

SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA

THE ORAL HEALTH OF SCHOOL CHILDREN IN
THE HO MUNICIPALITY, GHANA

BY

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A DISSERTATION TO THE SCHOOL OF PUBLIC
HEALTH UNIVERSITY OF GHANA, LEGON IN
PARTIAL FULFILMENT FOR THE AWARD OF A
MASTER OF PUBLIC HEALTH DEGREE.

APRIL, 2009

DECLARATION

I Prosper Tuosie Beni hereby declare that this study is my own work and that to the best of my knowledge it contains no material previously published or written by another person nor material which to a substantial extent, has been accepted for the award of any degree or diploma of a university or other institution of learning except where acknowledgement is made in the text

Signed..... (Prosper Tuosie Beni)

CERTIFICATION

The under mentioned persons supervised the conduct of this study from the proposal development stage, collection and analysis of the data and the write up and its submissions.

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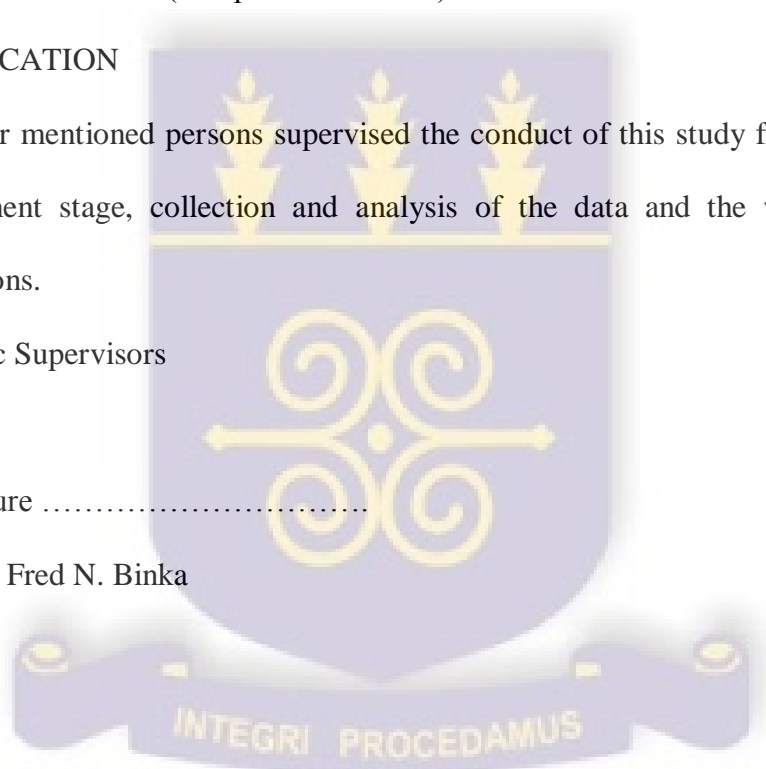
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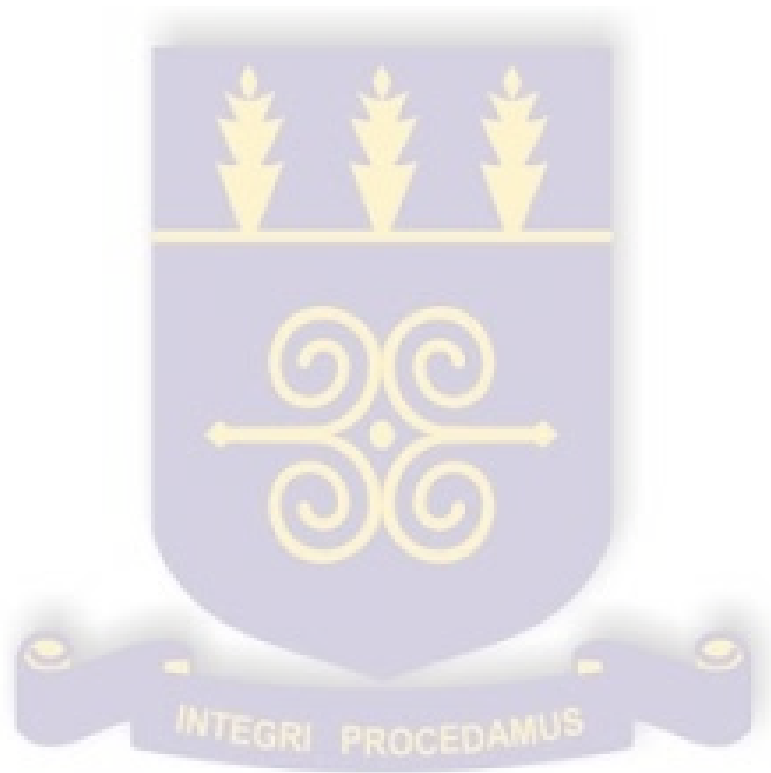
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DEDICATION

This work is dedicated to the Almighty God for his guidance and protection and also to my lovely, caring, thoughtful wife, Wendy Suzaala Baguoh Beni and son Kevin Prowen Naamwifang Beni as well as my mum, Julie and dad Dr.Charles Tuosie Beni for their unflinching support.



ACKNOWLEDGEMENTS

I would like to use this opportunity to thank the many persons who carefully and thoughtfully guided me to complete this dissertation.

Thanks to the Dean, Faculty members and all staff of the School of Public Health for their assistance.

Special thanks to Professor Fred Binka (primary supervisor), Dr. John Eleazer and Dr. Crosby Oppong-Yeboah who helped me with their expert knowledge and constructive suggestions to come out with this work. May God bless you.

To Dr. Nyamuame I say a very big thank you for the financial support and logistics you provided. I also express my gratitude to the Ho municipal education service and all the head-teachers and school children for their cooperation and permission that made this work possible. Prosper thank you for providing me the laptop to work with.

I ask for God's blessings for Ms. Afi Ashigbi (COHO) and Mr. Graham Dassah who helped in the data collection. For taking time off your busy schedule to help me with the data analysis, I say a big thank you to Mr. Tom Ndanu of the University of Ghana Dental School and Mr. Amos Laar of the School of Public Health, Legon

Eunice Vivien Gedzie, private secretary to the Medical Superintendent of the Volta regional hospital I am very grateful for the secretarial services you offered.

For having to do without me most of the time whilst I was in school, I ask for special blessings from God for my Wife, Son, Philip, Alice and Gevalt my pet dog. Finally to my course mates at the School of Public Health and all others whose names are not mentioned here I say be richly blessed by the Lord.

Thank you all.

ABSTRACT

Objective: An exploratory oral health study was undertaken in the Ho Municipality, Ghana in order to determine the prevalence of oral diseases among school children and provide baseline data on their oral health.

The knowledge and practices among the school children with respect to oral cleaning practices and oral health seeking behaviour, and the eating habits associated with oral health problems were determined.

Methods: This was a cross-sectional study. A stratified random sample of school children in primary one to JHS two from rural and urban schools was selected. Oral clinical examination was conducted using WHO standard guidelines. This enabled the investigator to measure the mean DMFT, CPITN scores, prevalence of malocclusion, tooth fracture, enamel hypoplasia and cleft lip/palate.

Questionnaires were administered by a Community Oral Health Officer (COHO), a Community Health Nurse and the principal investigator. However, oral examination was carried out by the principal investigator alone.

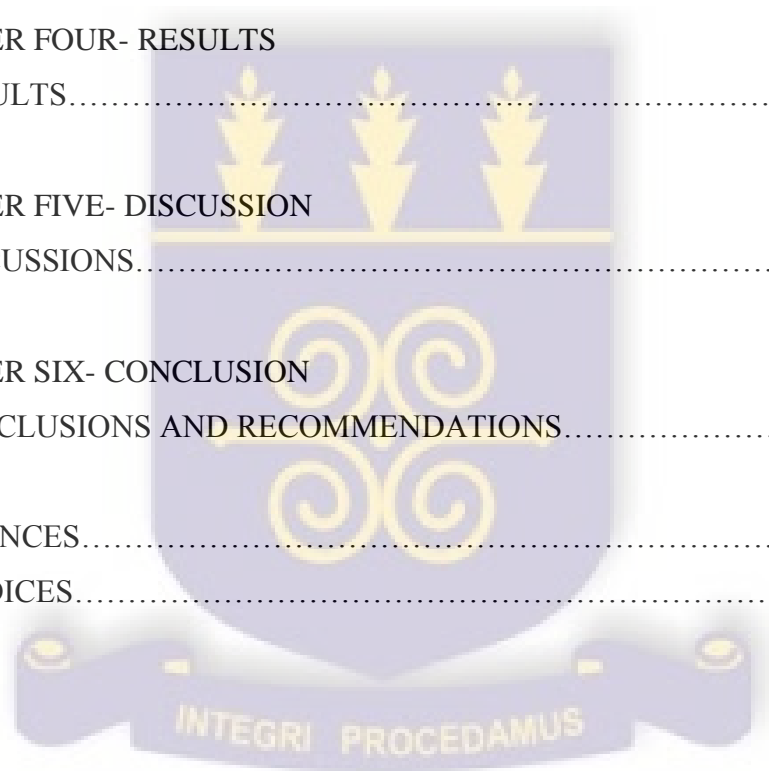
Results: A mean DMFT score of 0.24(+/-0.75) was obtained with a decay component of 92.3%. Caries free prevalence was 87.5%. The proportion of school children, 20.4% with healthy mouths was low. A total of 79.6% had calculus/bleeding gums. There were 59.9% of school children who claimed to clean their mouths twice daily. Majority of them used the toothbrush (82.2%) and toothpaste (92.3%). The prevalence of tooth fracture (4.2%) and enamel hypoplasia (5.3%) were low. No cleft lip/palate was seen. Malocclusion was 27.9% in the study sample with the perception of bad teeth arrangement being 15.6%. Only 2.4% of the school children ever visited the dentist. As low as 7.1% of those who ever had toothache sought treatment at a hospital with 92.9% seeking self-medication or doing nothing about their toothache.

Conclusion: The oral health of school children is poor. There is the need for a comprehensive programme on oral health to be incorporated in the school health outreaches.

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LIST OF ACRONYMS

- COHO Community Oral Health Officer
- CPITN Community Periodontal Index of Treatment Needs
- DMFT Decayed Missing Filled Teeth
- GES Ghana Education Service
- GHS Ghana Health Service
- ID Identity
- JHS Junior High School
- MCE Municipal Chief Executive
- MDHS Municipal Director of Health Services
- MHD Municipal Health Directorate
- MHMT Municipal Health Management Team
- OPD Out Patient Department
- RHD Regional Health Directorate
- SES Socio Economic Status
- SPSS Statistical Package for Social Scientists
- T.V. Television
- UK NDNS United Kingdom National Diet and Nutrition Survey
- USA United States of America
- WHO World Health Organization

CHAPTER ONE- INTRODUCTION

1.0 BACKGROUND

Oral health is an important indicator as well as a determinant of general health. The most common and important oral health problems are dental caries and periodontal diseases. These historically are considered the most important oral health burden (World Health Report, 2003) and are major public health issues. However, other oral diseases of concern are malocclusion, tooth fracture, enamel hypoplasia and cleft lip/palate. This study intends to explore the above oral diseases.

Dental caries is an ecological disease in which the diet, the host and the microbial flora interact over a period of time in such as to encourage demineralization of the tooth enamel with resultant cavity formation. This usually results in pain and tooth loss if left untreated. Thus there are four main criteria required for caries formation:

A tooth surface-enamel or dentin; cariogenic bacteria-or potentially caries causing; fermentable carbohydrates -such as sucrose and time (Soammes&Southam,1993) .The caries process does not have a predictable outcome, and different individuals will be susceptible to various degrees depending on their tooth shape, oral habits and the buffering capacity of their saliva. Dental caries can occur on any surface of a tooth that is exposed to the oral cavity, but not the structures which are retained within the bone (Kidd&Smith, 1990). The carbohydrates that are eaten are fermented over time by the cariogenic bacteria in a person's mouth into acids such as lactic acid (Halloway, 1983) This acid when left in contact with the tooth causes demineralization of the enamel resulting in cavity formation.

Once dental caries occurs in man its manifestations can be seen throughout life, though the lesion may be treated. Its occurrence in man defies all boundaries i.e. geographical, sex, race, age and socioeconomic status.

