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Oral Health Knowledge, Practices and Hygiene Status of Children with Special Needs. A Study Conducted In Likii Special School, Nanyuki,Kenya.

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Abstract:
Background
Children with special needs are those having a chronic, physical, developmental, behavioral or emotional disability, or those at an increased risk of such conditions, and require health and related medical services of a type or amount beyond that required by children generally and which necessitates additional training by health care providers. They comprise about 1 in 10 out of a population of a billion people living with disability.
Children with special needs have been estimated to be twice as likely as their peers without disability to have unmet and untreated oral health care needs due to various challenges in their quest for treatment. Such a substantial population necessitates the urgent formulation of systems, policies and mechanisms specially focused and directed towards improving the health status of these individuals, and more so their oral health status to be at par with their peers.
Objective
The study sought to find out the oral health knowledge, practices and oral hygiene status of children with special needs in Likii Special School, Nanyuki.
Study Design
This was a descriptive cross sectional study.
Study Area and Population
The study was conducted at Likii School of Special Needs, located 1 kilometer from Nanyuki Town, Laikipia County, comprising students aged between 6 to 18 years, studying at Likii School of Special Needs.
Materials and Method.
This included an interviewer administered questionnaire and a clinical form.
Results.
There was a high prevalence of dental caries of 78.57% in the study population. There was a significantly high mean DMFT of 5.0571. None of the children had access to an electric toothbrush or other tooth cleaning aids to supplement the normal toothbrush despite the reported reduced manual dexterity in some of the special health care groups. Those able to brush on their own were 45.9% males and 54.5% females, while 54.1% males and 45.5% females require assistance while brushing. Lack of a previous dental visit at the time of conducting the research was reported in 92.9% of the population, while only 7.1% had visited a dentist previously. Majority of the sample population had fair oral hygiene, while poorer oral hygiene status was recorded with an increase in age.
Conclusion
Within the confines of this study, children with special health care needs in Likii Special School for the mentally challenged have poor oral hygiene. The prevalence of dental caries was 78.57% which is much higher than the reported prevalence of dental caries of 23.9% among children in the Kenya National oral health survey done in 2015.
The mean dmft was found to be 0.6571 ±2.34 with the mean number of decayed teeth per child determined to be 0.64. The mean DMFT was 5.0571 ±4.36 with the mean number of decayed teeth per child determined to be 4.44. This mean DMFT was much higher than a DMFT of 0.8 reported children in the Kenya National oral health survey of 2015.It was noted that females had higher dmft mean of 0.85 ±2.635 and mean DMFT of 5.06 ±4.847 compared to their male counterparts with mean dmft of 0.49 ±2.063 and mean DMFT of 5.05 ±3.951.
There was an increase in dmft/DMFT and gradually worsening Oral hygiene status with an increase in age. A large proportion of those sampled in this study, 92.9%, had not had any previous dental visits.
Further, among children with special health care needs, it was determined that those with combined disability are the disability group with the most urgent need for intervention measures as they had the highest mean DMFT of 6.42 ±5.82.

Recommendations

This study provides baseline data that will support design and implementation of oral health policies aimed at addressing the high disease burden among children with special needs.

There should be formulation of health plans specifically focused on children with special needs, starting with those with combined disability that are most affected.

A conscious effort should be made to avail supplementary aids such as electric toothbrushes to improve their oral hygiene status while counteracting their reduced manual dexterity.

Companies that produce and market electric toothbrushes should consider donation of the same as part of their corporate social responsibility.

Efforts to correct the current disparity in oral health between children with special needs and their normal peers should be aimed at reducing the DMFT in females, and reducing the mean Oral hygiene index in males.

The school should consider setting aside more time for cleaning of teeth other than only in the morning as is currently the case.

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I. Introduction and Literature Review

1.1 INTRODUCTION

Oral health is defined as the standard of well-being of oral and related tissues. It has many aspects and includes the ability to carry out functions such as speaking, smiling, tasting, touching, chewing, swallowing and conveying a range of emotions through facial expressions, with confidence and without pain, discomfort and any disease of craniofacial complex.[1]Knowledge, and in this case oral health knowledge, is defined as an understanding of information about oral well-being in the ideal or desired state, which an individual acquires by experience or study. Practices are those particular habits, methods and repeated customs that are performed habitually or repeatedly.

The Kenya Persons with disabilities Act of 2003 defines disability as "a physical, sensory, mental, or other impairment including visual, hearing, learning or physical incapability which impacts adversely on social, economic or environmental participation." Further, the Children act of 2001 in Kenya, which has special focus on children, defines disability with reference to a disabled child as "a child suffering from physical or mental handicap which necessitates special care for the child".

A recent World Report on Disability states that one in ten, out of a billion people living with disability, are children. This constitutes about 10% of the population of the disabled people worldwide being children.[2] It further states that 80% of these children living with disabilities are in developing countries and live in poverty, which serves as a further impediment to their access to oral health care, oral hygiene maintenance tools and general health services as a whole.[3]

In Kenya alone, the Kenya National Special Needs Education Survey report published by Voluntary Service overseas (VSO) in collaboration with the Ministry of Education, Science and Technology shows a high incidence of occurrence up to 13.5% of disability among children and young people in Kenya. According to the report carried out among children mainly in schools, around 1 in 3 (31%) children living with disability have multiple disabilities.[4]

A report by the WHO estimates that 60 – 90% of school children and about 100% of the adult population has dental caries, with evidence of severe periodontal disease found in 15 – 20% of middle aged adults.[5]According to a research carried out by Gace et al, children and adolescents living with disability are estimated to be twice as likely as their peers without disability to have unmet and untreated oral health care needs.[6]

Further, dental treatment has been found to be the greatest unattended oral health care need among children in this group.[6,7] Subsequently, dental caries has been reported to be most prevalent amongst children and especially so in children with special needs.[8]

Although several factors are known to contribute to tooth susceptibility to dental caries, the most prevalent ones are dental plaque, poor oral hygiene status that harbors bacteria and a high sugar diet, especially sucrose. If not appropriately removed, plaque on teeth can lead to gingivitis and bleeding gums that progressively result in periodontal disease if not promptly and adequately treated.

Children with special needs face various challenges in their quest for dental care. These may be classified as environmental, which includes their inability to move on their own and inaccessible dentist premises, non-environmental challenges, such as dentists that lack adequate training to treat this class of people and developmental challenges. These challenges to a large extent contribute to their oral hygiene status being poorer than that of their peers without disability.

There have been very few focused studies and reports on the oral health knowledge, practices and hygiene status of children with special needs in Kenya. This is in spite of oral health being essential to general health, quality of life and in fact being related to general systemic health. This in part explains the lack of formulation of policies with special emphasis on marginalized groups such as children with special needs at the county government and national government level. Therefore, there is a real danger that such groups may be left behind as the country marches on towards achieving its set Goals for Oral Health 2020 globally and Kenya's own set health sector targets.

1.2 LITERATURE REVIEW.

The medical field, and especially in the area of oral health has made tremendous progress toward the improvement of the health status of individuals and its citizenry though county and national governments, as well as combined focused efforts globally. Of great significance are the Millennium Development Goals (MDGs) which are eight international development goals, formulated by the WHO in conjunction with the FDI. They were established following the Millennium Summit of the United Nations in 2000, following the adoption of the United Nations Millennium Declaration. 189 United Nations member states at that time, and at least 22 international organizations, committed to help achieve the goals.[9]

These were Global Health Goals to be achieved by the year 2015, and were signed in September 2000. At review of these set goals, carried out just before the expiry of this period established they had been useful to the participating governments and countries, had been achieved by most member countries and sometimes exceeded. However, in the developing countries of which Kenya is part, most parts of Asia as well as Africa at large, these goals remained just far-fetched aspirations due to numerous challenges hindering their achievement.[10]

It is upon these findings that WHO and FDI established Global Goals for Oral Health 2020[11], which are to act as a blue print upon which individual countries, national and local governments formulate their health policies. These Global Goals for Oral Health encompass a variety of set targets in reducing morbidity in various disease conditions including Dental Caries, Periodontal diseases and tooth loss among other objectives upon which various governments can then set their own realistically achievable goals and objectives to be attained within certain time periods.

