Pattern and Factors Associated with Utilisation of Dental Services among adult Patients at Ndola Teaching Hospital

Kaitwa Mbuya*

Department of Medicine, Copperbelt University, Kitwe, Zambia

Abstract

Introduction: Oral health has not been a priority in most low to middle income countries, Zambia inclusive despite being among the top ten global health challenges. There is a need not only to treat but also to put preventive measures in place to reduce the prevalence and future occurrence of oral diseases.

Objectives: To find out the utilisation patterns, socioeconomic factors that affect the utilisation patterns of dental services, and dental anxiety levels as well as their effect on utilisation patterns of patients visiting the dental department at Ndola teaching hospital.

Methods: The study design was a quantitative study, to be conducted as a cross-sectional survey, gathering information from patients that attend the dental department at Ndola teaching hospital. The information was collected through structured interviews using a modified questionnaire from the World Health Organization (WHO).

Results: Among the participants, 2.08% of patients were currently regular attenders, 3.82% were former regular attenders, 94.10% were never regular attenders and none of the patients were always regular attenders. The time since the last dental visit showed that 31.25% of patients had visited the dentist within a year before the current visit, 12.5% had last visited the dentist within a period of 2 to 5 years prior, 31.25% had visited more than 5 years ago, while 25% had never been to the dentist.

Conclusion: The time since the last dental visit was correlated to both the gender of the patients and the type of insurance policy held by the patient, while the pattern of dental attendance was not correlated with any of the socioeconomic variables investigated.

Keywords: Dental • Services • Utilisation • Patterns

Abbreviations: CDC: Centers for Disease Control and Prevention; DMFT: Decayed Missing Filled Teeth; FDI: World Dental Federation; MDAS: Modified Dental Anxiety Scale; MOH: Ministry of Health of the Republic of Zambia; NHANES: National Health and Nutrition Examination Survey; NTH: Ndola Teaching Hospital; PHC: Primary Health Care; SROH: Self-Reported Oral Health; TDRC: Tropical Diseases Research Centre; WHO: World Health Organisation

Introduction

Background information

The World Health Organisation (WHO), defines good oral health 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 diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking, and psychosocial wellbeing." [1].

Oral diseases and conditions are a serious public health problem with incidence throughout the world and are among the non-

communicable diseases that can affect some individuals throughout their lifetime. Oral diseases affect about 3.58 billion people worldwide which is nearly half of the worlds' population [2].

In developed countries, there has been a steady reduction in the occurrence of oral health diseases and conditions, but in low and middle-Income countries there is a growing prevalence of oral health diseases and conditions. This trend is attributed to; an increase in the harmful consumption of alcohol, increased use of tobacco products, and an increase in dietary intake of free sugars as a result of increased availability of such products. The World Health Organization (2016) predicts that if not enough effort is directed towards the prevention of non-communicable diseases (which include oral diseases), then by the year 2030, non-communicable diseases will be the major cause of mortality in Africa.

Many oral diseases afflict human beings around the world, of which the most prevalent are; dental caries (tooth decay), periodontal (gum) disease, tooth loss, oral cancer, oral manifestations of HIV infection, oro-facial trauma, noma and, birth defects such as cleft-lip and cleft-palate. The list of oral diseases provided is not exhaustive as there are many more, however, these diseases are responsible for the greater part of the disease burden of oral diseases [3].

Most oral health diseases are associated with the accumulation of bacteria in the mouth; these bacteria may then spread through the body locally or through the bloodstream. Depending on the parts of the body to which these bacteria or their toxins spread, they may cause various complications, which include atherosclerosis, pneumonia, dementia, acute bronchitis, rheumatoid arthritis, kidney diseases, and exacerbation of diabetes [4].

In addition, oral diseases can cause or exacerbate other non-communicable diseases, this is because some oral and non-communicable diseases share similar behavioural risk factors. Because of similar causal factors between oral health diseases and other non-communicable, prevention campaigns against risky oral health behaviours will have a positive effect on the outcomes of diseases with similar risk factors and vice versa. Common risk factors in oral diseases and other systemic conditions include a diet rich in free-sugars and low in fruits and vegetables, use of tobacco or tobacco-containing products, and harmful alcohol consumption [5]. Some links in risk factors between oral and other non-communicable diseases include:

- A diet high rich in free sugars is not only associated with dental erosion and development of dental caries but also type 2 diabetes, obesity, fatty liver disease loss of elasticity in skin and arteries, memory loss, and increased anxiety [6].
- The use of various forms of tobacco puts the users at serious risk of developing: Chronic Obstructive Pulmonary Diseases (COPD), atherosclerosis, hypertension, peptic ulcers, Alzheimer's disease pancreatic cancer, lung cancer, pregnancy complications, and hypercholesterolemia. The effects of tobacco on the mouth include oral cancer, leucoplakia, erosion of the palate, periodontal disease, dental caries, bad breath, nicotinic staining of teeth, poor wound healing, and increased chance of cleft lip and palate in children born to mothers who smoked during pregnancy [7].
- Excessive alcohol consumption has effects on the brain (memory loss and loss of coordination), heart (high blood pressure and irregular heartbeats), liver (alcoholic hepatitis, fibrosis, and

cirrhosis), and pancreas (pancreatitis). On oral health, alcohol promotes the development of oral cancer, results in traumatic injuries related to interpersonal violence, causes reduced saliva production, and results in inflammation of the tongue [8].
- Interestingly, the development and progression of both diabetes and periodontal disease share a symbiotic relationship. In that, sores in the mouth due to diabetes cause periodontal diseases, and in return, bacteria that thrive in the inflamed gums increase digestion of sugars in the mouth thereby indirectly raising blood sugar levels of the patient. Apart from exacerbating diabetes, gum (periodontal) diseases are also associated with heart diseases, premature births, and low birth weights [9].

Therefore, oral health and general health practices of individuals may have synergistic effects as an improvement in oral health practices may lead to improved general health. In addition, promotion of oral health and general health at the same time may prove more cost-effective and a more efficient manner of health promotion [10].

Most oral health conditions are preventable or easily treatable if the disease or condition is discovered in its' earlier stages. Unfortunately, prevention and early detection of oral diseases and conditions are almost impossible as the vast majority of patients visit dental care facilities only when symptomatic or in emergencies.

However, oral health remains a neglected area of global health that can greatly contribute to universal health coverage. Several oral conditions are easily manageable when recognised in their earlier stages but are missed because health care personnel at Primary Health Care (PHC) levels are overwhelmed or do not know what to look for concerning these oral conditions. Because of this, dental care in the region mainly involves pain relief and emergency care.

Statement of the problem

Although most oral diseases and conditions are preventable, over 80% of Zambians suffer from oral health problems. In addition, according to the Ministry of Health (2017), list of the top ten causes of morbidity in Zambia from 2011 to 2014, dental caries was the tenth most prominent cause of morbidity in Zambia, and in 2015, dental caries was ninth on the list of top ten causes of morbidity. In contrast to the reported prevalence of oral conditions, the ministry of health through the 2017 STEPS report on non-communicable diseases found that 71.5% women and 77.6% men stated that they had never visited a dentist before.