The WHO at its world health assembly in May 1987 adapted, as the first global indicator of oral health status, a mean not exceeding three (3) Decayed, Missing, Filled permanent teeth(DMFT) at the age of 12 years by the year 2000. In reality the WHO's DMFT target of 3 before 2000 was attained by 70% of countries. (WHO Technical Report, 1984)

This may not be the actual situation, as worldwide evidence indicates that the DMFT distribution is skewed. This has given rise to the 20:80 phenomenon in which 20% of the population in some countries carry 80% of the caries burden whereas 80% carry only 20% of the caries burden. There is also evidence which indicates a worsening caries experience, as such an increasing DMFT with increasing age.

Presently the distribution and severity of dental caries differ in various parts of the world and within the same region or country. According to the WHO updated information available in databanks, the DMFT scores in children is relatively high in the Americas, DMFT=3.0 and in the European region DMFT=2.6, whereas the index is lower in most African countries DMFT=1.7(Sheiham, 1984; Brathall et al, 2006). Time trends studies have however shown that in the underdeveloped countries, the number of dental caries is increasing at a frightening rate probably due to an increased consumption of sugars and inadequate exposure to fluoride use (Peterson et al, 2005). In the industrialized countries the caries rate has declined by about 40% in the past 10

years (Sheiham, 1984) as a result of extensive use of fluoride and public oral health education.

In quantifying oral epidemiological data, several indices have been developed. The Decayed, Missing and Filled Teeth or Surface (DMFT and DMFS) indices describe the severity of dental caries in an individual. DMFT expresses the caries prevalence in permanent dentition (WHO Oral health surveys, 1997) with evidence of caries attack as seen in a carious lesion, a filling or a missing tooth. DMFT and DMFS are obtained by calculating the number of teeth (T) or tooth surfaces (S) that are Decayed (D), missing due to caries (M) and Filled (F).

The DMFT(S) is used to estimate the number of teeth that have become affected by caries on the day of examination. Indices are either calculated for 28 permanent teeth not including teeth numbers 18, 28, 38, and 48 which are the “wisdom” teeth or for all 32 teeth. The caries index score (DMFT) is arrived at by adding the number of teeth /tooth surfaces that have caries, the number of teeth/tooth surfaces that have been lost due to tooth decay and those that have fillings or crowns. To illustrate this, here is an example.

A DMFT is 18, if five (5) permanent teeth are decayed (D), three (3) are missing due caries (M) and 10 teeth have fillings. This also implies that for 28 permanent teeth, 10 are intact. If a tooth has both carious lesion and a filling, it is computed as Decayed (D) only. A DMFT of 28 (or 32, if “wisdom” teeth are included) is maximum, implying all teeth are affected (WHO Technical Report, 1984). For primary dentition the maximum is 20 teeth.

The word periodontal literally means “around the tooth”. It is a chronic bacterial infection that affects the gums and bone supporting the teeth and can affect one or more teeth. It begins when the bacteria in plaque (the sticky, colourless film that constantly forms on one’s teeth) causes the gums to become inflamed. In the mildest forms of the disease, gingivitis, the gums redden, swell and bleed easily. There is usually little or no discomfort. Gingivitis is often caused by inadequate oral hygiene and it is reversible when professional treatment and good oral home care are sought.

Untreated gingivitis can advance to periodontitis. With time, plaque can spread and grow below the gum line. Toxins produced by the bacteria in plaque irritate the gums. The toxins stimulate a chronic inflammatory response in which the body in essence turns on itself and the tissues and the bone that support the teeth are broken down and destroyed. Gums separate from the teeth, forming pockets (spaces between the teeth and gums) that become infected. As the disease progresses, the pockets deepen and more gum tissue and bone are destroyed. Often the destructive process has very mild symptoms. Eventually, the teeth can become loose and may have to be removed. Its severity depends on the type and number of bacteria, food for the bacteria, host resistance as well as the nutritional state of the host, for example Vitamin C presence.

Periodontal disease is the second most common oral disease. Severe Periodontitis which may affect tooth loss is found in 5-20% of most adult population worldwide (Peterson et al, 2005). In Ghana 9 out of 10 school children have the disease (Manual on oral health care, MOH/GHS, 2001). It affects both the young and the old.

The Community Periodontal Index of Treatment Needs (CPITN) is the accepted method for undertaking epidemiological and screening studies for periodontal diseases. The index teeth that are used are 17,16,11,26,27,37,36,31,46,47(Mitchell&Mithchell,1995).

Malocclusion means the teeth are not aligned properly. Alternative names are crowded teeth, crossbite, overbite, etc. Occlusion refers to the alignment of the teeth and the way that the upper and lower teeth fit together or bite. Ideally all upper teeth fit slightly over the lower teeth. The points of the molars fit the grooves of the opposing molar. All teeth are aligned straight and spaced proportionally. The upper teeth keep the cheeks and lips from being bitten and the lower teeth protect the tongue.

Malocclusion like many other oral diseases may not be life threatening, but are important noble health issues (Sheiham, 1993) because of their prevalence in certain communities in Ghana. An unpublished work reported a moderately high prevalence of 9.6 % of malocclusion in the Wa municipality of Ghana in 2005(Abu-Sakyi, 2005). Malocclusion is the most common reason for referral to an orthodontist. It has a large impact on individuals and society in terms of discomfort, social and functional limitations (Sheiham, 1993).By treating moderate or severe malocclusion, the teeth are easier to clean and there is less risk of dental caries and periodontal diseases as well as tooth fractures.

Teeth are remarkably strong, but they can chip or crack (fracture) or break. This can happen in several ways including the following: biting down on something that is hard, falling, being hit on the mouth or face or having cavities that weaken the tooth.

Reliable data on the frequency and severity of orodental trauma, including tooth fractures are still lacking in most countries particularly developing countries (Enwonwu et al, 2005). Some countries in Latin America report dental trauma in about 15% school children. The prevalence is 5-12% in children in the Middle East, whilst it is 16-40% among 6 year olds and from 4-33% among 12-14 year olds in the industrialized world (Peterson et al, 2005).

When a tooth chips or breaks, it may not hurt and may not even be seen immediately. Minor tooth fractures do not usually cause pain, but if a large piece of the tooth breaks off, it can hurt. This is because the nerve inside the tooth may be damaged, and if it becomes exposed to saliva, hot or cold food/drinks or air, it can be extremely uncomfortable. The pain from a fractured tooth may not be constant and many people feel it when they chew because chewing puts pressure on the tooth. Fractured teeth also results in poor aesthetics.

A partial or complete failure of the right and left segments of the lip and roof of the mouth in the developing embryo, to unite along a line beginning at the lip and extending through the hard and soft palate would often result in oral clefts. The effect is to create a grotesque facial deformity and destroy the partition between oral and nasal cavities. They are predominantly of genetic origin though some environmental factors also play a role. The incidence of cleft lip or palate varies worldwide. Native Americans show the highest incidence at 3.74 per 1000 live births, fairly uniform incidence of 1:600 to 1:700 live births in Europeans, high in Asians(0.82-4.04/1000 live births) and low in Africa(0.18-1.67/1000 live births)(Peterson et al,2005).

Enamel hypoplasia is a developmental disease characterized by incomplete formation of the dental enamel and transmitted as an X-linked or autosomal dominant trait. Deficiencies of vitamins A, C or D as well as local infection have been associated with enamel hypoplasia. It usually presents as small grooves, pits, and fissures in mild cases, deep horizontal rows of pits in severe cases, or absence of enamel in extreme cases.

Most of these oral conditions with the exception of cleft lip and cleft palates, involve the tooth which can easily be accessed through direct visual examination. With the appropriate instruments, probing can be done and data thus easily collected.

1.1. STATEMENT OF THE PROBLEM

Dental caries accounted for the loss of 71.3% of all teeth extracted in the Northern region between January 1998 and December 2000 (Tamale Municipal Annual Health Report, 2000). At the Tarkwa Government Hospital, dental infection was second only to malaria in hospital attendance for the period of 1998 to 2000 and extractions due to caries was 66.5% in 2007 (Wassa West Annual Health Report, 2007). The 2004 oral health care report for the nation indicated that caries accounted for 80% of all extracted teeth in public dental clinics.

In the Volta region of Ghana, though it has a few public dental facilities, there are only two (2) facilities that have dentists at post as at 2008. These are located at Sogakofe Government hospital with one dentist and at the Volta Regional hospital which is within the Ho Municipality with two (2) dentists at post.

Dental caries occupied the third position in 2004 and placed second twice in 2005 and 2006 among the top ten causes of Outpatient Department attendance at the Volta Regional Hospital(Nyamuame,2006).Actual figures were 2,300 (2004):2,042(2005) and 2,393(2006).This might not be representative of the study area, since it is a report for the whole region. However, it does give an idea that dental diseases are a problem for the study area.

1.2. JUSTIFICATION FOR THE STUDY

There is very little data and information on the prevalence of oral diseases among the Ghanaian youth. A look at the 2007 Annual Report of the Ho Municipal health directorate does not provide any data on oral health from the school health programme, whilst the 2006 report of the Volta regional hospital showed that dental caries was among the top three (3) out-patient department (OPD) cases, from 2004 to 2006. For there to be an improvement in the oral health status of the population, there is an urgent need for this trend to be reversed.

This study is therefore relevant since it will explore the oral health status, with special reference to dental caries and periodontal diseases and thus provide data on the prevalence of oral diseases. Such data could then be used by the Ho municipal health directorate in planning for the oral health aspect of their school health programmes.

1.3.0. OBJECTIVES

1.3.1. General: To investigate oral diseases among school children in the Ho municipality.

1.3.2. Specific

1. To determine the prevalence and distribution of Oral diseases among school children in the Ho municipality.

2. To determine the knowledge and practices among school children in the Ho Municipality, with respect to Oral cleaning practices and Oral health seeking behaviour.

3. To document the eating habits associated with oral health problems among school children in the Ho municipality.

CHAPTER TWO- LITERATURE REVIEW

2.0. LITERATURE REVIEW

In spite of the important achievements in the oral health of people around the world, many communities especially the underprivileged societies still have oral health problems. According to the WHO world oral health report in 2003, the distribution and severity of oral diseases differ among countries and within the same country, with 60-90% of school children being affected in the industrialized world. However, oral health is said to have improved over time in the industrialized world, and deteriorating in the non-industrialized countries (Sheiham, 1984) due to the increased sugar consumption and inadequate fluoride exposure.

Oral conditions such as malocclusions, cleft lip and palate, fractured incisors and sealants (Macek, 2001) have been considered despite studies being based mainly on the two major oral conditions, which are dental caries and periodontal diseases.

2.1 DENTAL CARIES:

Dental Caries is considered a major oral health problem around the world. An estimated 90% of school children worldwide and most adults have experienced caries (World Health Report, 2003). In African countries, however, caries does not appear to be on the same order of severity as in the developed world (Thorpe, 2006). The oral health profile of Africa as seen today is very different from what was perceived previously.

The review of the published literature on Ghana about dental caries from 1963 to 1989 found a low prevalence and decreasing trends i.e. DMFT of 1.37 in 1964, 1.30 in 1981 and 0.69 in 1989 (Bruce, 1999). Differences in population groups (Macek, 2001) and study methods (Thorpe, 2006) have been given as the reasons for the variations in data available on caries prevalence in the developing countries. In diagnosing dental caries, some investigators tend to ignore precavitation lesions whilst others have made positive diagnosis at the earlier (sticky tissues) stage of lesion progression (Macek, 2001). Despite the existence of the WHO guidelines on oral health surveys (WHO Technical Report, 1984), which seeks to standardize the collection of information (Cleaton-Jones & Fatti, 1999), clinical assessment differences still persists.

Studies undertaken in the Ashanti and Greater Accra regions of Ghana in 1991 recorded low prevalence of caries with a DMFT of 0.69 in urban areas and 0.18 in rural areas. Dietary component variation was said to have accounted for this difference. Refined carbohydrate consumption and in-between snack meals consisting of toffees, sweets, soft drinks etc were found to be more common in the urban areas (Nornoo, 1986).