In Kenya alone, there has been momentous improvement in the Health Sector in line with the new constitution of Kenya 2010, Kenya Health Sector Strategic Investment Plan 2013 – 2017, Kenya's Vision 2030 and other efforts at the national government level like the leasing of medical machines for county governments, as well as deployment of medical professionals to all the health units in the country, both under the national and county governments. A great effort has also been directed at ensuring compliance with global commitments.

However, a fundamental flaw with all these policies at present and in the past is that they lack a specially formulated focus, aimed at vulnerable and marginalized groups including children with special needs. This is in spite of the significant proportion of the population that these marginalized groups constitute in local communities and as a section of the world population. There are about one billion people living with disability which comprises about a seventh of the world's population[2].

Among the marginalized groups, children with special needs remain the most excluded and discriminated not only because of their disabilities: physical, mental and emotional, but also a general lack of understanding about the causes, implications of their disability especially on oral health and how it affects the general health of the individual[12, 13]. In most African settings, there still is stigma traditionally associated with such conditions and to this date, they are still widely considered taboo.

According to a research carried out in Albania and the UNICEF fact sheet, children as well as adolescents living with disabilities have been estimated to almost be twice as likely as their age mate peers without disability to have unmet or untreated oral health care needs across all income levels and socio-economic status[6, 7].This means that it is likely that poor oral health, diseases and disease conditions associated with poor oral health are likely to be more prevalent in children with disability.

Various studies point to oral health disease being prevalent in children with special needs. This state that can be attributed to environmental factors, non-environmental barriers and developmental disorders.[14]

Environmental factors such as the high cost of oral health care, difficulty in finding a dentist willing to treat children with special health care needs and dental offices that are inaccessible to children with physical limitations serve as impediments and obstacles to such children attaining optimum oral health. Some dentists also lack the requisite skills, training and education to cater for these children with special needs. Another factor is social as well as physical information barriers either related directly to the disability, or the lack of presentation of oral health knowledge and skills in a format that is suitable to them, and one that caters to each of their individual needs.

Non environmental barriers such as oral defensiveness and the children's' or parent's fear of the dentist also contribute towards unmet oral health needs for children with special needs. Coupled with lack of social

awareness towards the need for specialized and frequent dental and hospital visits, these factors contribute to poor oral health among the disabled. Further, children with developmental disorders like Downs's syndrome, autism spectrum disorders and cerebral palsy face most barriers to care due to the complexity of their disabling conditions.

The relatively poor oral health in children with special needs is also attributable to the main debilitating condition being perceived as being more important than their oral health. Therefore, most attention and finances are channeled towards the disability. In some instances, the relationship between oral health and systemic health and the impact that oral health could have on general health is not well understood.

Children living with disability and especially those with multiple disabilities who have to be sometimes instutionalized are largely, and sometimes even totally dependent on their parents or caregivers for both their general health and their oral health care needs. The caregivers entrusted with such obligations seldom possess the required knowledge on oral health maintenance techniques. The caregivers of children with special needs also have an inadequate understanding of the role of diet in initiation and progression of oral health diseases such as dental caries and other oral diseases.

Among dental diseases, dental caries has been reported to be most prevalent among children all over the world. In this same population, dental treatment has been found to be the greatest unattended health need among these children with special needs[8]. Their oral health is thought to be compromised because they are disadvantaged due to the physical, emotional and/or mental challenges, thus they are more often unable to adequately and correctly apply knowledge and techniques necessary for the controlling of plaque.[15]

There is substantial evidence of children with special needs being left behind as the country and the world at large strides towards improvement of oral health and the general health of its population as a whole.

In a study done in 2011 on oral health status of children with cerebral palsy in Kenya, the mean dmft was found to be 5.49 in deciduous dentition, with the mean number of decayed teeth per child being 4.87. The overall caries experience was high, with a reported caries prevalence of 66.23%.[16]This figure is much higher than the overall DMFT/dmft score of 0.8 reported in the Kenya National Oral health survey of 2015 among children.

In yet another recent study done in 2017 by Raj Bimal Y, a student at the University of Nairobi, it was reported that 81% of visually impaired students undertaking their studies at Thika School for the Blind in Kiambu County had caries. This percentage is much higher than the expected 23.9% prevalence of dental caries in children as stated in the Kenya National Oral Health Survey report done in 2015.

The above mentioned results are consistent with those of studies carried out in other developing countries. In India for example, Nandini carried out a study on 150 blind children and found out that 37% had dental carries with 71% having a form of gingivitis.[17]Further afield in Kuwait, a study done by MaddiShyama et al on the oral hygiene and periodontal conditions in special needs children and young adults found that their oral hygiene was poorer than that of normal children. It was also reported that periodontal disease levels were higher than in normal children.[18]

A study done in India by Dinesh et al showed that blindness is the most frequent disability among children with special needs, followed by speech impairment, hearing impairment, movement disorder due to physical disability and finally mental disabilities in that order[19]. Low nutritional status, inadequate services and extreme poverty in parts of Asia and Africa and specifically Kenya compounds these conditions.

Locally, according to a report by the Kenya National Special Needs Education survey[4], the frequency of occurrence of disability is as shown below:

Disability type	**Frequency**
Multiple Disabilities other than Deaf blind	1069
Visual Impairment	674
Hearing Impairment	359
Physical Impairment	315
Learning Disabilities	236
Speech & Language Disorder	184
Epilepsy	132
Emotional & Behavioral Disorders	128
Intellectual & Cognitive Handicap	125
Down Syndrome	58
Autistic Spectrum Disorder	57
Cerebral Palsy	47
Albinism	29
Deafblind	23
Dwarfism	18

There is therefore an urgent need to assess the oral health knowledge, favorable practices and hygiene status of children living with special needs and to use such information to specifically tailor policies at the

county as well as national government levels and more so at a global level. Such policies should be formulated in a manner that includes such marginalized groups in the improvements being witnessed in the Health sector locally and abroad.

II. Problem Statement, Justification and Objectives.

2.1. STATEMENT OF THE PROBLEM

Studies previously conducted in the world show a significant proportion of the population, about one billion people, is composed of persons living with disability. About a tenth (10%) of this population is composed of children. Yet, due to focus on the main disabling condition and various environmental and non-environmental obstacles, they tend to ignore their oral health and therefore have poor oral health that has further implications on their general health. In addition, the disability limits the oral health maintenance practices of these individuals, thus increasing their risk of advanced dental and periodontal disease.

A large percentage of this population is found in the developing countries of Asia and Africa where due to financial constraints, such children cannot easily access oral health care. Therefore this study aims to assess the oral health knowledge, practices and health status of children with disability and assess whether there is a disparity when compared to those of their peers without special needs.

2.2. JUSTIFICATION OF THE PROBLEM

There is scanty data on the oral health needs and practices of children with special needs in Kenya and as such, there are no specific policies that address the oral health treatment needs of children with disability. There also exists a policy gap and lack of programs at county and national government levels, specifically suited towards catering to oral health needs of the marginalized groups. This is in spite of studies pointing towards such groups of the marginalized and vulnerable being more susceptible to poor oral health and having higher incidence of oral disease and disease conditions, in a population that is largely constituted by children with special needs.

This study will provide baseline data on oral health of children with special needs and allow interventions with the desired outcome of overcoming the environmental as well as the non-environmental obstacles that children with special needs face in their quest for ideal oral health. The main aim is to attain a state of parity in the oral health of children with special needs to that of their counterparts without disability.

2.3. OBJECTIVES.

2.3.1. MAIN OBJECTIVE.

To establish the oral health knowledge, practices and oral hygiene status of children with special needs attending Likii Special School, Nanyuki.

2.3.2. SPECIFIC OBJECTIVES.

1. To determine the oral hygiene practices of children with special needs.
2. To find out the level of understanding of the role of diet in oral health and hygiene status among children with special needs.
3. To describe the dmft/DMFT status of children with special needs
4. To determine the oral health of children with special needs using the simplified oral health index of Green and Vermillion (1964).

