *Questionnaire*: This tool was administered by the researcher and the teachers.(Appendix 3)
- b.) *Interview*: This tool was administered by the researcher and the teachers (Appendix 4).
- c.) *Audiometric Evaluation Form*. This form was used by the researcher and audiologists at KATH to assess the hearing threshold of the participants in decibels at 1000Hz, 2000Hz, 4000Hz, 8000Hz, 500Hz and 250Hz. (Appendix 6).
- d.) *Goldman-Fristoe Test of Articulation (GFTA)*. This tool is an orderly means of measuring an individual's articulation of the consonant sounds of Standard American English.
- e.) *Photo Articulation Test (PAT)*. This tool provides a means of rapidly assessing articulation performance in children aged 3 – 12 years.

3.7 SAMPLING SIZE DETERMINATION

The administration of the study was focused mainly on the prevalence of speech disorders in school children from class one to class six in Offinso Municipality in Ashanti Region. The desired sample size was calculated as follows:

$$n = \frac{Z^2 pq}{d^2} \quad (\text{Kirkwood and Sterne, 2003})$$

where;

n = the desired sample size

z = the standard normal deviation 3.18

p = the proportion of event of interest be 72%

q = 1 – P

d = degree of accuracy desired at 0 .05

$$n = \frac{(3.18)^2 (0.72)(0.28)}{(0.05)^2}$$

n = 815

10% of non-respondent effect would be used to comprehend the sample size, thus

$$\frac{10}{100} \times 815 = 81.5$$

Therefore, 81.5 + 815 = 897

The initial sample size was to be 897 but it was rounded up to 900, therefore the sample size of 900 respondents in the Offinso Municipality was surveyed and the confidence interval of 99% employed.

3.8 DATA QUALITY

Data quality was assured through:

- a.) Careful design of questionnaire, interview guides, and adherence to proper interviewing procedures.
- b.) Pre-testing of the questionnaires.
- c.) Proper training of the interviewers.
- d.) Closed supervision of the data collection by Principal Investigator; and
- e.) Proper categorization and coding of the data.

3.9 INCLUSION CRITERIA

Respondents in the selected government basic schools were engaged in the study. This included children from class one to class six from the randomly chosen government basic schools in the municipality.

3.10 EXCLUSION CRITERIA

Respondents who have been transferred from the selected schools before and after the stated period were not included in the study.

3.11 PRE-TESTING

Data collection tools were pre-tested at Offinso North District of Ashanti Region because this district shares similar characteristics with the Offinso Municipality. This afforded the opportunity to make the necessary corrections in the data collection tools before actual data collection in order not to commit errors, waste of resources and incur costs.

3.12 ETHICAL CONSIDERATION

To fulfil ethical requirements, written permission was sought from Ashanti Regional Director of Education, Municipal Director Of Education (MDE), and the Committee for Human Research and Publication Ethics SMS/ KNUST & KATH.

3.13 STUDY LIMITATION

Prevalence studies have their strength in presenting a snapshot picture of the situation at hand. In this thesis, the focus was to present the true condition of speech disorders. The study did not address aspects such as management and effects of speech disorders and other related issues that did not necessarily fall within the concentration of the study.

3.14 DATA ANALYSIS

When the entire data collections were done, a master list of the key responses of the open-ended items was prepared and the responses were coded. Before the coding, the data was cleaned, coded, and entered into the computer using EPI-INFO version 6.04 statistical packages a software used by health researches and Statistical Package for Social Sciences (SPSS) version 10 software. After the data entry, the software was used for the analysis of the data and simple percentages and frequencies table were used.

CHAPTER FOUR

RESULTS

4.1 INTRODUCTION

This chapter discusses the results of the survey conducted in the Offinso Municipality of Ashanti Region by means of frequency tables and appropriate inferential statistical techniques.

4.2 PERSONAL DATA OF RESPONDENTS

4.2.1 Demographic Characteristics of Study Population

Table 4.1 shows that among the 900 respondents randomly chosen from class one to class six, attending 58 government primary schools in Offinso Municipality of the Ashanti Region during 2013/2014 academic year, 80 of the respondents (representing 8.8%) were chosen from Abofour “A” circuits, 120 of the respondents (representing 13.3) were chosen from Abofour “B” circuits, 179 of the respondents (representing 19.8) were chosen from Offinso “A” circuits, 174 of the respondents (representing 19.3) were chosen from Offinso “B” circuits, 176 of the respondents (representing 19.5) were chosen from Offinso “C” circuits, and 171 of the respondents (representing 19.0) were chosen from Offinso “D” circuits. A ratio of the total sample was selected from each circuit by a random technique. The ratio was based on the size of each circuit. The selected sample sub-sets was related to the size of the total circuit.