With the stark contrast that exists between the prevalence of oral disease and the utilisation of services, important to know more about the patients who access dental services in the country. It is much easier to collect information pertaining to patients who use the oral health services from a clinical setup than from the general population. However, such information is not available as most the studies on utilisation of oral health services in Zambia are conducted in the general population.

Justification

In Zambia, approximately 80% of the population suffers from oral health conditions, most of which are preventable [11]. There is already a high number of reported dental diseases and, a significant part of the population engaging in behaviours that are likely to cause more oral health diseases.

Therefore, there need for a greater effort in treating and prevent further occurrence and recurrence of oral disease and conditions. In order to address these two needs, adequate information on the usage of preventive and curative treatment services is required.

To improve oral health outcomes an adequate knowledge of the way the individuals use health services and the factors predictive of this behavior is essential. The nation requires valid and reliable estimates on the proportion of the population visiting the dentist each year and the purposes for these visits for a variety of reasons. For example, public health practitioners and policy makers rely on this data to develop policies concerning access to care and the financing of oral health services. Policymakers also use these data to identify barriers to oral health care for specific populations subgroups and to create programs that eliminate obstacles to oral health care. Researchers use dental visit data to assess trends over time and to evaluate changes resulting from the implementation of health programs. Finally, government agencies and other non-governmental agencies involved in oral health care use these utilisation estimates to track progress toward national health objectives [12].

The information on utilisation to be collected is useful when deciding which areas in the treatment of oral diseases require more attention. The study will also help determine if there is a need for increased sensitization of the public on the risk factors, treatment, and prevention of oral diseases.

Literature Review

Dental care utilisation can be defined as the percentage of the population who access dental services over a specified time. Oral health is a critical and yet often overlooked component of overall health and well-being among both children and adults. There are reports that in most cases dental patients only visit the dentist when in pain and then never bother to return for follow-ups. Oral health problems such as dental caries, periodontitis, and oral cancers, are a global health problem in both industrialized and especially in developing countries. Dental disease restricts activities in school, work, and home and often significantly diminishes the quality of life for many children and adults, especially those who are low-income or uninsured. Despite the impressive advances in both dental technology and in the scientific understanding of oral diseases, significant disparities remain in both the rates of dental disease and access to dental care among sub-groups of the population. Various factors contribute to people's decision to either forgo care or seek professional assistance for dental problems. To improve oral health outcomes, an adequate knowledge of the way the individuals use health services and the factors predictive of this behaviour is essential [13]. The utilisation of dental services by different classes of people is different due to variations in facilitators and/or barriers to dental health care. Patterns of utilisation of dental services are associated with factors such as sex, age, area of residence, ethnicity, employment status, and possession of dental insurance, among other factors. Some of these factors are listed below.

Dental attendance patterns

The dental attendance pattern of a patient can be defined as the regular or usual habit of reporting (or not reporting) to the dental clinic at the time agreed upon with or recommended by their dentist.

The recommended interval between oral health visits should be determined specifically for and aimed to meet the needs of each patient. The recall interval should be based on an assessment of disease levels and risk of or from dental disease. The recommended time for routine dental appointments ranges from the shortest period of 3 months to a maximum of 24 months. A patient may need to be seen more frequently than 3 months for specific reasons such as disease management, ongoing courses of treatment, emergency dental interventions, or episodes of specialist care. In contrast, patients who have repeatedly demonstrated that they can maintain good oral health and who are not considered to be at risk of oral disease may be extended over time up to an interval of 24 months [14].

With the possibly wide range of range between recall time intervals for dental visits among patients with varying needs, it becomes more accurate to ask patients to classify their patterns of attendance following the recommendations that their dentist made specifically for them. According to Aldossary, et al., the long-term dental attendance pattern of each patient can be derived from their response to two of the following three questions. The first question asks patients whether they go to the dentist for regular check-ups, occasional check-ups, or only when they are having problems with their teeth. Patients who state that they go for regular check-ups should be asked if there has ever been a time in their life when they have not gone for a regular check-up. Patients who state that they go to the dentist for an occasional check-up or only when they have a problem with their teeth should then be asked if there had been a time in their life when they had been attending regular check-ups. These questions allow for the classification of patients into four distinctive classes: always regular attenders, current regular attenders, former regular attenders, and never regular attenders [15].

In their study, Aldossary, et al., found that 32% of patients identified as current regular-attenders, 30% as former regular-attenders, 28% as always regular-attenders, and 10% as never-regular attenders. In detail, 19.3% of males were; always regular-attenders, 37.0% current regular-attenders, 31.7% former regular-attenders and 12.0% never regular-attenders. In comparison 39.5% of females were; always regular-attenders, 30.9% current regular-attenders, 22.0% former regular-attenders and 7.6% never regular-attenders. When the effect of education was investigated, it was found that 33.5% of participants with no educational qualifications were always regular-attenders, 39.3% were current regular-attenders, 23.1% were former regular-attenders, and 4.1% were never regular-attenders. For participants that had received an education below the level of a degree, 31.9% were always regular-attenders, 31.2% were current regular-attenders, 29.4% were former regular-attenders, and 7.5% were never regular-attenders. Furthermore, for participants who had attained a university degree or higher, 22.8% were always regular-attenders, 33.3% were current regular-attenders, 22.8% were former regular-attenders, and 21.1% were never regular-attenders [16].

There are very large differences in the utilisation of preventive and symptomatic dental services among different countries and different regions. For example, a study among Jordanian adults by Obeidat et al. found that 93.3% of respondents had visited a dentist before; however, 89% of dental visits were due to symptomatic reasons and 6.7% of respondents had never visited a dentist at any

time in their lives. While Ayaji and Arigbede in a Nigerian study found that only 55.8% of respondents had ever visited a dentist at any time in their lives, of which 38.9% of the respondents had visited for symptomatic reasons while 16.9% visited for preventive check-ups. Contrarily, in the United Kingdom, Marshman et al reported a lower number of symptomatic dental visits (19.7%) and a higher number of visits for regular and occasional check-ups (75.2%). Furthermore, Saddki, et al. in a study on pregnant women in Malaysia found that 29% of subjects had visited a dentist during their pregnancy of which 20.1% of visits were for symptomatic reasons, and 8.9% of the visits were for check-ups.

In Zambia, the (Ministry of Health, 2017) STEPS report on non-communicable diseases showed a slightly higher proportion of women (8.2%) that had visited the dentist within the last year compared to men (6.1%), and also a lower proportion of women (71.5%) stated that they had never visited a dentist before, compared to men (77.6%). The reasons given for the last visit were consultation of advice (4.6%), pain or trouble with teeth or gums (74.8%), follow-up treatments (13.6%), routine check-ups (6.6%), and other reasons (0.5%).

Gender

In their study on the effects of gender and age on health related behaviours, Deeks, et al., clustered their findings into health behaviours, health beliefs, and health screening practices. According to the researchers, women were statistically significantly more likely to attend health screening, women were found to have more healthy beliefs and behaviours concerning chronic diseases and illnesses. For instance, significantly more women than men were believed that lifestyle, genetics, a stable home life and environment, and having a disease prevention strategy can influence the state of their health. In addition, more women than men felt that it was their responsibility to seek advice on disease prevention and were more likely to participate in health prevention strategies such as seeking out reading material on non-communicable diseases [17].