Another study in the Ga district of 2002 reported a low mean DMFT of 0.63 with standard deviation of 1.2 (Onuaha, 2002) for the whole population. The mean DMF value was higher in young adults who were out of school in all cases except among the 15 – 19 year olds, where caries experience was higher among young adults who were in school, DMFT = 0.55 than those who were not, DMFT = 0.37. The most significant finding in the study was caries prevalence among urban young adults was much higher in young adult who were out of school, DMFT = 0.83 than their

counterparts who were in school, DMFT = 0.56, but the finding was not statistically significant ($p = 0.64$). Few dental fillings were observed among the youth and for those who were out of school, there was no dental filling.

A cross-sectional study on the Oral Health Status of 15 – 24 year olds in the Wa Municipality of Ghana found the mean DMFT of the whole population to be 0.6 (Abu-Sakyi, 2005) that is, 0.65 teeth per individual had decayed or missing. The decay (D) component was 87% and that of missing (M) component was 13%. The filled component of the DMFT in all groups was zero, which means that there was no dental filling seen in the study population. Caries experience was higher among those in school with mean DMFT of 0.84 than those out of school who had a DMFT of 0.46 and this was statistically significant ($p=0.01$).

The prevalence of caries was found to be 13.9%, with a mean DMFT of 0.14 among 12 year old suburban Nigerian school children (Adeokoya et al, 2006). The decayed component accounted for 77.2% of the DMFT, while filling and missing teeth accounted for 15.8% and 7% respectively. Over 85% of the children examined were caries free. The probability of having caries experience, $DMFT > 0$ was significantly associated with the type of school and regular sweet consumption ($p < 0.05$).

A survey on oral health carried out in the Gambia, West Africa on 5 and 12 year old established that 88% and 73% of the examined 5 respectively 12 years old children exhibited clinically diagnosed caries (Kosovic & Nilson-Anderson, 2001). Girls were found to be more caries free than boys in this study and the reason assigned for this was the over representation of girls. The DMFT among the 12 year old urban and rural children was in general 2.27. The Mean DMFT values differed significantly between urban children with high socio-economic status. Urban children with low

socio-economic status and rural children with low socio-economic status ($p < 0.5$). Caries prevalence (DMFT = 2.84) among rural area children was significantly higher ($p < 0.5$) compared to urban children of high socio-economic status (DMFT = 1.69), but similar to urban children with low socio-economic status.

Males have been found to have lower dental caries prevalence than females. This observation has been attributed to the early eruption times of females, thus exposing them longer to the factors causing the disease. Females also tend to visit dental clinics more frequently than their male counterparts, which means they receive more treatment (increased filled, F component). A study on oral health status of black college student in Khayelethsha, South Africa collaborate the above findings, when it came out with a mean DMFT score for males being almost half that of females (Carstens et al, 1991). This contrasts with the survey of dental caries in the Gambia, where more girls had a tendency of being more caries free than boys (Kosovic & Nilson-Anderson, 2001).

An oral health survey of Third Grade Students in New Hampshire, USA, among children screened, 52.0% had a history of dental carries, 21.7% had untreated decay and 45.9% had a dental sealant on at least one permanent molar. Of the children seen, 69.8% had no obvious dental problems, 25.1% required early care and 5.1% required urgent care (MMWR weekly, 2002). All values were obtained with a 95% confidence interval.

High Socio economic status (SES) is usually associated with increased access to health care delivery, a positive attitude towards health and the ability to afford such care (Burt & Eleland, 1992). A parent's socio-economic standing and education may therefore influence the incidence of dental caries in the children (Akpata, 1987). The children of high-level income parents are reported to have more dental caries (Holan et al, 1991). The report on the UK National Diet and Nutrition Survey (NDNS)

emphasized the association between decay experience and social inequalities (Gregory et al, 1995; Hinds&Gregory, 1995). However, Klein observed that lower SES groups had higher values for the Decayed and Missing components of the DMF scores and lower values for the filled component. Children in higher SES had a higher filled component.

A very marked relationship was found between SES and dental diseases during a study on school children in Accra, Ghana. Caries was found to be higher in urban than rural areas (Addo Yobo et al, 1991). This was attributed to variations in diet. Higher SES, rising income and urbanization was found to cause people to change their diet from the traditional starchy foods to more refined carbohydrates.

The caries levels in the industrialized countries have declined largely as a result of the massive use of fluorides in the form of fluoridated water, topical application of fluorides and fluoridated pastes. For developing countries in Africa, fluoridation is absent and the prevalent poverty makes the wide use of toothbrushes and fluoride toothpastes low (Aderinokun et al, 1999). Over 100 clinical trials show that the incidence of new caries lesions can be reduced by 20 – 30% (or greater) by routine use of fluoridated toothpastes (WHO Technical Report, 1984).

Studies carried out in South Africa between 1973 and 1984 reported an apparent lack of association between caries and sugar consumption, implying that Africans were probably genetically immune to caries. However, recent review of these studies indicates otherwise (Manyi&Fejerskov, 1990). For both the primary and permanent dentition in 12 year olds there is a positive correlation between the dmft/DMFT

indices and the availability of sugar. Data has clearly shown that low caries levels are associated with low availability of sugar and higher caries levels with higher availability of sugar. Significantly studies conducted in 1982 showed that all the 21 nations with a daily per capita supply of sugar less than 50g and a corresponding DMFT less 3.0 were developing countries (Screbnny, 1982). Five out of seven countries with a daily per capita sugar supply of more than 120g had a DMFT greater than 5.0 and all these countries were developed countries.

2.2. PERIODONTAL DISEASE

Periodontal disease is believed to be associated with adulthood. This is so, for the simple reason that most epidemiological data on periodontal diseases have been limited to the adult populations (Silvestone, 1978). However, gingivitis which is a precursor to periodontitis has been found in infants and said to increase with age (Bruce, 1980) and rarely progresses to Periodontitis.

In a recent study conducted in the Wa Municipality, 96.36% of individuals out of school had periodontal disease compared to those in school, 86.43%.The difference was statistically significant ($p=0.007$). Out of those in school, females were recorded to have healthy mouths than males. All those who had healthy mouths in the out of school category were rural dwellers (Abu-Sakyi, 2005).

Gingivitis prevalence in a study conducted on children in India was found to be 84.37% and generally increased with age. This could be due to the presence of mixed

dentition, varied food habits, shedding of primary teeth, improper and unsupervised oral hygiene practices and malocclusions (Dhar et al, 2007).

Sexual differences in periodontal diseases have not been consistent, and some studies have shown contrasting results. Boys showed gingivitis prevalence of 83.31% and girls 85.53% in the Dhar V study conducted in India. This result was found to be highly statistically significant. This was explained by the differences in pubertal changes and the fact that the girl child in rural areas is being given lesser oral hygiene facilities and priority compared to boys (Dhar et al, 2007).

Another study in adult population aged 19 to 64 years in Greece revealed that women had less periodontal diseases than men. This was statistically significant ($p < 0.05$) in the younger age groups (Anthanasouth et al, 1990).

Studies conducted in 1991 found significant difference between sexes for the presence of calculus (Carstens et al, 1991). Boys had significantly higher debris, calculus deposits and intensive gingivitis counts than girls by sex and age (Mohammed & Salwa, 1982). Iranian males showed a slightly less periodontal disease than females but the difference was not statistically significant (Kharmco, 1990).

In the developed countries, increased expenditure on health education, the use of toothbrush and toothpaste has tremendously improved on their oral health. In an Ontario study in Canada, 88% of the subjects reported toothbrush usage. The chewing stick or sponge is the main tool for oral cleansing in rural Ghana, whilst toothbrush is seen as a sign of good education and affluence (Norton & Adely, 1989;

Addo-Yobo et al, 1990). A study in Nigeria found no significant difference in the oral hygiene status between subjects using toothbrush and those using chewing stick (Aderinokun et al, 1999). Addo Yobo et al observed that neither the method nor frequency of tooth cleaning was found to be a statistical significant association for good oral health.

A minimum of twice a year visit has been recommended. Studies in Canada have recorded more than twice (Hamilton&Coulby, 1991) a year dental attendance whilst the opposite holds true for developing countries (Addo-Yobo et al 1990), where pain relief is the main reason for people visiting the dentist (Morgan et al, 1992). 70.2% of respondents in a Maryland School in the U.S.A. had ever had a dental visit, whilst only 6.6% had never seen a dentist.

A study on the oral health habits and periodontal health among university students in Kenya, with a mean age of 23 years, 39% of the participants had visited a dentist before mainly for extraction. 16% said they visited a dentist at least once a year and 96% said they studied daily (Chinda et al, 1992). Using WHO criteria, plaque was visible on 35% of the surfaces, 11% gingival sites examined bled on probing. Supra and sub gingival calculus was recorded at 18% of index tooth surfaces.

In their study in Ghana, Addo Yobo et al found that 90% of their subjects had never visited the dentists (Addo-Yobo et al, 1990), whilst a study on the utilization of dental services in the Greater Accra region was found to be 1.6%, i.e. only about two out of one hundred people utilize dental services (Bruce et al, 2002).

2.3. MALOCCLUSION

Malocclusion has been perceived to mean differently to different people, as such there are degrees of differences in investigator consistencies. Malocclusion is however, generally considered as deviation from the ideal relation of the teeth of both jaws and it occurs in both primary and secondary teeth. The focus in malocclusion is however on the mixed dentition state, because it is easily corrected.

In a study in Papua New Guinea in 1997 amongst 12 to 15 year olds, 3% were recorded as needing some form of orthodontic treatment(Bandar,1997).Among a group of Zimbabwean students of mean ages 13.9 years, only 15.8% reported dissatisfaction with the position of their teeth whereas crowding or spacing in the upper and lower anterior jaw was recorded as 65.5% and 60.5% respectively(Makoni et al,1997).In 2000, studies carried out amongst Hungarian school children reported 23% moderate to severe malocclusion(Szoke,2000).

In Ghana similar studies have shown evidence of malocclusion. A study among 5-18 year olds in theBrong Ahafo region in 1967 reported malocclusion scores of 38.6% with anterior cross-bites being most common(Houpt et al,1967). Richardson in his study on dental diseases among school children in Mampong, Ghana recorded a malocclusion prevalence of 4.3% among 5-14 year olds. In this study, however, overcrowding due to premature shedding of the deciduous teeth was found to be the most common cause(Richardson,1968).In a more recent study in 2005 malocclusion was found to be moderately high in 15-24 year olds in the Wa municipality,Ghana.Severe forms of malocclusion formed 9.6%(Abu-Sakyi,2005).

A review of the literature on the prevalence of malocclusion in the USA in 1985 concluded a significant 20-30% departure from normal occlusion in children and that majority would benefit from orthodontic treatment.

2.4. FRACTURED TEETH

In a Nigerian study on traumatic fracture of anterior teeth in 12 year old school children, more boys 86 (10.8%) had various degrees of trauma to their anterior teeth compared to 71 girls (8.9%) i.e. Male : Female ratio was 1.2:1 (Agbelusi & Jeboda, 2005). The overall prevalence of tooth fractures reported was 9.8%. The most frequent injury was class II fractures (52.2%) and there were more maxillary teeth fractures than mandibular teeth and the difference was statistically significant $p < .01$, and the central incisors were the teeth most frequently fractured in both sexes.

A 13.8% dental trauma prevalence has been reported among Jordanian school children (Hamdan & Rajab, 2003). Difference in prevalence among between boys (17.1%) and girls (10.6%) was statistically significant ($p < .05$). Maxillary central incisors were the most affected (79.2%) and the most common type of fracture was enamel-dentin fracture (40.6%). The relationship between dental injuries and socio economic indicators was not statistically significant.

In a more recent study, Abu- Sakyi reported 7.6% of subjects having fractured incisors in Wa municipality in Ghana. Those requiring treatment constituted 3.2% of the study subjects. None of his 19 subjects had its fractured tooth treated but ten of them were visually non problematic (Abu-Sakyi, 2005).

2.5. CLEFT LIP AND CLEFT PALATE

A partial or complete failure of the right and left segments of the lip and roof of the mouth in the developing foetus, to unite along a line beginning at the lip and extending through the hard and soft palate would often result in oral clefts. The effect is to create a grotesque facial deformity and destroy the partition between oral and nasal cavities. They are mostly of genetic origin though some environmental factors among others, drugs, smoking, inadequate nutrition also plays a role. In several Asian countries, among others Malaysia, the incidence of cleft lip and palate occurs is 1 in 941 births (Soeria, 2006).

