EFFECT OF SOCIOECONOMIC STATUS ON ORAL HYGIENE: A CASE STUDY OF SCHOOL CHILDREN IN PESHAWAR

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CERTIFICATE

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I **Muhammad Amin** hereby state that my MPhil thesis titled **Effect of socioeconomic status on oral hygiene: a case study of school children in Peshawar** is my own work and has not been submitted previously by me for taking any degree from this University Pakistan Institute of Development Economics or anywhere else in the country/world.

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Dedication

I dedicate this Research to my beloved parents, have been a great

source of inspiration and support; their love encouraged me at

every step-in life and particularly during my studies at PIDE. I

dedicate my little effort to my brothers and sister whose love, trust,

and prayers are unforgettable for me.

Muhammad Amin

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ABSTRACT

Oral and dental illnesses are among the most frequent in the globe. The purpose of this study is to see how a relevant awareness and education program (consisting of health belief model) affected the behaviors of 8th-grade studentsin Peshawar in terms of avoiding oral and dental disorders. This study was carried out with 8th-grade male and female students in Peshawar. A total of 300students from five schools were chosen from the list of students. The response and oral examination for children were recorded using the WHO oral health assessment form 2013. The already produced teaching information was then provided to each group in five sessions using various techniques. Data were analyzed using, chi-square for comparison and logistic regression forcontrolling confounders, using SPSS 20 software. Data indicated that the oral health of low-income schoolchildren was worse than high-income groups. The effect of oral health education programs on oral health measures were significantly improved after first and second intervention. Frequency of brushing, method of brushing, pattern of brushing, mouthwash, dental floss, brush after every meal, gargle, tongue cleaner, and periodontal status were significantly improved after oral health education program intervention. Significant factors affecting oral hygiene status were income level of parents, profession, father education, mother education, and gender. It is concluded thatoral health education program improves oral health of school children.

Keywords: Oral hygiene, status of school children, health education, health belief model, periodontal status, caries prevention.

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LIST OF ACRONYMS

HBM   Health Belief Model

OHA   Oral Health Assessment

OHI   Oral Hygiene Intervention

OHP   Oral Health Professional

NICE   National Institutes of Health and Clinical Excellence

WHO   World Health Organization

CHAPTER 1
INTRODUCTION

Better oral hygiene practices are preventive methods to avoid dental diseases. Preventive approach to dental diseases is economical in terms of cost than restorative approach. Thus, appropriate oral hygiene habits are more cost-effective in controlling dental problems and maintaining improved oral health, which is seen as an important component of an individual's overall health (Khalil et al., 2020). Mucosal health according to World Health Organization (WHO), is "*a state of being free from mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal (gum) disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking, and psychosocial wellbeing*". Thus, Oral health is an integral part of general health and essential for overall wellbeing. Aesthetically oral health is not only important for psychological and physiological wellbeing but viability for a successful social life. It shows that personality and social status is reflected by an oral and maxillofacial build-up, as face is the index of mind. Oral hygiene can be described as the state or practice of keeping the oral cavity in a healthy condition through an effective regimen of regular brushing, flossing, and rinsing twice or thrice a day followed by a periodic check-up by a dentist(Khalil et al., 2020).

Tooth brushing is the most reliable and most recommended means of oral hygiene method. It is considered a primary mechanical means of removing a substantial amount of plaque and preventing halitosis. Secondarily it is used as

a mean of delivering the chemotherapeutic agents of toothpaste. Most people in developed countries use a toothbrush in routine, but its adequacy in controlling plaque is still questioned as compliance with brushing methods is quite variable. Because the expense of restorative dental procedures might surpass available health care resources, the present focus of oral health specialists is on beneficial preventative program (Åstrøm, 2012).

Periodontal disease is a persistent illness caused by bacteria in plaque. As a result, efficient plaque management can minimize the occurrence of these disorders. Brushing, flossing, oral irrigation, and the use of fluoride toothpaste, and mouthwashes are all effective plaque management strategies that everyone can use. Aside from individual care, professional plaque management procedures include scaling, pit and fissure sealants, and laser tooth surface conditioning (Slots, 2017).

The idea of dental health comprises both hard and soft structures within the oral cavity, including soft tissues, gingiva, surrounding periodontium, and hard structures, in addition to the existence of healthy dentition and functional teeth. Edentulism, tooth decay, fractured teeth, and misaligned teeth not only diminish the quality of life by causing pain and discomfort, but also create social disgrace. These oral problems also make it difficult to perform fundamental actions such as mastication, swallowing, and socializing. Dental illness has a detrimental influence on the study and work schedules of school-aged children, resulting in thousands of wasted school hours each year throughout the world(Khalid et al., 2020).

Dental caries (cavities) and gingival disorders, which include gingival and periodontal disease, are the most frequent dental illnesses. Dental caries is a complicated illness with numerous causal elements that all occur at the same time to produce an ideal environment for the commencement and advancement of the caries process. Caries is a dynamic process that involves alternating phases of demineralization of enamel due to low PH caused by bacterial metabolism. Dental caries is a worldwide issue, and there is no country or geographical unit with a human population that is not affected by it. When a kid develops dentition and the first teeth erupt, the caries process begins(Kazeminia et al., 2020). The burden of dental caries disease in Pakistan is quite high, particularly among youngsters. Caries is also more prevalent in rural people than in metropolitan areas. Poor hygiene, oral hygiene, and a lack of knowledge aggravate the condition. Carbonated beverages, betel nuts, smokeless tobacco, and Gutka are the most commonly consumed cariogenic food goods in Pakistan (a chewing tobacco preparation).

The socioeconomic and demographic reasons of dental caries in Pakistan are frequently overlooked, and research focuses mostly on health aspects of the illness; nonetheless, this is an area that requires more research to identify socioeconomic characteristics related with dental health. Children learn proper oral hygiene practises from their parents or elder family members. Most oral infections can be avoided by raising public knowledge about oral hygiene and general brushing/flossing procedures through community initiatives. Oral health knowledge is essential for improving oral health indicators in all segments of the community(Khalid et al., 2020).

According to the National Oral Health Survey of Pakistan, most people in both the public and private sectors lack access to basic oral health care. The government does not provide free dental care, and treatments provided by private hospitals and clinics are frequently quite expensive, making them unaffordable for the majority of patients. Children from low-income families have inadequate oral hygiene knowledge, which leads to a variety of dental problems. The purpose of this study is to analyses whether socioeconomic disparities and inequalities influence major oral hygiene markers in children attending private and public schools in Peshawar. Private schools serve children from significantly wealthy households than public schools since tuition costs at private schools are more than at public schools.

According to the World Health Organization, the world's 1/5thpopulation lives in extreme poverty (less than one dollar per day). Poverty is a key factor of the growth of illnesses in society; when people are poor, they avoid going to physicians and eat unsanitary food. Because of the low poverty level, individuals are looking for necessities such as shelter, water, and food(Poverty & Initiative, 2018). That is why they are unconcerned about oral hygiene. According to the World Health Organization, oral health is defined as "*a state of being free from chronic mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal (gum) disease, tooth decay, tooth loss, and other disease and disorders that limit an individual's capacity in biting, chewing, smiling, speaking, and psychosocial problems.*" According to WHO's Global Burden of Disease Study 2016, half of the world's population is affected by tooth caries and periodontal disorders. As a result of these illnesses, people

suffer from oral diseases, and these ailments are measured for prevalence(Dye, 2017).

"*Youngsters are the riches of tomorrow; we need healthy and strong children to face the difficulties in Pakistan.*" The overall health of the world should be in harmony. In Pakistan, dental issues in children are an important aspect of oral hygiene, and regular dental care, particularly as children develop, is necessary(Wilson et al., 2010).They are an important aspect of nation demographics. School age is viewed as the base of childhood during which a child's social health is groomed, resulting in the youngster emerging as a productive member of the community.

Oral health has a significant impact on a person's overall health. Oral health concerns begin at birth and continue throughout a person's life. Dental problems in children and teens are more common in Pakistan than other diseases due to a lack of good dental care. Oral health is critical to all children's and adults' overall health and well-being. Most dental disorders are preventable, but oral care resources are scarce in many regions of the world, and there has been little effort to educate people about the need of practicing good oral health practises for lifetime health(Petersen, 2008).

The relationship between overall health, dental health, and socioeconomic level has previously been well documented. Although oral illness is preventable by following a basic regimen of oral hygiene care such as frequent brushing, flossing, dental appointments, and correct dietary habits, the healthcare delivered in Pakistan was largely treatment focused rather than preventative.

1.1.   Significance/rationale of study

Oral health is an indispensable part of human body. Healthy dentitions are essential for phonetics, aesthetics and speech. Students at school are prone to dental caries to less attention at this age to oral hygiene. Other factor for oral hygiene status among children is education of parent. Family with low level of education have less attention to oral health of their children. Socioeconomic status is one important factor for maintenance of oral health. Members of poor socioeconomic level cannot visit dentists regularly and pay for dental treatment. Unluckily in Pakistan we do not have privileges for the poor family about dental treatment. Free treatment or treatment on minimal charges is provided at tertiary care hospitals. But due to overload of patients most of population have less access to these care centres.

This study is based on primary data from district Peshawar. This district is selected due to the following reasons. Peshawar is the capital of Khyber Pakhtunkhwa and its residents are more qualified and financially better than other districts. If oral hygiene status is poor in this district, then the situation in rest of districts of KPK can potentially be comprehended as relatively worse; this makes it a better choice. The second reason was that this study required frequent follow up, cooperation of the participants and ethical approval from parents & school management; which was easier in local district due to cost consideration and social capital being a local resident. Moreover, there was a previous study conducted on Peshawar school children, showing that caries rate was higher lower socioeconomic level than higher socioeconomic level (Sami et al., 2019). Therefore, it provided a baseline for our study. Moreover, the

previous study on Peshawar school children showed that caries rate was higher in lower socioeconomic level than higher socioeconomic level. But that study did not give any intervention to improve their oral health status so it was only restricted to a survey type study.(Sami et al., 2019). Therefore, it is believed that the current study would add to the literature on the topic with new evidence.

To our knowledge to there is no study on effect of socioeconomic status on oral health status of school children. This study will provide local data about how socioeconomic status oral health of school children. These data will be shared with policy makers to implement preventive measures to control dental caries among school children.

1.2. Objectives of the study

- To determine oral hygiene practices amongst school children.

- To determine the effect of different socio-economic status of parents on oral hygiene amongst schoolchildren in Peshawar.

- To determine the effect of oral health education programme on oral health status of school children

CHAPTER 2
LITERATURE REVIEW

This section is focusing on reviewing the literature relevant to topic and identifying the gap for further research. The first section is discussing about applied anatomy of dentition and indices used to record to oral health status to refresh basic knowledge.

The second section discusses dental health awareness, dental health services, school health education, history and status of school health programme in Pakistan and dental care. The final section of the literature review describes the impact of socioeconomic status of father on oral health status among school children.

2.1.   Applied Oral anatomy

The oral cavity of human is the first part of alimentary tract receiving food and producing saliva. The oral cavity is lined by oral mucosa having the outermost layer of epithelium(Madani & Kuperstein, 2014). Additional to digestive function the mouth has phonetics, esthetics and communication. Though the primary voice production happen in throat, the tongue, lips and dental arches articulate the sound to create the speech in proper format(Lemmons & Beebe, 2019). The oral cavity is moist having lining of mucous membrane and have dentition in alveolar ridges. The transition landmark between oral cavity and skin is the lips(Rajkumar & Ramya, 2017).

The oral cavity has two parts: the oral cavity proper and vestibule. The area between teeth, lips and cheeks is called vestibule. The borders of oral cavity are alveolar process containing dentition (in front and sides), faces at posterior end hard and soft palate superiorly, mylohyoid muscle and tongue inferiorly (Pocock et al., 2013). Oral cavity is also having major and minor salivary glands. Three major salivary glands are parotid, sublingual and submandibular. The opening of parotid open in buccal mucosa superior to maxillary first molar and sublingual and submandibular gland open in sublingual area (Nanci, 2017).

2.2. Human dentition

There are two sorts of dentitions in human being one is primary dentition containing 20 total teeth and other is permanent or secondary containing 32 teeth. The primary dentition starts at age of 6 months and complete at age of 2 years. There are four incisors and two canine and four molars in each arch in primary dentition(Casanova-Rosado et al., 2011).

The permanent dentition started at age of 6 years and complete at 12 years age. In permanent dentition there are four incisors, two canine, four premolars and six molars in each dental arch. The eruption time of central and lateral incisors are 8 and 9 years in upper arch and 6 and 7 in lower arch. First molars erupt at age 6 years and second molar at age 12. Cuspids and bicuspids erupt around at age 10-11 years (Diwan et al., 2015).From 6 to 12 years of age the dentition is called mixed dentition having some primary and some secondary teeth.