Lutfiyya, et al. report on their study, which was done in the US, and it showed that a lower percentage of the males (46.5%) interviewed reported visiting the dentist within 12 months of the survey compared to females (53.5%). In contrast, Zangiabadi, et al. found that in Ontario Canada, males in Ontario had a higher percentage of dental visits at 30.7% while 25.0% of female respondents had visited the dentist within 12 months of the interview. Bornstein, et al. did another study in a different part of Canada (Toronto) where the findings were that: female respondents (77.2%) had a slightly higher percentage of visits to the dentist than male respondents (74.3%) did. In Iran, Bahramian, et al. found minor differences in dental attendance between males and females in that 60.8% of males and 61.7% of females had not been to the dentist in 3 years, and 39.2% of males and 38.3% of females visited a dentist every 1-2 years. Studied the attendance of a dental clinic in Nigeria for a year, in which they found that there had been 2664 males (44.3%) and 3344 females (57.7%). However, the researchers went on to point that the results were not statistically significant.

Using household surveys conducted throughout Zambia, administered to adults aged between 18 and 69 years, the reported that a higher percentage of female respondents believed they had poor oral health in comparison to males. Among participants with

natural teeth, 15.2% of females compared to 8.5% of males believed that the health of their teeth was poor or very poor and 8.0% of females in contrast with 5.6% of males believed that the health of their gums was poor or very poor. In addition, 36.4% of females reported experiencing oral pain in the past year while 26.5% of males did the same. Female respondents also had a higher percentage of people that had gone to see the dentist in the previous year at 8.2% while for males the number was 6.1%. Lastly, more men (77.6%) said they had never been to the dentist before, while less of the female group of participants admitted to the same 71.5%.

Age

Non-communicable diseases (lifestyle related disease and illness) are preventable but are still responsible for a large proportion of deaths. Understanding health-related behaviours such as preventative health care and risk perception may help to reduce the incidence and burden of chronic illness. In a study on the effects of gender and age on health related behaviours, Deeks, et al., observed that younger participants are less likely to have annual health checks, seek advice or attend education sessions for prevention of lifestyle-related disease and illness [18].

Lutfiyya, et al., did a study in the United States, in which findings showed that people in the age group between 18 and 44 years (45.4%) had a higher percentage of visits than those between 44 and 64 years (34.3%) and those above 65 years (20.3%). While in Iran, found the age group 25-45 years old recorded the highest dental attendance within 2 years (41.1%), followed by the group 46-64 years old (37.6%) and least dental attendance for two years was in the group 15-24 years old (34.7%). Did a study in Toronto Canada where the findings were that: 84.2% for individuals 60 years and above, was the highest percentage of recent dental visits among the age groups, followed by 81.3% for people between 40-49 years old, then 76.4% for individuals 50-50 years old and the lowest percentage of dental visits was 69.6% for 25-39 years old.

In their study found that age was the most statistically significant pointer to the utilisation of dental services at the clinic in which they conducted their study. With the patients grouped in 15 years intervals, it was found that the highest attendance within the year was from patients aged from 16 to 30 years (39.5%), after which 31 to 45 years (22.8%), followed by 46 to 60 years (14.0%), then 1 to 15 years (13.7%), lastly those above 60 years (10.0%).

Grouped participants of the study into four age groups ranging between 18-29 years, 30-44 years, 45-59 years, and above 60 years. When questioned about their oral health status, 5.5% of participants aged 18-29 years thought that their poor or very poor oral health, together with 14.3% of those aged 30-44 years, 20.8% of those aged 45-59 years, 32.1% of those above 60 years. The percentage of respondents who thought the health of their gums was poor or very poor were, 3.7% among 18-29 years, 6.7% among 30-44 years, 12.9% among 45-59 years, and 20.3% of those above 60 years. Also, the report showed that 24.8% of 18-29 years old, 35.0% of 30-44-year olds, 40.3% of 45-59-year olds, 46.9%, and of participants above 60 years, had experienced oral pain in the last 12 months. Despite the reported numbers on poor oral health, a low number of patients (6.3% of 18-29 years old, 7.9% of 30-44 years old, 7.7%45-59-year olds, and 8.5% of those above 60 years) visited the dentist within the last 12 months. The problem of low dental visits is further highlighted by the high

percentage of patients that had never been to the dentist in their lifetime which was 82.3% among 18-29-years old, 71.1% among 30-44 years old, 62.1% among 45-60 years old and 58.6 in those above 60-year old.

Education level attained

Lutfiyya, et al. report on the United States, concerning levels of education, the lowest utilisation of dental services was reported among individuals that could not complete high school (9.4%), whilst High school graduates (58.5%), had the highest percentage of dental visits seconded by university graduates (32.6%).

Bornstein, et al. did another study in Toronto Canada, where they found that respondents who had less than high, school education had a lower dental attendance at 68.0% while the group that had completed high school had a higher dental attendance 77.7%.

While in Ontario, Canada, Zangiabadi, et al. found that 34.6% of individuals that had not completed high school had dental visits within 12 months, 31.5% of those with a high school or college diploma had dental visits within 12 months, and 23.5% of individuals with University degrees had dental visits within 12 months of the study.

In Iran, Bahramian, et al. found University graduates dental attendance within 2 years was highest at 42.8%, followed by attendance of high school graduates at 38.3%, and people that did not complete high school had the lowest dental attendance at 35.3%.

In the United States, a cross-sectional study by Ju, et al., of data from the National Health and Nutrition Examination Survey (NHANES) from 2015–2016 revealed inequality in the utilisation of oral health services according to education level attained. Inequality measurements were based on the report of a participant's failure to visit a dentist within the year. It was noted that 60.3% who had not completed high school, 50.5% of those who had only completed high school, 41.3% of those that had some college education and only 22.0% of those that had completed college failed to visit the dentist in the year.

Employment status

According to Choi, et al., South Korea achieved universal health insurance 12 years after the implementation of a national health insurance system. The existence of universal health insurance, therefore, makes it much easier to isolate the effect of employment on the utilisation of dental care services without the influence of insurance. The researchers thus decided to conduct a study on the the relationship between employment status of patients and their reported unmet dental care needs. This was done by asking participants if they had failed to access dental care services over the past year when they needed treatment or a check-up. The proportion of participants reporting unmet oral need was relatively low and with little variation across the various groups, *i.e.* 14.6% of the permanently employed, 19.4% of those in precarious employment, 19.5% of the self-employed, and 17.8% of those unemployed [19].

In British Columbia, Canada, Jessani, et al. did a study on dental care utilisation: patterns and predictors in persons living with HIV, and according to their findings, employment status was not a statistically significant predictor of utilisation. This is because 65.2% of the unemployed respondents, as well as 68.2%, did not have a dental visit in the past year while 34.8% of the unemployed, as well as 31.8% of the employed, had a dental visit in the past year. Lutfiyya, et al. report on the United States showed that, employed individuals had the highest percentage of visits at 58.5%, the group of the unemployed reported 4.3% visits, and of the people who had chosen to remain unemployed, or those unable to work, reported visits by 37.2% of the group.