Table 4.1: Geographical Area of Respondent within Government Primary School in Offinso Municipality.

CIRCUIT	Frequency	Percentage (%)
Abofour “A”	80	8.8
Abofour “B”	120	13.3
Offinso “A”	179	19.8
Offinso “B”	174	19.3
Offinso “C”	176	19.5
Offinso “D”	171	19.0
TOTAL	900	100

Source: Author’s construction using data from the survey.

Table 4.2 also illustrates that among 900 respondents from class one to class six attending 58 government primary schools in Offinso Municipality of Ashanti Region, 400 of them (representing 44.4%) were males while 500 (representing 55.5 %) were females.

Table 4.2: Distribution of Gender

Gender	Frequency	Percentage (%)
Male	400	44.4
Female	500	55.5
TOTAL	900	100

Source: Author’s construction using data from the survey.

The age distributions of the respondents in this study are shown in Table 4.3. Out of 900 respondents, 427 (representing 47%) belonged to the 5–7 age groups, 339 (representing 38%) were 8–9 years old, 107 (representing 12%) under the 10–12 age group and 27 (representing 3%) were above 12 years.

Table 4.3: Age Groups of Respondents

Age Group	Frequency	Percentage (%)
5 – 7	427	47
8 – 9	339	38
10 – 12	107	12
Above 12	27	3
TOTAL	900	100

Source: Author's construction using data from the survey.

From Table 4.4, it can be seen that, out of the nine hundred respondents interviewed, 220 (representing 24%) were chosen from class one, 237 (representing 26%) were chosen from class two, and 170 (representing 19%) were chosen from class three, 124 (representing 14%) were chosen from class four whilst 98 (representing 11%) were chosen from class five. Fifty one (representing 6%) of the respondents were chosen from class six.

Table 4.4: Class Distribution

Classes	Frequency	Percentage (%)
Class 1	220	24
Class 2	237	26
Class 3	170	19
Class 4	124	14
Class 5	98	11
Class 6	51	6
TOTAL	900	100

Source: Author's construction using data from the survey.

4.3 PREVALENCE OF SPEECH DISORDERS

4.3.1 Estimated Prevalence of Speech Disorders

Table 4.5 shows that out of 900 respondents selected from the six circuits of children attending 58 government primary schools in the Offinso Municipality, 144 respondents had speech disorders. The total prevalence of speech disorders in the Offinso Municipality was estimated to be 0.16. Prevalence refers to “the percentage of cases in a given population at a specified time” (Law et al., 2000).

Table 4.5: Estimated Prevalence of speech Disorders

No. of Schools	No. of circuits	Selected Students	No. of Speech Disorder	Prevalence in the Population (N = 900)
58	6	900	144	0.16
TOTAL	6	900	144	16

Source: Author’s construction using data from the survey.

4.3.2 Estimated Prevalence of Speech Disorders by Type

Table 4.6 shows the prevalence rate of speech disorder by type in the Offinso Municipality. Overall, 109 respondents were identified as having articulation disorders, 28 respondents were identified as stutterers, and 7 were identified as having voice disorder. The estimated prevalence for articulation disorder was 0.12, stuttering disorder was 0.03, and voice disorder was 0.007. The total prevalence of speech disorders in the Offinso Municipality was estimated to be 0.16.

Table 4.6: Estimated Prevalence of Speech Disorder by Type

Speech Disorder	Frequency	Percentage (%)	Prevalence in the Population (N = 900)
Articulation Disorder	109	75.6	0.12
Stuttering Disorder	28	19.4	0.03
Voice Disorder	7	4.8	0.007
TOTAL	144	100	0.16

Source: Author's construction using data from the survey.