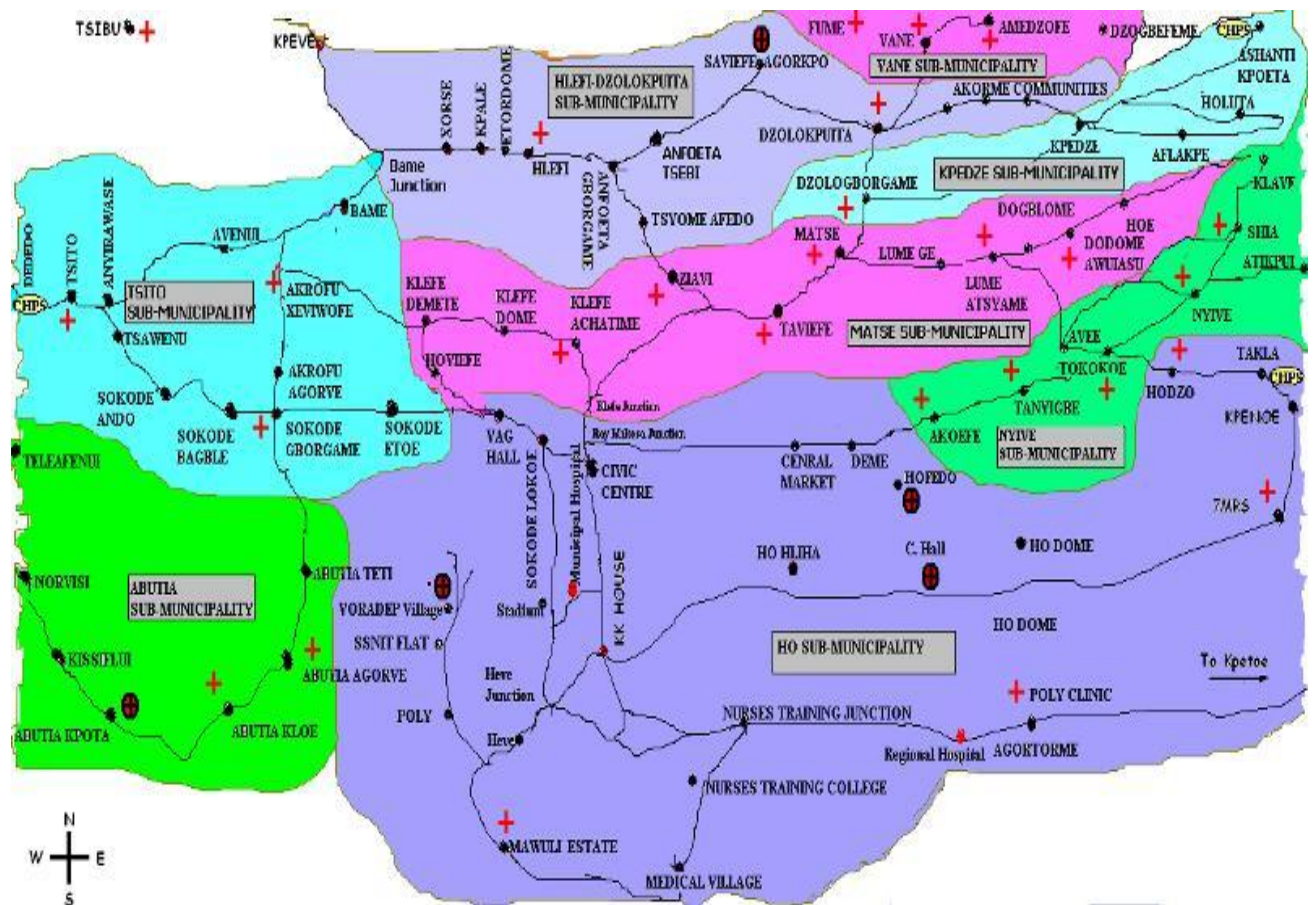
2.6 ENAMEL HYPOPLASIA

A study done on 12 year olds in Iran in 2001 on assessment of DMFT and enamel hypoplasia found the percentage of enamel hypoplasia to be 32.7% (Daneshkazemi & Davari, 2005). Work done on the prevalence of intrinsic tooth discoloration among 11-16 year olds in Nigeria showed there was a prevalence of 7.3% of enamel hypoplasia (Koleoso et al, 2004). No published literature on Ghana could be found on the PubMed database.

CHAPTER THREE- METHODOLOGY

3.0. RESEARCH METHODOLOGY

FIGURE 1: STUDY AREA SHOWING THE MAP OF HO MUNICIPALITY.



Source: Ho MHMT

3.1. STUDY LOCATION

Ho Municipality is one of the fifteen-political/administrative districts in the Volta region of Ghana. It is located in the middle zone of the Region. The Municipality, formerly a district which was made up of six sub-districts had two of its sub-districts, Adele and Kpetoe-Ziope carved out that make up the new Adaklu-Anyigbe district. The municipality has since then been made of four sub-municipalities namely Ho Shia, Kpedze Vane, Abutia and Tsito sub-municipalities. Ho Municipality is bordered on the north by the Hohoe District, west by Asuogyaman district, east and South-east by Adaklu-Anyigbe district, North-west by South Dayi district and North-east by The Republic of Togo.

Although the land area covered by the Municipality has not yet been clearly demarcated, together with Adaklu-Anyigbe, they cover an area of about 2,564 square kilometres with Ho Municipality operating with an estimated population of 160,493 with an annual growth rate of 1.9%. Ho town doubles as the Municipal Capital and the Regional Capital of the Volta Region.

LOCAL GOVERNMENT

The Ho Municipal Assembly constitutes the Local Government in the Municipality which is headed by a Municipal Chief Executive (MCE). The Municipal Health Directorate (MHD) is a decentralized department under the Municipal Assembly which is also represented on the Municipal Assembly's Social Services Sub-Committee by the Municipal Director of Health Services (MDHS).

ECONOMIC ACTIVITIES

The main economic activity in the municipality is Agriculture. Agricultural activities employ about 64% of the total labour force in the municipality. The crops mainly produced include Maize, Cassava, Yams, Plantain, Banana, Citrus, and Rice, Mangoes and Avocado pear.

The Non-Traditional crop like Pineapple is dominant at Akrofu, Sokode and Abutia areas. Sugar cane is also grown at Tsawoenu. Few people are also engaged in the Government set-ups, trading and constructional works.

ROAD NETWORK

Network of roads is approximately 639km .The primary trunk roads with bitumen surface are about 137.8km whilst gravel surfaced is about 205.8km .The secondary of feeder roads network is approximately 295km.Most of these are gravelled roads and always become un-motorable during the rainy season and creates poor accessibility in the municipality.

EDUCATION

There are currently(2007/08 academic year)155 primary schools,107 Junior High Schools,14 Senior High School,1 Teacher Training College,1 Nurse Training College,1 Community Health Nurses Training College and School of Hygiene .There are 5 Commercial / Vocational , 1 Technical Institute and 2 Tertiary Institutions , Ho Polytechnic and Adult College, Tsito.

ETHNIC GROUPS

The municipality is made up of three main ethnic groups: the Ewes, Ga-Adangbe and Avatimes who speak the Ewe, Adangbe and Avatime languages respectively. These groups are predominantly Christians with a few Moslems and traditionalists.

COMMUNICATION

There are four mobile telecommunication networks operating in the municipality. These are MTN, Kasapa, Tigo and One touch. In addition to this, Ghana Telecom operates fixed line services with a number of phone booths at vantage places making communication a bit easier to the rural areas. Apart from that the Ho Municipal Health Directorate Office (like all the other fourteen Health Directorates offices in the region) has a 2-way static radio that makes communication easier among the various District Health Directorates and also with the Regional Health Directorate.

3.2. TYPE OF STUDY – A Cross Sectional study was conducted to measure the prevalence of oral diseases.

3.3. DEFINITION OF VARIABLES

1. Dental Caries: refers to the presence of a hole (cavity) on any of the five surfaces (occlusal, medial, distal, buccal, lingual/palatal) of a tooth and can be detected by the use of a dental probe.
2. Periodontal Disease: refers to the presence of calculus (calcified deposits) on the index teeth and the presence of bleeding gums on probing.

3. Malocclusion: refers to crooked and uneven bite. The teeth are arranged in manner that the upper and lower teeth meet in a normal pattern. Any deviation from this normal arrangement is considered as malocclusion.

4. Fractured Incisors: refers to the presence of a fracture/crack on any part of the first four upper and lower anterior teeth

5. Cleft lip and palate: refers to any defect in the upper lip and palate such that there is a gap.

6. Enamel hypoplasia: refers to defects in the teeth that are usually milky white, yellow or brown in colour.

7. Good oral health cleaning practices refers to the use of toothbrush and toothpaste or chewing sponge or chewing stick etc to clean the teeth twice a day.

8. Poor oral health cleaning practices refers to the use of toothbrush and toothpaste or chewing sponge or chewing stick to clean occasionally or the total absence of cleaning.

9. Good oral health eating habits refers to the non-consumption of high cariogenic foods but takes in fruits and chewing gums.

10. Poor oral health eating habits refers to the consumption of highly cariogenic foods (toffees, biscuits, chocolate, ice-cream and soft drinks) and not cleaning the teeth after ingestion.

11. Good oral health treatment seeking behaviour refers to visiting the dental clinic to see the dentist when there is toothache or any other oral problem.

12. Poor oral health treatment seeking behaviour refers to having toothache or any other oral problem and not seeking dental attention.

3.4.0. STUDY POPULATION

The study population comprised school children from Ho Municipality and the target population was primary and junior high school children.

3.4.1. STUDY UNIT

The study unit was any school child, male or female living in the Ho municipality and attending primary or junior high school in the municipality.

3.4.2. SAMPLE SIZE.

The target population size of 36,874 (estimated) was obtained from the Statistics department of the Ho Municipal Education Directorate. For there to be adequate representation of the entire dental conditions of interest, the condition of least

prevalence, fractured teeth 7.6 % (Abu-Sakyi, 2005) was used in determining the sample size. Providing for an allowance of 5% for error, the sample size was 395 school children at 95% confidence level. This was obtained by using EPI INFO (statcalc) version 6.0, November 1993 programme.

3.4.3. SAMPLING METHOD

The list of all primary and junior high schools and the total enrolment was obtained from the Ho municipal educational directorate and stratified by locality into rural and urban based on the Ghana Statistical Service classification. According to this classification a locality is classified as urban if it has a human population of 5000 or more and rural if less than 5000 people. Ten (10) schools were purposefully selected at random by paper balloting. That is, the names of rural and urban schools were written on pieces of paper, folded and then accordingly picked at random without replacing. There were 232 rural and 145 urban schools. Thus the number of rural and urban schools selected was based on a proportion of approximately 60% rural and 40% urban. The selected schools were then used for the study. Boarding schools were excluded from this study since there was a possibility of them attracting students from places other than within the Ho Municipality. School children from the selected schools were then interviewed and examined. All students were given an equal opportunity to take part.

3.5.0. DATA COLLECTION TECHNIQUES AND TOOLS

Data were collected by interviewing school children who were in school. School open oral clinics were conducted. Study subjects were interviewed using structured questionnaires and examined orally. The survey tools was made up of Part 1 – Interview questionnaire on population characteristics and oral health practices and Part 2 – Oral health assessment form for clinical examination based on a modified version of the 1986 WHO oral health assessment form.

3.5.1. DATA ANALYSIS

Data entry fields were created in EPI INFO statistical software. Data collected were cleaned by doing double entry to remove any inconsistencies and wrong data. It was also reduced using Microsoft Excel and SPSS version 16.0. After ensuring the necessary corrections, analysis was done using SPSS version 16.0 software. Chi-square statistical analysis was done and the level of statistical significance was a p-value of 0.05 or lower. Frequencies and cross-tabulations were also generated. Determination of the decayed (D) component and missing (M) was done manually with a calculator since difficulties were encountered in arriving at the mean DMFT.