In a retrospective study of patients attending a dental clinic in one year, at the dental clinic located at the federal college of dental technology and therapy in Enugu, Nigeria, Onyejaka, et al., found employment status to be a significant factor in the utilisation of dental services. The employment status of the 6008 patients was as follows, 40.8% students, 26.2% worked for private businesses, 20.6% civil servants, 11.0% unemployed and 1.3% were clergymen [20].

Olusile, et al., conducted a cross-sectional survey in the North-Central, North-West, South-East, South-South, and South-West geopolitical zones of Nigeria, to investigate self-rated oral health status, oral health service utilisation, and oral hygiene practices among adult Nigerians. The researchers clustered the participants by employment status according to 5 groups as follows: unspecified, student, unskilled worker, skilled worker, very skilled worker. Their findings showed that 82.6% of students, 77.6% of unskilled workers, 76.2% of the unskilled group, 71.5% of the skilled workers, and 66.8% of the very skilled workers had never visited the dentist throughout their life.

Dental insurance coverage

The 'inverse care law,' states that "the availability of good medical care tends to vary inversely with the need for it in the population served" *i.e.* those who most need medical care, are the ones who cannot afford it and not least likely to receive it. Many people from around the world are suffering from oral pain and other problems of the mouth or teeth, which is a rapidly expanding public health problem in developing countries because of limited dental services. The inverse care law is highlighted in developing countries by limitations in access to dental care due to cost and other factors that further constraint access. To encourage fair access to necessary oral health care, the World Health Organization advocates for universal dental coverage at the primary healthcare level with special attention to ensure that the most vulnerable population groups can access the care they need.

Individuals without dental insurance, or with only limited insurance coverage show reduced utilisation of oral health services. Dental insurance reduces the costs that prevent individuals from accessing care. A systematic review and meta-analysis of data from 3 electronic databases (MEDLINE, Embase, Cochrane Central Database), covering the period from January 2005 to April 2017, found that dental insurance has a significant effect on increasing utilisation in dental care.

Findings made by in the Health and Retirement Study (HRS) agree. The HRS is a household survey in the U.S. that collects self-reported data from interviews with a sampled population of individuals over age 50 every other year. The HRS is an excellent data source for assessing the association between dental coverage, use, and retirement among an older population. This is because the study contains a large amount of information on demographics;

income, assets, physical health, mental health and cognition, health care utilisation, health care costs, and health insurance coverage. Manski, et al., carried out an analysis on HRS self-reports from 17,217 adults older than 50 years, and data from 14,970 respondents was accepted and included in the study. Their study focused on factors that affected whether or not a person visited the dentist within two years of the most recent survey. And some of the most statistically significant predictors of a dental visit were having no natural teeth, poor-fair self-reported health, and possession of dental coverage.

In the U.S., Medicaid is the nation's public health insurance program for people with low income. In 2011, Choi did a study to compare the similarities and differences in the dental visiting behaviour of patients with low income between states that offer medicaid coverage, and those that do not. Her findings showed that low-income patients with medicaid dental coverage were 16.4 to 22.0% more likely to have visited a dentist within the 12 months before the study.

According to in a study done in Ontario Canada, it is not only the unemployed or low-income earners who have difficulty affording and accessing dental care, but also middle-income earning adults. Their study also revealed that participants with dental insurance have better oral health outcomes despite the different income, education, and age groups, after adjusting for covariates. The results of the study showed that possession of insurance increases the proportion of individuals visiting the dentist by 25.0 to 29.3% amongst those in the lowest fifth of income-earners.

Blomqvist and Woolley make the case for expanding the governments role in financing dental care in Canada citing the fact that many Canadians have refrained from visiting a dentist in the past due to financial reasons. The largest share of dental care costs for Canadians is paid for by Private dental insurance, therefore uninsured Canadians suffer the most from financial barriers against access to the dental care they need. The authors make their case for universal public dental insurance and suggest three possible routes of implementation which are: building a universal single-payer plan; consolidating, expanding, and rationalizing existing public dental insurance plans; universal dental insurance with public-private competition.

Dental care related anxieties

Anxiety is an emotional state in which a person experiences a feeling of tension about future events, and it is usually characterised by; restlessness, a sense of dread, feeling constantly "on edge", difficulties in concentrating, and irritability. In severe cases, anxiety may be accompanied by physical symptoms such as dizziness, tiredness, palpitations, muscle aches, and tension, trembling or shaking, dry mouth, excessive sweating, shortness of breath, stomach ache, nausea, headaches, pins and needles, and insomnia.

Dental anxiety is the form of anxiety associated with the thought of visiting the dentist for either preventive care or other dental procedures. The development of dental anxiety is often related to anticipation of a painful injection or procedure, the discomfort of keeping one's mouth open for an extended period, or a lengthy and costly treatment plan. Patients with dental anxiety may perceive experiencing more pain that lasts longer; moreover, these patients

also have an exaggerated memory of pain they experienced. Patients with dental anxiety often delay visiting the dentist for fear of experiencing pain and such behaviour ultimately culminates in poorer oral health status and presentation to the dental clinic when in acute emergencies that require complicated and traumatic treatment procedures. Therefore, there is a positive reinforcement of the patients' anxiety leads to further avoidance of dental visits and this creates a vicious self-perpetuating cycle if these patients are not identified and managed properly.

Dental anxiety can be scored using the Modified Dental Anxiety Scale (MDAS), which is a tool containing 5 questions, and respondents answer each question on a scale from (not anxious) to 5 (extremely anxious). The scores to each question are then tallied to get the patients final score out of a total of 25 points, with the patients responses ranging from 5 (not anxious) to 25 (extremely anxious) out of 25.

In a study by White, et al. the findings showed that on average, women had greater levels of anxiety (2.12 points greater). The study also reported that 17% of participants scored 15 points or above and 7% scored not less than 19 points on the modified dental anxiety scale. Furthermore, the researchers report that 8.4% of respondents admitted to being anxious enough to avoid visiting the dentist, and the reasons cited for the causes of their anxiety, were clustered under the themes: fear of dental experience (30.8%), previous negative dental experience (50%), cost of treatment (7.7%), gag reflex (3.8%), and fear of bad news(7.7%). In a study in Chennai, India Appukuttan, et al. found out that 17.5% of respondents had postponed visiting the dentist due to anxiety, and on average, patients who rated their last dental visit as bad had a higher anxiety score (12 points) compared to those who had a good experience (10.1 points). In addition, the study found an inverse correlation between the average anxiety score (Figure 1).
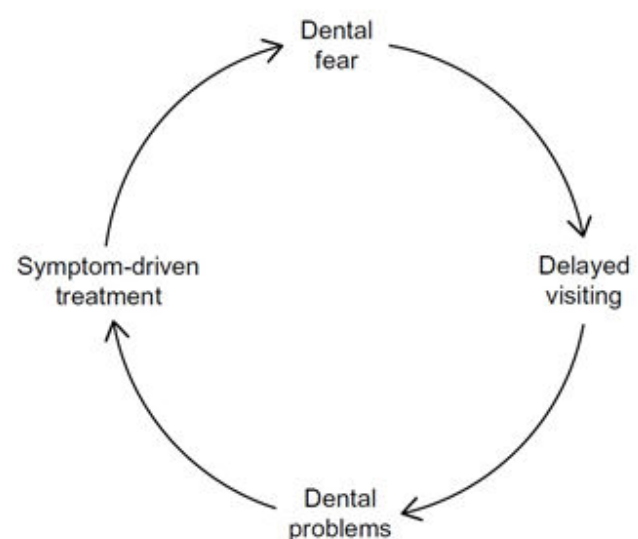

Figure 1. The vicious cycle of dental fear.