4.3.3 Estimated Prevalence of Speech Disorders by Gender

The prevalence of speech disorder by gender is given in Table 4.7. Out of 144 respondents who had speech disorders, 113 of the respondents were males while 31 of the respondents were females. The total ratio of males to females was therefore 3.65: 1 for speech disorders in the Offinso Municipality. The ratio of males (87) to females (22) was 3.95: 1 for articulation disorder only; the ratio of male (21) to females (7) was 3:1 for stuttering only, and the ratio of male (5) to females (2) was 2.5:1 for voice disorder only. The estimated prevalence for male was 0.13 and female was 0.03. The total prevalence of speech disorders in the Offinso Municipality was estimated to be 0.16. The arrangement of prevalence of speech disorders was meaningfully different according to gender. There was a greater prevalence of all three speech disorders (articulation, stuttering, and voice) in males as compared to females.

Table 4.7: Estimated Prevalence of Speech Disorders by Gender

Speech Disorder	Male	Female	Total	Ratio of Males to Female
Articulation Disorder	87	22	109	3.9 : 1
Stuttering Disorder	21	7	28	3.0 : 1
Voice Disorder	5	2	7	2.5 : 1
Total(Frequency)	113	31	144	3.56 : 1
Prevalence by Gender	0.13	0.03	0.16	

Source: Author's construction using data from the survey.

4.3.4 Estimated Prevalence of Speech Disorders by Class Level

The prevalence of speech disorder by class was also done and this is presented in Table 4.8. Out of 220 respondents selected from class one, 59 (representing 26.8%) had speech disorders. Out of the 237 respondents selected from class two, 33 (representing 13.9%) had speech disorders. From the 170 respondents selected from class three, 20 (representing 11.7%) had speech disorders. From the 124 respondents selected from class four, 21 (representing 16.9%) had speech disorders. Whilst of the 98 respondents selected from class five, 8 (representing 8.1%) had speech disorders and from the 51 respondents selected from class six, 3 (representing 5.8 %) had speech disorders. The estimated prevalence for class one was 0.065, class two was 0.036, class three was 0.022, class four was 0.023, class five was 0.008 and class six was 0.003.

Table 4.8: Prevalence of Speech Disorder by Class Level

Speech Disorders	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Total
Articulation Disorder	51	21	13	17	5	2	109
Stuttering Disorder	7	12	5	3	0	1	28
Voice Disorder	1	0	2	1	3	0	7
Total	59	33	20	21	8	3	144
Prevalence by Class	0.065	0.036	0.022	0.023	0.008	0.003	0.16
Total in each Class	220	237	170	124	98	51	900
% of total in each class	26.8%	13.9%	11.7%	16.9%	8.1%	5.8%	16%

Source: Author's construction using data from the survey.

Table 4.9 shows the differences between respondents with speech disorders and respondents without speech disorders. It is evidence that there is statistically significant difference between respondents with speech disorders and respondents without speech disorders. The P - value of respondents with speech disorders and respondents without speech disorders is $P = 0.0019$. The respondent with speech disorders is 144 and respondent without speech disorders is 756.

Table 4.9: Respondents with or without Speech Disorders by Class level

CLASS	SPEECH DISORDERS	WITHOUT SPEECH DISORDERS	CLASS DISTRIBUTION
ONE	59	161	220
TWO	33	204	237
THREE	20	150	170
FOUR	21	103	124
FIVE	8	90	98
SIX	3	48	51
TOTAL	144	756	900

Source: Author's construction using data from the survey.

4.3.5 Estimated Prevalence of Speech Disorders by Possible Associated Factors

Table 4.9 shows possible associated factors of speech disorders. Out of 144 respondents who had speech disorders, 74 (representing 51.3%) had vocal cord nodules, 14 (representing 9.7%) had hearing impairment, and 56 (representing 38.8%) had unknown source.

Table 4.10: Possible Associated Factors of Speech Disorders

Etiological Category	Frequency	Percentage (%)
Vocal Cord Nodules	74	51.3
Hearing Impairment	14	9.7
Unknown Source	56	38.8
TOTAL	144	100

Source: Author's construction using data from the survey.

CHAPTER FIVE

DISCUSSION

5.1 INTRODUCTION

This chapter presents a detailed discussion of the findings of the study conducted in the Offinso Municipality of the Ashanti Region. The aim was to find out the true prevalence of speech disorders in school going children from class one to class six in the Offinso Municipality in the Ashanti Region. The discussions were done under the broad objectives of this study which included prevalence of speech disorders, prevalence of speech disorders by type, prevalence of speech disorders by gender, prevalence of speech disorders by class level and possible associated factors of speech disorders in the municipality. The results indicated five main findings.