2.4 RESEARCH QUESTION

What is the oral health knowledge, practice and hygiene status of children with special needs in Likii special school, Nanyuki?

2.5 VARIABLES TO BE INVESTIGATED

VARIABLE	PARAMETER	UNIT OF MEASUREMENT
Socio-demographic variables	1. Age 2. Sex	Number of Years Male/ Female
Independent	Debris and calculus Dental Caries	Oral health index dmft/ DMFT
Dependent	Knowledge Oral Hygiene Practices Oral Hygiene Status	1.Knowledge on oral hygiene maintenance practices 2.Knowledge on role of diet in oral hygiene 1. How many times do they brush their teeth in a day 1. Good/ Fair / Poor

III. Materials and Methods

3.1 STUDY DESIGN

The study technique was a descriptive cross sectional study.

3.2 STUDY AREA

The study was conducted at Likii School of Special Needs that is located about 1 kilometer from Nanyuki Town, along the Nanyuki- Meru Highway, in Laikipia County.

3.3 STUDY POPULATION

The study population comprised students undertaking their studies at Likii School of Special Needs, Nanyuki that mostly caters for children who are mentally challenged.

3.3.1 INCLUSION CRITERIA

Students enrolled at Likii School of Special Needs were interviewed and examined. Only students whose parents gave consent to the study and who had a duly filled and signed consent form from their parents or guardians were included in the study.

3.3.2 EXCLUSION CRITERIA

Children whose parents did not give consent to the study and/or who did not assent to taking part in the research themselves.

3.4 SAMPLE SIZE DETERMINATION

The sample size to be used was determined by the following formulae:

1. Sample size, $n = \frac{Z^2 P(1-P)}{C^2}$

Where;

n = sample size

Z= level of confidence according to the standard normal distribution (for a level of confidence of 95%, Z = 1.96)

P = estimated proportion of the population that presents the characteristic (0.5 was used as the actual value of P was unknown)

C = tolerated margin of error (target was to know the real proportion within 5% therefore C value was 0.05)

Thus $n = \frac{(1.96^2)(0.5)(1-0.5)}{0.05^2}$ = 384.

The value of n used in this calculation therefore was 384.

2. As the population under study was less than 10,000

The desired sample size $nf = \frac{n}{1+\left(\frac{n}{N}\right)}$

Where;

nf = desired sample size when study population is <10,000

n = the initially obtained sample size, 384

N = estimate of expected population size (value used, 80)

Thus $nf = \frac{384}{1+\left(\frac{384}{80}\right)}$

The desired sample size (nf) = 66 students.

3.5 DATA COLLECTION TECHNIQUES AND INSTRUMENTS

All children attending Likii special school who assented to the study and whose parents gave consent were included. An interview questionnaire was administered to the students. The clinical examination forms were attached to the questionnaires and each clinical form was filled with the individual student's data after assessment.

An informed consent was sought from the parents and an assent to participate in the study by the individual students. Their oral health status, oral health maintenance practices and knowledge on the role of diet in oral health were assessed using an interview questionnaire.

Using the decayed, missing and filled teeth (dmft) index for primary and early mixed dentition (children of ages 6–10 yrs.) and Decayed, Missing and Filled Teeth (DMFT) index for late mixed dentition (children of ages 11–15 yrs.) and permanent dentition (ages 16-18 years), all teeth were assessed for dental caries. A tooth was declared decayed when undisputed cavitation were found on any surface of the tooth. A tooth was categorized as missing if it was extracted due to caries or did not erupt. A tooth classified as filled was that with a restoration for a carious lesion.[20]

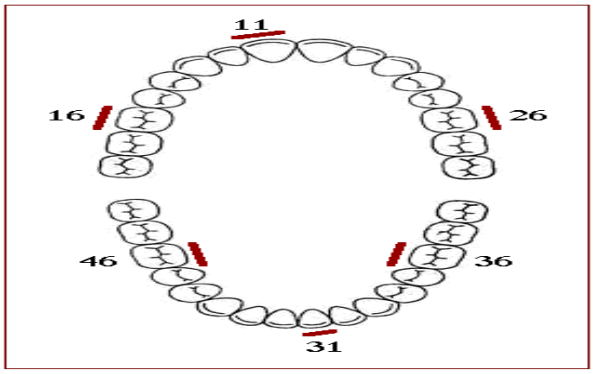
Their oral hygiene status was assessed using the Simplified Oral Hygiene Index (OHI-S) of Green and Vermillion (1964)[21] that comprises the Debris index and the Calculus Index.

Selection of tooth surfaces.

The six surfaces to be examined for the simplified oral hygiene index were chosen, four from the posterior teeth, two from anterior teeth.

In the posterior region, the first fully erupted tooth distal to the second bicuspid was examined. The buccal surfaces of the selected upper molars and the lingual surfaces of the selected lower molars were inspected and graded according to the debris and calculus index.

In the anterior portion, the labial surfaces of the upper right and lower left central incisors were scored. In the absence of either anterior teeth, the central incisor on the opposite side of the midline was used in place of the missing tooth.



3.5.1 Criteria for classification of Debris (Debris Index).

SCORES	CRITERIA FOR THE CLASSIFICATION
0	No presence of debris or stain
1	Soft debris that covers not more than one third of the whole tooth surface.
2	Soft debris that covers more than one third of the tooth surface but not more than two thirds of the tooth surface that is exposed.
3	Soft debris that covers more than two thirds of the tooth surface that is exposed.

3.5.2 Criteria for classification of Calculus (Calculus Index).

CALCULUS SCORE	CRITERIA FOR THE CLASSIFICATION
0	No presence of calculus
1	Supragingival calculus that does not cover more than one third of the exposed tooth surface.
2	Supragingival calculus that covers more than one third of the exposed tooth surface but not more than two thirds.
3	Supragingival calculus that covers more than two thirds of the exposed tooth surface.

3.6 DATA ANALYSIS AND PRESENTATION

The data collected during the duration of the study was analyzed using IBM SPSS statistics version 22. Microsoft excel on Windows 10 was also used to analyze the data. The means, standard deviations and percentages of different data sets was calculated and different variables from the study compared using cross tabulation.

The results of the analysis were presented using Microsoft Word on Windows 10 in a text format incorporating tables and charts that summarize the collected and analyzed data.

A hard copy of this analyzed data was then be printed out for presentation.

3.7 ETHICAL CONSIDERATION.

Ethical approval to carry out the project was obtained from Kenyatta National Hospital/ University of Nairobi Ethics and Research Committee.

Permission to conduct the study was sought from the Dean of School of Dental Sciences, University of Nairobi Dental Hospital.

Informed consent was obtained from all the parents/guardians, and assent from the students before conducting the study. The study was only carried out on students that assented to the study and had a duly filled consent form.

Confidentiality of all information gathered via questionnaires and clinical assessment was assured by having identity codes on the questionnaires and clinical assessment forms instead of the participants' names.

3.8 PERCEIVED BENEFITS OF THE STUDY.

The study was undertaken as a partial requirement for attaining a Bachelor Degree in Dental Surgery from the University of Nairobi.

The information obtained from questionnaires and clinical assessment of the oral health together with the challenges they faced in their quest for oral health will be used as a basis for formulation of policies and health programs with a specific focus on such marginalized groups.

Once completed, the study will increase the University of Nairobi's database for anyone who desires to do a research in the same field in future.

A copy of the completed research project once approved will also be provided to the National Council for Persons with disability in Kenya to serve as baseline data for this sampled population upon which further studies can be carried out to aid in policy formulation.

3.9 LIMITATIONS OF THE STUDY

Most of the students at the institution are mentally challenged and thus required some form of help while filling in the questionnaire hence the possibility of bias in the answers. Their level of understanding of the role of diet in oral health and hygiene status could not be adequately assessed due to lack of comprehension in a majority of the sample population.

There was no access to the participants' previous medical records hence little or no knowledge about systemic medical conditions that could directly have an influence on the oral health status of the students.

There was also a limited sample population examined since the study will only took place in one school, due to limited time available to conduct the study.

The diet responses were based on a common diet offered by the school since the school is a boarding facility, hence provided very little insight towards individual diets that may have contributed to the oral health status being as it was.