3.5.2. QUALITY CONTROL

In order to obtain good quality data the community oral health officer (COHO) at the Volta Regional Hospital Dental Unit was trained on interviewing techniques. A Pre-test was done by selecting ten (10) school children from a school that was excluded from the actual study. The respondents were interviewed by the COHO, a Community Health Nurse and the principal investigator whilst oral examination was done solely by the principal investigator. This was done prior to the actual survey. The aim of this exercise was to ensure that there was (i) Uniform interpretation, understanding and

application of the recording criteria and instructions (ii) familiarization with the field procedures, survey forms, instruments to be used and the indices (iii) reasonable consistency with minimal intra examiner variations.

To avoid mistakes being made on the survey forms, the COHO was made to append her initials against the identification number of the respondents. The data collected was double entered into EPI INFO 3.3.2 statistical software. The purpose of this was to eliminate data entry errors. Back-ups were also kept by sending data to principal investigators e-mail address.

3.6. ETHICAL ISSUES

1. A written permission was sought from the following: Ho Municipal Director of Health Services and Ho Municipal Director of Education. The topic and objectives of the study were discussed with them.
 2. Permission was obtained from Head teachers of the selected schools, and Informed Consent from the school children was given on their behalf by the various class teachers. Selected children were free to withdraw though none did so.
 3. All children in the selected schools were given a talk on oral health education and tooth brushing techniques.
 4. Names of children who needed dental treatment were written out and given to their class teachers who had to inform the parents of affected children. For those who needed dental treatment, they were advised and referred to the Volta Regional Hospital, Ho or any dental clinic of their choice with a copy of a referral form.
- (Appendix Two)

3.7. TRAINING

The COHO and a Community Health Nurse were taken through the questionnaires on how best to translate the questions in the local dialects for those respondents who did not understand.

3.8. PILOT STUDY

The questionnaire and instruments was pretested on ten (10) respondents at a school which was excluded from the final study. The idea behind this was to allow the assistants familiarize with the questionnaires and to get hold of the actual work that was to be done. The results obtained from the pre-test were used to make the necessary changes required on the survey forms.

3.9. DATA COLLECTION PROCEDURE

Actual clinical examination was done after registering and interviewing the children. The principal investigator carried out the clinical examination alone. Subjects were examined under sunlight, using plain mouth mirrors and single periodontal probes, and this was carried out in the open under tree shades. Standard cross-infection control was observed through cold sterilization of instruments with the chemical PeraSafe[®] and use of one pair of disposable hand gloves per subject.

The principal investigator sat behind subjects with the assistants in front of the subject but very close to the examiner. The subjects were made to sit on a straight chair with a tall back- and headrests. The aim of this was to let the recorder hear instructions

from the examiner clearly and allow the examiner to confirm that oral examination findings were accurately recorded by the assistants.

The WHO manual on oral health surveys, recording instructions and diagnostic criteria was applied for dental caries and periodontal diseases (WHO Oral Health Surveys, 1997) (Appendix One).

3.10. STUDY LIMITATIONS

- Bad weather as a result of the rains did not permit the principal investigator to do all the oral examinations in the open as some were done indoors.
- Issues of finance and logistics prevented the investigator from achieving the calculated sample size.
- The use of daylight during the oral examination could have resulted in an underestimation of dental caries.
- The principal investigator did not have access to the recommended WHO periodontal probe used for assessing CPITN. A dental probe was therefore used with minimal probing to reduce its effect on bleeding gum.

CHAPTER FOUR-RESULTS

4.0. RESULTS

The aim of this present study was to investigate the oral diseases among school children in the Ho municipality located in the Volta region of Ghana. In order to obtain data of high quality, the research assistants were taken through a training programme that included a pilot study.

TABLE 4.1 Population Characteristics of School Children in the Ho Municipality, 2008

POPULATION CHARACTERISTIC	FREQUENCY (%)		TOTAL	
	URBAN SCHOOLS(N=145)	RURAL SCHOOLS(N=232)	NUMBER OF CHILDREN	%
SEX				
Male	42.1	54.7	188	49.9
Female	57.9	45.3	189	50.1
AGE GROUP(YRS)				
4-9	24.1	16.8	74	19.6
10-14	61.4	65.1	240	63.7
15+	14.5	18.1	63	16.7
GUARDIAN'S EDUCATION				
Educated	57.9	52.2	205	54.4
No Education	11.7	14.7	51	13.5
Don't know	30.3	33.2	121	32.1
GUARDIAN'S OCCUPATION				
FARMER	11.7	51.3	136	36.1
TRADER	62.8	27.6	155	41.1
GOVERNMENT WORKER	9.7	6.5	29	7.7
HOUSEWIFE	15.9	14.7	57	15.1

A total number of 377 school children between the ages of 4 years and 20 years with the mean age as 11.9 +/- 2.6 years made up the study population. School children in the age group 10-14 years constituted the greatest percentage (63.7%) of the sample. One hundred and forty five (38.5%) urban and two hundred and thirty two (61.5%) rural school children were examined. Males (49.9%) and females (51.1%) in the study population were about the same. Majority of study subjects' guardians i.e. 54.4% had

some level of education while 13.5% had never been to school. Most of the subjects' guardians were traders (41.1%) with government workers being 7.7%

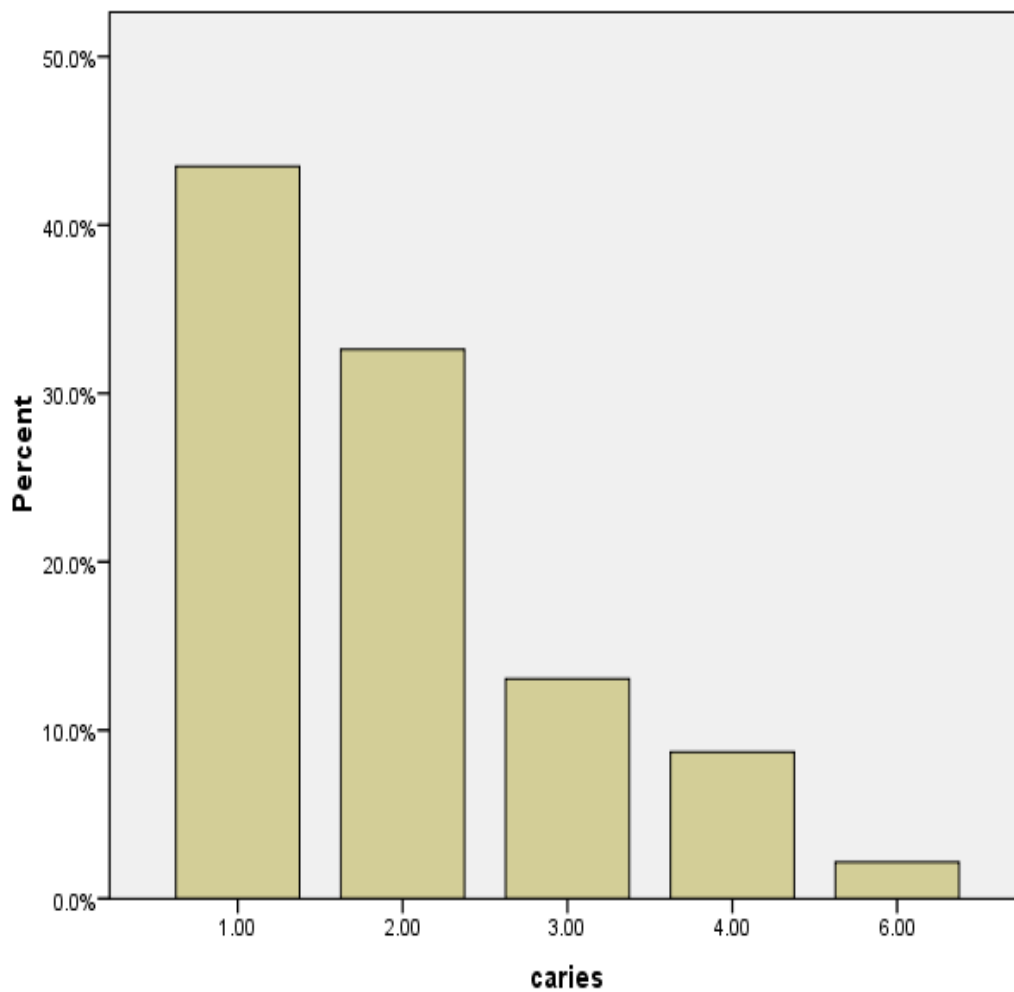
TABLE 4.2 DMFT (Caries) Scores of School Children by Sex, Residence and Age group in the Ho Municipality, 2008

VARIABLE	DMFT SCORES (%)							MEAN DMFT
	0	1	2	3	4	5	6	
SEX								
MALE	84.6	6.9	5.3	2.7	0.5	0.0	0.0	0.28
FEMALE	90.5	4.2	2.6	0.5	1.6	0.0	0.5	0.21
RESIDENCE								
URBAN	85.5	8.3	2.8	1.4	1.4	0.0	0.7	0.28
RURAL	88.8	3.9	4.7	1.7	0.9	0.0	0.0	0.22
AGE GROUP (YEARS)								
4-9	84.6	6.8	4.1	2.7	0.0	0.0	0.0	0.23
10-14	90.4	4.6	2.9	0.8	0.8	0.0	0.4	0.19
15+	77.8	7.9	7.9	3.2	3.2	0.0	0.0	0.46

There were 47 persons with caries i.e. DMFT > 0 indicating a caries prevalence of 12.5%. The Mean DMFT of the study sample was 0.24 (+/- 0.75). The minimum and maximum DMFT were 0 and 6 respectively. The difference between male and female mean DMFT of 0.28 and 0.21 respectively was not significant (p=0.159). Urban school children had a higher mean DMFT=0.28 than their rural colleagues who had a mean DMFT=0.22. However, this was not statistically significant with a p-value=0.308

Among the various age groups, the 15+ year group had the highest mean DMFT score of 0.46 and the 10-14 year group had the lowest score of 0.19. This was statistically significant with p-value=0.037.

FIGURE 2 DMFT (Caries) Scores of school children in the Ho municipality, 2008



For the forty seven children with DMFT > 0, the mean DMFT was 1.93 (+/- 1.13) and 43.5% of them had at least one carious tooth whilst 2.2% had a maximum of six carious teeth. The decay (D) component of the DMFT for those with caries was 92.3% and the Missing (M) component was 7.7%. There was no Filled (F) component in all groups.

TABLE 4.3 Caries Free Prevalence by Sex, Locality and Age group in the Ho Municipality, 2008

VARIABLE	CARIES FREE POPULATION	
	N=330	%
SEX		
Male	159	84.6
Female	171	90.5
LOCALITY		
Urban	124	85.5
Rural	206	88.8
AGE (YRS)		
4-9	64	86.4
10-14	217	90.4
15+	49	77.8

Caries free persons are those with a DMFT = 0. The caries free persons were 330 in number, i.e. 87.5% of the study sample. 88.8% of rural school children were caries free as compared to 85.5% of urban school children. The highest proportions of caries free persons (90.4%) were found in the 10-14 year group. The difference in proportions between male and female was 84.6% and 90.5% respectively.

TABLE 4.4 Community Periodontal Index and Treatment Needs (CPITN) Scores for Urban and Rural School Children by Sex and Age and Locality in the Ho Municipality, 2008.

VARIABLE	CPITN SCORES (%)		
	0	1	2
SEX:			
MALE	8.8	10.6	30.5
FEMALE	11.7	11.7	26.8
RESIDENCE:			
URBAN	7.4	13.0	18.0
RURAL	13.0	9.3	39.3
AGE(YEARS):			
4-9	5.3	2.7	11.7
10-14	11.9	15.9	35.8
15+	3.2	3.7	9.8
TOTAL	20.4	22.3	57.3

CPITN Scores: 0 = Healthy, 1 = Bleeding, 2 = Calculus.

The highest score of 2, i.e. calculus was obtained by 57.3% of subjects. There were 20.4% children with healthy mouths and 22.3% had bleeding gums. About 39.3% of rural school children had the highest score as compared to 18.0% of urban school children. This was statistically very significant with a p-value < 0.001. Females (11.7%) had more healthy mouths than males (8.8%). However this was not significant, p=0.264. Among the various age groups, the 10-14 year olds (35.8%) had the highest score.

FIGURE 3 Periodontal disease states by percentage of school children in the Ho municipality, 2008.