5.2 PREVALENCE OF SPEECH DISORDERS

5.2.1 Estimated Prevalence of Speech Disorders

The current study has provided new data on the prevalence of speech disorders in a large unit of government primary school students in Offinso Municipality. Prevalence figures help in the development of service delivery by informing decisions about resource allocation. Prevalence data can also be used to calculate the level of effect of intervention and to indicate the boundaries between impairment and typical development (Law *et al.*, 2000). The study revealed that out of 900 students selected for the study, 144 students had speech disorders. The total prevalence of speech disorders was estimated to be 0.16 (at 99% confidence interval). While this figure corresponded to the

prevalence estimate reported by some investigators (e.g., Calnan & Richardson, 1976; 1977), it did not match the figure obtained by others (e.g., Bax & Hart, 1976).

Close inspection of those studies revealed important differences in the methods used and the populations studied, and those differences may account for the different results obtained.

5.2.2 Estimated Prevalence Of Speech Disorders by Type

The estimated prevalence of speech disorders by type revealed that 0.12 were identified as prevalence of articulation disorders. This was lower than the prevalence in studies reviewed for this thesis, which reported the prevalence of articulation disorders as 6.4% (Beitchman *et al.*, 1986). The estimated prevalence of stuttering in the present study was 0.03. It must however be noted that the findings do strongly support the assertion of Craig *et al.* (2002), who determined the prevalence of stuttering in their population to be 0.72%. In this work, the estimated prevalence of voice disorders was 0.007. Again, this was lower than the reported prevalence from Aronson (1990), who suggested that 6% of children had voice disorders, and Akif Kilic *et al.* (2004), who determined that the prevalence of vocal nodules in school children was 30.4%. The major reason for the lower estimate figures in articulation disorder, stuttering disorder and voice disorder is the different methodologies employed. Typically, studies that use screening or diagnostic techniques report lower prevalence figures than those that use parent reports and teacher.

5.2.3 Estimated Prevalence of Speech Disorders by Gender

The results of the gender distribution of speech disorders revealed that, out of 144 respondents who had speech disorders, 113 of the respondents were males while 31 of the respondents were females. The total ratio of males to females was 3.65:1 for speech disorders in the Offinso Municipality. The ratio of males (87) to females (22) was 3.9:1 for articulation disorders only. This evidence of higher articulation disorders in males compared to females was similar to findings of other studies on prevalence of articulation disorders (e.g., Beitchman *et al.*, 1986, Aithal, 1985; Keating *et al.*, 2001), age of acquisition of articulation (e.g., Dodd *et al.*, 2003; McCormack & Knighton, 1996), and risk factors for articulation disorders (Campbell *et al.*, 2003). In this study, the ratio of males to females with stutter reported was higher (3:1) than in previous reports. Bloodstein (1995) summarized results from a number of studies in which the ratios ranged from 2.2:1 to 6.3:1. Varieties of explanations were possible but remain hypothetical. There are fluctuations in the reported incidence of stuttering at different ages. In younger children, lower male–female ratios have been reported. For example, Bloodstein reported a ratio of 3:1 in the first grade, rising to 5:1 in the fifth grade. Craig *et al.* (2002) reported a similar rise from 2.3:1 in primary school-aged children to 4:1 in adolescents. The students in this study were younger and, in the main, preadolescents. The ratio of males (5) to females (2) was 2.5:1 for voice disorders. Duff *et al.*, (2004) who studied rates of voice disorders in 2,445 preschool children (1,246 males and 1,199 females) living in Illinois found no significant differences for age, gender, or race.

5.2.4 Estimated Prevalence of Speech Disorders by Class Level

The results of the class distribution of speech disorders revealed the following: out of 220 students selected from class one, 59 (representing 26.8%) had speech disorders; out of the 237 students selected from class two, 33 (representing 13.9%) had speech disorders; out of the 170 students selected from class three, 20 (representing 11.7%) had speech disorders; out of the 124 students selected from class four, 21 (representing 16.9%) had speech disorders; out of the 98 students selected from class five, 8 (representing 8.1%) were having speech disorders; out of the 51 students selected from class six, 3 (representing 5.8%) were having speech disorders. In this study, it was not possible to test the association of speech disorders by class level due to the small numbers in the majority of cells. It was seen that there was an overall decreasing prevalence of identified speech disorders with increasing class level. For example, the prevalence of articulation disorders was higher in class one as compared with all other classes. Another reason that made it impossible to test the association of speech disorders by class level in this investigation was the age range of the cohort. A number of studies have acknowledged the decreasing incidence of speech disorders with age (Craig *et al.*, 2002; Harasty & Reed, 1994; Keating *et al.*, 2001; Kirkpatrick & Ward, 1984), and the data from this work confirmed that this trend continues through primary school.