IV. Results.

4.1 DEMOGRAPHIC DATA.

1. Participants in the study.

A total of 70 participants were recruited into the study. There were 37 (52.9%) male participants and 33 (47.1%) female participants as seen in table 1 below.

Table 1: Gender distribution of participants in the study.

Gender.	Frequency and Percentages. (Number (%))
Male	37 (52.9%)
Female	33 (47.1%)

2. Age distribution of participants in the study.

The mean age of the 70 participants included in the study was 14.30, with a standard deviation of ±3.23634. The maximum age recorded was 18 years by 17 participants, while the minimum recorded age was 6 years.

Participants in the study aged 18 years were 17 (24.3%), and this was the age that independently comprised the largest proportion of the total research population. Those with the least proportion in the research population were those aged 6, 7 and 10 years with one participant each (1.4% of the total population).

Table 2: Age distribution.

Ages	Frequency and Percentages (Number (%))
Age 6 – 8	5 (7.1%)
Age 9 – 11	10 (14.3%)
Age 12 – 14	18 (25.7%)
Age 15 – 17	20 (28.6%)
Above age 17	17 (24.3%)

3. Type of disability.

Out of the 70 participants in the study, 32.4% (12) males and 21.2% (7) females had Autism. 5.4% (2) males and 18.2% (6) females had Down syndrome. Those reported to have cerebral palsy were 5.4% (2) males and 3.0% (1) female. Among those who are mentally handicap were 32.4% (12) males and 39.4 % (13) females. Those with dyslexia as their form of disability were 2.7% (1) male only. One female, 3.0% had learning difficulty. There was one male, 2.7% with microencephaly. Among those with combined disability were 18.9% (7) males and 15.2% (5) females.

Table 3: Distribution of disability by gender.

	Gender.	
Type of Disability	Male (Number (%))	Female (Number (%))
Autism	12 (32.4%)	7 (21.2%)
Down syndrome	2 (5.4%)	6 (18.2%)
Cerebral palsy	2 (5.4%)	1 (3.0%)
Mentally handicap	12 (32.4%)	13 (39.4%)
Dyslexia	1 (2.7%)	0 (0.0%)
Learning difficulty	0 (0.0%)	1 (3.0%)
Microencephaly	1 (2.7%)	0 (0.0%)
Combined disability	7 (18.9%)	5 (15.2%)

4.2 ORAL HYGIENE PRACTICES.

1. Frequency of cleaning of teeth.

A majority of the respondents, 67 (95.71%), reported that they brush their teeth once daily, in the morning. Of these, 35(94.6%) male respondents and 32(97%) females gave this as their response. Only 2 male participants (5.4%) and 1 female participant (3.0%) reported to be brushing their teeth more than once a day as shown in table 6 below.

Table 4: Frequency of tooth brushing by Gender.

	Gender.	
Frequency of Tooth brushing	Male (Number (%))	Female (Number (%))
Morning only everyday	35 (94.6%)	32 (97.0%)
More than once a day	2 (5.4%)	1 (3.0%)

a. Comparing frequency of brushing with its effect on mean dmft& DMFT.

Participants that reported brushing more than once a day had a lower mean DMFT of 0.67 ±1.15 compared to that of those that brush only once daily that was at 5.25 ±4.35. There was however a very low number of participants in the study with deciduous dentition.

An independent T test comparison of means showed no statistical significance between frequency of brushing and the mean DMFT.

Table 5: Comparison of frequency of brushing with mean dmft and DMFT.

Frequency of brushing	**Number (= n)**	**Mean DMFT**	**SD DMFT**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			
Brush 1 time	67	5.25	4.35	-0.47	9.64	T=2.187	68	0.075
Brush more than 1 time a day	3	0.67	1.15	2.43	6.74			

b. Comparison between frequency of brushing teeth and mean Debris, Calculus and Oral Hygiene indices.

Those participants in the study that reported to brush only once daily had lower mean debris and oral hygiene indices of 1.51 ±0.69 and 1.63 ±0.86 respectively, while their counterparts that brush more than once daily had debris and oral hygiene mean indices of 1.56 ±0.67 and 1.67 ±0.73 respectively.

Those that brushed their teeth more than once daily had a lower mean calculus index of 0.11 ±0.19 compared to a mean calculus index of 0.13 ±0.29 in those that brushed only once daily.

An independent T test comparison of means showed no statistical significance between means of Debris index, Calculus index and Oral hygiene index with the frequency of brushing.

Table 6: Comparison of brushing frequency with mean Debris, Calculus and Oral Hygiene indices

Frequency of Brushing.	**Number (= n)**	**Mean debris index**	**SD debris index**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			
Morning only (once)	67	1.51	0.69	-0.85	0.76	T= 0.142	68	0.906
More than once a day	3	1.56	0.67	-1.63	1.53			
Frequency of Brushing.	**Number (= n)**	**Mean calculus index**	**SD calculus index**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			
Morning only (once)	67	0.13	0.29	-0.32	0.36	T= 0.103	68	0.927
More than once a day	3	0.11	0.19	-0.41	0.44			
Frequency of	**Number (= n)**	**Mean oral hygiene**	**SD oral hygiene**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			

Brushing.		**index**	**index**					
Morning only (once)	67	1.63	0.86	-1.05	0.98	T= 0.254	68	0.949
More than once a day	3	1.67	0.73	-1.70	1.64			

2. **Appliance used to clean their teeth.**

All the participants in the study, 70 (100%) reported to be using a toothbrush to clean their teeth.

3. **Access to an electric toothbrush.**

Despite the fact that the whole population uses a toothbrush to clean their teeth, none of the participants had access to an electric toothbrush.

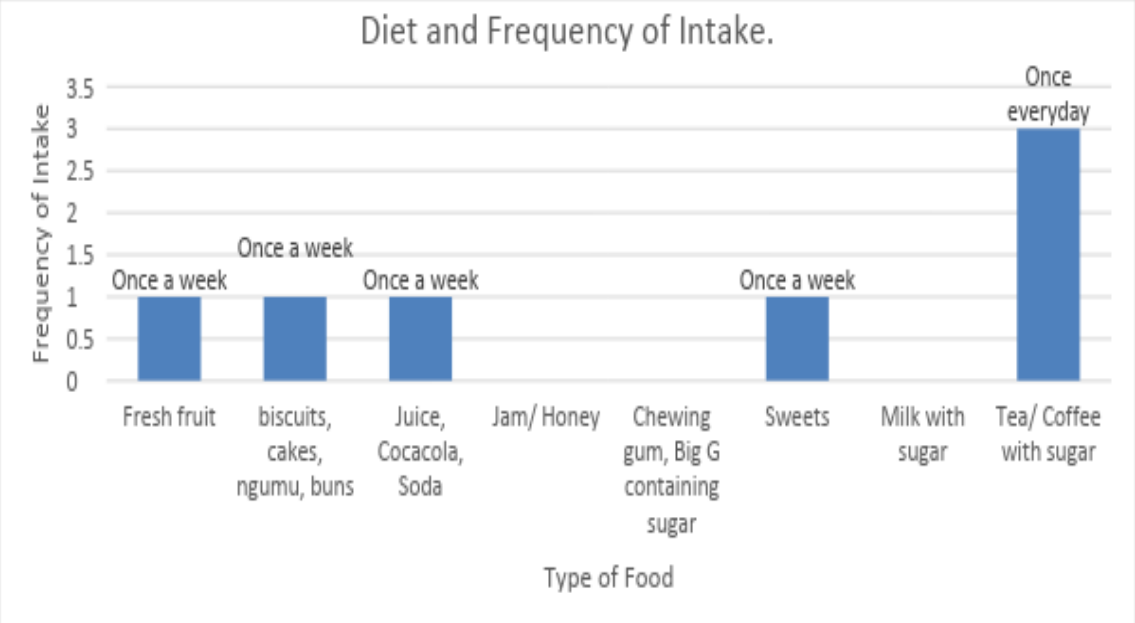
4. **Dentifrice used while cleaning teeth.**

All 70 participants, (100%), reported to be using toothpaste as the dentifrice with their toothbrush while brushing teeth.