Reproduced from: The vicious cycle of dental fear: exploring the interplay between oral health, service utilisation and dental fear and age of the participants, and a slight variation in average anxiety score across genders as females scored 10.71 and males 10.08 points. Lastly, different educational levels showed varying mean anxiety scores with the uneducated having the highest average 11.92 points,

those with post-graduate degrees 11.13 points, degree/diploma holders 10.35 points, and high school graduates 10.03 points (Table 1).

Objectives

General objective: To understand the utilisation pattern of oral health care services by adults attending the dental department at Ndola Teaching Hospital.

Specific objectives

• To understand the proportions of different patterns of dental attendance of adult patients visiting the dental department and Ndola.

• To investigate the social, economic and demographic factors that are associated with specific patterns of utilisation of oral health services.

• To establish the prevalence and severity of dental anxiety among patients and investigate if it has any effects on the utilisation patterns of dental services.

Research question

What are the utilisation patterns of oral healthcare services among the various patients visiting the Ndola Teaching Hospital dental department?

Measurements

Independent variables	Dependent variable
Age	Utilisation pattern of oral health services.
Gender	
Highest education level attained	
Employment status.	
Dental insurance coverage.	
Dental anxiety.	

Table 1. Measurements between Independent variables and dependent variable

Conceptual framework

According to the Andersen and Newman Framework of Health Services Utilisation, an individual's access to and use of health services is a function of three characteristics, namely; predisposing factors, enabling factors, and need factors (Figure 2).
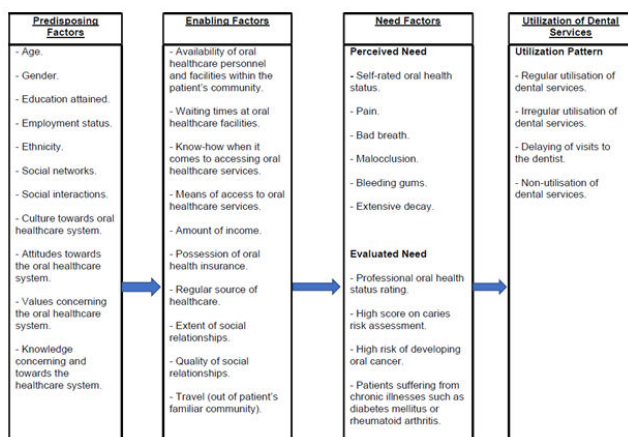

Figure 2. Conceptual framework.

Predisposing factors: Refer to the socio-cultural characteristics of individuals that exist before their illness. These include factors such as; age, gender, education level attained, employment status, ethnicity, social networks, social interactions, culture, attitudes towards healthcare, values concerning the healthcare system, and knowledge that people have concerning and towards the health care system.

Enabling factors: Are conditions that affect the patient when it comes to the logistical aspects of obtaining care. They include; the availability of healthcare personnel and facilities within the patients' community, waiting times at healthcare facilities, know-how when it comes to accessing healthcare services, the means of access to healthcare services, amount of income, possession of health insurance, a regular source of healthcare, the extent of social relationships, quality of social relationships, and travel (patients being away from their community).

Need factors: Are the most immediate cause of health service utilisation, as they stem from health and functional problems that generate the need for healthcare services. Need factors can further be divided into perceived need and evaluated need. Perceived need refers to how patients view their general health and functional state, as well as how they experience symptoms of illness, pain, and worries about their health and whether or not they judge their problems to be of sufficient importance and magnitude to seek professional help. Evaluated need represents a healthcare professional's judgment about a patient's health status and the extent of their need for medical care. Perceived and evaluated needs affect the utilisation pattern of health services in different ways *i.e.* Perceived need will better help to understand care-seeking and adherence to a medical regimen, while evaluated need will be more closely related to the kind and amount of treatment that will be provided after a patient has presented to a medical care provider.

Methodology

Study Site

Ndola teaching hospital is a level 3 hospital is located on plot number 10101 at the corner of Broad way and Nkana Road, Ndola,

Copperbelt Province, Zambia. The hospital offers many key health services including dental services, TB diagnostic services, laboratory services, X-Ray services among others (Figure 3).
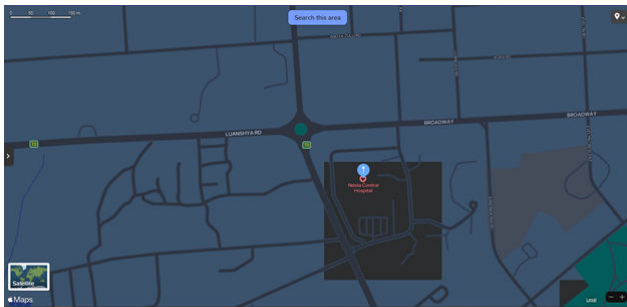

Figure 3. Map of study site.

Target population

All adult males and females above the age of 18 years visiting the dental department at Ndola teaching hospital. The choice of adult subjects for the study was because of the greater influence that adults have over their own healthcare decisions.

Study design

The research design used was a cross-sectional quantitative study so as to describe factors affecting the utilisation, as well as the utilisation patterns of oral healthcare services of adult patients visiting Ndola Teaching Hospital (Figure 4).

Sample size and sampling procedures

The study made use of use purposive sampling, and targeted only adult patients that visited the dental department at Ndola Teaching Hospital, and interviews were held with all the patients who had agreed to participate in the study. The sampling was meant to only include participants e the number of participants who are part of the target population.

$$n = \frac{(Z^2)P(1-P)}{E^2}$$

$$n = 385$$

n – The sample size.

Z – 1.96 is the standard deviation from the mean at the 95% confidence level.

P – 0.5 to maximize the variability in the baseline level of indicators.

E – 0.05 is the expected margin of error within the 95% confidence level.

Figure 4. Sample size calculation.

Inclusion and exclusion criteria

The study included all participants who meet the following criteria:

- Adults above 18 years old.
- Registered hospital patients possessing a patient file.
- Patients who had visited the hospital during the stipulated working hours of the dental department.
- Patients that had agreed to participate in the study.

The study excluded the following patients from participating in the study:

- Patients under the age of 18 years old.

- Patients visiting out of the stipulated working hours.
- Patients not in possession of a patient file.
- Patients unwilling to participate in the study.
- Participants with whom effective communication could not be achieved.