5.2.5 Estimated Prevalence of Etiological Factors to Speech Disorders

The findings of possible associated factors showed that out of 144 respondents who had speech disorders, 74 (representing 51.3%) had vocal cord nodules, 14 (representing 9.7%) had hearing impairment, and 56 (representing 38.8%) had unknown source.

Vocal cord nodules appeared strongly as the most common possible associated factor. This finding validates the assertion of Case's (1984), that the greatest commonly happening vocal pathology and hoarseness in children are vocal cord nodules. Coyle and colleagues (2001) also confirmed that vocal nodules were the supreme everyday diagnosis (74.3%) of the diseases found in the 0 – 14 years group of their study. Vocal cord nodules are developments that appear on the vocal cord as an effect of vocal misuse. The abusive vocal actions, such as crying, excessive volume, shouting, throat clearing and vocal imitations in children are usually considered as vocal nodules (Deem & Miller, 2000; Boone & McFarlane, 2000; Case, 1984)

5.3 CONCLUSION ON DISCUSSION

The present study authenticates the past studies with only few studies contradicting the findings of the study. The current discussions have covered the five main specific objectives of the study. The government primary school system in the Offinso Municipality can be seen as a model for catering for the needs of children with speech disorders in a broader state education system where support is not available. Speech language pathologists should play a role in the collaborative team charged with constructing educational programmes for children with speech disorders in the wider educational community.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter presents the conclusions and recommendations of the study conducted.

6.2 CONCLUSIONS

The purpose of the present study was to survey the prevalence of speech disorders in school children from class one to class six in the Offinso Municipality in the Ashanti Region. The prevalence of speech disorders in the Offinso Municipal government primary school was the number of affected individuals present in the schools at the exact time of the study divided by the total number of the population. The data has shown that out of 900 respondents screened for speech disorders, 144 respondents were diagnosed as having speech disorders with prevalence of 0.16. To summarize, 109 (representing 75.6%) of the 900 respondents in this study were known as having an articulation disorder with prevalence of 0.12% , Twenty-eight (representing 19.4%) were recognized as having a stuttering disorder with prevalence rate of 0.03, and 7 (representing 4.8%) were identified as having a voice disorder with prevalence rate of 0.007.

Again, the results showed that the pattern of prevalence of the three speech disorders was meaningfully different according to gender. The ratio of males (113) to females (31) was 3.65:1 for speech disorders in the Offinso Municipality. There was a higher prevalence of all three speech disorders (articulation, stuttering, and voice) in males as compared to females.

It was moreover found out that there was an overall decreasing prevalence of identified speech disorders with increasing class level. For example, the prevalence of articulation disorders was higher in class one as compared with all other class.

Finally, the frequent causes of speech disorders were vocal cord nodules and hearing impairment. It can be concluded that most of these causes are preventable if appropriate measures are taken.

6.3 RECOMMENDATIONS

Based on the conclusions of this research, the following are recommended:

- i) A national survey to assess the overall speech disorders in the country.
- ii) Attention should be paid to the identification of the speech disorders so that appropriate interventions can be initiated.
- iii) Strengthening of public awareness programmes regarding the need for speech assessment by government, health planners and other decision makers.
- iv) The government must employ speech and Language Pathologist in every district education sector so that they can assist students with speech disorders.
- v) Speech and Language Pathologist must assist in making educational programs for children with speech disorders in Ghana.
- vi) Hearing screening should be organized more frequent for school going children since hearing impairment can cause speech disorders especially articulation disorders.