Upper molars have three roots; two buccal and one palatal, upper first premolar have two roots; one buccal and one palatal, and incisors, canine and second

premolars have single roots in both upper and lower arch. Lower molars have two roots; one mesial and one distal and lower first premolar have one root(Manjunatha, 2012).

2.3. Dental anatomy

Tooth is bone like structure present in oral cavity in U shaped structures called dental arches. The upper arch is called maxilla and lower arch is mandible. Tooth having a crown which visible part in oral cavity and root which is embedded portion in alveolar bone. Each tooth has four basic components called enamel, dentin, pulp and periodontium (Phulari, 2013).

The enamel is the part of teeth covering the outermost portion is hardest substance in whole body. The function of enamel is to create a wear resistance layer for dental crown. Due to high mineral content and insulating properties of enamel this structure protect the pulp form physical, thermal and chemical forces that injurious for vitality (Lacruz et al., 2017).

Dentin is the vital and mineralized tissue lying beneath the enamel in coronal portion and cementum in radicular portion. Dentin surrounds the pulp in both coronal and radicular portions. The composition of dentin is hydroxyapatite(45%), organic matrix(33%), and water(22%)(Nanci, 2017). The color of dentin is yellowish giving translucency to enamel. Due to less mineral content the dentin has less brittleness and provide support to overlying enamel. The dentin has two distinct properties contrary to enamel one is ; regeneration throughout life and sensing of thermal and physical insult due to its containing dentinal tubules (Bernal et al., 2021).

The pulp is soft tissue part of the tooth present in the center of tooth having nerves and vascular supply. The components of pulp are pulp horns, pulp chamber and radicular pulp.(Krasner & Rankow, 2004) The pulp undergo constriction with age due to deposition of secondary dentine in response to physical, chemical and thermal stimuli. Radicular pulp is extending from cervix to apical foramen and variable in size, shape and number(Goldberg, 2014). Through apical foramin the pulp is connected with periodontium. The average volume of pulp is 0.38 centimeter cube(Sustercic & Sersa, 2012).

The periodontium is sort of specialized tissues surrounding the tooth to maintain it in maxillary and mandibular bone. The four main component of periodontium are gingiva, cementum, periodontal ligament, and alveolar bone(Carranza et al.; Kumar, 2015.p.172).

2.4. Assessment Oral health status in children

There are various indices used to record oral health status in children. Commonly pathologies in oral cavity of children are dental caries and periodontal diseases. The dental caries is the most common issue. The high rate of dental caries in children can be attributed to the use of sweets, lack of awareness among parent to brush the teeth of their children and lack of community based programs to prevent or intercept dental caries(Hooley et al., 2012).

The indices used to record oral status in children is detailed below.

2.5.   Caries Prevalence DMFT/DMFS

The amount and prevalence of dental caries in an individual can be assessed by using two most common indices called DMFT and DMFS. Both these indices assess the prevalence of dental caries numerically. The total numerical score is obtained by adding the individual score for

- Decayed (D) teeth
- Missing (M) teeth
- Filled (F) teeth
- teeth (T) or surfaces (S) of teeth

These indices show the burden of dental caries until the examination date. The third molars are not counted in these indices. In simple words these indices show how many teeth have carious lesion, how many teeth have extracted due to carious lesions, how many teeth undergo fillings and crown due to caries.

DMFS is more detailed index also showing the surface involved in carious lesion. The posterior teeth have 5 surfaces while anterior have 4 surfaces. In case if a surface has both carious and filling it will be labeled as D. The highest score for DMFS comes to 128 for 28 teeth(Hummel et al., 2019), (Becker et al., 2007). The primary dentition which has 20 numbers of teeth can be assessed for caries using "deft" or "defs".

Following abbreviations are used for collecting caries data from adults;

DMFT: Mean number teeth having decay, missing or filling

%DMFT: Percentage of individual in a population having caries

%D: Percent of untreated teeth having decay DT:

 Average number of teeth affected by decay

%Ed: Percentage of edentulous cases

2.6.   Significant Caries Index (SiC)

In most countries the prevalence of caries is skewed i.e. the prevalence of caries in 12 years on DMFT index even some proportion is caries free. So, the DMFT index overestimate the caries prevalence and wrong conclusion cam be drawn. SiC was introduced to assess the caries in individuals with highest caries index in population under study (Campus et al., 2003).

The Significant Caries Index calculation
The SiC is calculated as below

- Individuals are arranged as per to their DMFT values

- About 33% of the population having maximum DMFT scores is selected

- Average DMFT for this new created group is computed and called SiC Index.(Leempoel et al., 1995)

The attention is focused on school age children with large DMFT and SiC index score and preventive measures should be implanted to prevent the caries. Both DMFT and SiC index should be assessed on country level then province, city and finally district level. The score of SiC above 3 show high caries rate (Scurria et al., 1998).

2.7.   Community Periodontal Index (CPI)

For assessment of periodontal status three indicators are used which are

- gingival bleeding

- presence and amount of calculus

- depth of periodontal pockets

For recording CPI, a special type of probe with ball like tip of 0.5mm and black band at 3.5, 5.5 mm and circular mark at 8.5 and 11.5 mm. The oral cavity is divided into parts called sextants. The tooth numbers in various sextants are: 18- 14, 13- 23, 24- 28, 38- 34, 33- 43, and 44-48. The examination for a sextant should be done if 2 or more teeth are there and no indication for extraction exists.

For 20 years old person the following teeth need to examine:

17/16 11 26/27

47/46 31 36/37

The average score for each sextant and whole person is recorded. The highest score should be recoded.

For individual below age 20 years, only 6 teeth are examined which are; -16,11, 26, 36, 31 and 46. The reason for this modification is to avoid the scoring of sulcus depth due to eruption of teeth. For similar reasons individuals below 15 should not be examined for sulcus depth and only calculus and bleeding be recorded.

Recording of gingival pockets and calculus

The teeth that included in this index should be probed to determine the depth of pocket, detection of calculus in subgingival area and bleeding on probing. The

force applied during probing should not exceed than 20 grams. This level of force can be gauge by placing probe tip under thumb nail and pressing until blanching noticed. To detect calculus in subgingival sulcus the light possible force should be used to permit the probe movement along the tooth surface**.**

The ball tip of probe should be moved to follow the anatomy of configuration tooth root surface. If patient hurt on probing, then force is much higher than recommended. The gentle insertion of periodontal probe allows to record the real sulcus depth without loss of attachment. Both buccal and lingual surfaces should be explore(Benigeri et al., 2000).

Examination and recording

If there is not tooth included in index is present in a sextant, then tooth with highest score will recorded.

The codes are as follows:

- 0 - Healthy periodontitium

- 1- Bleeding seen wither directly or through mouth mirror after gentle probing

- 2- Calculus sensed during probe insertion into sulcu, but all the black band of the probe visible

- 3- Pocket depth of 4 to 5 mm present

- 4- Pocket 6 mm or more present

- X- Excluded sextant (because < 2 teeth present)

- 9 -Not recorded at all(Nomura et al., 2016)

2.8.   Oral Hygiene Index (OHI)

The OHI has two components one is Debris Index and other is Calculus index. Each of these indices are based on 12 score showing the amount of plaque or calculus present on the lingual and buccal surfaces of each quadrant of each dental arch, namely

- The segment posterior to the canine on right side

- The segment posterior to the canine on left side

- The segment mesial to the right and left first canines
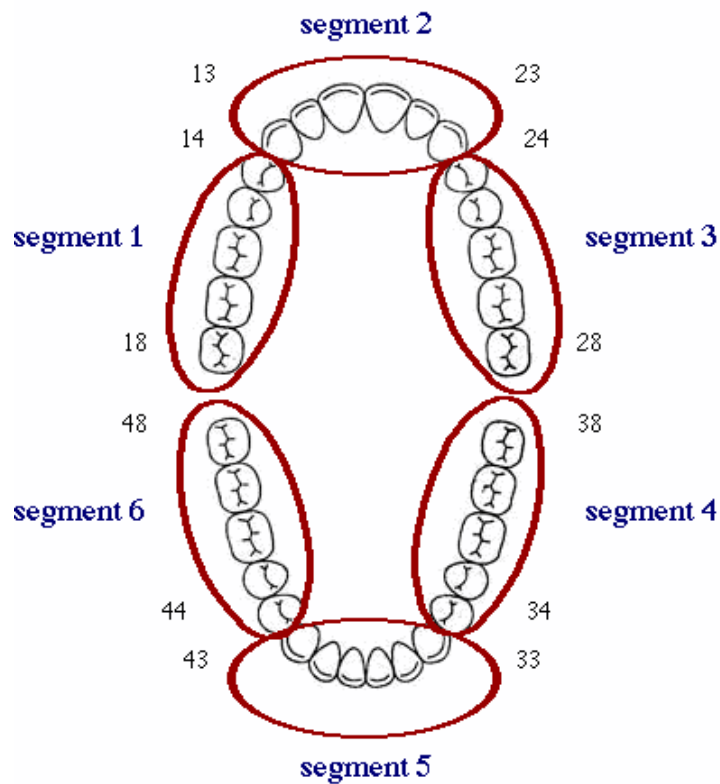
Figure 2.1: Segments of dental arches

Examination of each segment is examined for detection of calculus or debris is performed. One tooth is selected for calculating individual index. The

16

included tooth should be highest area covered with plaque or calculus. The recoding of debris score is same as calculus and addition of Subgingivaldeposits detection are made.

Criteria for classification debris

0- No staid debris can be seen

1 Soft debris covering <1/3 tooth surface, or extrinsic stains without plaque

2 Soft debris covering >1/3, but >2/3 of tooth surface.

3 Soft debris covering >2/3 of tooth surface.(Pudentiana et al., 2021)

Figure 2.2: Grades of plaque
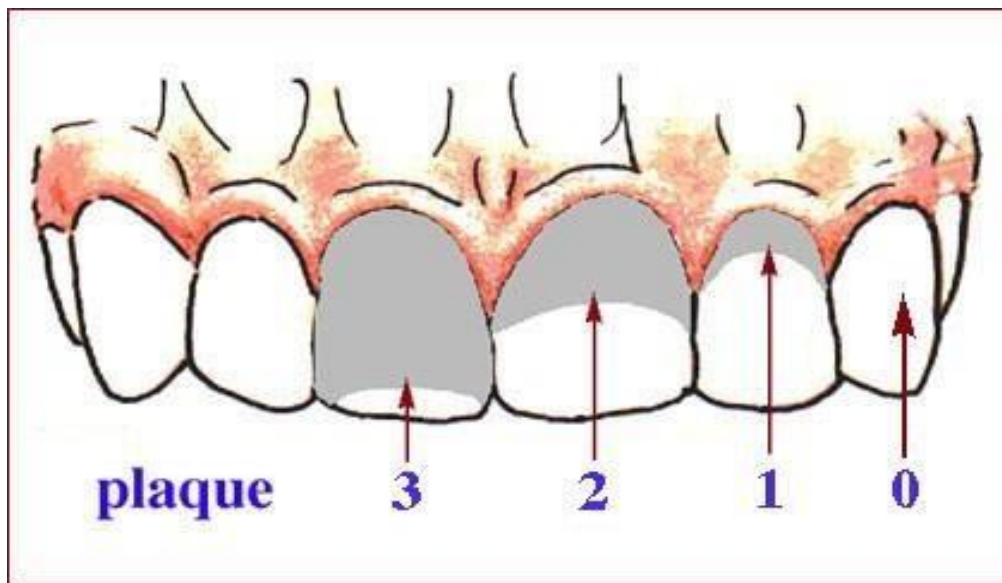
Criteria for classifying calculus

0 No calculus seen

1 Supra-gingival calculus covering <1/3rd tooth surface.

2 Supra-gingival calculus covering >1/3rd but >2/3rd tooth surface or subgingival calculus or both.

3 Supra-gingival calculus covering > 2/3rd tooth surface or band of calculus in Subgingival area or both(Mashima et al., 2017).

2.9. Dental health

2.9.1. Dental health awareness

Dentists and dental hygienists should instil confidence in their patients to clean and floss their teeth after breakfast in the morning and before going to bed at night. Bulgar investigated the relationship between oral health belief and dental caries experience in children, as well as the accurate and efficient of a latest model of the oral hygiene belief scale(Buglar et al., 2010). Seven of the sixteen items tested had a substantially higher mean score among caries-free children. Similarly, among caries-free children, four out of five components had significantly better scores. This showed that the oral health belief questionnaire distinguished caries-free youngsters from experienced children. The study also discovered that individuals had enough information about their caries status and oral health views (Tadikonda et al., 2017).

According to the study's findings, patients' bleeding tendency was reduced by primary level of influence by change in behaviour through oral cleanliness, and supra gingival and plaque retention were eliminated(Newton & Asimakopoulou, 2015). The health belief model is a tiered paradigm in which each step in the decision-making process is dependent on the preceding choice or belief. This procedure requires someone to think that he or she is vulnerable

to a condition, that the condition is serious, that there is an effective solution for this condition, and that they can overcome all hurdles to implementing the intervention. Each step is predicated on the prior premise(Hollister & Anema, 2004).