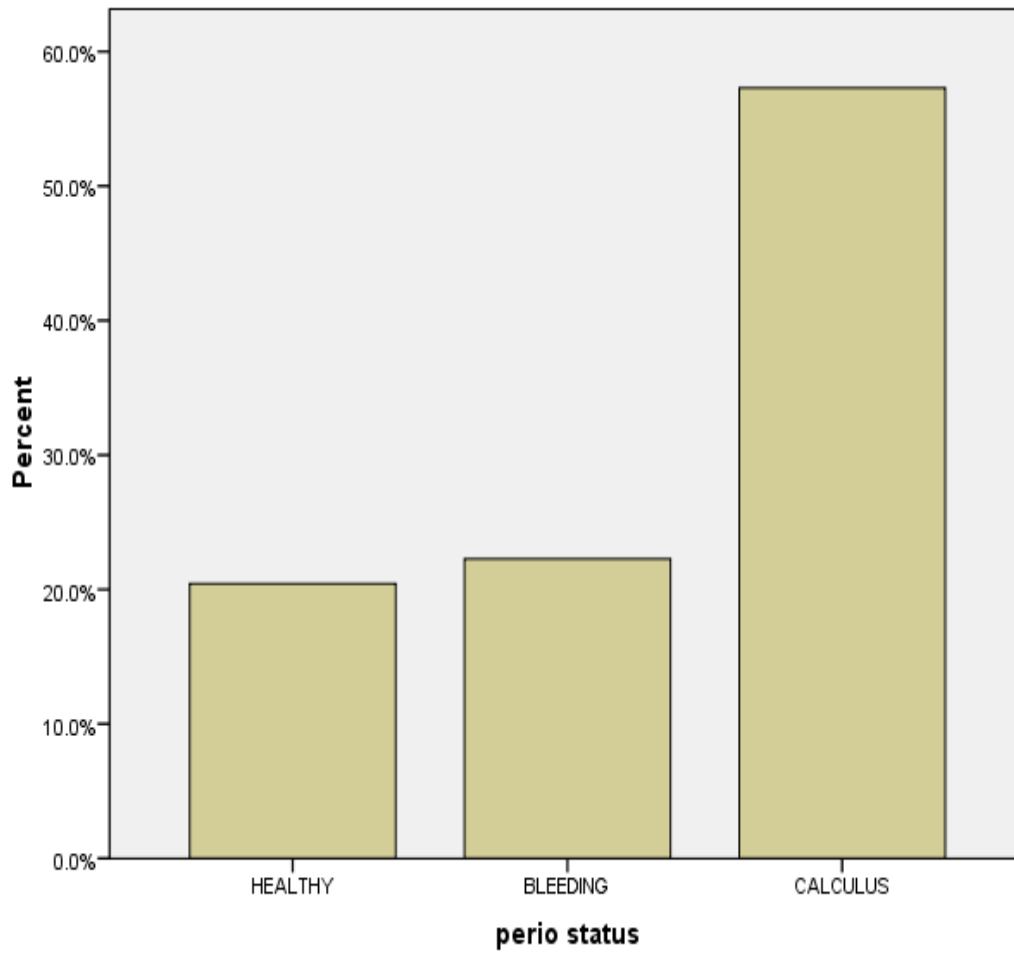


TABLE 4.5 Malocclusion Status of School Children by Sex and Locality in the Ho Municipality, 2008

MALOCCLUSION STATUS	SEX		LOCALITY		TOTAL
	Male	Female	Urban	Rural	
Absent/None	35.3	36.9	26.5	45.6	72.1
Slight	10.1	9.0	7.7	11.4	19.1
Moderate/Severe	4.5	4.2	4.2	4.5	8.8

The prevalence of Malocclusion was high with 19.1% and 8.8% of subjects having either slight or moderate/severe respectively. The distribution of malocclusion was about even between sexes and locality.

TABLE 4.6 Perception of arrangement of teeth of School Children by locality in Ho Municipality, 2008

PERCEPTION OF TEETH ARRANGEMENT	URBAN SCHOOLS N=145	RURAL SCHOOLS N=232	TOTAL N=377
Good	82.1	85.8	84.4
Bad	17.9	14.2	15.6
TOTAL	100	100	100

About 15.6% of the study sample perceived their teeth arrangement to be bad. The difference between urban and rural school children was not significant as p -value=0.335

TABLE 4.7 Distribution of Fractured Anterior/Incisor Teeth of School Children by Sex and Locality in the Ho Municipality, 2008.

FRACTURE STATUS	SEX (%)		LOCALITY (%)		TOTAL	
	MALES	FEMALES	URBAN	RURAL	N	%
Present	2.7	1.6	2.1	2.1	16	4.2
Absent	47.2	48.5	36.3	59.4	361	95.8

TABLE 4.8 Treatment Status of Fractured teeth by locality in the Ho Municipality, 2008

TREATMENT STATUS OF FRACTURED TEETH	LOCALITY (%)		TOTAL (%)
	URBAN	RURAL	
Not treated, no problem	87.5	85.7	86.7
Not treated, with problem	12.5	14.3	13.3
TOTAL	100	100	100

There were 16 school children found to have fractured anterior teeth (Table 4.6.0). This made up 4.2% of the population. There were more males (2.7%) than females (1.6%) with tooth fracture, though not statistically significant with a p-value=0.302. None of the 16 children with fractured teeth had any treatment. However, 86.7% of those with fractured teeth had no treatment and no visual problem. Only 13.3% had no treatment and with problems.

TABLE 4.9 Distributions of Hypoplasia in School Children by Locality, Sex in the Ho Municipality, 2008

HYPOPLASIA	LOCALITY		SEX		TOTAL	
	URBAN	RURAL	MALES	FEMALES	N	%
Present	12	8	6	14	20	5.3
Absent	133	224	182	175	357	94.7
Total	145	232	188	189	377	100

Enamel hypoplasia was present in 20 school children. This made up 5.3% of subjects examined. Of those with hypoplasia, 60% were found in urban school children and 40% in rural school children. 30% were males and 70% females. These differences were however not statistically significant as $p=0.198$ and 0.074 for sex and locality respectively

TABLE 4.10 Frequency of Oral Cleaning Practices among School Children by locality and Sex in the Ho Municipality, 2008

ORAL CLEANING PRACTICE	LOCALITY (%)		SEX (%)		TOTAL (%)
	URBAN	RURAL	MALES	FEMALES	
GOOD	39.8	60.2	44.7	55.3	59.9
BAD	36.4	63.6	57.6	42.4	40.1

About 59.9% of the study sample reported good oral cleaning practice, i.e. cleaned their mouths twice a day. The difference in frequency of oral cleaning among males and females was statistically significant ($p=0.014$), with more females, 55.3%

practicing good oral cleaning than males, 44.7%. The difference in oral cleaning practices between rural and urban children was not significant with a p-value=0.506. Majority of the children, i.e. 82.2% reported using toothbrush and 92.3% used toothpaste in cleaning their teeth. Out of the 47 children who had caries, 28 representing 59.6% brushed twice a day and 19 i.e. 40.4% did not brush twice a day. On information on who taught them how to clean their teeth, 73.2% said they were taught by their parents, 21.5% by teachers and only 0.2% had information on tooth cleaning from the media.

TABLE 4.11 Oral cleaning practice of school children and mother’s education in the Ho municipality, 2008

MOTHER’S EDUCATIONAL LEVEL	ORAL CLEANING PRACTICE (%)		TOTAL (%)
	Good	Bad	
Educated	61.1	44.4	54.4
No education	11.5	16.6	13.5
Don’t know	27.4	39.0	32.1
TOTAL	100.0	100.0	100.0

Of the children who had educated mothers, 61.1% of them claimed to have brushed twice a day compared to 11.5% of children of mothers with no education

TABLE 4.12 Frequency of Mouth rinsing after eating food among school children in the Ho Municipality, 2008

VARIABLE	URBAN SCHOOLS (%)	RURAL SCHOOLS (%)	TOTAL (%)
Rinse Mouth	17.2	41.4	58.6
Do not Rinse Mouth	21.2	20.2	41.4

About 58.6% of the subjects claimed to rinse their mouths with water after eating food, with 41.4% being rural school children and 17.2% being urban. The difference is very significant at $p < 0.001$.

TABLE 4.13 Frequencies of dental visits among school children by locality in the Ho Municipality, 2008

DENTAL VISIT	URBAN SCHOOLS		RURAL SCHOOLS		TOTAL	
	N	%	N	%	N	%
Had a Dental Visit	7	4.9	2	0.9	9	2.4
Had No Dental Visit	137	95.1	230	99.1	367	97.6

For the study sample only 9 children i.e. 2.4% had ever visited a dentist. Of these 1.1% had visited the dentist more than twice, 0.5% twice and 0.8% once. More urban children (4.9%) visited the dentist than rural children (0.9%). However the difference is insignificant with $p=0.085$.

TABLE 4.14 Frequency of various toothache treatments sought among school children by locality in the Ho Municipality, 2008.

TREATMENT TYPE	LOCALITY		TOTAL	
	URBAN	RURAL	N	%
Went to the hospital/health centre	3	6	9	7.1
Self medication	36	49	85	66.9
Nothing	20	13	33	26.0

There were 112 (29.7%) school children who reported having ever had toothache. Only 9 i.e. 7.1% went to the hospital/health centre for treatment while 66.9% sought self medication and 26.0% did not seek any treatment at all.

TABLE 4.15 Food eating habits among School Children by locality in the Ho Municipality, 2008

FOOD TYPE	URBAN (%)	RURAL (%)	TOTAL (%)
Fruits/Gum			
Daily	37.7	62.3	74.5
Less than daily	40.6	59.4	25.5
Ice cream/Toffee			
Daily	33.3	66.7	67.8
Less than daily	48.8	51.2	32.2

Generally 74.5% and 67.8% of school children consumed either fruits/gum or ice cream/toffees respectively on a daily account. There were 37.7% and 62.3% of urban and rural school children respectively who consumed fruits/gum on a daily basis, whilst 33.3% rural and 66.7% urban school children consumed ice cream/toffee daily. The difference is statistically significant with p-value=0.004.

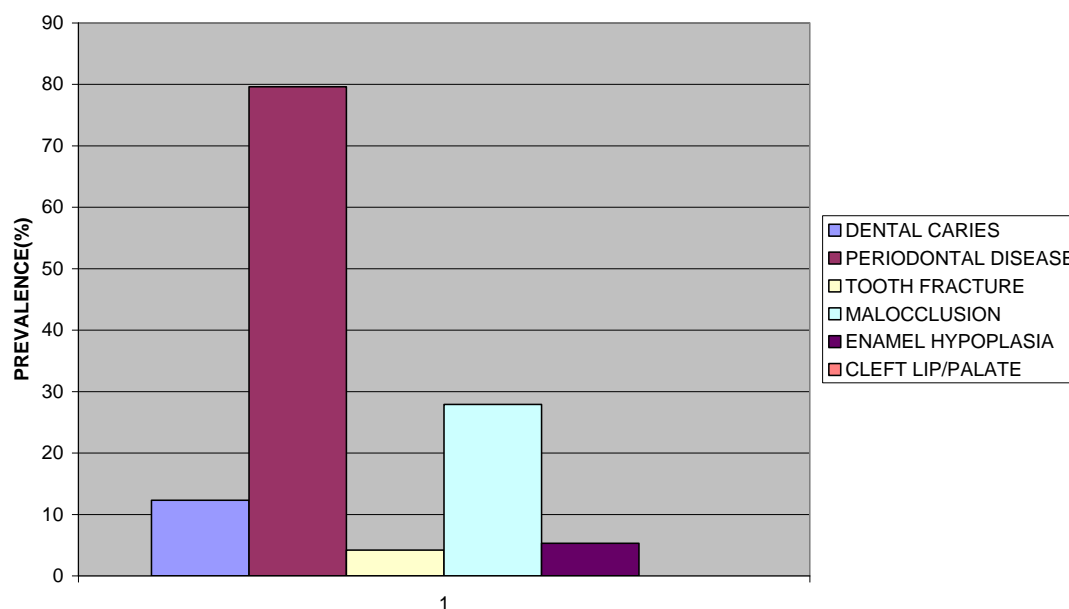
TABLE 4.16 Food eating habits among School Children in the Ho Municipality.