4.3 DIET AND ITS ROLE IN ORAL HEALTH AND HYGIENE STATUS.

1. Type of food and Frequency of consumption.

The whole population sample was located in a boarding school where they resided and thus the diet as well as the frequency of food intake was standardized as follows:



The population sample comprised children with special health care needs, a majority of whom are mentally handicap and autistic.

Their level of understanding of the role of diet in oral health and hygiene status could therefore not be adequately assessed due to lack of comprehension in a majority of the sample population.

4.4dmft/DMFT STATUS

a. **Comparing Gender with its effect on mean dmft/ DMFT.**

The female population had higher dmft and DMFT mean values of 0.85 ±2.635 and 5.06 ±4.847 respectively compared to their counterpart male mean values of 0.49 ±2.063 and 5.05 ±3.951 for dmft and DMFT respectively. This shows a higher incidence of dental caries in the female population.

An independent t test comparison of means of dmft and DMFT with gender showed a non-significant association between dmft as well as DMFT with gender, suggesting that there was no association between Gender and dmft or DMFT status.

Table 7: Comparison of gender with dmft& DMFT means.

Gender	**Number (= n)**	**Mean dmft**	**SD Dmft**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			
Male	37	0.49	2.063	-1.485	0.761	T=1.390	68	0.522
Female	33	0.85	2.635					
	Number	**Mean**	**SD DMFT**	**95% Confidence interval**		**Test**	**df**	**P value**

	(= n)	DMFT		Lower	Upper			
Male	37	5.05	3.951	-2.107	2.094	T=0.170	68	0.995
Female	33	5.06	4.847					

b. **Comparing age groups with their effect on dmft/ DMFT.**

The highest mean dmft value was recorded among the 6 to 8 year olds with a dmft mean of 5.80 ±5.85 with the lowest value among the 12 to14 year olds, with a dmft mean of 0.06 ±0.24.

The highest mean DMFT was recorded among those above 17 years of age, with a mean of 6.53 ±6.11 with the lowest mean DMFT among the 6 to 8 year olds, 0.20 ±0.45.

An analysis of variances between dmft and DMFT with the participants' age groups showed a statistically significant association between age and dmft as well as DMFT, meaning there was a relationship between age groups and the prevalence of dmft/DMFT.

Table 8: Analysis of variances between dmft& DMFT with participants' age.

AGE	Number (= n)	Mean dmft	SD dmft	95% Confidence interval		Test	Df	P value
				Lower	Upper			
Age 6 to 8	5	5.80	5.85	-1.46	13.06	F= 12.417	4, 65	0.000
Age 9 to 11	10	1.60	2.91	-0.48	3.68			
Age 12 to 14	18	0.06	0.24	-0.06	0.17			
AGE	**Number (= n)**	**Mean DMFT**	**SD DMFT**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			
Age 6 to 8	5	0.20	0.45	-0.36	0.76	F= 3.042	4, 65	0.023
Age 9 to 11	10	3.20	2.74	1.24	5.16			
Age 12 to 14	18	5.00	3.36	3.33	6.67			
Age 15 to 17	20	6.00	3.61	4.31	7.69			
Above 17 years	17	6.53	6.11	3.39	9.67			

c. **Comparing Disability Groups with their effect on mean dmft/ DMFT.**

The highest mean DMFT was recorded among those with combined disability, a mean of 6.40 ±5.82 while the lowest mean DMFT was recorded among those with Down syndrome and Microcephaly, at 2.13 ±2.70.

An analysis of variances showed no statistically significant association between mean DMFT and the type of disability.

Table 11: Analysis of variances between DMFT with type of disability.

Disability	Number (= n)	Mean DMFT	SD DMFT	95% Confidence interval		Test	df	P value
				Lower	Upper			
Autism	20	6.30	4.16	4.35	8.25	F= 1.494	5, 64	0.204
Down syndrome and Microcephaly	8	2.13	2.70	-0.13	4.38			
Cerebral palsy	3	3.33	4.16	-7.01	13.68			
Mentally handicap	25	4.64	3.94	3.02	6.26			
dyslexia and learning difficulty	2	4.00	4.24	-34.12	42.12			
combined disability	12	6.42	5.82	2.72	10.12			

4.5ORAL HEALTH STATUS.

1. **Oral hygiene grading**

A majority of the male population, 25 (67.6%) had fair oral hygiene status, while a majority of the female population, 17 (51.5%) had good oral hygiene status.

Table 9: Oral hygiene status among the gender groups.

			Gender.	
Oral hygiene grading			Male (Number (%))	Female (Number (%))
		Good	11 (29.7%)	17 (51.5%)
		Fair	25 (67.6%)	15 (45.5%)
		Poor	1 (2.7%)	1 (3.0%)

a. Comparison of Gender and its effect on Debris Index, Calculus Index and Oral Hygiene index means.

The male gender recorded higher means in Debris index 1.68 ±0.66, calculus index 0.15 ±0.31 and oral hygiene index 1.82 ±0.84 versus lower means of debris index 1.32 ±0.66, calculus index 0.10 ±0.26 and oral hygiene index 1.42 ±0.83 observed in the female gender.

An independent T test comparison of means of Debris index, calculus index and oral hygiene index with gender showed a statistically significant association between the Debris index and oral hygiene index with gender. There was no significant statistical association between the Calculus index and gender.

Table 10: Comparison of means of Debris, Calculus and Oral hygiene with Gender.

Gender	**Number (= n)**	**Mean Debris index**	**SD debris index**	**95% Confidence interval**		**test**	**df**	**P value**
				Lower	**Upper**			
Male	37	1.68	0.66	0.04	0.67	T=0.008	68	0.029
Female	33	1.32	0.66	0.04	0.67			
Gender	**Number (= n)**	**Mean Debris index**	**SD debris index**	**95% Confidence interval**		**test**	**df**	**P value**
				Lower	**Upper**			
Male	37	0.15	0.31	-0.09	0.19	T=0.917	68	0.492
Female	33	0.10	0.26	-0.09	0.18			
Gender	**Number (= n)**	**Mean Oral Hygiene index**	**SD Oral hygiene index**	**95% Confidence interval**		**test**	**df**	**P value**
				Lower	**Upper**			
Male	37	1.82	0.84	0.001	0.80	T=0.042	68	0.050
Female	33	1.42	0.83	0.001	0.80			

b. Comparing age groups with their effect on Debris, Calculus and Oral hygiene indices.

Those above 17 years had the highest debris index mean of 1.88 ±0.70 and those aged 9 to 11 years had the lowest debris index mean of 1.13 ±0.44. The highest calculus index mean was among those above 17 years with a mean of 0.25 ±0.37 while the lowest mean was in those aged between 6 to 8, as well as those aged between 12 to 14 years with a mean of 0.03 ±0.07 and 0.03 ±0.09 respectively. Participants aged above 17 years had the highest mean oral hygiene index of 2.13 ±0.90, with the lowest oral hygiene index mean among the 9 to 11 year olds with a mean of 1.20 ±0.54.

An analysis of variances showed that there was a statistically significant association in variances of the means of Debris index and Oral hygiene index with the participants' age groups. There was however no statistically significant association between the variances of Calculus index and the participants' age groups.

Table 11: Comparison of variances of Age groups with means of DI, CI and OHI.

AGE	**Number (= n)**	**Mean Debris index**	**SD Debris index**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			
Age 6 to 8	5	1.33	0.77	0.37	2.29	F=3.088	4, 65	0.022
Age 9 to 11	10	1.13	0.44	0.82	1.45			
Age 12 to 14	18	1.29	0.56	1.01	1.57			
Age 15 to 17	20	1.63	0.71	1.29	1.96			
Above 17 years	17	1.88	0.70	1.52	2.24			
AGE	**Number (= n)**	**Mean Calculus index**	**SD Calculus index**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			
Age 6 to 8	5	0.03	0.07	-.0592	.1259	F= 1.655	4, 65	0.171
Age 9 to 11	10	0.07	0.16	-.0485	.1819			
Age 12 to 14	18	0.03	0.09	-.0149	.0704			
Age 15 to 17	20	0.17	0.37	-.0068	.3402			
Above 17 years	17	0.25	0.37	.0556	.4346			
AGE	**Number (= n)**	**Mean oral hygiene index**	**SD oral hygiene index**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			
Age 6 to 8	5	1.37	0.82	0.35	2.38	F= 3.404	4, 65	0.014
Age 9 to 11	10	1.20	0.54	0.82	1.58			
Age 12 to 14	18	1.31	0.58	1.03	1.60			
Age 15 to 17	20	1.79	0.96	1.34	2.24			
Above 17 years	17	2.13	0.90	1.66	2.59			

c. Comparing Disability type with Debris, Calculus and Oral Hygiene indices means.