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APPENDIX 1 SPEECH INVENTORY

Name:	Date:
Class:	Sex:
Rank:	Age:
Date of onset of Speech Disorder:	
Medical Cause of Speech Disorder:	

1. TYPE SPEECH DISORDERS

1	Articulation	
2	Voice	
3	Fluency	

2. DEGREE OF IMPAIRMENT

1	Mild	
2	Moderate	
3	Severe	

3. ARTICULATION

1	Substitutions	
2	Omissions	
3	Distortions	
4	Additions	

5. VOICE

1	Too Loud	
2	Too Soft	
3	Pitch too high / low	
4	Hoarse / harsh quality	
5	Transient loss of Voice	
6	Permanent loss of Voice	
7	Excessively Nasal	
8	Reduced Nasality	

4. RHYTHM: THERAPY

1	Repeat Initial Sounds	
2	Repeat words	
3	Hesitates before Speaking	
4	Prolongs Speech Sounds	
5	Cessation of Sound	

6. RECEIVED SPEECH

YES FOR	NO BECAUSE	
Several Weeks	Not Referred	
Several Months	Not Available	
Several Years	Not Well Enough	
Patient found it helpful	No Transport	
YES	NO	Other

APPENDIX 2 ARTICULATION TEST

Name:		Age:			
School:		Class:			
SOUND	ITEM	I	M	F	PHONOLOGICAL PROCESS
P	Pencils, Zipper , Cup				
M	Matches, Christmas, drum				
N	Knife, Santa, gun				
W	Window				
H	House				
B	Rabbit, Bathtub				
G	Gun, Wagon, Flag				
K	Cup, Chicken, Duck				
F	Fishing, Telephone, Knife				
D	Duck, Window, Bed				
ŋ	Finger , Ring				
dʒ	Jumping , Pajamas, Orange				
J	Yellow				
T	Telephone, Bathtub, Carrot				
ʃ	Church, Matches				
ʒ	Shovel, fishing, Brush				
L	Lamp , Yellow, Squirrel				
R	Rabbit, Carrot, Car				
V	Vacuum, Shovel, Stove				
S	Scissors, Pencils, House				
Z	Zipper, Scissors				
θ	Thumb, Bathtub, bath				
Δ	This , Feather				

I – Initial Position
M – Medial Position
F – Final Position

APPENDIX 3
QUESTIONNAIRE

This is a survey being conducted by a graduate student reading MSc. Speech and Language Pathology, from the School of Medical Sciences, Department of Eye, Ear, Nose, and Throat, and KNUST, to assess the Prevalence of Speech Disorders in School Children from Class one to Class six in Offinso Municipality in Ashanti Region. It is hoped that you will provide factual, honest and reliable answers to help bridge gap between theory and practice. Your responses to the questions will be used purely for academic purposes.

Name: _____ Sex: _____ Class: _____ Age: _____

1. Have you ever had a speech problem?
 - a) Yes
 - b) No
2. If yes, what is your speech difficulty?
 - a) Voice
 - b) Fluency
 - c) Articulation
3. Are there any factors that may have caused the problem
 - a) Yes
 - b) No
4. If yes, what are the factors
5. Are there people in your family that have speech difficulties?
 - a) Yes
 - b) No
6. What was the age when the student entered school?.....
7. Has the student ever failed or skipped a grade?
 - a) Yes
 - b) No
8. What is the present grade placement, school setting, and school attending?.....
9. What kind of grades or evaluation does the student receive?.....
10. Are there any subjects or classes that are especially difficult for the student?.....
11. Are there any subjects or classes in which the student does especially well?.....

12. Does the student receive any special academic support services?

a) Yes

b) No

13. If yes, specify.....

APPENDIX 4

INTERVIEW FORMAT AND TEST SENTENCE

1. INTRODUCTION :

Good Morning / Afternoon, my name is and I work.....
.....During the month ofwe are undertaking a survey to find out Prevalence of Speech Disorders in School Children from Class one to Class six in Offinso Municipality in Ashanti Region. Are you willing to participate? All you have to do is to repeat five sentences after me and answer one or two simple questions.

2. Administer five (5) sentences on card

- I. Limes are sour
- II. The barn swallow captured a plump worm
- III. The phantom soared across the foggy heath
- IV. Look at all that Stuff.
- V. It's a pretty pink shell.

3. On the basis of this short test, proceed only if the student has a definable speech disorder. Use the data sheet provided to record the information:

- I. Enrolment number
- II. Date of birth
- III. Gender
- IV. Special learning need (including whether the child had speech disorders), level of learning support provided, and curriculum adaptation made and the teacher's perception of the student's support needs to be included in the classroom.