Data collection

Data were collected from participants using a structured questionnaire to provide uniform responses and to limit the data collection to include only the data that was relevant to the research. The structured questionnaire that was used in the interviews is part of the appendices and was adapted from the 5th edition of the World Health Organization manual titled 'Oral Health Surveys: Basic methods. The questionnaire was administered in a face-to-face interview in english or translated to the language the patient was most comfortable with. In cases where communication was ineffective due to a lack of a translator then the interviews were canceled to avoid collecting inaccurate information.

Data analysis

Data analysis was carried out using version 26.0 of IBM SPSS Statistics. The frequency of responses to particular questions was described in percentages, and the correlations were analysed using Pearson's correlation coefficient.

Ethical consideration

To begin with, ethical approval to conduct the study was obtained from the Tropical Diseases Research Centre (TDRC) Ethics Review Committee (ERC), thereafter, permission to conduct the study was obtained from the Copperbelt Provincial Health Office (PHO) and Ndola teaching hospital through the provincial health director and senior medica superintendent respectively. All the letters of approval have been added to the appendices.

As directed by the PHO, interviews with the patients were conducted whilst observing the guidelines provided by the ministry of health on the prevention of COVID-19 transmission, which included wearing a facemask, frequent hand washing or using an alcohol-based hand sanitizer, avoiding handshakes, coughing or sneezing into a flexed elbow, and keeping a distance of one metre or more during the interview.

The interviews shall not take priority over the treatment of the patients and shall not interfere with the management of the patient as it will be administered to stable patients that are willing to participate.

Study limitations

The study is only able to describe utilisation patterns for different patients and correlate with the available demographic data, however, the study is not able to explain why particular patients have the specific utilisation pattern described.

Secondly, efforts were made to minimize time spent per interview because patients were primarily seeking oral healthcare services and therefore priority was given to the patients' access to health services. In addition, time spent per interview had also to be minimized to reduce the contact time between the interviewer and the patients as a

way to further limit the risk of transmitting the SARS-CoV-2 virus between the patient and interviewer.

Furthermore, some disease conditions suffered by the patients visiting the dental department at Ndola teaching hospital rendered patients unable to communicate verbally. This is because some patients were unable to properly speak due to swellings or fractures around the jaws, while others suffered severe pain or increased discomfort arising from an attempt to speak.

Results

Out of the targeted population of 385 respondents, we received 288 respondents who met the inclusion criteria and were willing to participate in the study, resulting in a response rate of 74.81%. Toothache was the most common reason stated for visiting the dentist as it was responsible for 65.63% of the current as well as 77.31% of the last dental visit attended by the patients (Table 2).

Variables	Categories	n (%)
Age (years)	18-34	167 (57.99)
	35-54	99 (34.37)
	55+	22 (7.61)
Gender	Male	96 (33.33)
	Female	192 (66.67)
Education	Up to primary school	60 (20.83)
	Secondary school or above	228 (79.17)
Employment	Unemployed	42 (14.58)
	Student	47 (16.32)
	Employed	199 (69.09)
Dental insurance	Yes	162 (56.25)
	No	126 (43.75)
Health insurance policy provider	Hospital-Staff Plan	12 (7.41)
	National Health Insurance	126 (77.78)
	Private insurance company	24 (14.81)
Dental anxiety	Mild to moderate dental anxiety	265 (92.01)
	Severe anxiety or dental phobia	23 (7.99)
Last dental visit	Never to more than 1 year	198 (68.75)
	Within 1 year	90 (31.25)

Table 2. Prevalence and distribution of socioeconomic variables.

When asked about the time since the last dental visit of the patient, 31.25% (regular attenders) of patients had visited the dentist within a year before the current visit, 68.75% (non-regular attenders) had last visited the dentist for more than a year. The population consisted of 33.33% male respondents and 66.67% female respondent, with age ranging from 18 to 71 years, a mean age of 34.89 and a median age of 32 years. The ages were clustered into three groups namely 18-34 years (57.99%), 35-54 years (34.37%) and 55+ years (7.61%). Questioning on the highest level of education attained showed that 20.83% had up to a primary school education, while 79.17% had a completed a secondary school education or higher. In addition, the population consisted of 14.58% unemployed, 16.32% student and 69.09% employed respondent; with 56.25% of the population having dental insurance, and 43.75% without. For the respondents with insurance, the insurance providers for 7.41% was the hospital staff-plan, 77.78% was the national health insurance management Authority, and for 14.81% were private insurance companies. The majority of the population (92.01%) was classified

under mild to moderate dental anxiety, while those with severe dental anxiety were 7.99% of the population (Figure 5).
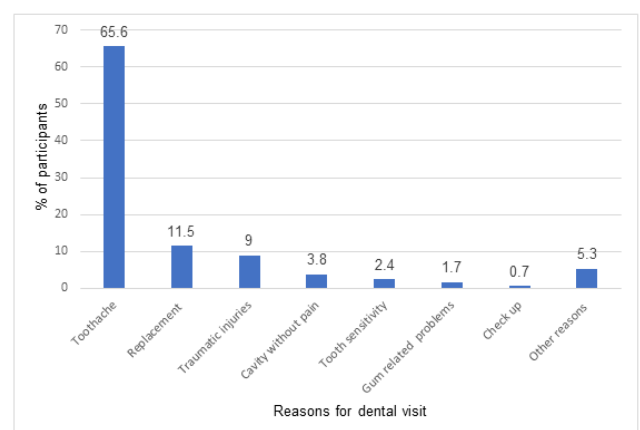

Figure 5. Reasons for visiting the dentist.

The most common reason for which participants were visiting the dental department was toothache (65.6%), seconded by replacement of missing teeth (11.5%), whilst only 0.7% of participants were visiting for a check-up.

Testing for correlation between the dependent (annual dental visits) and independent variables showed significant correlations from three independent variables, namely age (p=.001), gender (p=.000), and insurance policy provider (p=.004). The age group 18-34 years had 40.72% regular, with 59.28% non-regular attenders; group 35-54 years 84% non-regular, with 16% regular attenders; while group 55+ had 71.43% non-regular, with 28.57% regular attenders. The female population consisted of 60% non-regular and 40% regular attenders while the males were made up of 85.71% non-regular and 14.29% regular attenders. Participants who had received up to primary education had 70% non-regular and 30% regular attenders while those with secondary education or higher had 68.42% non-regular and 31.85 regular attenders. Employment cross-tabulation with

utilisation patterns showed that 57.14% of the unemployed were non-regular, whilst 42.86% were regular attenders; 70.21% of students were non-regular whilst 29.79% were regular attenders; and 70.85%of the employed were non-regular whilst 29.15% were regular attenders of dental visits. Participants with dental insurance coverage consisted of 66.67% non-regular attenders and 33.33% regular attenders; whilst those without coverage had 71.43% non-regular attenders and 28.57% regular attenders. The patients having health insurance policy from the hospital staff had no dental visits withing the last year; those with policies from the NHIMA 66.67% non-regular and 33.33% regular dental attenders; whilst those with private insurance policy showed 50% non-regular and 50% regular attendance. Lastly participants with mild to moderate dental anxiety had 69.81% were non-regular a while 30.19% were regular attenders: and participants with severe dental anxiety 56.52% were non-regular attenders whilst 43.48% were regular attenders (Table 3).