The Mentally handicap had the highest Debris index mean of 1.77 ±0.69 while those with Down syndrome and Microcephaly had the lowest debris index mean of 1.08 ±0.64.

The highest calculus index mean was recorded among the mentally handicap, 0.22 ±0.33, while no calculus was observed among those with Down syndrome and Microencephaly.

The Mentally handicap once more had the highest mean oral hygiene, 1.99 ±0.86, while those with down syndrome and microcephaly had the lowest oral hygiene index mean of 1.08 ±0.64.

A comparison of variances showed a statistically significant association between the oral hygiene index and type of disability. There was no statistically significant association between the Debris index and Calculus Index means with the type of disability.

Table 12: Comparison of Disability type with Debris, Calculus and Oral Hygiene indices means.

Disability	**Number (= n)**	**Mean Debris index**	**SD Debris index**	**95% Confidence interval**		**Test**	**Df**	**P value**
				Lower	**Upper**			
Autism	20	1.27	0.51	1.03	1.51	F= 2.231	5, 64	0.062
Down syndrome & Microcephaly	8	1.08	0.64	0.55	1.62			
Cerebral palsy	3	1.39	0.67	-0.28	3.06			
Mentally handicap	25	1.77	0.69	1.49	2.06			
Dyslexia & learning difficulty	2	1.75	0.59	-3.54	7.04			
combined disability	12	1.64	0.76	1.15	2.12			
Disability	**Number (= n)**	**Mean Calculus index**	**SD Calculus index**	**95% Confidence interval**		**Test**	**Df**	**P value**
				Lower	**Upper**			
Autism	20	0.06	0.16	-0.02	0.14	F= 1.143	5, 64	0.347
Down syndrome & Microcephaly	8	0.00	0.00	0.00	0.00			
Cerebral palsy	3	0.06	0.10	-0.18	0.29			
Mentally handicap	25	0.22	0.33	0.08	0.36			
Dyslexia & learning difficulty	2	0.08	0.12	-0.98	1.14			
combined disability	12	0.15	0.43	-0.12	0.43			
Disability	**Number (= n)**	**Mean oral hygiene index**	**SD oral hygiene index**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			
Autism	20	1.33	0.60	1.04	1.61	F= 2.439	5, 64	0.044
Down syndrome & Microcephaly	8	1.08	0.64	0.55	1.62			
Cerebral palsy	3	1.44	0.75	-0.42	3.31			
Mentally handicap	25	1.99	0.86	1.64	2.35			
Dyslexia & learning difficulty	2	1.83	0.71	-4.52	8.19			
combined disability	12	1.79	1.09	1.10	2.49			

4.5 MAINTENANCE OF ORAL HYGIENE.

1. Help while cleaning teeth due to a physical, mental or emotional challenge.

A total of 17 (45.9%) male participants in the research were able to brush their teeth on their own without any assistance while 18 (54.5%) females could do it on their own. Among those that required a form of assistance from the house matron while brushing were 20 (54.1%) males and 15 (45.5%) females.

Table 13: Assistance while brushing teeth due to disability.

	Gender.	
Help while brushing Teeth.	Male (Number (%))	Female (Number (%))
No. I do it alone	17 (45.9%)	18 (54.5%)
House matron	20 (54.1%)	15 45.5%)

a. Comparing effect of assistance while brushing with the impact on mean dmft& DMFT.

Children who require a form of assistance while brushing had a higher DMFT mean of 5.71 ±5.08 while those that brush on their own had a mean DMFT of 4.40 ±3.45.

An independent T test comparison of means showed no statistically significant association between whether or not they receive a form of assistance while brushing with their mean DMFT.

Table 14: Comparison of assistance while brushing with mean dmft and DMFT.

Use of assistance while brushing.	**Number (= n)**	**Mean DMFT**	**SD DMFT**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			
No assistance	35	4.40	3.45	-3.39	0.76	T= 2.844	68	0.210
Assisted brushing.	35	5.71	5.08	-3.39	0.76			

b. Comparison of effect of assistance while brushing with mean Debris, Calculus and Oral Hygiene indices.

Those that brush on their own had higher debris and oral hygiene indices of 1.62 ±0.60 and 1.74 ±0.69 respectively compared to 1.40 ±0.74 and 1.53 ±0.99 respectively for those that required help from the house matron while brushing.

However, those that required help from the house matron while brushing had a slightly higher calculus index of 0.13 ±0.35, compared to a calculus index of 0.12 ±0.21 in those that brushed on their own.

An independent T test comparison of means showed no statistical significance between means of Debris index, Calculus index and Oral hygiene index with the frequency of brushing.

Table 15: Comparison of assistance while brushing with mean Debris, Calculus and Oral Hygiene indices.

Use of assistance while Brushing.	**Number (=n)**	**Mean debris index**	**SD debris index**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			
No assistance	35	1.62	0.60	-0.10	0.54	T=2.862	68	0.180
Assisted brushing	35	1.40	0.74	-0.10	0.54			
Use of assistance while Brushing.	**Number (=n)**	**Mean calculus index**	**SD calculus index**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			
No assistance	35	0.12	0.21	-0.14	0.13	T=0.480	68	0.945
Assisted brushing	35	0.13	0.35	-0.14	0.13			
Use of assistance while Brushing.	**Number (=n)**	**Mean oral hygiene index**	**SD oral hygiene index**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			
No assistance	35	1.74	0.69	-0.19	0.62	T=2.270	68	0.297
Assisted brushing	35	1.53	0.99	-0.19	0.62			

2. Number of dental visits in the past 1 year.

A majority of participants, 27 (73%) males and 26 (78.8%) females had never visited a dentist. On the other hand, 2 (5.4%) male participants had visited the dentist more than one time in the past one year.

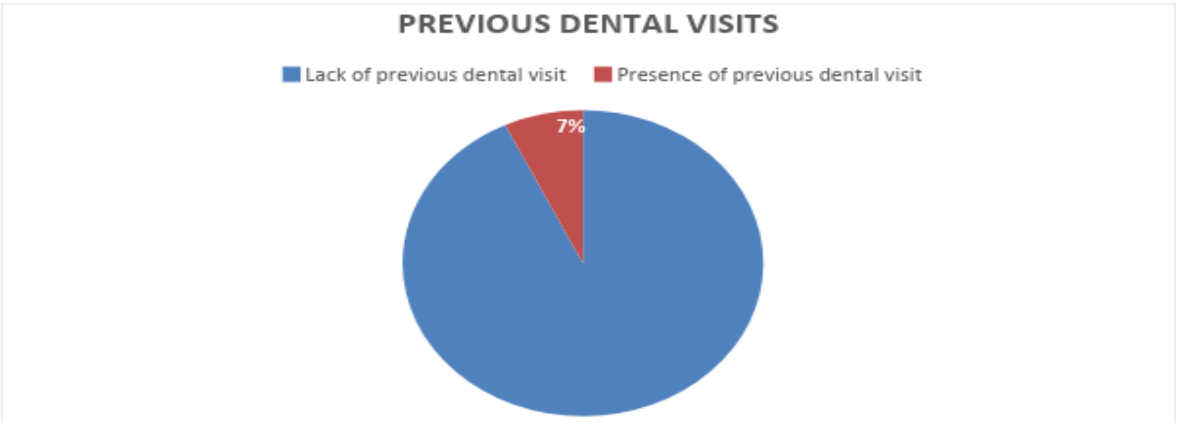
Table 16: Frequency of dental visits by Gender.