4. Thank the student for their co-operation and record by means of a tick in the appropriate space on the selected class data sheet before moving on the next student.

PLEASE ENDEAVOR TO FOLLOW THE ABOVE FORMAT FOR PURPOSES OF RELIABILITY

Many thanks for your assistances

APPENDIX 5

VOICE HANDICAP INDEX

Instructions: These are statements that many people have used to describe their voices and the effects of their voices on their lives. Circle the response that indicates how frequently you have the same experience.

Note: The letter preceding each item number corresponds to the subscale (E = emotional Subscale, F = functional Subscale, P = physical Subscale)

- F1. My voice makes it difficult for people to hear me
- P2. I run out of air when I talk
- F3. People have difficulty understanding me in a noisy room.
- P4. The sound of my voice varies throughout the day
- F5. My family has difficulty hearing me when I call them throughout the house.
- F6. I use the phone less often than I would like
- E7. I'm tense when talking with others because of my voice.
- F8. I tend to avoid groups of people because of my voice
- E9. People seem irritated with my voice
- P10. People ask, what's wrong with your voice?
- F11. I speak with friends, neighbors, or relatives less often because of my voice
- F12. People ask me to repeat myself when speaking face – to – face
- P13. My voice sounds creaky and dry
- P14. I feel as though I have to strain to produce voice
- E15. I find other people don't understand my voice problem.
- F16. My voice difficulties restrict my personal and social life.
- P17. The clarity of my voice is unpredictable.
- P18. I try to change my voice to sound different.
- F19. I feel left out of conversations because of my voice.
- P20. I use a great deal of effort to speak.
- P21. My voice is worse in the evening
- E22. My voice problem upsets me
- E23. My voice makes me feel handicapped.
- E24. I feel annoyed when people ask me to repeat.
- P25. My voice gives out'' on me in the middle of speaking.

The student is asked to indicate how often each symptom occurs. The word "never" and "always" are used as endpoint anchors, and scored as 4 and 0, respectively. Intermediate scores range between 1 and 3. The total scores are then computed for each subscale: Emotional, Functional and Physical.

APPENDIX 6

AUDIOLOGICAL EVALUATION

KUMASI HEARING & SPEECH ASSESMENT CENTER

KATH

WHO Collaborating Centre - Komfo Anokye Teaching Hospital Kumasi

DIRECTOR: PROF. SIR. G.W. BROBBY (KCSG) MD., DDS, FWACS, FA ORL, FICS, Dsc (h.c.)

Name: _____ Birthdate _____ Age _____ Number _____

Address _____ Referred by _____

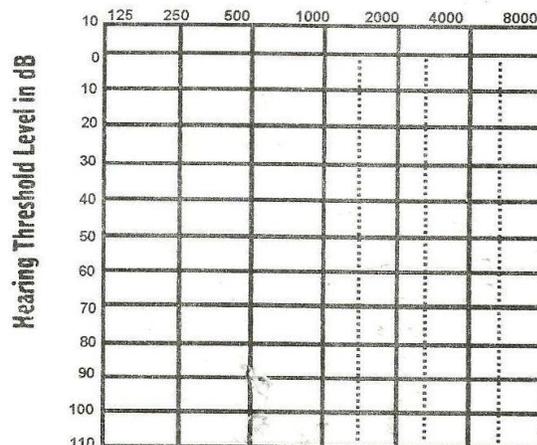
Date _____ Clinician _____ Audiometer _____

Signal _____ Response _____ Reliability _____

SPEECH AUDIOMETRY

	SRT	PTA	DISCRIMINATION					UCL
			%	HTL	Mask	SN	List	
R								
L								
SF								
AID								

FREQUENCY IN HERTZ (H_z)



CLINICAL IMPRESSIONS

Right Left HEARING STATUS Ear Ear

- Normal or Essentially Normal
- Mild
- Mild-Moderate loss
- Moderate loss
- Moderate-Severe loss
- Severe loss
- Severe-Profound loss
- Profound loss

TYPE OF LOSS

- Conductive
- Sensorineural
- Mixed

TYMPANOMETRY

- Possible Middle Ear Pathology
- Normal or Essentially Normal middle Ear function

LEGEND

EAR	AIR	MASK	BONE	MASK	No Resp
R	O	Δ	<	[⊘
L	X	□	>]	⊗

RECOMMENDATIONS

Audiologist