2008

		ICE CREAM/TOFFEE		TOTAL
		Other than daily	Daily	
FRUITS/GUM	Other than daily	41	55	96
	Daily	80	200	280
TOTAL		121	255	376

About 71.4% of school children i.e. 200 consumed both ice cream/toffee and fruits/gum. This was significant with a p-value=0.011.

FIGURE 4 PREVALENCE OF ORAL DISEASES AMONG SCHOOL CHILDREN IN THE HO MUNICIPALITY, 2008



CHAPTER FIVE- DISCUSSIONS

The sample was representative of school children in the Ho municipality. The data quality was good due to checks put in place as outlined previously in the data quality section, i.e. chapter three of this document. Though this study initially set out to investigate cleft lip/palate, none of it was seen. However enamel hypoplasia which was not included initially was found among the school children. The main findings are discussed here.

DENTAL CARIES

The prevalence of dental caries is usually expressed as the percentage of the population affected, while the severity or experience is calculated based on the mean DMFT. The WHO categorises DMFT as very low when the value is between 0.1-1.1.

This study reports a very low mean DMFT of 0.24(+/- 0.75) and a caries prevalence of 12.5%. The minimum and maximum scores were 0 and 6 respectively. This contrasts with the results of recent studies conducted in Ghana which found the mean DMFT to be 0.6(Abu-Sakyi, 2005). However, this finding compares favourably with those of Bruce et al in 2002 which recorded a mean DMFT of 0.3 among 4-16 year olds in peri urban school children. The present findings follow the decreasing trend of caries reported in an earlier study ((Bruce, 1999).

Comparing the results of this study with a similar one conducted in Nigeria (Adeokoya et al, 2006), a developing country like Ghana reveals consistencies. The Nigerian study had a caries prevalence of 13.9% and a mean DMFT of 0.14.

The very low mean DMFT score recorded in this study could be due to the fact that most of the school children reported consuming both ice cream/toffees and fruits/gum. Thus, the cariogenic effect of the ice cream/toffee was cancelled out by the protective factors of the fruits/gum. 71.4% of the children consumed both foods and this was significant, $p=0.011$. (Table 4.16)

The high proportion of children who claimed to have good oral cleaning practice could also account for the low caries, because of the anti cariogenic effect of the toothpaste most of them used.

Though the mean DMFT was very low for the whole population, for those who had caries, $DMFT > 0$, the mean DMFT was 1.93 (± 1.13). This means that there was a caries severity of about two (2) teeth for each school child who had caries. This is low compared to the WHO standard of three (3) DMFT for 12 year olds.

Consistent with other studies in Ghana ((Abu-Sakyi, 2005) the D-component of the DMFT was the highest with a value of 92.3%. The high D-component may be due to the lack of awareness of dental treatment availability in the Ho municipality or lack of monetary support to have treatment done. This could also be the explanation for the zero (0) fillings (F) that was observed among those with caries.

Males were found to have more caries than females though the difference was not significant, $p=0.159$ (Table 4.2). This is in contrast with the results of an oral health survey carried out in the Gambia (Kosovic&Nilson-Andeson, 2001) though females were over represented in this study. The higher mean DMFT recorded for males may

be due to the low patronage (2.4%) of oral health care services as seen in Table 4.13. Therefore the filled and missing components which tend to be high in females because they seek oral care better than males was absent. Another reason could be due to the fact that females reported cleaning their teeth more frequently (twice a day) than males (Table 4.10). This difference in oral cleaning frequency was significant $p=0.014$.

Urban school children were found to have more caries (mean DMFT=0.28) than their rural counterparts (mean DMFT=0.22) though statistically insignificant $p=0.308$. This result is not very different from other studies in Ghana (Nornoo, 1986; Onuaha, 2002). It however differs from the findings of a study done in Wa, Ghana (Abu-Sakyi, 2005). The urban children consumed more cariogenic foods and had poorer cleaning habits than their rural colleagues (Table 4.15) thus offering an explanation for the higher caries seen in urban dwellers.

The caries free population, that is those with a DMFT=0 was 88.8% for rural school children and 85.5% for urban children. This corroborates the higher mean DMFT seen in the urban areas.

The caries experience increases with age in the deciduous dentition. The DMFT tends to decline until the age of 10-14 years and then rises after that to age 15 years which group had the highest mean DMFT score of 0.46. This far exceeds that of the whole population under study and contrasts with a study conducted in Mampong, Ghana (Richardson, 1968). The difference in the mean DMFT among the various age groups was significant with a p-value of 0.037.

With increasing age, teeth tend to stay longer in the mouths and are thus exposed to the cariogenic effects of foods such as ice cream/toffee. This could be the reason for the high caries seen in the 15+ year olds. The low value for the 10-14 could be due to the effect of deciduous teeth though this study did not seek to find carious deciduous dentition.

PERIODONTAL DISEASES

In assessing periodontal diseases in populations, the CPITN has been used as an accepted index for which oral interventions may be considered. The index records treatable disease conditions.

The CPITN scores revealed a poor state of oral hygiene in the study group. The highest score of two (2) i.e. the presence of calculus was seen in 57.3% individuals and 22.3% had bleeding gums. Only 20.4% of the children had healthy mouths. Based on the CPITN scores a total of 79.6% individuals had some form of periodontal disease. The implication of this is that eight (8) out of ten (10) children had periodontal disease. The CPITN findings are consistent with other studies (Bruce, 1999; Abu-Sakyi, 2005; Addo-Yobo et al, 1990).

The children reported good cleaning practices (Table 4.10). However, their claim did not reflect in their periodontal disease status, thus the high prevalence of periodontal disease (Figure 3). It could also be that they actually brushed twice daily with toothpaste, but this was not effective.

There were more rural school children with calculus, (39.3%) than urban children (18.0%). This was found to be very significant, $p < 0.001$ and is not consistent with other studies (Abu-Sakyi, 2005) which reported similarities in periodontal status among urban and rural dwellers. However an earlier study (Onuaha, 2002) confirms this study. Ineffective tooth cleaning practices may be the reason for this disparity though more rural school children reported cleaning their teeth twice a day.

Sexual differences in periodontal diseases were statistically not significant with a p-value of 0.264. There were 11.7% females who had more healthy mouths than males, 8.8%. This reflected in the presence of calculus. 30.5% males had more calculus than females, 26.8%. This result is in conformity with other studies (Mohammed&Salwa, 1982). Generally, female children are believed to take better care of their teeth than their male counterparts (Dhar et al, 2007; Kharmrco, 1990), hence the above differences.

Compared to the mean DMFT scores, where the 10-14 year group had the lowest score, the CPITN results shows otherwise. The age group 10-14 year old had the highest CPITN score of two (2) being calculus presence. This may be due to the difference in aetiology of the two disease states.

MALOCCLUSION

It has been difficult to assess malocclusion, since there is no single categorised index for measuring its prevalence. Previous studies done in Ghana took into consideration

orthodontic conditions (Onuaha, 2002) which this study sought to use. Another study did not state the criteria used (Makoni et al, 1997).

In the Ho municipality, a high prevalence of 27.9% malocclusion was recorded using orthodontic needs (Appendix one). Of these 19.1% had slight and 8.8% had moderate/severe malocclusion. The present result is comparable to another study (Onuaha, 2002) which applied the same criteria and recorded 9.6% prevalence of moderate/severe malocclusion. The higher prevalence recorded here when compared to another study (Richardson, 1968) could be due differences in diagnostic methods. Distribution of malocclusion was about the same between sexes and locality.

None of those who had malocclusion sought treatment. Though 15.6% of the children perceived their teeth to be badly arranged, none of them went for orthodontic treatment due to their low knowledge of such treatment options.

FRACTURED TEETH

Fractured teeth among the children was found to be of low prevalence i.e. 4.2% in comparison to other studies (Agbelusi&Jeboda, 2005; Hamdan&Rajab, 2003) but higher than another done in the Ga district of Greater Accra region (Onuaha, 2002).

The low prevalence was not surprising as the principal investigator did not see play grounds in most of the schools. Children were therefore probably not involved in much physical contact sports which are responsible for most tooth fractures. Also

more emphasis is placed on academic work than physical exercise. It also possible that the children whose parents were mostly farmers and traders (Table 4.1) engaged in such activities to augment family incomes and thus did get involved in after school sports.

It must be noted that, despite the low prevalence there were more males 2.7% with fractured teeth than females, 1.6%. This compares with a Nigerian study (Agbelusi&Jeboda, 2005). Males are generally more aggressive and tend to engage more in physical contact activities than females and this could account for the difference.

For those with fractured teeth, none had any treatment. An interesting observation was that 86.7% of those with fractured teeth had neither treatment nor clinical signs/symptoms. Only 13.3% had neither treatment nor tooth problems such as a sinus, toothache or discoloured tooth. The apparent lack of treatment for fractured teeth may be due to lack of treatment knowledge, financial problems or poor dental visits.

ENAMEL HYPOPLASIA

Of all the subjects examined, 20 constituting 5.3% of them had enamel hypoplasia with 70% being females and 30% males. Also 60% were found in urban areas compared to 40% in the rural areas. These differences were not statistically significant, $p=0.198$ for sex and $p=0.074$ for locality.

A review of oral health survey on school children in Ghana using PubMed did not reveal the prevalence of enamel hypoplasia. The results obtained however compares with a 7.3% prevalence of enamel hypoplasia in Nigeria (Koleoso et al, 2004). The low prevalence could be due as a result of adequate maternal nutrition during pregnancy and the low level of systemic infections such as measles which are known to be associated with enamel hypoplasia.

ORAL CLEANING PRACTICES AND TREATMENT SEEKING BEHAVIOUR

On oral cleaning practices majority of the subjects i.e. 59.9% reported having good oral cleaning practice (brushing their teeth twice a day). About 55.3% females had good oral cleaning practice as compared to the 44.7% males. This was statistically significant with a p-value of 0.014. The difference in frequency of cleaning teeth among urban and rural schools was insignificant statistically, $p=0.506$ (Table 4.8.0)

There were 82.2% of the children who claimed to use the toothbrush and 92.3% reported using toothpaste (mostly Pepsodent[®] and Close-up[®]). When asked on who taught them how to clean their teeth, 73.2% said they were taught by their parents, 21.5% by teachers and only 0.2% by the media.

The above findings generally compares favourably with studies carried out on school children in Ghana (Abu-Sakyi, 2005). Changing lifestyles and the easy availability of toothbrushes and toothpaste may account for the high patronage of these (Norton&Adely, 1989; Addo-Yobo et al, 1990). Though the researcher expected to find the usage of traditional tooth cleaning materials more especially in the rural areas

this was not the case. Females tend to be better caretakers of their oral hygiene than males and this could be the reason for the observation.

The present study did not find any significant relation between oral cleaning practices and dental caries and oral hygiene status and this is confirmed by studies done in Ghana (Addo Yobo et al, 1990).

Of the 47 who had dental caries, 59.6% claimed to brush their teeth twice daily with toothpaste and 40.4% did not. This finding shows that the children did not brush twice daily as they claimed or they did not brush effectively nor had no proper supervision on tooth cleaning practices by their parents and teachers whom most of them said taught them how to brush.

On the influence of parents' education on oral cleaning practices, children of educated mothers had better oral practice than their colleagues whose parents were not educated. (Table 4.11). Education thus plays an important role in oral health education.

It is good practice for people to rinse their mouths with water after eating foods. This is because, using the water to rinse reduces the amount of food debris in the mouth and consequently reduces the effect of cariogenic bacteria. In this study 58.6% of the subjects claimed to rinse their mouth. This claim was probably false as there were more, 31 children with caries who said they rinsed their mouths than those who did not, 16 children. This did not also reflect in their CPITN score as there as there was no significant difference $p=0.109$ between those who rinsed and those who did not.

As low as 2.4% school children had ever visited the dentist, with 1.1% of those who visited doing so more than twice, 0.5% twice and 0.8% once.(Table4.13). These findings confirm the fact that there is low number of dental visits in developing countries as compared to developed countries (Addo-Yobo et al, 1990; Morgan et al, 1992; Bruce et al, 2002). The number of dental visits has been shown to be positively associated with good oral hygiene and awareness. It is therefore not surprising as this study has revealed a high prevalence of calculus due to poor dental visits.