	Gender.	
Number of dental visits	Male (Number (%))	Female (Number (%))
I have never visited a dentist	27 (73.0%)	26 (78.8%)
I did not visit the dentist during the past 1 year	0 (0.0%)	1 (3.0%)
I don't know/ I don't remember	6 (16.2%)	5 (15.2%)
One time	2 (5.4%)	1 (3.0%)
Two times	2 (5.4%)	0 (0.0%)

Further, a comparison between those who had visited the dentist in the past 1 year regardless of the number of times compared to those without previous dental visits revealed the following:

Table 17: Previous dental visits

	Frequency and Percentage
Lack of previous dental visit	65 (92.9%)
Presence of previous dental visit	5 (7.1%)



a. Comparing the number of dental visits with dmft and DMFT means.

Those who had visited the dentist two times in the past one year had the highest mean DMFT of 9.50 ±10.61.

An analysis of variances showed a statistically non-significant association between number of dental visits and the mean DMFT.

Table 18: Comparison of variances between number of dental visits and DMFT.

Number of dental visits	Number (= n)	Mean DMFT	SD DMFT	95% Confidence interval		Test	df	P value
				Lower	Upper			
I have never visited a dentist	53	4.68	3.89	3.61	5.75	F=1.257	4, 65	0.296
I did not visit the dentist during the past 1 year	1	0.00	0.00	0.00	0.00			
I don't know/ i don't remember	11	6.45	5.54	2.73	10.18			
One time	3	5.33	2.52	-0.92	11.58			
Two times	2	9.50	10.61	-85.80	104.80			

Those with previous dental visits had a higher DMFT mean of 7.00 ±6.04 compared to those without previous dental visits that had a mean DMFT of 4.91 ±4.23.

An independent T test comparison of means showed no statistically significant association between presence or lack of previous dental visits and the mean DMFT status.

Table 19: Comparison between previous dental visit and mean DMFT

Number of dental visits	Number (= n)	Mean DMFT	SD DMFT	95% Confidence interval		Test	df	P value
				Lower	Upper			
Lack of previous dental visit	65	4.91	4.23	-6.13	1.95	T=0.813	68	0.305
Presence of previous dental visit	5	7.00	6.04	-9.52	5.34			

b. Comparison between number of previous dental visits and mean Debris, Calculus and Oral hygiene indices.

Those who had never visited the dentist before recorded the highest debris index mean of 1.53 ±0.72 while the lowest debris index mean was observed among those with two previous dental visits with a debris index mean of 1.71 ±0.71.

Those with a history of one dental visit in the past one year had the highest calculus index and oral hygiene index of 0.22 ±0.38 and 1.72 ±0.67 respectively.

Those with no history of any previous dental visit had the lowest calculus index of 0.12 ±0.31 while the lowest oral hygiene index mean of 1.33 ±0.94 was recorded among those with two previous dental visits in the past one year.

An analysis of variances showed a statistically non-significant association between the Debris index and Calculus Index means with the number of previous dental visits

Table 20: Comparison of means of Debris Index, Calculus Index and Oral Hygiene Index with number of previous dental visits.

Previous dental visits	Number (=n)	Mean debris index	SD debris index	95% Confidence interval		Test	df	P value
				Lower	Upper			
I have never visited a dentist	53	1.53	0.72	1.33	1.73	F=0.193	3,66	0.901
I didn't visit the dentist during the past 1 year/ I don't know/ i don't remember	12	1.47	0.57	1.11	1.84			
One time	3	1.50	0.44	0.40	2.60			
Two times	2	1.17	0.71	-5.19	7.52			
Previous dental visits	**Number (=n)**	**Mean calculus index**	**SD calculus index**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			
I have never visited a dentist	53	0.12	0.31	0.04	0.20	F=0.130	3, 66	0.942
I didn't visit the dentist during the past 1 year/ I don't know/ i don't remember	12	0.13	0.20	0.00	0.25			
One time	3	0.22	0.38	-0.73	1.18			
Two times	2	0.17	0.24	-1.95	2.28			
Previous dental visits	**Number (=n)**	**Mean oral hygiene index**	**SD oral hygiene index**	**95% Confidence interval**		**Test**	**df**	**P value**
				Lower	**Upper**			
I have never visited a dentist	53	1.65	0.91	1.40	1.90	F=0.130	3,66	0.958
I didn't visit the dentist during the past 1 year/ I don't know/ i don't remember	12	1.60	0.69	1.16	2.04			

One time	3	1.72	0.67	0.05	3.40			
Two times	2	1.33	0.94	-7.14	9.80			

V. Discussion and Conclusion.

5.1 DISCUSSION

Demographical data

Out of the 70 participants in the study, there were more males, 37(52.9%), than females 33 (47.1%). These figures were similar to those obtained from a study done amongst visually impaired students in Sulaimani city in Iraq where there were more males, 34, than females, who were 16 in number.[22] The results can be attributed to a higher number of school going male children with special health care needs as compared to their female counterparts as reported in the Kenya National Special Needs Education survey.[4] The report indicated that there were 53.4% male children that attended school compared to 46.6% population of female children with special needs that attended school.

The mean age of the participants in the study was 14.30±3.24 with maximum of the population between 15 to 17 years of age. These results were not far off from a similar study conducted among visually impaired students in Alnoor Institute of AlmadinahAlmunawwarah in Saudi Arabia that revealed that most of the participants were between 10 to 15 years of age and overall mean of age was 12.1 years.[23]

The frequency of disability was found to be highest among those who were mentally handicap followed closely by those with autism. Lowest frequency of disability was recorded among those with dyslexia and learning difficulty as well as those with microcephaly.

This result was a complete departure from the results obtained in the Kenya National Special Needs Education survey[4], that reported highest frequency of children with special needs among those with multiple disabilities other than Deaf blind followed by those with visual impairment. Those with dwarfism and the deafblind comprised the lowest proportion of children with special healthcare needs. This difference in results could be attributed to the fact that the Kenya National Special Needs Education survey comprised a larger population sample across the country and many more special needs types other than those included in this particular study which was done in one school. This could explain the difference in results.

Oral hygiene practices.

A majority of the respondents, 35(94.6%) male and 32(97.0%) female, reported to brush their teeth only once daily while a minority of them, 2(5.4%) male and 1(3.0%) female, reported to brush their teeth more than once daily. These results are similar to those of a study done to determine the Oral health status of 12-year-old children with disabilities and controls in Southern India that determined that 174 (91.3%) brushed their teeth once daily, while 27 (8.3%) brushed their teeth two or more times daily.[24] This could be attributed to the school schedule that exclusively provides time for brushing in the morning and thus brushing at any other time could be left to personal motivation.

All the students used a toothbrush to clean their teeth. This was attributed to the urban location of the school as well as the schools policy attempts to achieve standardization among its students. However, despite the limited manual dexterity that is reported among some disability groups in children with special health care needs, it was observed that none of them had access to an electric toothbrush. A similar study done to determine the Oral health status of 12-year-old children with disabilities and controls in Southern India that determined that among the children with special health care needs, a majority of the population, 190 (99.6%), similarly used a toothbrush to clean their teeth while 1 (0.4%) used a finger to clean their teeth.[24]

All 70 participants reported to use toothpaste as a dentifrice while cleaning their teeth, which is very similar to the whole population of 191 students that reported to use toothpaste in a study by Purohit B among children with disability in Southern India.[24]

Children with special needs that that demonstrated the ability to brush their teeth on their own were 17 (45.9%) male and 18 (54.5%) female participants, whereas 20 (54.1%) male and 15 (45.5%) female participants could not brush on their own, and needed a form of assistance or monitoring while brushing teeth. This is comparable with 102 (53.6%) participants that were able to brush without assistance, 43 (22.3%) that required a form of supervision while brushing and 46 (24.2%) that required assistance while brushing in a similar study byPurohit B among children with disability in India.[24] This shows that among children with special healthcare needs, the number of those who can brush on their own and those that need a form of supervision or assistance while brushing their teeth is almost equal.