The basic components of the health belief model are derived from a well-established body of psychological and behaviour theory, which various hypothesis that behaviour depends primarily on two variables; (1) an individual is placed on a particular goal (2) to achieve the goal likelihood of action an individual." When we conceptualized these variables in the context of health-related behaviour, responses are (1) the desire to avoid illness (or if ill, to get well); and (2) the desire to achieve the goal likelihood of action an individual(Cunha-Cruz et al., 2007). The findings of linear regression analysis revealed that perceived obstacles, self-efficacy, and signals to action accounted for the greatest percentage of total variance seen in oral health behaviours. The overall number of HBM health behaviour components and demographic factors explained 29% of the research. The current study's findings show that promoting oral and dental hygiene through self-efficacy may be accomplished by lowering perceived obstacles and improving oral and dental cleanliness(Rahmati-Najarkolaei et al., 2016).

A research in 2008on Saudi school health intervention regarding food variety sent the message to policymakers to focus on school dietary habits of school children to prevent unhealthy snacks and fizzy beverages in school children's lunch and during break(Farsi et al., 2008). Many variables impact children's dental hygiene habits. Research was undertaken with 1,120 youngsters who did

not know the pattern of oral hygiene and performed inconsistently. The frequency of dental plaque among youngsters who do not practise regular oral hygiene was 37.0 percent(Carvalho et al., 2017). National and worldwide research have revealed that children's behaviours are changing dramatically, and they are gaining new knowledge through health education in the classroom. Research that was undertaken to enhance oral health through lectures and other activities. The children attended preschool and primary school. The children who wash their teeth insufficiently declined from 20.7 percent to 4.1 percent, while those who brush their teeth frequently decreased from 62.1 percent to 49.7 percent, but the good hygiene index improved from 8.9 percent to 32 percent(Carvalho et al., 2017).

School is the finest location in the world to promote health and avoid sickness. Brushing teeth with fluoride toothpaste on a regular basis is critical for children's dental health and a healthy lifestyle. It may be simpler to improve oral health and avoid oral illness when both parents and schools are active in oral health promotion. Research done in Southern Thailand found that fluoride toothpaste supplied by the school's teacher improved the school's oral health programme. The study found that there is a significant influence on the incidence of dental caries in Thai schoolchildren. The incidence rate of dental caries falls by up to 34% for all schools that participated in the study and by up to 41% for more cooperative students. It is reported that there was no gender difference in knowledge, attitudes, and practise before and after the oral health education. At the end of the trial, awareness regarding the cause of dental caries increased significantly from 9.5 percent to 51 percent, and knowledge about

floss increased significantly from 12 percent to 58.6 percent. After a year, awareness of various oral diseases went from 34.5 percent to 54.5 percent, while knowledge of gum bleeding increased from 47 percent to 62 percent (Kaewkamnerdpong & Krisdapong, 2018).

The importance of individual responsibility for completing self-oral health care ranged from 53 percent to 87 percent. In industrialised nations, oral health educationoffered by a schoolteacher or oral health professional has typically improved students' oral health knowledge, attitudes, and oral hygiene status. The research has focused on the impacts and process of teaching oral health education training and the session of oral health education in a school that affect the impactof the programme and the results of the students(Sanadhya et al., 2014).

The investigations, on the other hand, did not indicate significant differences in plaque level across groups, which is supported by the number of applicants in the research group. Another study found that while oral health education is an essential goal for preventing oral illness and promoting oral health, there is no benefit of health education on gingivitis reduction, which is also caused by poor hygiene(Stein et al., 2018).

A study was conducted in which 534 and 538 children were observed before and after the intervention, but no better differences in the demographic characteristics of the study population were found between pre- and post-intervention, the prevalence of dental caries was found to be 48.3 percent during pre-intervention, but there was no significant effect after the intervention. In the oral cavity after intervention, the significant drop in debris was from 78.3 percent to 54.1 percent, and the reduction in stage-1 plaque was from 75.5

percent to 66.5 percent. Following the treatments, there was no substantial change in gingival health(Raj et al., 2016).

A study found that oral health education is far more successful in improving low oral health hygiene levels in school settings when different strategies such as lecture, practise, intervention, model, or brochure are employed. The same outcome was obtained in each group's test score, and the study revealed that both oral health hygiene and children's awareness of oral health were increasing at the same time. As a result, education may readily excite schoolchildren, and teaching brushing skills is a complicated and time-saving operation(Demiriz et al., 2018).

Research was done in which just 4.1 percent of the youngsters used to brush their teeth every day prior to the intervention, but this number increased dramatically to 9.9 percent after the intervention. Before the intervention,around 14% of the children had never brushed their teeth in their lives, which reduced to 7% following the intervention. The percentage of people who rinse their mouth after eating a meal has climbed from 39.5 percent to 52.2 percent(Raj et al., 2016). Proper tooth brushing has been demonstrated in studies to enhance oral hygiene and significantly reduce dental cavities in preschool and school children(Macpherson et al., 2013).

Another research was undertaken in which tooth brushing was largely focused on the effectiveness of oral hygiene by manual or electric toothbrushes, or with changes in oral hygiene(Rosema et al., 2008). Other research found that tooth brushing has a function as an independent variable in oral illness, and some investigated the right manner to clean teeth and how to change tooth brushing

habit(A. J. Casanova-Rosado et al., 2014). According to this study of Casanova-Rosado., et al., preventative oral care is administered by a healthcare professional and dental hygienist, but individual oral hygiene is also very important if maintained at home. An individual's regular oral hygiene is required to eradicate the bacterial biofilm through thorough teeth brushing.

Oral health is an extremely vital aspect of maintaining consistent overall health and quality of life. Many people across the world have mouth pain or discomfort. People have a basic human right to vital oral health care, which ensures their health and quality of life. Dental caries and periodontal disorders are the most common oral ailments. Dental caries is a widespread dental illness that affects a wide range of people; however, its focus is on schoolchildren, making it the most frequent chronic disease among children globally (F. Khan et al., 2013).

Gingivitis and dental caries are the most prevalent oral illnesses in children, with the latter affecting 60-90 percent of children worldwide (Petersen, 2008). Dental caries is a chronic and cumulative disease that grows more sophisticated with time. If left untreated, it can have a negative impact on children's quality of life, such as their ability to eat and chew, the food they pick, how they appear, and how they communicate. Pain in their teeth or mouth might impair their focus and engagement in school, limiting not just their play and growth but also depriving them the full benefit of education. Dental caries is still a big problem in many low-income nations; also, access to oral health treatments is limited in many developing countries, and teeth are frequently left untreated or pulled due

to discomfort. Unfortunately, oral health care is still more concerned with therapy than with prevention (Petersen, 2008).

Because the mouth cavity is associated with the formation of a healthy personality, perceptions, and overall enjoyment experiences, oral health is a crucial component of health throughout life. However, millions of people suffer from dental caries and periodontal disease, resulting in needless discomfort, chewing, swallowing, and speaking issues, and often prohibitively high medical expenditures. Untreated dental disorders in children usually result in major general health concerns, substantial discomfort, feeding difficulties, and school absence. The emergence of a chalky white spot on the tooth surface, indicating an area of demineralization of the enamel surface, is the first indicator of a new carious lesion. Numerous epidemiological studies on children's dental health have been undertaken across the world. According to the authors, the percentage of children who complete primary school may be a good predictor of DMFT indices in developing nations (Basharat & Shaikh, 2016).

The World Health Organization (WHO) has chosen children aged 12 to 15 to be the target age group for worldwide comparisons in children's oral health. Because all permanent teeth have erupted except the third molars, the 12 to 15-year-old age group is an ideal cluster for determining the dental caries status in permanent teeth. The purpose of this study was to determine the prevalence of caries among schoolchildren.

The absence of sickness does not define general health. Physical, mental, and social well-being are all aspects of health. Because the majority of oral disorders are lifestyle-related, a behavioural modification is required to minimize disease.

It is worth mentioning that the causal and risk factors for major diseases are frequently the same as those for oral disease. This indicates that avoiding oral illnesses will result in a reduction in diseases other than those found in the mouth. It is critical to understand the target population's knowledge, attitude, and practice surrounding oral health in order to develop a relevant and suitable health education programme(Lian et al., 2010).

Oral illnesses can have a substantial influence on a person's social life. Knowledge of these diseases and effective techniques to combat them can prevent dangerous oral health practises and lessen the negative effects ofchronic oral disease with a thorough health education programme. Greater knowledge has been linked to improved cleanliness (lower plaque score) and amore positive attitude toward oral health(Smyth et al., 2007).

Poor oral health has a negative influence on the overall health of the population. This exacerbates public health practitioners' worries about minimizing health issues in order to improve health. Dental caries is common in poor nations, affecting around 60% of school-aged children and adults. Although dental caries levels have decreased, early childhood caries continues in many locations, notably in socially deprived sectors of society, such include those in poverty or with low socioeconomic position, inadequate education, or a lack of social support(Mani et al., 2013).

The goal of this study is to determine socioeconomic status of father and oral hygiene condition and their effect on school children through health education and promotion with the result of fluoride therapy, nutrition recommendations, and preventive health care through Health education and promotion is an

important factor for all of these factors. Public health focuses on illness prevention, protection through vaccine coverage, and healthy behavior adoption through health education and promotion for the benefit of health, health belief model which was planned in 1950 and improved through the years. Model of health belief the HBM, presented in the early 1950s by Godfrey Hoch Baum, Irwin Rosenstock, and Stephen Keels, and adopted by the United States Public Health Service in 1970, was used to persuade individuals to make better health decisions. Hoch Baum and colleagues expected that people would feel increased pressure to make better health choices (Malek Mahmoodi et al., 2020).

Oral health practises and psychological influences on oral hygiene habits such as brushing, flossing, and visiting the dentist are among the most studied factors in oral health research. Maintaining proper oral health is seen as a critical problem in dental health promotion. Daily brushing and flossing are recommended by major dental groups (ADA& British Dental Association). Brushing is strongly linked to a variety of oral health outcomes, according to research. Honkala and Freeman (1988) examined multiple research projects on oral health behaviours from various European nations. The scientists found that the frequency with which people clean their teeth impacts the occurrence of Gums related disease (Honkala et al. 1988). In other study brushing frequency was connected to gums health. Brushing teeth is also associated to dental caries experience (Chestnut et al. 1998) and self-reported oral health. In terms of dental flossing, there is evidence that using professional dental floss can help prevent tooth cavities. Furthermore, consistent use of dental floss or analogous

interdental hygiene techniques is thought to be an important component in the prevention of periodontal diseases(Jackson et al., 2006).

The utilization of oral hygiene services and visits to dental clinics in connection to oral hygiene is mostly discussed. Now fundamental problems about dental therapy usage and visits to dental hygienist: (a) however regular dental visits use improves oral health, and (b) what the appropriate "check-ups" is. The recall interval is the duration between visits to dental services or dentists, which is commonly defined in months or years. There has been some dispute over whether frequent dentist visits improve oral health. It has been proposed that regular dental visits are connected with better oral health, resulting in less untreated illness, more working teeth, reduced rates of tooth loss, and less acute symptoms (Murray 1996). Sheiham, on the other hand, contends that frequent visitors may not have a significant benefit over irregular attendees in terms of total illness experience, and that regular visits may not assist to avoid the start of oral disease (Sheiham et al. 1985). Furthermore, intriguing findings were discovered in the research of Chinese teenagers' self-reported oral health (Jiang et al. 2005) and UK adults (Baker 2009).

According to the findings, not seeing the dentist in the previous 12 months was associated with higher self-reported dental health. The rationale was that the recent visit was likely related to the existence of symptoms; hence, individuals who visited a dentist were more likely to report poor oral health. To date, scientific research on oral health status and visits to dentists/dental services is conflicting. Furthermore, there has been debate concerning the ideal duration of the recall interval for preventing oral illnesses (Kay 1999; Sheiham 2000; Lahti

et al. 2001). A recent Cochrane Review investigated the impact of various set recall intervals for dental check-ups. This evaluation found insufficient data to support or contradict the practise of urging people to visit the dentist at the normally suggested six-month intervals (Beirne et al. 2007).

In the United Kingdom national institutes for health and clinical excellence (NICE) published a recommendation on regular basis of dental clinics. This recommendation emphasised making a recall interval decision based on an oral hygiene check-ups and history about disease related and follow up for treatments (Tabiat-Pour et al. 2008). Psychological issues are also thought to have an impact on dental health. Psychological condition can have an impact on health and dental health in two ways. Unwanted psychological status and the resulting stress can have a detrimental impact on lifestyle and the performance of good behaviours, which has an indirect impact on health (Mayne 1999). Close 41 relationships between psychological factors and oral health related behaviours, such as toothbrushing, flossing, and dental visit frequency imply that an indirect effect of psychological factors on oral health behaviours is plausible(Alkilzy et al., 2018).