Variable	Category	Last dental visit						P value
		Non-regular (>1 year ago)		Regular (<1 year ago)		Total		
		n	%	n	%	n	%	
Age	18-34	99	59.28	68	40.72	167	100	.001**
	35-54	84	84	16	16	100	100	
	55+	15	71.43	6	28.57	21	100	
Gender	Female	114	60	76	40	190	100	.000**
	Male	84	85.71	14	14.29	98	100	
Education	Up to primary school	42	70	18	30	60	100	0.815
	Secondary school or higher	156	68.42	72	31.58	228	100	
Employment	Unemployed	24	57.14	18	42.86	42	100	0.118
	Student	33	70.21	14	29.79	47	100	
	Employed	141	70.85	58	29.15	199	100	
Dental insurance	Yes	108	66.67	54	33.33	162	100	0.389
	No	90	71.43	36	28.57	126	100	
Dental insurance provider	Hospital-staff policy	12	100	0	0	12	100	0.004**
	National health policy	84	66.67	42	33.33	126	100	
	Private insurance	12	50	12	50	24	100	
Dental anxiety	Mild to moderate	185	69.81	80	30.19	265	100	0.188
	Severe	13	56.52	10	43.48	23	100	

Table 3. Correlation of Socioeconomic variable with dental attendance pattern.

Discussion

Utilisation patterns

When asked about the time since the last dental visit of the patient, 31.25% (regular attenders) of patients had visited the dentist within a year before the current visit, 68.75% (non-regular attenders) had last visited the dentist more than a year ago. The vast majority of the patients (99.31%) of patients were visiting the dental department for symptomatic reasons of which toothache was the most common (65.63%), and only 0.69% were visiting for routine check-ups.

There are very large differences in the utilisation of preventive and symptomatic dental services among different countries and different regions. In their 2015 study, Aldossary, et al. found that 32% of patients identified as current regular-attenders, 30% as former regular-attenders, 28% as always regular-attenders, and 10% as never-regular attenders. For contrast, a study among Jordanian adults by Obeidat, et al. in 2014 found that 93.3% of respondents had visited a dentist before; and 89% of the dental visits were due to symptomatic reasons and only 6.7% were for check-ups. While Ayaji and Arigbede in 2012 found that only 44.2% of respondents had never visited a dentist at any time in their lives, 69.71% of visits were for symptomatic

reasons while 30.29% visited for preventive check-ups. On the contrary, in the United Kingdom, Marshman, et al. reported a lower number of symptomatic dental visits (19.7%) and a higher number of visits for regular and occasional check-ups (75.2%). Furthermore, Saddki, et al. found that 29% of subjects had visited a dentist during their before, of which 20.1% of visits were for symptomatic reasons, and only 8.9% of the visits were for check-ups.

Gender

The population consisted of 33.33% male respondents and 66.67% female respondents; the female population consisted of 60% non-regular and 40% regular attenders while the males were made up of 85.71% non-regular and 14.29% regular attenders. The correlation between gender and patten of dental attendance was statistically significant (r=-.263 p=.000), and the females had a higher proportion of regular attenders of dental visits. The findings of the study appear to concur with the 2017 STEPS report on non-communicable diseases showed a slightly higher proportion of women (8.2%) that had visited the dentist within the last year compared to men (6.1%), and also a lower proportion of women (71.5%) stated that they had never visited a dentist before, compared to men (77.6%).

According to research undertaken by Deeks, et al. women were statistically significantly more likely to attend health screening, women were found to have more healthy beliefs and behaviours concerning chronic diseases and illnesses. In addition, more women than men felt that it was their responsibility to seek advice on disease prevention and were more likely to participate in health prevention strategies such as seeking out reading material on non-communicable diseases. Lutfiyya et al reported a lower percentage of the males (46.5%) visiting the dentist within 12 months of the survey compared to females (53.5%). In contrast, Zangiabadi, et al. found that males had a higher percentage of dental visits at 30.7% while for females, 25.0% reported visiting the dentist within 12 months of the interview. Bornstein, et al. found that: female respondents (77.2%) had a slightly higher percentage of visits to the dentist than male respondents (74.3%). In Iran, Bahramian, et al. found minor differences in dental attendance between males and females in that 60.8% of males and 61.7% of females had not been to the dentist in 3 years, and 39.2% of males and 38.3% of females visited a dentist every 1-2 years. Onyejaka, et al., studied the attendance of a dental clinic in Nigeria for a year, in which they found that there had been 2664 males (44.3%) and 3344 females (57.7%).

Age

The population had ages ranging from 18 to 71 years, a mean age of 34.89 and a median age of 32 years. The ages were clustered into three groups namely 18-34 years (57.99%), 35-54 years (34.37%) and 55+ years (7.61%). The age group 18-34 years had 40.72% regular, with 59.28% non-regular attenders; group 35-54 years 84% non-regular, with 16% regular attenders; while group 55+ had 71.43% non-regular, with 28.57% regular attenders. The correlation between age group and patten of dental attendance was statistically significant (r=.195 p=.001), and the younger age groups had higher proportions or regular attenders of dental visits.

In a study on the effects of gender and age on health related behaviours, Deeks, et al., observed that younger participants are less likely to have annual health checks, seek advice or attend education sessions for prevention of lifestyle-related disease and illness.

Findings by Lutfiyya, et al showed that age group between 18 and 44 years (45.4%) had a higher percentage of visits than those between 44 and 64 years (34.3%) and those above 65 years (20.3%). While in Iran Bahramian, et al., found the age group 25-45 years old recorded the highest dental attendance within 2 years (41.1%), followed by the group 46-64 years old (37.6%) and least dental attendance for two years was in the group 15-24 years old (34.7%). Bornstein, et al., did a study in Toronto Canada where the findings were that: 84.2% for individuals 60 years and above, was the highest percentage of recent dental visits among the age groups, followed by 81.3% for people between 40-49 years old, then 76.4% for individuals 50-50 years old and the lowest percentage of dental visits was 69.6% for 25-39-year-olds. In their study, Onyejaka, et al. found that age was the most statistically significant pointer to the utilisation of dental services. it was found that the highest attendance within 12 months was from patients aged from 16-30 years (39.5%), after which 31-45 years (22.8%), followed by 46-60 years (14.0%), then 1-15 years (13.7%), lastly those above 60 years (10.0%).

Education

Questioning on the highest level of education attained showed that 20.83% had up to a primary school education, while 79.17% had a completed a secondary school education or higher. Participants who had received up to primary education had 70% non-regular and 30% regular attenders while those with secondary education or higher had 68.42% non-regular and 31.85 regular attenders. Checking for a correlation between education attained and the patten of dental attendance showed not statistically significant correlation (r=-.014 p=.815).

Lutfiyya, et al. report on a population visiting the dentist comprised 9.4% individuals that could not complete high school, 58% High school graduates, 32.6% university graduates. Bornstein, et al. found that respondents who had less than high, school education had a lower dental attendance at 68.0% while the group that had completed high school had a higher dental attendance 77.7%). Zangiabadi et al found that 34.6% of individuals that had not completed high school had dental visits within 12 months, 31.5% of those with a high school or college diploma had dental visits within 12 months, and 23.5% of individuals with University degrees had dental visits within 12 months of the study. Bahramian, et al. found University graduates dental attendance within 2 years was highest at 42.8%, followed by attendance of high school graduates at 38.3%, and people that did not complete high school had the lowest dental attendance at 35.3%. In the United States, a cross-sectional study by Ju, et al., in 2021 reported It that 60.3% of subjects who had not completed high school, 50.5% of those who had completed high school, 41.3% of those that had some college education and only 22.0% of those that had completed college failed to visit the dentist in the year.

Employment

The population consisted of 14.58% unemployed, 16.32% student and 69.09% employed respondents. Employment cross-tabulation with utilisation patterns showed that 57.14% of the unemployed were non-regular, whilst 42.86% were regular attenders; 70.21% of students were non-regular whilst 29.79% were regular attenders; and

70.85% of the employed were non-regular whilst 29.15% were regular attenders of dental visits. There was no significant correlation found between patten of dental attendance and employment status (r=.092, p=.118).

South Korea having achieved universal health insurance, provides an environment in which it is much easier to isolate the effect of employment on the utilisation of dental care services without the influence of insurance. According to a South Korean study by Choi, et al. the proportion of participants reporting unmet dental health need was relatively low and with little variation across the various groups. The results showed only 14.6% of the permanently employed, 19.4%of those in precarious employment, 19.5% of the self-employed, and 17.8% of those unemployed reported unmet oral need. Jessani, et al., found that employment status was not a statistically significant predictor of dental care utilisation patterns as only 34.8% of the unemployed, as well as 31.8% of the employed respondents, had a dental visit in the past year. Lutfiyya et al reported that, employed individuals had the highest percentage of dental visits within their study population at 58.5%, the unemployed composed only 4.3% of the group, and 37.2% of the group were those who had chosen to remain unemployed or were unable to work. In Enugu, Nigeria, Onyejaka, et al., found employment status to be a statistically significant factor in the utilisation of dental services and the study population was distributed as follows; 48.1% were employed, 40.8% students, and 11.0% unemployed. While in a different part of Nigeria, Olusile, et al., conducted a cross-sectional survey Their findings showed that 82.6% of students, 77.6% of unskilled workers, 76.2% of the unskilled group, 71.5% of the skilled workers, and 66.8% of the very skilled workers had never visited the dentist throughout their life.

Insurance

For the respondents with insurance, the insurance providers for 7.41% was the hospital staff-plan, 77.78% was the national health insurance management authority and for 14.81% were private insurance companies. Participants with dental insurance coverage consisted of 66.67% non-regular attenders and 33.33% regular attenders; whilst those without coverage had 71.43% non-regular attenders and 28.57% regular attenders. The patients having health insurance policy from the hospital staff had no dental visits withing the last year; those with policies from the NHIMA 66.67% non-regular and 33.33% regular dental attenders; whilst those with private insurance policy showed 50% non-regular and 50% regular attendance. The correlation between possession of dental insurance and the patten of dental attendance showed no statistical significance (r=.051, p=.389), however, the correlation between insurance policy provider and pattern of dental attendance showed a statistically significant correlation (r=-.225, p=.004).

The 'inverse care law,' states that "the availability of good medical care tends to vary inversely with the need for it in the population served" *i.e.* those who most need medical care, are the ones who cannot afford it and least likely to receive it. Many people from around the world are suffering from oral pain and other problems of the mouth or teeth, which is a rapidly expanding public health problem in developing countries because of limited dental services. The inverse care law is highlighted in developing countries by limitations in access to dental care due to cost and other factors that further constraint access. To encourage fair access to necessary oral health care, the World Health Organization advocates for universal dental coverage at the primary healthcare level with special attention to ensure that the most vulnerable population groups can access the care they need. Individuals without dental insurance, or with only limited insurance coverage show reduced utilisation of oral health services. Dental insurance reduces the costs that prevent individuals from accessing care. In addition, Blomqvist and Woolley in Canada also make the case for expanding the governments' role in financing dental care citing the fact that many Canadians have refrained from visiting a dentist in the past due to financial reasons. The largest share of dental care costs for Canadians is paid for by private dental insurance, therefore uninsured Canadians suffer the most from financial barriers against access to the dental care they need. In 2011, Choi did a study to compare the similarities and differences in the dental visiting behaviour of patients with Medicaid dental coverage, and those without and found that patients with Medicaid dental coverage were 16.4% to 22.0% more likely to have visited a dentist within the 12 months before the study. According to a study by Zivkovic, et al. participants with dental insurance had better oral health outcomes despite the different income, education, and age groups, after adjusting for covariates. The results of the study showed that possession of insurance increases the proportion of individuals visiting the dentist by 25.0 to 29.3% amongst those in the lowest fifth of income-earners.

Dental anxiety

After the scores of the modified dental anxiety scale were clustered into Mild to moderate dental anxiety (score 5-19) and Severe dental anxiety (score 20-25), the majority of patients (92.01%) fell under mild to moderate, while the remainder (7.99%) had severe dental anxiety. The participants with at most moderate dental anxiety showed a population with 30.19% last dental visit within 12 months (regular attenders), and 69.81% (non-regular attenders) outside 12 months. Whilst the severely dentally anxious patients had 43.48% regular attenders and 56,52% non-regular attenders. The correlation between time since last dental visit and anxiety level was not statistically significant (r=-.078, p=.188).

White, et al the findings showed that on average, women had greater levels of anxiety (2.12 points greater). The study also reported that 17% of participants scored 15 points or above and 7% scored not less than 19 points on the Modified dental anxiety scale. In addition, the researchers report that 8.4% of respondents admitted to being anxious enough to avoid visiting the dentist. In a similar study in Chennai, India Appukuttan, et al found out that 17.5% of respondents had postponed visiting the dentist due to anxiety.

Conclusion

From the results of the study, the classification of patients according to attendance patterns revealed that 31.25% were regular attenders and 68.75% were non-regular attenders. A bivariate analysis conducted in the dependant variable (dental attendance pattern) the independent variables found age, gender and the dental insurance provider to be significantly correlated with the dental attendance patterns. Furthermore, no significant correlation between patient's dental anxiety level and utilisation pattern or time since last dental visit. The most significant determining factor of whether or not

visited the dentist seemed to be the presence of symptoms, as 99.31% of visits were symptom driven.

Recommendations

The patterns of dental attendance seem most influenced by the presence of symptoms, and the majority of patients only attend dental visits when suffering from one or more symptoms. It is therefore necessary to educate patients on the prevention and early detection of dental diseases and conditions as a way of minimizing costs, avoiding uncomfortable symptoms, maintaining aesthetic appearance, and avoiding lengthy as well as traumatic procedures to cure advanced disease.

Acknowledgements

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