A majority of the participants 27 (73%) males and 26 (78.8%) females had never visited a dentist before. This could be attributed to the higher disease burden associated with disability as it is given preference to their oral health due to a lack of understanding of the connection between oral health and their systemic health status as stated in the impact of oral health on general health by Hein C and Williams R.[12]

The students who participated in the research are enrolled at a boarding school where they reside. They all consumed diet that was standardized by the school. On analysis of the diet, it was determined that the participants were exposed to a cariogenic diet once a week in the form of sweets that are composed of sucrose, which is an etiological factor associated with dental caries and juice, coca cola and soda. However, the diet was considered to be a low cariogenic diet. This was determined after taking into account correlation analyses of time-trend data on per capita sugar consumption and caries incidence that provide evidence to suggest that, caries incidence increases when per-capita sugar consumption exceeds 40g/day in the absence of fluoride use, and 50g/day when fluoride is used.[25] Second, intake of solid forms of sugar (sweets), which have been reported to be more easily retained in teeth and are thus considered more cariogenic[26] occurred only once a week which is a relatively low frequency of intake. Therefore, diet was not considered as a determinant factor for their dmft/DMFT status as well as their oral health status.

A majority of the patients had fair oral hygiene status, as evidenced by 25 (67.6%) males and 15 (45.5%) females falling within this category. These results are similar to those obtained in a study to determine oral health knowledge, practice and oral hygiene status among visually impaired students in Sulaimani city in Iraq, where most students had fair to poor oral hygiene.[22]These results are probable evidence to the effect that, children with special needs are not as effective in maintaining their oral hygiene status while compared to their peers without special healthcare needs.

The prevalence of dental caries was 78.57% which corresponds to equally high prevalence levels in similar studies done on children with special health care needs. In a study done by Raj Bimal Y in 2017[27], a student at the University of Nairobi, it was reported that 81% of the students undertaking their studies at Thika School for the Blind in Kiambu County had dental caries. Yet another study done in 2011 by Ober-Oluoch et al seems to concur with this finding. In their study of oral health status of children with cerebral palsy in Kenya, there was a reported caries prevalence of 66.23%.[16]

All these values are significantly higher than the expected dental caries prevalence of 23.9% in children that was reported in the Kenya National Oral Health survey report in 2015. This is an indication that there is a significantly higher dental caries experience among children with special health care needs than is found in their normal counterparts. This could be attributed to several factors including: a lack of comprehension of the importance as well as the appropriate maintenance techniques of good oral hygiene, reduced manual dexterity among some disability groups, as well as less focus on their oral health due to the overlying general condition that is given preference by their parents or caretakers.

The mean dmft, determined among children up to age group 12 to 14 years was found to be 0.6571 ±2.34 with the mean number of decayed teeth per child determined to be 0.64. The mean DMFT, determined in children between age group 6 to 8 up to those above 17 years was 5.0571 ±4.36 with the mean number of decayed teeth per child determined to be 4.44. This was significantly different from a high mean dmft value of 5.49 recorded among children with cerebral palsy in Kenya.[16]The huge difference in mean dmft could be attributed to the age differences in the selection criteria, where this study focused on children between age 6 to 18 years, who are by this time in mixed dentition or permanent dentition.

The DMFT mean of 5.06 obtained from this study was much higher than the DMFT/dmft mean of 0.8 stated in the Kenya National Oral health Survey done in 2015, pointing to a higher mean DMFT among children with special health care needs.

On comparison of dmft/ DMFT values with gender, it was noted that females had higher dmft mean of 0.85 ±2.635 and mean DMFT of 5.06 ±4.847 compared to their male counterparts with mean dmft of 0.49 ±2.063 and mean DMFT of 5.05 ±3.951. This finding is similar to the one obtained in a study to determine caries prevalence in a 7 to 15 year old Albanian School children with disability population.[28] A possible explanation for this finding would be the earlier eruption times of teeth among the female population as compared to males.

There was a progressive reduction in mean dmft with an increase in age. However, there was a progressive increase in DMFT with an increase in age among the age groups. This could be attributed to the shedding and reduction in number of deciduous teeth with an increase in age. In the permanent dentition, there is a progressive increase in number of teeth and surfaces exposed in the oral cavity as teeth erupt concurrent with an increase in age among the age groups.

Children with combined disability had the highest mean DMFT in the population sample, followed by those with Autism. Those with Down syndrome and Microcephaly had the lowest DMFT mean recorded. This is an indication of those with combined disability as being the group with the most urgent need for dental intervention.

Those that brush their teeth only once a day were the majority, compared to those who brushed more than once daily. Although there was no significant association between frequency of brushing with dmft/DMFT as well as the oral hygiene index, it was noted that those that brush only once a day had a higher mean DMFT

compared to those who brushed more than once daily. This is because brushing of teeth is effective in removal of the bacterial biofilm that leads to initiation of the carious process.

Further, there was no significant association between whether or not the participants required assistance while brushing with their dmft/DMFT status as well as their oral hygiene status. It should however be noted that those who brushed on their own had a lower DMFT as compared to that of those that required assistance while brushing. This can be attributed to several reasons such as a high student to house matron ratio, lack of specialized oral hygiene practices for each child or even a lack of adequate knowledge on oral hygiene practices by the house matrons.

There was no significant association between the number of dental visits and the mean DMFT/dmft as well as the oral hygiene status.

Both genders in the study population sample had fair oral hygiene status, with the female population having a slightly better mean oral hygiene index as compared to the male population. These results are similar to those of another study carried out to determine the oral hygiene status of institution dwelling orphans in Benin City, Nigeria, where 73.7% of the sampled population had fair oral hygiene status.

In this particular study, the state of oral hygiene was largely attributed to the debris index that had far greater mean values in comparison to the calculus index. It is thus thought that the oral hygiene status can be improved by effective oral hygiene practices in a majority of the population without professional intervention.

Those aged 15 to 17, as well as those above 17 years recorded the highest mean oral hygiene index, indicating that there was poorer oral hygiene status with an increase in age. This could be attributed to the increased DMFT in these ages that consequently has an impact on the oral hygiene. It could also be attributed to the long term effects of some of the drugs such as anticonvulsants, used by large sections of the participants in the study, on the gingiva and oral tissues that make it increasingly difficult to carry out oral hygiene maintenance practices.

5.2 CONCLUSION

The findings obtained from this research are proof that children with special health care needs in Likii Special School for the mentally challenged have poorer oral hygiene status than their normal peers. The prevalence of dental caries was 78.57% which is much higher than the reported prevalence of dental caries of 23.9% among children in the Kenya National oral health survey done in 2015.

The mean dmft, determined among children up to age group 12 to 14 years was found to be 0.6571 ±2.34 with the mean number of decayed teeth per child determined to be 0.64. The mean DMFT, determined in children between age group 6 to 8 up to those above 17 years was 5.0571 ±4.36 with the mean number of decayed teeth per child determined to be 4.44. This mean DMFT was much higher than a DMFT of 0.8 reported children in the Kenya National oral health survey of 2015.

It was noted that females had higher dmft mean of 0.85 ±2.635 and mean DMFT of 5.06 ±4.847 compared to their male counterparts with mean dmft of 0.49 ±2.063 and mean DMFT of 5.05 ±3.951.

There was an increase in dmft/DMFT and gradually worsening Oral hygiene status with an increase in age. A large proportion of those sampled in this study, 92.7%, had not had any previous dental visits. Further, among children with special health care needs, it was determined that those with combined disability like mentally handicap combined with microcephaly or mentally handicap combined with learning difficulty were the disability group with the most urgent need for intervention measures.

5.3 RECOMMENDATIONS

This study provides baseline data that will support design and implementation of oral health policies aimed at addressing the high disease burden among children with special needs.There should be formulation of health plans specifically focused on children with special needs, starting with those with combined disability that are most affected.

A conscious effort should be made to avail supplementary aids such as electric toothbrushes to improve their oral hygiene status while counteracting their reduced manual dexterity.Companies that produce and market electric toothbrushes should consider donation of the same as part of their corporate social responsibility.

Efforts to correct the current disparity in oral health between children with special needs and their normal peers should be aimed at reducing the DMFT in females, and reducing the mean Oral hygiene index in males.

The school could consider appropriating more time for cleaning of teeth other than only in the morning as is currently the case.

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