Psychological well-being can also have a direct impact on health via biological determinants and immunological response. For example, animal and human research have found that psychological variables influence periodontal cellular immune response and neuro-immunological pathways. Numerous research has been conducted to study the association between psychosocial variables and dental health outcomes. Periodontal health appears to be more important in oral health studies than other outcomes. Depression, anxiety, stress, loneliness, bad

life events, everyday strain, professional stress, life satisfaction, type-A personality, and coping methods have all been linked to poor periodontal health. Peruzzo et al. conducted a comprehensive assessment of the literature on the association between psychological variables such depression, anxiety, andstress and periodontal health. Despite this, there is evidence to link depressed symptoms to higher lactobacillus counts, suggesting that those who suffer from depression are more prone to develop dental caries (Anttila et al. 1999).

In a more recent research of dental caries, cynical hostility was connected to the number of decaying teeth in Finnish adults as a measure of lack of confidence in, or animosity toward, other people (Suominen-Taipale et al. 2009). Various indicators of self-reported oral health outcomes have been shown to be closely related to psychological factors such as self-esteem (Benyamini et al. 2004; Locker 2009), depression (Anttila et al. 2006; Locker 2009), anxiety (Anttila et al. 2006), life satisfaction (Benyamini et al. 2004; Sanders et al. 2005; Locker 2009), and stress (Sanders et al. 2005). In conclusion, both behavioural and psychological characteristics are associated to oral health status to varying degrees, although the strength of the association varies depending on the outcome measurements. Patients' health beliefs are a barrier to modifying health habits and increasing self-care. (Jaret, 2001). A person who holds these ideas is interested in diet, dental hygiene, and simply washing their hands. However, many low-income people have not prioritized health-promoting habits. Hom, Lee, and colleagues (2012)

The health belief model is one of the ideas investigated in this research investigation (HBM). The HBM is a psychological model that may be used to

explain and predict health behaviours. It was created in the 1950s by social scientists Hoch Baum, Rosenstock, and Kegels. The HBM uses value-expectancy and decision-making theories to explain health behaviour from a social psychology perspective (Becker, 1974; Kronenfeld&Glik, 1991; Maiman& Becker, 1974). The model focuses on characteristics that influence an individual's control over a certain action and predicts behaviour using these same dimensions (or variables). Perceived susceptibility, perceived severity, perceived advantages, perceived obstacles, signals to action, and demographics or psychological structures are the model's initial six components (Rosenstock 1974)

Parental attitudes toward oral health can have an influence on children's quality of life. Indeed, the experience and comprehension of dental illness and treatment of children before preschool age has a detrimental impact on their oral health quality. In this situation, the caregiver's lowest oral health quality may be strongly linked to the child's poor oral health and the existence of oral illness (Cenafils-Brutus 2016).

2.9.2. Perceived susceptibility

Susceptibility beliefs or perceptions Beliefs about how to know about the effect and harm that will occur if they do not floss, such as decay and periodontal disease, which leads to tooth loss and supporting structure disruption. Perception of the occurrence and impact of an illness. Xiang, Wong, and colleagues (2020). School is a difficult time in adolescents' lives, and it can influence how they see things in terms of their health. The notion is that school children do not believe flossing their teeth is vital because they believe they are

immune to future ailments. Perceived vulnerability is a potent motivator for people to adopt better behaviours to decrease future risks. This is related to the Health Belief Model in terms of how students perceive their susceptibility to diseases, the perceived benefits and seriousness of oral health practises, the barriers they face, their cues to action for flossing, and, finally, self-efficacy or doing something about their flossing to feel better about their oral hygiene and prevent future diseases (Lim, Kim et al. 2015).

Regarding perceived susceptibility to oral health problems, it is possible that participants did not consider themselves vulnerable to diseases such as periodontal disease or oral cancer because they believe they are young and that these diseases cannot damage them now or in the near future (Lim, Kim et al. 2015).

2.9.3. Perceived Severity

Beliefs about the seriousness of a situation, such as how bad it is when patients do not floss, what will happen to their teeth, and how not flossing affects restorations and how not flossing affects periodontal disease, which leads to dental caries and other conditions, and tooth extraction will eventually be an option. Perception of illness severity and the seriousness of a problem, up to tooth loss (Walker and Jackson 2015).

2.9.4. Perceived benefits:

Beliefs about the advantages include what makes flossing so great: your gums will feel better, your breath will smell better, you will be healthier and live longer, you will have less tooth decay, healthy gums, and good dental hygiene.

Benefits come when we successfully interfere in perceptions (Ghaffari, Rakhshanderou et al. 2018)

2.9.5. Perceived barriers:

Perceived barriers what the children perception about if we prevent them from flossing and ask response from children so they reply to different responses like we don't have time to floss, if we floss then our gums bleed, if we floss then our tooth makes interdentally spaces and gums become swell and bleeds. (Phanthavong, Nonaka et al. 2019).

2.9.6. Cues to action:

Cues to action send reminder messages to children in the form of prime-time news and poster messages on the room's wall and through social media, and they also engage youngsters at night with their favourite programme before bed (Xiang, Wong et al. 2020).

2.9.7. Self-efficacy:

Reinforce this feeling of confidence by asking the children during their check-ups if they floss on a regular basis and telling them when they are doing well. Check the children's gingival health on a regular basis and teach them what to look for. Give the kids numerous floss sample packs and invite them to come back for more when they run out (Walker and Jackson 2015).

2.9.8. Records:

It is always a good idea to record interventions in the children's records, such as discussing reasons for flossing to increase susceptibility, giving the children floss because they stated that a barrier would be that they could not afford floss,

and noticing that the children's gingiva was less puffy and had less plaque than the previous time (Bahramian, Mohebbi et al. 2017).

2.10. Dental health services

Since oral and dental health is essential components of general health, so this is included in the discussion of non-communicable illnesses, such dental problems, kidney-related illnesses, diabetes hypertension, and cardiac diseases.

In public health Importance of oral health care and oral hygiene is very important for the prevalence of caries and other oral health related diseases to promote at community level. School health services program in which booklets are provided for oral hygiene instructions and methods for brushing twice a day after breakfast, before sleep, flossing and rinsing after meal, and brushing techniques can reduce the oral burden of disease and improves quality of oral health care.

2.10.1. Health Education to school children

Many illnesses and diseases are more likely to affect young children. It is the duty of school administration to educate kids and promote cleanliness and sanitary behaviour in them. They must inform their pupils of the numerous health hazards and teach them how to prevent illness and other types of poor health by forming healthy and hygienic routines and behaviours.

The school Health programmes include training teachers on the following topics and educating pupils on health and hygiene concerns by including health and hygiene information messages into the curriculum: Instruction in sanitation, hygiene, and cleanliness information on how to prevent certain prevalent, non-

communicable illnesses, preventing the spread of infectious illnesses such as the H1N1 virus, hepatitis, HIV, and AIDS.

2.11. Effect of socioeconomic status on oral health

A study was conducted to see if socioeconomic disparities and inequalities influenced crucial oral hygiene markers on 300 students in Karachi, Pakistan. Students from public and private schools were chosen for the study. The youngsters varied in age from 2 to 18 years. The mean DMFT scores of pupils in private and public schools were not statistically different (private (1.82) vs. public (1.48) (p = 0.257). The mean number of carious teeth in private school children was 1.69, compared to 1.34 in government school children, whereas the mean values of other key indicators of oral hygiene, such as plaque deposition (p = 0.001), dental stains (p 0.001), and bleeding gums/gingivitis (p 0.001), were statistically significant between public and private school children (Khalid et al., 2020).

Another study in China on disparities in dental services among urban and rural individuals reported that resident of rural (n=595) have less visits to dentists than urban (n=637). Higher positive attitude and awareness was found among urban than rural residents (Qu et al., 2021).

A study was carried out on Syria on oral health status in Syria using DMFT index among 811 school children. Their results showed that a strong association between socioeconomic status and the oral health was found (P = 0.03), Pearson's correlation test shows inverse association between the two variable (r = − 0.074, P<0.001)(Alhaffar et al., 2019).

An Iranian study examined 31,146 school children, aged 6 and 12 year in 31 provinces shows that dental caries experience was higher among children with low SES statistically (P<0.05) (Ghasemianpour et al., 2019).

2.12. Policy Review

According to our objective of the study our aims is to provide a review of relevant policies for improvement of oral hygiene practices at school level, which is provided below.

2.12.1. Vision of KPK Health Policy

To improve the health, productivity, and prosperity of our society, all Khyber Pakhtunkhwa residents should have access to affordable, high-quality healthcare.

2.12.2. Mission of the Policy

In order to guarantee everyone has access to high-quality healthcare, a sustainable, coordinated, integrated, and comprehensive health system based on the Primary Health Care concept must be developed and implemented at all level.

2.12.3. Principles of the Policy

Based on the universal principles, the Health Department promises to guarantee that everyone in Khyber Pakhtunkhwa will have access to healthcare. To be accomplished as part of the larger government effort to implement "Health in All Policies" and the Sustainable Development Goals (SDGs).

2.12.4. Outcomes

The Khyber Pakhtunkhwa Department of Health realises its vision and accomplish its mission by working to achieve a number of outcomes in collaboration with partners and stakeholders.

The policy outcomes were chosen because the outputs-based budget for the three years 2018–2021 reflects them. Improved access to and coverage of vital health care, especially for the underprivileged and disadvantaged. Measurable reduction in the prevalence of illness, particularly in vulnerable populations. Improved human resource management better accountability, regulation, and governing. More effective health finance for KP residents' financial risk protection and efficient service delivery. Forty million residents in KP alone, received free healthcare through the Sehat Insaaf Card thanks to the use of Rs. 22 billion.

Table 1: KPK Health Budget

	Budget 2022 2023 settled	Budget 22 23 NMAs	Total budget 22 23	
Health	183,082	22,643	205,725	
Departmental and sectoral allocations – Settled Districts (1/2)				
	Current	**Developmental**	**FPA**	**Total**
Health	160,938	17,944	4200	183,082
NMA: Newly Merged Areas				

2.12.5. Status of School Health programme in Pakistan

In the past, Pakistan has offered the various elements of its school health program in an inconsistent manner. Early in the 1970s, school health services were still provided as a part of health services. A school health program with a

focus on health screening and other concerns was introduced in the 1980s, and local doctors were specifically chosen for this role. The majority of the time, doctors avoided going to remote areas, making it hard to create a trustworthy system for monitoring their attendance. As a result, this initiative was discontinued since it failed to yield the desired results. The School Health Program in Punjab was started by the Punjab Health Sector Reforms Program. National Commission for Human Development and PHSRP (Ahmad & Danish, 2013).

2.12.6. Dental care at school

A number of diseases are linked with bad dental care.

Teacher demonstrates brushing methods in classroom and rinsing after meal, when to brush their teeth, how to brush their teeth before sleep or before bed in night, as it is ideal time for brush. Reasons behind is that all the oral germs and micro-organism were clean by brushing in night and feel very fresh in night, humans produce chyme enzyme in our saliva which digest food in our stomach and prevent from halitosis i.e., bad breath of mouth.

2.13 Previous literature on the title and their critical appraisal

Previous study on Peshawar school children showed that caries rate was higher lower socioeconomic level than higher socioeconomic level. But that study did not give any intervention to improve their oral health status so it was only a survey type study(Sami et al., 2019). Another study in Syria during Syrian crisis on 811 school children reported that there is statistically significant association between DMFT score and socioeconomic status (p=0.03)(Alhaffar et al., 2019).

A large sample size study including 40360 preschool children of 3 to 5 years age in China determine the association of SES and dental caries prevalence and reported that statistically significant association exist between dental caries and SES with dental caries more common lower SES children(Zhang et al., 2021). A European study on 1248 Lithuanian children of 7-12 years age found a statistically significant association of dental caries and SES(Saldūnaitė et al., 2014).

Hence to sum up, there is literature available on the topic however, majority of the previous literature was just survey type research. They only determine the association between dental caries and socio-economic level. The current study on the other hand will first determined the association and then used two times intervention for oral hygiene promotion. This is therefore expected to be an addition to the existing literature on the topic.

CHAPTER 3

METHODOLOGY

This case study is based on primary data that was collected from schoolchildren of various socioeconomic backgrounds to assess oral health status and awareness about oral health. Oral health status and oral health awareness was compared among socioeconomic status of father (SES). The participants were exposed to interventions (Oral health education program).

This chapter describes the methodology in detail like study design, setting, sampling technique, sampling criteria and data collection procedure.

3.1. Study design

This study is conducted in a case study mode where behaviors were compared. Initially the oral health of students was compared on the basis of socio-economic status. Secondly the oral health education intervention comprised of sessions concerning awareness and oral health status before and after the 1st and 2nd intervention. Case study is used where no control group is used. Hence, for this study, instead of randomized clinical trial we used case study design. The reason for adopting the suggested technique is that it is unethical to leave some school children without oral health education intervention. The second reason was our main objective was to assess the effect of SES on oral hygiene status. To our knowledge there is complete lack of literature on effect of oral health education intervention on oral hygiene in various SES levels.

3.2. Sampling technique:

The sampling technique used in this study was based on non-probability sampling because the sample frame was difficult to assess. This study used convenient sampling technique because at the time of data collection COVID-19 also made it difficult to use consistent sampling technique. Total of 5 schools were selected through convenient sampling among all school of Peshawar. In all, 05 public and private schools (02 public boys' and girls' schools and 03 public boys' and girls' schools) were asked to participate. All schools agreed to participate.

3.3. Sample size

A total 300 school children were selected by using WHO calculator at 5% margin of errors and 95% confident level using awareness about oral hygiene from previous study (Abdulbaqi et al., 2020).

3.4. Study Settings:

Five schools from Peshawar city were selected.

3.5. Subjects under the study

All male and female school pupils aged 11 to 16 years.

3.6. Study approach

The case study approach was chosen for this investigation; therefore, a closed-ended questionnaire was created to collect data on oral hygiene practises. The study's target demographics were all enrolled secondary school pupils, both male and female, aged 11 to 16 years.

Peshawar city contains four towns and around 99 union councils, however due to time constraints we choose convenient sampling, and five schools were chosen to be researched. Major reason for adopting the convenient sampling was that the study needed agreement of schools to participate and get consent from pupil's parents (to get them examined) therefore cooperation was the main consideration in sample selection. However, student's selection was performed randomly among all willing-to-participate students.

3.7. Time frame

The research began on April 1, 2021 and concluded on July 31, 2021. The trial lasted for four months in total.

3.8. Data collection tools

The structured closed ended questionnaire and face to face interviews were used to collect primary data about oral hygiene practices.

3.9. Inclusion criteria

- Enrolled secondary school students of Peshawar city.
- Age between 11-16 years old.
- Both male and female.
- Willing to participate
- Public and private schools.

3.10. Exclusion criteria

- Secondary schools' students of other districts.
- Absent students.
- Non cooperative students

3.11. Data collection procedure

Because the research's reliability is dependent on real data collection, a structured close-ended questionnaire was developed to collect data on oral hygiene practices from the selected population. The questionnaire was pretested before launching the actual survey, and restructuring was carried out in accordance with the pilot study. To simplify and make the questionnaires more efficient, questions were revisited and confusion were deleted after pilot testing. The questionnaire was then used to gather real data from a specific sample of the target population and prepared for analysis.

In the first visits questions were asked about oral hygiene awareness and oral examination was done to record oral health status according to SES. Oral health education was given in verbal as well as video form. On second visits data were recorded about oral health status like frequency and method of brushing. And again, oral health education was given. On third visit data were recorded about oral health status. Plain Pashto language was used at the level of understanding for school children.

3.12. Study Variables

Dependent variable: The oral hygiene maintenance was recorded as: brushing teeth (yes/no), use of Miswak (yes/no), use of Mouthwash (yes/no), and use of Dental floss (yes/no). The 'Yes' answer to any of the above was recorded as value 1, otherwise 0. This variable served as dependent variable for regression.

In addition, Tables are used to analyse awareness about oral hygiene and oral hygiene maintenance habits. These variables are also categorical in nature and are explained below:

➢ Oral hygiene/health status was assessed on basis of DMFT/dmft score. If the participant have no missing, filled and carious, tooth was considered good. We determined the status by physical examination for missing, decayed and filled teeth to quantify the variable

➢ Awareness about oral hygiene status was assessed by asking questions and the responses were recorded on Likert scale (Strongly Agree, Agree, Disagree, Strongly Disagree, I don't know). These were adapted from previous studies.

Independent variables: These were age (in years), gender, socio-economic status of father, parental education, and parental occupation. Except age all were categorical.

3.13. Training of interviewers and logistics

Because the study was being conducted in secondary schools in Peshawar, and the sample that was chosen to be interviewed included both male and female students, one female dental hygienist was trained to gather data from girls who declined to talk to male dental hygienist.

The following are the logistics employed in the study's implementation:

➢ Vehicle
➢ Lap top computer
➢ Stationary

- ➢ Telephone
- ➢ Internet USB
- ➢ Troche
- ➢ Tongue depressors
- ➢ Community periodontal probe
- ➢ Mirror, probe, tweezers
- ➢ Disinfectant solutions
- ➢ Tongue retractors
- ➢ Cotton
- ➢ Hand sanitizer
- ➢ Face mask
- ➢ Examination gloves
- ➢ Polythene gloves

3.14. Data management

After gathering and evaluating the data, it was saved on a computer and password-protected so that no one could access it.

3.15. Ethical Consideration

Because the study is being conducted in secondary schools, the district education officer has given his consent. Both male and female directors were included. Prior to beginning the interview, the school administrators' permission was obtained. The students provided written informed consent to participate in the study. Before the study, all students provided informed consent and participated voluntarily.

The individuals were only entered into the database by a number code, and the information received from them would be kept secret and utilised solely for research and academic reasons. This study was carried out without the involvement of any private survey institution or group.

As the community has cultural and religious concerns, female students were entertained by female staff to collect data and fill out the questionnaire.

3.16. Statistical analysis

Data analysis was conducted utilizing SPSS 20. Descriptive statistics were calculated as mean and SD for continuous data like age and percentage along frequencies for qualitative variables like gender and socio-economic status (SES) etc. Chi square test was applied for determining association of oral health awareness and oral health status with SES. Confounders were controlled using logistic regression analysis using oral hygiene (brushing) as dependent variable and Income, profession, Father education, Mother education, and Gender as independent variable to calculate odds and 95% confident interval under two-sided hypothesis at P≤0.05.

3.17. Logistic regression

Logistic regression is used for this study because the dependent variable is categorical in nature. It is better than simple Chi-square test because all other variables are held constant and only one variable at a time is analyzed to determine the association. It the best method in statistics to control confounders as compared to Chi-square test and Mantel Hanzal statistics. In this analysis, for each independent variable there is one reference category against which other levels of that independent variable are compared to calculate the effect size in form of odds ratio with 95% CI to know the statistical significance. Therefore, logistic regression is adopted for estimation.

For econometric assessment, Eq(1) is used. Eq(1) presents the general form which relates the dependent variable and the independent variables. For the regression equation, OH reflects Oral Hygiene as dependent variable where it is captured with Bushing habits, where it was regressed on a set of independent variables. The set of important independent variables were age (in years), gender, socio-economic status of father, parental education, and parental occupation. Except age, all were categorical variables. The regression equation can be written as follows:

Oral hygiene habits = f (age, gender, socioeconomic status, parental education, and parental occupation) Eq (1)

This equation can be formally written as below:

$$OH = \beta_0 + \beta_1 Age + \beta_2 Gender + \beta_3 SES + \beta_4 P\_Edu + \beta_5 P\_Occup + U_i \quad Eq(1)$$

CHAPTER 4
RESULTS

This chapter presents the results and discusses the findings of the study. First, the socioeconomic details of the sample are presented followed by in-depth analysis. Socioeconomic level of participant's father is shown in Fig 1. Most common status was low social position (n=77, 38.5%) and least was very high (n=10, 5%). %). Medium social position 68(34%) High socioeconomic status was found in 37(18.55%).

Monthly income of Father socioeconomic status
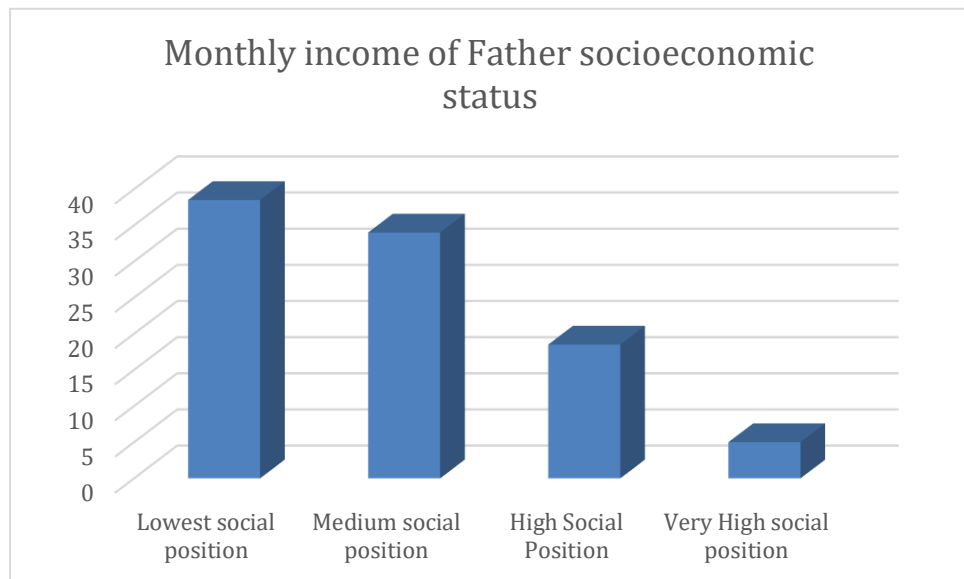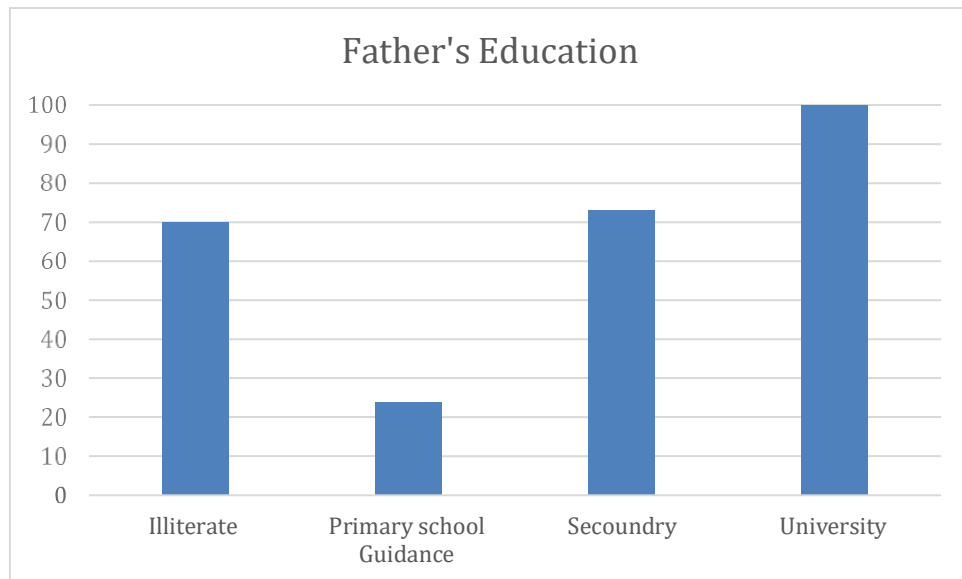
Father's Education

Most common education category of father's education was university level (n=145, 48.33%) followed by secondary level (73 24.33%) followed by primary level (24 8%).followed by illiterate(70 23.33%). **(Figure 4.2)**

Most of the mothers were house wives (92%). Only 3% mothers were teachers and 3% were government servants. (Figure 4.3)
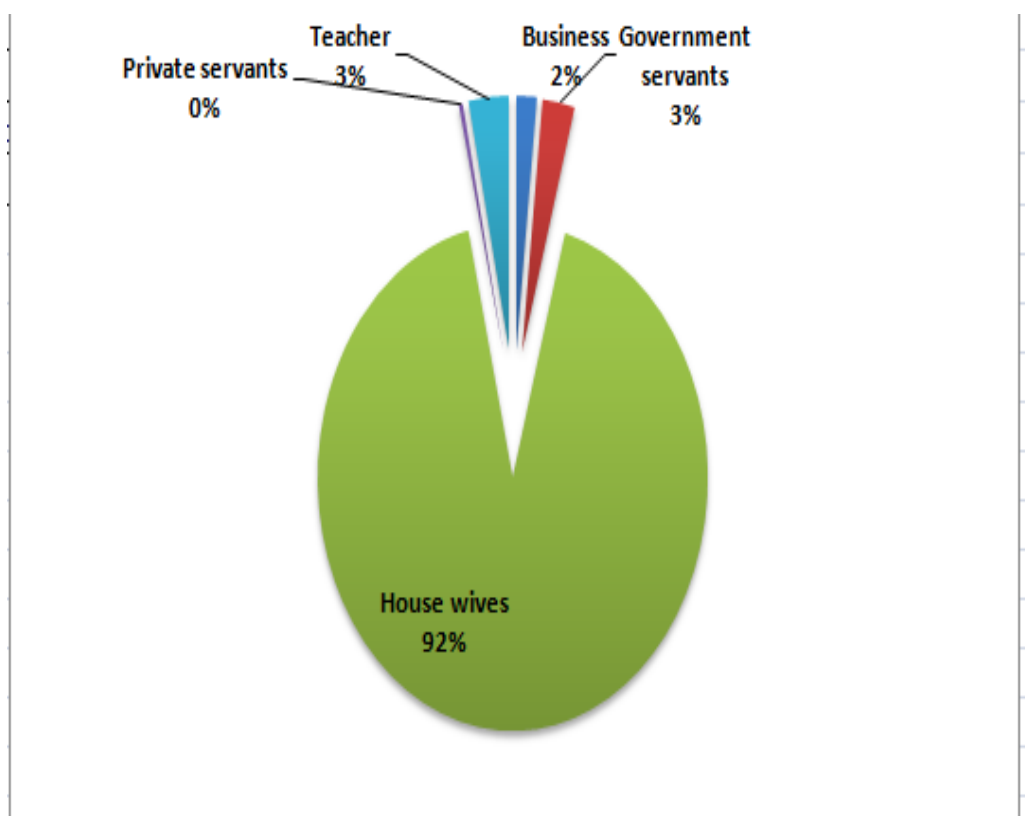
Figure 4.3: Mother Occupation

Table 2: Demographics of Participants

Variable	Characteristic	N = 300[1]
Children's Age(years)	Mean (SD)	13.703(0.98)
Child's Gender	Female	82 (27.33)
	Male	218 (72.67)
Child's School	Govt girls' middle school	60 (20.00)
	Govt high school paharipura	60 (20.00)
	Pak international public school	60 (20.00)
	The educator school	60 (20.00)
	The little age school	60 (20.00)
Father's Profession	Businessmen	83 (27.67)
	Driver	31 (10.33)
	Govt servant	78 (26.00)
	Labour	48 (16.00)
	Public servant	31 (10.33)

	Teacher	29 (9.67)
Father education	Nil	55 (18.33)
	Primary	27 (9.00)
	Matric	49 (16.33)
	Inter	24 (8.00)
	Graduates	83 (27.67)
	Master	62 (20.67)
Mother education	Nil	127 (42.33)
	Primary	69 (23.00)
	Matric	74 (24.67)
	Inter	13 (4.33)
	Graduates	13 (4.33)
	Master	4 (1.33)
Mother occupation	Business	5 (1.67)
	Government Servants	8 (2.67)
	Housewives	276 (92.00)
	Private Servants	1 (0.33)
	Teacher	10 (3.33)

The mean age of participants was 13.703 years. The females were 82 (27.33%) and males were 218 (72.67%). The patterns of school of children showed that children were equally distributed among Government girls' middle school, Govt high school Pahari Pura, Pak international public school, The educator school and the little Sages schools each having 60(20%). Most common profession of children father were business (n=83, 27.67%) and government service (78, 26.00%). Father's education showed that most education level were graduates (n=83, 27.67%), master (n=62, 20.67%), and illiterate (n=55, 18.33%). The details of mother's education and occupation are given in Table 2.

Table 3: Diagnosis of participants

Variable	Characteristic	N = 300[1]
Enamel fluorosis	Mild	3 (1.00)
	Moderate	3 (1.00)
	Normal	273 (91.00)
	Questionable	18 (6.00)
	very mild	3 (1.00)
Dental erosions	dentinal lesion	1 (0.33)
	enamel lesion	7 (2.33)
	Normal	288 (96.00)
	pulp involvement	4 (1.33)
Dental trauma	Enamel and dentine fracture	1 (0.33)
	Enamel fracture only	4 (1.33)
	No	286 (95.33)
	Pulp involvement	1 (0.33)
	Treated injury	8 (2.67)
Oral mucosal lesion	Absent	290 (96.67)
	Present	10 (3.33)
Intervention urgency	immediate treatment needs due to infection of dental	4 (1.33)
	no curative treatment need	188 (62.67)
	preventive or routine treatment need	60 (20.00)
	scaling requires	48 (16.00)

Enamel fluorosis was found in 23(9%) participants and most common type of fluorosis was "questionable" (n=18, 6%). In 12(4%) school children dental erosion was found. Most common pattern of erosion was enamel lesion (n=7, 2.33%). In 14(5%) cases dental trauma was noted and most common type of dental trauma was enamel fracture only (n=4, 1.33%). Oral mucosal lesion was present in 10(3.33%) participants. Most common reasons for not visiting dentist were fear (n=196, 65.33%). Rest of details is given in table 3.

Table 4:Awareness among school children about oral health

	Characteristic	N = 300[1]
Excessive sweet cause decay	No	65 (21.67)
	Yes	235 (78.33)
How often change brush	One Month	236 (78.67)
	Three Months	56 (18.67)
	Six Months	8 (2.67)
Soft drinks affects dental health	No	62 (20.67)
	Yes	238 (79.33)
Dental diseases impact general body health	No	118 (39.33)
	Yes	182 (60.67)
Last 12 months did you experience pain	many time	84 (28.00)
	Never	108 (36.00)
	Occasionally	108 (36.00)
	No	93 (31.00)
Regular visit necessary	Yes	207 (69.00)
	No	134 (44.67)
Reasons for not visiting	Fear	196 (65.33)
	high cost	104 (34.67)
Bacterium always presents in your mouth	No	35 (11.67)
	Yes	265 (88.33)
Bacterium responsible for decay	No	30 (10.00)
	Yes	270 (90.00)
There are special gel cements	No	32 (10.67)
	Yes	268 (89.33)

About 235 (78.33%) participants were aware that "excessive sweet cause decay". About 236 (78.67%) children were aware that they changed brush after one month. Majority of children were aware that "Soft drinks affects dental health" (n=238, 79.33%). Awareness about that "dental diseases impact general body health" was found in 182 (60.67%) children. Awareness for "Bacterium always presents in your mouth" and "bacterium responsible for decay" were

present in 207 (69%) and 265 (88.33%) respectively. Rest of detail is shown in

Table 4.

Table 5: Oral health status of school children

	Characteristic	N = 300[1]
Status primary teeth	Caries	4 (1.33)
	Filled	7 (2.33)
	Sound tooth	289 (96.33)
Status permanent teeth	Carious	63 (21.00)
	filled with caries	5 (1.67)
	fix dental prosthesis	1 (0.33)
	missing due to caries	9 (3.00)
	Sound	222 (74.00)

Among primary dentition carious lesions were found in4 (1.33%) while

7(2.33%). Among permanent 63 (21%) has caries, 5 (1.67%) has filled teeth, 1

(0.33%) has fix dental prosthesis, and 9 (3%) has missing teeth due to caries.

(Table 5)

Table 6: Awareness among school children about oral health

	Characteristic	N = 300[1]
Brushing and flossing twice a day could reduce tooth decay	Agree	128 (42.67)
	Strongly Agree	67 (22.33)
	Strongly Agree	67 (22.33)
	Disagree	26 (8.67)
	Strongly Disagree	13 (4.33)
	I don't know	66 (22.00)
If I get tooth decayI suffer from severe pain	Agree	160 (53.33)
	I don't know	83 (27.67)
	not agree	27 (9.00)
	strongly agree	30 (10.00)
Two times brushing and flossing prevents disease	Agree	154 (51.33)
	I don't know	91 (30.33)
	not agree	26 (8.67)
	strongly agree	29 (9.67)
My gums bleed tooth break when i brush and floss	Agree	44 (14.67)
	I don't know	116 (38.67)
	not agree	106 (35.33)
	strongly agree	13 (4.33)
	strongly disagree	10 (3.33)
I am confidents i floss my teeth	Agree	118 (39.33)
	I don't know	63 (21.00)
	not agree	68 (22.67)
	strongly agree	45 (15.00)
	strongly disagree	6 (2.00)
How often did you brush your teeth in last 2 weeks	Yes	283 (96.77)
	No	13 (4.33)
How often did you floss your teeth in last 2 weeks	Yes	281 (93.77)
	No	19 (6.33)

Among school children 128 (42.67%) were 'agree' and 67 (22.33%) were 'strongly agree' that "Brushing and flossing twice a day could reduce tooth decay". For "tooth decay is cause of severe pain" 160 (53.33%) were agree and 30 (10%) were 'strongly agree'. 118 (39.33%) were agree with flossing of teeth.

Most common pattern of teeth and 126 (42%) were doing once a day brushing.

Of all 281 (93.77%) participants did floss in last two weeks. **(Table 6)**

Table 7: Effect of socioeconomic status on awareness of oral health

	Characteristic	low, N = 76[1]	medium, N = 111[1]	High, N = 67[1]	very high, N = 46[1]	p-value[2]
Excessive sweet cause decay	*No*	27 (35.53)	19 (17.12)	15 (22.39)	4 (8.70)	0.002
	Yes	49 (64.47)	92 (82.88)	52 (77.61)	42 (91.30)	
How often change brush	*One Month*	55 (72.37)	87 (78.38)	55 (82.09)	39 (84.78)	0.666
	Three Months	19 (25.00)	20 (18.02)	11 (16.42)	6 (13.04)	
	Six Months	2 (2.63)	4 (3.60)	1 (1.49)	1 (2.17)	
Soft drinks affects dental health	*Absent*	22 (28.95)	17 (15.32)	14 (20.90)	9 (19.57)	0.161
	Yes	54 (71.05)	94 (84.68)	53 (79.10)	37 (80.43)	
Dental diseases impact general body health	*Absent*	35 (46.05)	39 (35.14)	26 (38.81)	18 (39.13)	0.519
	Yes	41 (53.95)	72 (64.86)	41 (61.19)	28 (60.87)	
Experienced pain in last 12months	*Many Time*	30 (39.47)	31 (27.93)	18 (26.87)	5 (10.87)	0
	Occasionally	22 (28.95)	40 (36.04)	24 (35.82)	22 (47.83)	
	Never	24 (31.58)	40 (36.04)	25 (37.31)	19 (41.30)	
Regular visit necessary	*No*	28 (36.84)	34 (30.63)	22 (32.84)	9 (19.57)	0.247
	Yes	48 (63.16)	77 (69.37)	45 (67.16)	37 (80.43)	
Regular check-ups	*No*	31 (40.79)	49 (44.14)	30 (44.78)	24 (52.17)	0.677
	Yes	45 (59.21)	62 (55.86)	37 (55.22)	22 (47.83)	

Reasons for not visiting	*Fear*	47 (61.84)	71 (63.96)	49 (73.13)	29 (63.04)	0.492
	high cost	29 (38.16)	40 (36.04)	18 (26.87)	17 (36.96)	
Bacterium always presentsin your mouth	*No*	12 (15.79)	10 (9.01)	8 (11.94)	5 (10.87)	0.563
	Yes	64 (84.21)	101 (90.99)	59 (88.06)	41 (89.13)	
Bacterium responsible for decay	*No*	9 (11.84)	8 (7.21)	6 (8.96)	6 (13.04)	0.566
	Yes	66 (86.84)	103 (92.79)	61 (91.04)	40 (86.96)	
There are special gel cements	*No*	7 (9.21)	9 (8.11)	10 (14.93)	6 (13.04)	0.479
	Yes	69 (90.79)	102 (91.89)	57 (85.07)	40 (86.96)	

Effect of socioeconomic status on awareness of oral health showed that only awareness about 'excessive sweet cause decay' was statistically significant (p=0.002). The highest level was found in very high income (91.3%) and least was low income (64.47%). Rest of awareness parameters were not statistically among income level. **(Table 7)**

Table 8: Effect of socioeconomic status on oral health in schoolchildren

	Characteristic	low, N = 76[1]	medium, N = 111[1]	High, N = 67[1]	very high, N = 46[1]	p-value[2]
Primary	*Caries*	0 (0.00)	3 (2.70)	1 (1.49)	0 (0.00)	0.062
	filled with caries	5 (6.58)	2 (1.80)	0 (0.00)	0 (0.00)	
Permanent teeth status	*Carious*	22 (28.95)	20 (18.02)	14 (20.90)	7 (15.22)	0.355
	filled with caries	3 (3.95)	2 (1.80)	0 (0.00)	0 (0.00)	
	fix dental prosthesis	0 (0.00)	1 (0.90)	0 (0.00)	0 (0.00)	
	missing due to caries	2 (2.63)	2 (1.80)	2 (2.99)	3 (6.52)	
	Sound	49 (64.47)	86 (77.48)	51 (76.12)	36 (78.26)	
	Not	4 (5.26)	10 (9.01)	3 (4.48)	2 (4.35)	
	once a day and	42 (55.26)	41 (36.94)	33 (49.25)	20 (43.48)	
	Once in a week	13 (17.11)	28 (25.23)	13 (19.40)	9 (19.57)	
	Twice a day	4 (5.26)	15 (13.51)	3 (4.48)	1 (2.17)	

Effect of socioeconomic status on oral health in school children were statistically significant for both primary (p=0.062) and permanent dentition (p=0.355) **(Table 8)**

Table 9: Effect of socio economics status on awareness about oral health among school children

	Characteristic	low, N = 76[1]	medium, N = 111[1]	High, N = 67[1]	very high, N = 46[1]	p-value[2]
It is likely that I will develop tooth decay	*Strongly Agree*	2 (2.63)	4 (3.60)	8 (11.94)	5 (10.87)	<0.001
	Agree	8 (10.53)	45 (40.54)	16 (23.88)	16 (34.78)	
	I don't know	48 (63.16)	36 (32.43)	25 (37.31)	18 (39.13)	
	Disagree	15 (19.74)	24 (21.62)	11 (16.42)	6 (13.04)	
	Strongly Disagree	3 (3.95)	2 (1.80)	7 (10.45)	1 (2.17)	
I got tooth decay	*Strongly Agree*	6 (7.89)	6 (5.41)	3 (4.48)	6 (13.04)	0.012
	Agree	11 (14.47)	44 (39.64)	19 (28.36)	18 (39.13)	
	I don't know	30 (39.47)	25 (22.52)	25 (37.31)	11 (23.91)	
	Disagree	8 (10.53)	8 (7.21)	9 (13.43)	2 (4.35)	
	Strongly Disagree	21 (27.63)	28 (25.23)	11 (16.42)	9 (19.57)	
Brushing and flossing twice a day could reduce tooth decay	*Strongly Agree*	15 (19.74)	30 (27.03)	13 (19.40)	9 (19.57)	0.023
	Agree	27 (35.53)	51 (45.95)	25 (37.31)	25 (54.35)	
	I don't know	24 (31.58)	16 (14.41)	20 (29.85)	6 (13.04)	
	Disagree	6 (7.89)	6 (5.41)	9 (13.43)	5 (10.87)	
	Strongly Disagree	4 (5.26)	8 (7.21)	0 (0.00)	1 (2.17)	
Tooth decay will make me suffer from severe pain	*Strongly Agree*	9 (11.84)	11 (9.91)	6 (8.96)	4 (8.70)	0.27
	Agree	32 (42.11)	69 (62.16)	31 (46.27)	28 (60.87)	
	I don't know	27 (35.53)	24 (21.62)	22 (32.84)	10 (21.74)	
	Disagree	8 (10.53)	7 (6.31)	8 (11.94)	4 (8.70)	

Two times brushing and flossing prevents disease	*Strongly Agree*	9 (11.84)	10 (9.01)	5 (7.46)	5 (10.87)	0.035
	Agree	26 (34.21)	61 (54.95)	37 (55.22)	30 (65.22)	
	I don't know	30 (39.47)	35 (31.53)	18 (26.87)	8 (17.39)	
	Disagree	11 (14.47)	5 (4.50)	7 (10.45)	3 (6.52)	
	Strongly Disagree	0 (0.00)	5 (4.50)	4 (5.97)	1 (2.17)	
Gums bleed/ tooth break when I brush and floss	*Strongly Agree*	2 (2.63)	6 (5.41)	3 (4.48)	2 (4.35)	0.063
	Agree	14 (18.42)	14 (12.61)	10 (14.93)	6 (13.04)	
	I don't know	33 (43.42)	35 (31.53)	32 (47.76)	16 (34.78)	
	Disagree	21 (27.63)	48 (43.24)	18 (26.87)	19 (41.30)	
	Strongly Disagree	6 (7.89)	3 (2.70)	0 (0.00)	1 (2.17)	
I floss my teeth	*Strongly Agree*	10 (13.16)	20 (18.02)	8 (11.94)	7 (15.22)	0.148
	Agree	19 (25.00)	50 (45.05)	27 (40.30)	22 (47.83)	
	I don't know	21 (27.63)	19 (17.12)	15 (22.39)	8 (17.39)	
	Disagree	25 (32.89)	20 (18.02)	16 (23.88)	7 (15.22)	
	Strongly Disagree	1 (1.32)	2 (1.80)	1 (1.49)	2 (4.35)	
Brushing frequency in last 2 weeks	*Thrice a day*	1 (1.32)	0 (0.00)	0 (0.00)	1 (2.17)	0.827
	Twice a day	13 (17.11)	35 (31.53)	16 (23.88)	14 (30.43)	
	Once a day	35 (46.05)	46 (41.44)	28 (41.79)	17 (36.96)	
	Each alternate day	10 (13.16)	13 (11.71)	11 (16.42)	6 (13.04)	
	Once in a week	13 (17.11)	13 (11.71)	9 (13.43)	6 (13.04)	
	No	4 (5.26)	4 (3.60)	3 (4.48)	2 (4.35)	
How often did you floss your	*Twice a day*	4 (5.26)	15 (13.51)	3 (4.48)	1 (2.17)	0.071

teeth in last 2 weeks	once a day and	42 (55.26)	41 (36.94)	33 (49.25)	20 (43.48)	
	On Alternative day	13 (17.11)	17 (15.32)	15 (22.39)	14 (30.43)	
	Once in a week	13 (17.11)	28 (25.23)	13 (19.40)	9 (19.57)	
	Not	4 (5.26)	10 (9.01)	3 (4.48)	2 (4.35)	

Three parameters i.e. "It is likely that I will develop tooth decay" (p=<0.001), "If I got tooth decay" (p=0.012) and "two times brushing, and flossing prevents disease" (p=0.023) were statistically different among various income levels. Rest of variables were not statistically significant. **(Table 9)**

Table 10: Effect of health intervention on oral hygiene measures

Variable	Characteristic	Before, N = 300[1]	after 1st intervention, N = 300[1]	after 2nd intervention, N = 300[1]	p-value[2]
Brush teeth	Yes	254 (84.67)	277 (92.33)	300 (100.00)	<0.001
Brush pattern	after every meal	1 (0.33)	98 (32.67)	101 (33.67)	<0.001
	Morning	81 (27.00)	37 (12.33)	36 (12.00)	
	Noon	43 (14.33)	92 (30.67)	92 (30.67)	
	Night	100 (33.33)	47 (15.67)	47 (15.67)	
	Irregular	29 (9.67)	24 (8.00)	24 (8.00)	
	No	46 (15.33)	2 (0.67)	0 (0.00)	
Brush duration	<1 min	43 (14.33)	37 (12.33)	37 (12.33)	<0.001
	> 2 min	0 (0.00)	122 (40.67)	122 (40.67)	
	1 min	74 (24.67)	43 (14.33)	43 (14.33)	
	2 min	122 (40.67)	74 (24.67)	74 (24.67)	
	No	61 (20.33)	24 (8.00)	24 (8.00)	

		173 (57.67)	179 (59.67)	173 (57.67)	0.848
Miswak	*Yes*				
brushing method	*Circular*	40 (13.33)	41 (13.67)	11 (3.67)	<0.001
	Horizontal	102 (34.00)	131 (43.67)	126 (42.00)	
	thrice methods	100 (33.33)	63 (21.00)	64 (21.33)	
	Vertical	58 (19.33)	65 (21.67)	99 (33.00)	
Mouthwash	*Yes*	77 (25.67)	71 (23.67)	103 (34.33)	0.008
Dental floss	*Yes*	92 (30.67)	121 (40.33)	120 (40.00)	0.021
Brush after every meal	*Yes*	80 (26.67)	130 (43.33)	120 (40.00)	<0.001
Gargles	*Yes*	242 (80.67)	260 (86.67)	261 (87.00)	0.052
Tongue cleaner	*Yes*	143 (47.67)	112 (37.33)	172 (57.33)	<0.001
Periodontal status	*Absent*	221 (73.67)	300 (100.00)	299 (99.67)	<0.001
	Present	79 (26.33)	0 (0.00)	1 (0.33)	
Bleeding gums while brushing	*Yes*	117 (39.00)	65 (21.67)	72 (24.00)	<0.001

The effect of oral health education programs on oral health measures were significantly improved after first and second intervention. Frequency of brushing, method of brushing, pattern of brushing, mouthwash, dental floss, brush after every meal, gargle, tongue cleaner, and periodontal status were significantly improved after oral health education program intervention. The details frequencies and P-values are given in T**able 10**.

Table 11: Multivariate analysis for Oral Hygiene (brushing) among schoolchildren

Explanatory variables	characteristics	Oral Hygiene		OH (univariate)	OH (multivariate)
		No	**Yes**		

Income	Low	33 (14.5)	195 (85.5)	-	-
	Medium	19 (5.7)	314 (94.3)	2.80 (1.56-5.14, p=0.001)	3.34 (0.82-12.85, p=0.086)
	High	13 (6.5)	188 (93.5)	2.45 (1.28-4.95, p=0.009)	2.49 (0.55-10.36, p=0.221)
	Very high	4 (2.9)	134 (97.1)	5.67 (2.19-19.34, p=0.001)	5.51 (1.02-31.39, p=0.048)
Profession	Labour	26 (18.4)	115 (81.6)	-	-
	Businessmen	14 (5.6)	235 (94.4)	3.80 (1.94-7.73, p<0.001)	1.12 (0.24-5.60, p=0.886)
	Driver	5 (5.2)	91 (94.8)	4.11 (1.64-12.54, p=0.005)	3.71 (1.42-11.69, p=0.013)
	Govt servant	12 (5.1)	222 (94.9)	4.18 (2.08-8.88, p<0.001)	1.62 (0.37-7.97, p=0.539)
	Public servant	8 (8.6)	85 (91.4)	2.40 (1.08-5.91, p=0.041)	0.87 (0.16-5.23, p=0.878)
	Teacher	4 (4.6)	83 (95.4)	4.69 (1.75-16.35, p=0.005) -	1.68 (0.31-10.70, p=0.563) -
Father education	Illiterate	20 (11.9)	148 (88.1)	-	-
	Primary	5 (6.2)	76 (93.8)	2.05 (0.80-6.36, p=0.166)	1.87 (0.69-6.03, p=0.249)
	Matric	14 (9.7)	130 (90.3)	1.25 (0.61-2.63, p=0.538)	0.88 (0.39-2.02, p=0.754)
	Inter	5 (6.9)	67 (93.1)	1.81 (0.70-5.62, p=0.255)	1.04 (0.34-3.73, p=0.943)
	Graduate	16 (6.4)	233 (93.6)	1.97 (0.99-3.97, p=0.054)	0.95 (0.36-2.56, p=0.923)
	Master	9 (4.8)	177 (95.2)	2.66 (1.21-6.30, p=0.019)	1.25 (0.44-3.73, p=0.676)
	Illiterate	30 (7.9)	351 (92.1)	-	-
	Primary	21 (10.1)	186 (89.9)	0.76 (0.42-1.37, p=0.351)	0.86 (0.45-1.64, p=0.631)

Mother education	Matric	10 (4.5)	212 (95.5)	1.81 (0.90-3.97, p=0.113)	1.73 (0.82-3.92, p=0.167)
	Inter	1 (2.6)	38 (97.4)	3.25 (0.67-58.64, p=0.253)	1.83 (0.35-33.71, p=0.566)
	Graduate	4 (10.3)	35 (89.7)	0.75 (0.27-2.62, p=0.605)	0.73 (0.25-2.73, p=0.600)
	Master	3 (25.0)	9 (75.0)	0.26 (0.07-1.20, p=0.050)	0.23 (0.06-1.15, p=0.047)
Gender	Male	64 (9.8)	590 (90.2)	-	-
	Female	5 (2.0)	241 (98.0)	5.23 (2.29-15.08, p<0.001)	4.31 (1.83-12.66, p=0.003)

Significant factors affecting oral hygiene status were income level of parents, profession, father education, mother education, and gender. The odds of brushing were 5.51 times in high income level as compared to low-income level statistically(p=0.048). The odds of brushing were 4.31 times higher in female than males statistically (p=0.003). The frequency of brushing was 254 (84.67%) before intervention and 277 (92.33%) after first intervention and 300 (100%) after second intervention. The frequency of brushing after every meal increased from 0.33% (before) to 32.67% (after 1st intervention) to 33.67% (after 2nd intervention). Similarly, the frequency of brushing after every meal increased from 25.67% (before) to 23.67% (after 1st intervention) to 34.33% (after 2nd intervention). Rest of details for odds ratio along p-value and 95% confident interval are given in **Table 11**.

This research was conducted to determine awareness and oral health status among school children in various socioeconomic statuses. Our second objective was to determine the impact oral health education on oral health status. Findings

show that less than 80% school children have awareness about oral hygiene and children with low socioeconomic status were less aware and poor oral health status.

CHAPTER 4

DISCUSSION

This study was aimed to determine oral hygiene practices amongst school children in various SES and to determine the effect of oral health education programme on oral health status of school children. The findings showed that oral hygiene and awareness level about oral hygiene was less satisfactory. Oral health education programme on oral health status of school children can improve oral health status significantly.

This study showed that oral hygiene and awareness are lower in low SES than high SES. Results revealed that males had poor significantly oral hygiene status than the females. This difference can be explained due to variations in oral hygiene measures, different dietary habit among genders. It is generally believed that males are less careful about cleaning teeth and this was confirmed in our study. The results are contrary to a study conducted in UAE, where different results have been reported in study on school children in United Arab Emirate. They found no different oral hygiene among genders and better gingival health was found among girls than boys(Gopinath et al., 2015). Another study conducted on children in Udaipur also found no sexual dimorphism for oral hygiene status(Kumar et al., 2009). The possible explanation for variation in our results among genders can due to difference in severity of mental illness among males and females in our study. Bennadi et al.(2020) study showed that oral hygiene status among mentally challenged maleswas inferior than females.

The inadequate provision of oral health care in Pakistan, as well as the high degree of unmet oral health care needs, is well established. The frequency of dental caries is estimated to be 50-70 percent, and the prevalence of oral cancer is among the highest in the world. Even though oral health care has been declared to be part of the primary health care system, disparities in oral health between rich and poor, as well as emerging issues of access to and use of appropriate care, have never been addressed, indicating a lack of awareness among both patients and health-care decision-makers. A basic bundle of oral care that does not require experienced dental surgeons might include oral cancer screening and atraumatic restorative therapy for tooth decay.(Harchandani, 2012)

In Pakistan, there is a clear lack of availability and accessibility to oral and dental health care. Training community volunteers or informal dental health care providers in dental health promotion and information-sharing with vulnerable communities, for school children, and deployment of dental auxiliaries for patient screening, detection and referral of suspicious oral lesions, and provision of basic oral health care could be an efficient and effectiveway of reducing the burden of oral diseases in Pakistan.(A. A. Khan, 2015) In Pakistan, the dentist-to-population ratio is low (1:10 850), compared to the WHO-recommended threshold of 1:7500.

The current study revealed that oral health education can improve the awareness level and oral health of school children. Oral health education was given in verbal as well as video form. On third visit data were recorded about oral health status. Plain Pashto language was used at the level of understanding for school

children. This result is consistent with Al Saffan et al.(2017).The said study was conducted on 1279 school children in Saudi Arabia. They give oral health education for 30 minutes in the form of power point presentation. They measured awareness level before and after awareness level and reported that oral health education significantly improve awareness of school children (Al Saffan et al., 2017).

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1. Summary

The majority of our schoolchildren have inadequate understanding of oral health. The primary cause of dental disorders is neglect of the subject and dental appointments. Doctors were discovered to be the primary source of oral health awareness in youngsters; thus, they may play a good role in this scenario. The socioeconomic status has association with oral health status. Oral health promotion programme improves oral hygiene of school children. Oral health promotion intervention improves the awareness and oral hygiene of school children statistically.

5.2. Recommendations

Education on oral hygiene should be given in all private and government schools. There is a need to provide basic oral hygiene education at primary level curriculum and teachers training program for improvement of oral hygiene care to reduce oral burden of diseases. Proper brushing techniques, proper time for brush and rinsing mouth after meals and before sleeping in night brushing is mandatory. .

Oral health education and promotion provides through broacher and poster outside of washroom which gives positive message for brushing and flossing techniques for all family members. Oral hygiene awareness message spread through social media and electronic media and through print media.

Stakeholders should provide all facilities to teaching staff and school children of oral health promotion programmes.

5.3. Limitations of the study

Mainly, this study can be improved in the future by increasing the sample size and ensure better diversity. As the study required frequent interaction with students, the current research could not ensure a truly representative sample for the study, therefore, future study can improve the insights if the government own the study and ensure institutional involvement. In addition, COVID-19 also made it difficult to use consistent sampling technique. This could be avoided in the future.

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APPENDIX-I

Questionnaire

My name is Muhammad amin I am students of M Phil health economics at Pakistan institute of development economics Islamabad and my research topic is how does socio economic status affects oral hygiene of school children in Peshawar.

1. **Demographic Data**

   Name of students_____Age _____

    Sex_____Class _____

School _____

   Father name_____Father occupation_____

   Monthly income_____   Father education_____

   Mother education_____   Mother occupation_____

2. Do you brush? YES /NO
3. When do you brush your teeth? Irregular/ morning /noon/ night/after every meal
   - In morning before breakfast/after breakfast
   - In noon before lunch/after lunch
   - In night before dinner/after dinner/before sleep
4. Average duration taken for single brushing? less than a minute/one minute/two minute/more than two minutes
5. Do you use miswak? YES /NO
6. What methods do you use while brushing? HORIZONTAL/ VERTICAL/CIRCULAR
7. Does your toothpaste contain fluoride? YES/NO
8. Do you use mouthwash? YES/NO
9. Do you use floss? YES/NO
10. Do you use tongue cleaner? YES/NO

11. Do you brush after every meal? YES/NO

12. Do you think excessive sweet consumption can cause decay? YES/NO

13. Do you gargle after every meal? YES/N0

14. How often do You change your toothbrush? 1 month/ 3 months/6 months

15. Do you think soft drinks affect dental health? YES/NO

16. Have you noticed bleeding of your gums while brushing? YES/ NO

17. Does dental disease impact general body health? YES/NO

18. How often in the last 12 months did you experience pain or discomfort in your teeth and gums? Many times, / occasionally/never

19. Are regular dental visit necessary? YES/NO

20. Do you go for regular dental checkup? YES/NO

21. Reason behind not visiting the dentist? FEAR/HIGH COST

22. Do you think bacterium is always present in your mouth? YES/ NO

23. Do you think bacterium is responsible for decay? YES/NO

24. Do you think there are special gels and cements to prevent decay? YES/NO

Summary of publish literature on oral hygiene of school children

Study Title	Authors	Goal of study	Geographic Region	Sample	Results of Study
A Study on Oral Hygiene among Students of a Secondary School in Harinavi, South 24 Parganas, West Bengal	Jayeeta Burman, Aparajita Dasgupta, Rajarshi Banerjee, SembagamuthuSembiah, Lina Bandyopadhyay, Bobby Paul	The purpose of this study is to determine the state of their oral hygiene and oral health, as well as the risk factors linked with these conditions.	Kolkata, West Bengal, India	151	Among 151 pupils, 64.2 percent had poor oral health, 52.3 percent had inadequate awareness of oral health, and 64.2 percent had inadequate oral hygiene practise. Females exhibited higher levels of oral health awareness and practise than males. Good oral health was connected with factors such as excellent practise of oral hygiene (odds ratio [OR] = 6.7 [3.4-12.2]); satisfactory awareness of oral health (OR = 2.9 [1.9-3.5]); and gender (OR = 2.9 [1.5-5.8]). Oral health awareness (OR = 5.8 [2.8-12.2]) is also highly related with effective oral hygiene behaviour. Factors such as oral hygiene practise (adjusted OR [AOR] = 6.8 [3.2-14.5])

					and oral health awareness (AOR = 2.1 [1.3-3.6]) retained significance in the final model of multivariable logistic regression analysis.
Relationship between Socioeconomic Inequalities and Oral Hygiene Indicators in Private and Public Schools in Karachi: An Observational Study	Tamsal Khalid 1, Syed Sarosh Mahdi 1,2,* , Mariam Khawaja 1 , Raheel Allana 3 and Francesco Amenta 2	The purpose of this study was to see if socioeconomic disparities and inequalities had an effect on crucial oral hygiene markers	Karachi Pakistan	300	A total of 300 students from public and private schools were chosen for the study. The youngsters varied in age from 2 to 18 years. The mean DMFT scores of pupils in private and public schools were not statistically different (private (1.82) vs. public (1.48)). (p = 0.257). The mean number of carious teeth in private school children was 1.69, compared to 1.34 in government school children, whereas the mean values of other key indicators of oral hygiene, such as plaque deposition (p = 0.001), dental stains (p 0.001), and bleeding gums/gingivitis (p 0.001), were statistically significant between public and private school children.
Oral Health Status Among 12-Year-Old Schoolchildren in Kosovo	Lulëjeta Ferizi1,2, Venera Bimbashi3,4, Jeta	To assess the oral health of 12-year-old Kosovo pupils.	Prishtina, Prishtina, Republic of Kosovo	1204	Rural schoolboys had the greatest mean and standard deviation of DMFT and OHI-S indexes (3.67 1.98 and OHI-S 1.75, respectively). In all, 54.1 percent brush their teeth just once

	Kelmendi5,6, Tetore Olloni3,4				a day, 39.7 percent brush twice a day, and only 6.2 percent clean their teeth seldom.
Are School Oral Health Programs Effective in Changing Dental Health and Health Behaviour of Children, an Observational Study	Sarah Ahmed Bahammam1	Oral health problems in youngsters are on the rise, owing to either a lack of education or poor oral health treatment. The study looked on the effectiveness of the school oral health (OH) programme in transforming dental health and health behaviour among Saudi pupils	Medina, Kingdom of Saudi Arabia	348	The study's findings revealed that children had improved OH status, knowledge, behaviour, and practises. The findings of self-evaluation revealed that the education programme performed by teachers was more successful than the education programme conducted by dentists. Furthermore, the psychological element of the children's oral health-related quality of life (OHRQoL) score was shown to be high.
Effect of a school-based oral health education program on Iranian children: results from a group	Yekaninejad MS, Eshraghian MR, Nourijelyani K, Mohammad K, Foroushani AR, Zayeri F, Pakpour AH,	Parents and school personnel are crucial in supporting children's dental health. Our study's aims were to see if an intervention aimed at parents and school personnel might enhance schoolchildren's oral-	Tehran Islamic Republic Of Iran	392	The primary goal was a change in oral-health behaviours (brushing and flossing), with secondary outcomes included improvements in oral hygiene and Community Periodontal Indexes, as well as Health Belief Model components. For data analysis, multilevel modelling was used. When compared to the student intervention group, students in the complete

randomized trial	Moscowchi A, Tarashi M	health behaviour and oral-health status.			intervention group brushed and flossed considerably more frequently. Although gingival health improved dramatically in the full intervention group, it did not improve much in the student group.
Effect of Education on Promoting Preventive Behaviors of Oral and Dental Problems: Applying Health Belief Mode	Vaezipour Z.1 MSc, Gharlipour Z.*1 PhD, Mohebi S.1 PhD, Sharifirad GH.2 PhD	Oral and dental illnesses are among the most frequent in the globe. The purpose of this study was to see how an education programme based on the health belief model affected 7th-grade students' actions for preventing oral and dental disorders.	Qom city of Islamic republic of Iran	100	When compared to before the intervention, the dimensions of Knowledge (p0.001), perceived vulnerability (p=0.001), perceived severity (p=0.01), perceived obstacles (p=0.02), and perceived self-efficacy (p0.001) had substantially altered in the intervention group
DENTAL HEALTH SELF CARE AMONG SCHOOL GOING CHILDREN OF PESHAWAR	Awais Hassan Khan1, Babar Ahad1, Usman Amanat1 , Khalid Hassan Khan2 , Dania Hassan2	To examine oral health awareness, oral hygiene practices/care, and the pattern of dental disorders among Peshawar schoolchildren.	Peshawar Pakistan	400	In the current study, the male to female ratio was 3.2:1. The participants' total level of oral health knowledge was determined to be below the standard level. Brushing once a day was observed in 62.75 percent of youngsters and twice a day in 9.75 percent of children. Only 9% of schoolchildren have visited a

					dentist in the previous six months. Dental caries was discovered to be the most frequent dental condition (27.5 percent), followed by plaque (20.25 percent), and fluorosis (1 percent) among our study group. Sensitivity, bleeding gums, malocclusion, and tooth loss were all present in 5.25 percent, 2.75 percent, 10.25 percent, and 4.75 percent of the population, respectively. Females and upper-class pupils were found to be more conscientious about their dental health and dentist appointments.
Oral hygiene practices among dental students of Peshawar city a comparative study	Zia ur Rehman Khalil1, Aamir Hameed1, Aliya Khan1,Mehree n Zia2 , Kanwal Nazir Arbab1	The current study aims to examine oral hygiene behaviours among undergraduate dental students in the preclinical and clinical years at Peshawar district dental institutions.	Peshawar Pakistan	380	When compared to the clinical group, 62.7 percent (42 out of 205) of the preclinical students were deemed to be in the unsatisfactory practise area. Only 37.3 percent of pupils received a poor practise score. There is a statistically significant trend (0.074).
School-based strategies for oral health education of	Abdul Haleem1*, Muhammad Irfanullah	Dental practitioners have predominantly provided oral health education (OHE) in schools. Given	Karachi Pakistan	1517	The mean oral health knowledge (OHK), oral health behaviour (OHB), oral hygiene status (OHS), and combined knowledge, behaviour, and

| adolescents- a cluster randomized controlled trial | Siddiqui2 and Ayyaz Ali Khan1 | the high expense of this expert-led method, alternatives depending on instructors, peer leaders, and learners themselves have also been used. The data for the comparative efficiency of these techniques, however, is insufficient in the dental literature. The current study compared the effectiveness of dentist-led, teacher-led, peer-led, and self-learning oral health education programmes. | | | oral hygiene status (KBS) scores for all three educator-led OHE techniques were significantly greater than the self-learning and control groups. |