When school children who had ever had toothache were asked on the type of treatment they received for their ailment, only 7.1 %(9 children) said they went to a health centre or hospital for treatment. As high as 66.9% and 26.0% sought self medication and nothing respectively. As explained earlier the lack of awareness on oral health care, financial ability, and the presence of unqualified health personnel could be the reasons adduced for the above.

FOOD EATING HABITS

Generally the school children had good oral eating habits since 74.5% reported consuming fruits/gum daily. About 33.3% rural and 66.7% urban school children consumed ice cream/toffee on a daily basis. This was statistically significant with a p-value of 0.004 and it reflected in their DMFT score.

CHAPTER SIX-CONCLUSION

CONCLUSIONS

Oral health has a very low priority among Ghanaians in general. This exploratory study has provided baseline data on the oral health of school children in the Ho municipality and would therefore serve as a reliable source of information on which to base oral healthcare services in the municipality.

The findings of this study show that the oral health of school children in the Ho municipality is poor with a low level of oral health education and low patronage of dental services at the Volta regional hospital, the only one in the municipality.

The expensive nature of oral health care may also be preventing from accessing and using the services available at the regional hospital.

RECOMMENDATIONS

1. There should be collaboration between the MHMT, the Volta regional hospital, GES in order to improve on the oral health of the population of school children in the municipality. The school health programme would have to be monitored and evaluated.

2. To the Ghana Education Service

Teachers should be trained on the importance of oral health education and they should lay emphasis on tooth cleaning practices. Oral health should be incorporated in their curriculum and stressed.

3. To the Ho Municipal Health Management Team

- The MHMT should promote oral hygiene education including the teaching of proper tooth cleaning techniques at the community level. This could be done at antenatal clinics, child welfare clinics, school health outreach programmes. Community health nurses should be trained to initiate these programmes as soon as possible. Local radio stations (FM) could be used in the education to reach a wider population.
- The MHMT and RHD should publicize the availability of oral/dental services at the regional hospital in Ho. Simple educational materials/messages on oral health should be designed to convince people to seek oral health care.
- Atraumatic restorative therapy could be provided at the health centres to cater for simple caries. Nurses should be trained to do this

4. To the Volta Regional Hospital

- The hospital should organize outreach programmes to schools to provide simple interventions such as prophylaxis and plaque control (Scaling and Polishing). These outreaches should be supported by the regional health directorate to improve on dental visits by students, pupils and general public at large.

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APPENDICES

APPENDIX ONE

TITLE: THE ORAL HEALTH OF SCHOOL CHILDREN IN THE HO MUNICIPALITY

CONFIDENTIALITY:

Your responses will be treated with confidence and at all times data will be presented in such a way that your identification cannot be connected with specific published data.

(I) DATE OF INTERVIEW	<input type="text"/>
(II) NAME OF RECORDER	<input type="text"/>
(III) NAME OF SCHOOL	<input type="text"/>
(IV) NAME OF RESPONDENT	<input type="text"/>
(V) I.D.	<input type="text"/>
(VI) CLASS	<input type="text"/>

DEMOGRAPHICS

Q.#	QUESTION	CODE	VARIABLE	SKIP #
1.	Sex [1]=MALE [2]=FEMALE	<input type="checkbox"/>	Q1Sex	
2.	Age of respondent(Years)	<input type="checkbox"/>	Q2Age	

3.	Village/Town of residence [1]= URBAN [2]= RURAL	<input type="checkbox"/>	Q3Res	
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4.	What is the educational level of your mother, stepmother or female guardian? [1]=PRIMARY [2]=MIDDLE [3]=SECONDARY [4]=VOCATIONAL [5]= TERTIARY [6]=NO SCHOOLING [88]=DON'T KNOW [99]=N/A	<input type="checkbox"/>	Q4Edulev	
5.	What is your mother's, stepmother's or female guardian's work/occupation? [1]= FARMER [2]= TRADER [3]=GOVERNMENT WORKER [4]= ARTISAN [5]= OTHER, (SPECIFY)	<input type="checkbox"/>	Q5Moccu	
6.	What is the educational level of your father, stepfather or male guardian? [1]=PRIMARY [2]=MIDDLE [3]=SECONDARY [4]=VOCATIONAL [5]=TERTIARY [6]=NO SCHOOLING [88]=DON'T KNOW [99]=N/A	<input type="checkbox"/>	Q6Edulev	
7.	What is your father's, stepfather's or male guardian's work/occupation? [1]= FARMER [2]= TRADER	<input type="checkbox"/>	Q7Faoccu	

	[3]=GOVERNMENT WORKER [4]= ARTISAN [5]= OTHER, (SPECIFY)			
--	--	--	--	--

ORAL HEALTH TREATMENT SEEKING PRACTICES

Q#	QUESTION	CODE	VARIABLE	SKIP #
8.	Have you ever had toothache or pain from your tooth? [1]=YES [2]=NO	<input type="checkbox"/>	Q8Ttpain	If no skip to Q10
9.	If yes, what did you do to stop the pain? (<i>Tick more than one if needed</i>) [1]=WENT TO THE HOSPITAL/HEALTH CENTER [2]=TOOK SOME MEDICINE [3]=PUT SOME HERBS ON THE TOOTH [4]=PUT SOME MEDICINE ON THE TOOTH [5]=RINSED MY MOUTH WITH SALTY WATER/WARM WATER WITH SALT/MEDICINE IN WATER [6]=NOTHING	<input type="checkbox"/>	Q9Treat	
10.	Have you ever been to a dentist? [1]=YES [2]=NO	<input type="checkbox"/>	Q10VistD	If no skip to Q14
11.	If yes, when? [1]=THIS YEAR [2]=LAST YEAR [3]=MORE THAN TWO YEARS AGO [4]=CANNOT REMEMBER	<input type="checkbox"/>	Q11Time	
12	If yes, where? <input type="text"/>		Q12Place	
13.	How many times have you been to a dentist in the last five (5) years? [1]=ONCE [2]=TWICE [3]=MORE THAN TWICE [4]=CANNOT REMEMBER	<input type="checkbox"/>	Q13FreqD	

ORAL CLEANING PRACTICE

Q #	QUESTION	CODE	VARIABLE	SKIP #
14.	How many times do you clean your teeth? [1]=ONCE A DAY [2]=TWICE A DAY [3]=MORE THAN TWICE A DAY [4]=ONCE A WEEK [5]=ONCE A WHILE [6]=NEVER	<input type="checkbox"/>	Q14CIntt	
15	What do you use to clean your teeth? [1]=CHEWING STICK [2]=CHEWING SPONGE [3]=TOOTHBRUSH [4]=PLANTAIN STALK ANY OTHER,SPECIFY <input type="text"/>	<input type="checkbox"/>	Q15Brsh	
16.	Do you use toothpaste? [1]=YES [2]=NO	<input type="checkbox"/>	Q16Paste	If no skip to Q18
17.	If yes, what type/brand of toothpaste do you use? <input type="text"/>		Q17Type	
18.	From which of the following did you learn about taking care of your teeth?(<i>Tick more than one if needed</i>) [1]=FRIENDS [2]=TEACHERS [3]=DOCTORS [4]=PARENTS [5]=DENTIST [6]=NURSE [7]=TV/RADIO [8]=NEWSPAPER/MAGAZINE OTHER,SPECIFY	<input type="checkbox"/>	Q18Tcare	

EATING HABITS

Q 19 How often do you eat any of these foods? (*Tick more than one if needed*)

FOOD TYPE	OCCASIONAL [1]	EVERYDAY [2]	ONCE A WEEK [3]	MORE THAN ONCE A WEEK [4]	NEVER [5]	CODE	VARIABLE Q19Fdtyp
Coke or other soft drink/mineral						<input type="checkbox"/>	
Chewing gum						<input type="checkbox"/>	
Fresh fruit						<input type="checkbox"/>	
Toffees						<input type="checkbox"/>	
Biscuits						<input type="checkbox"/>	
Chocolate						<input type="checkbox"/>	
Ice cream						<input type="checkbox"/>	
Tea with sugar						<input type="checkbox"/>	
Other, specify <input type="text"/>						<input type="checkbox"/>	

Q #	QUESTION	CODE	VARIABLE
20.	Do you rinse your mouth with water after eating? [1]=YES [2]=NO	<input type="checkbox"/>	Q20Rins

PART 2—CLINICAL EXAMINATION

<p>Q21. <u>PERIODONTAL STATUS(CPITN)</u></p> <p style="text-align: center;">17/16 11 26/27</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 33px; height: 33px;"></td> <td style="width: 33px; height: 33px;"></td> <td style="width: 33px; height: 33px;"></td> </tr> <tr> <td style="width: 33px; height: 33px;"></td> <td style="width: 33px; height: 33px;"></td> <td style="width: 33px; height: 33px;"></td> </tr> </table> <p style="text-align: center;">47/46 31 36/37</p>							<p>[0]=HEALTHY [1]=BLEEDING [2]=CALCULUS [X]=EXCLUDED QUADRANT</p>	<p>Q21Cpitn</p>
<p>Q22. <u>MALOCCLUSION</u></p> <p style="text-align: center;"><input style="width: 40px; height: 30px;" type="checkbox"/></p>	<p>[0]=NONE/ABSENT</p> <p>[1]=SLIGHT e.g. One or more rotated or tilted or slight crowding or spacing which affects the regular tooth alignment</p> <p>[2]=MODERATE/SEVERE i.e. the presence of one or more of the following:</p> <ul style="list-style-type: none"> • Of the four(4) anterior incisors: maxillary over-jet, anterior cross-bite equal to or more than a full tooth depth • Open bite • Mid-line shift estimated to more than 4mm • Crowding 	<p>Q22Maloc</p>						
<p>Q23. Is the respondent wearing an orthodontic appliance?</p> <p style="text-align: center;"><input style="width: 40px; height: 30px;" type="checkbox"/></p>	<p>[1]=YES [2]=NO</p>	<p>Q23Aplnc</p>						
<p>Q24. What do you say about the arrangement of your teeth?</p> <p style="text-align: center;"><input style="width: 40px; height: 30px;" type="checkbox"/></p>	<p>[1]=GOOD [2]=BAD</p>	<p>Q24Align</p>						

<p>Q25. DENTITION STATUS</p> <p>18 17 16 15 14 13 12 11 21 22 23 24 25 26 27 28</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr><td>D</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>M</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>F</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table> <table border="1" style="width:100%; border-collapse: collapse;"> <tr><td>D</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>M</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>F</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table> <p>48 47 46 45 44 43 42 41 31 32 33 34 35 36 37 38</p>	D																		M																		F																		D																		M																		F																		<p>[D]=DECAYED [M]=MISSING [F]=FILLED</p> <p>NOTE: A tooth with a decay and a filling is considered as [D]=DECAYED</p>	<p>Q25Dstat</p>
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<p>Q26. FRACTURED TOOTH(INCISORS)</p> <p style="text-align: center;"><input type="checkbox"/></p>	<p>[0]=PRESENT [1]=ABSENT</p>	<p>Q26Tfrac</p>																																																																																																												
<p>Q27. Tooth/teeth involved?</p> <p style="text-align: center;"><input type="checkbox"/></p>	<p>[1]=TREATED WITHOUT PROBLEM [2]=TREATED WITH PROBLEM [3]=NOT TREATED,NO PROBLEM [4]=NOT TREATED,WITH PROBLEM(SINUS,ABSCESS,DISCOLORATION)</p>	<p>Q27TRx</p>																																																																																																												
<p>Q28. CLEFT LIP/PALATE?</p> <p style="text-align: center;"><input type="checkbox"/></p>	<p>[0]=PRESENT [1]=ABSENT</p>	<p>Q28Cleft</p>																																																																																																												
<p>Q29. OTHER ORAL DISEASE PRESENT</p> <p style="text-align: center;"><input style="width: 150px; height: 20px;" type="text"/></p>																																																																																																														

APPENDIX TWO
REFERRAL FORM

REFERRAL FORM

NAME:

AGE:

SEX:

DATE:

CONDITION:

The above named person with the identified condition was detected through an oral health screening exercise held in the Ho Municipality. He/She is being referred to you for expert management

APPENDIX THREE

PERMISSION LETTERS: