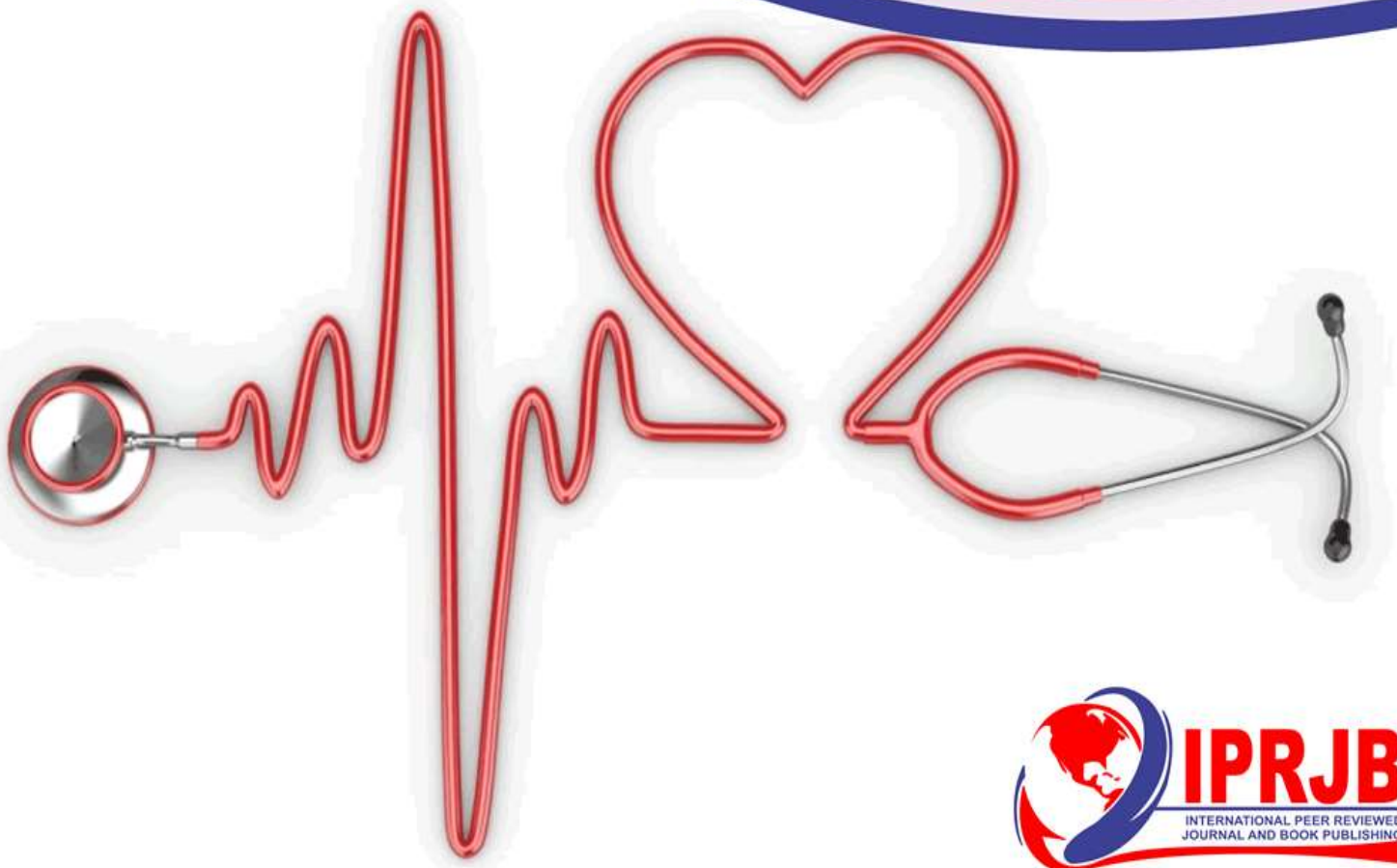




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**Socio-Demographic Characteristics Associated With Dental Caries among Patients  
Attending Malindi Sub-County Dental Clinic, Kenya**


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### Socio-Demographic Characteristics Associated With Dental Caries among Patients Attending Malindi Sub-County Dental Clinic, Kenya

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#### Abstract

**Purpose:** The goal of this study was to determine socio-demographic characteristics associated with dental caries among patients attending dental clinic at Malindi sub-county.

**Methodology:** The study design was a cross-sectional descriptive study design consisting of 223 participants. This study took place at the Malindi Sub County Dental Clinic. A systematic random sampling method was used to pick the participants on a daily basis until we had contacted all the eligible individuals and enrolled them. This study was done from March, 2023 to November, 2023 approved by ERC reference (ISERC/MSc/041/2022). The pretested questionnaire was used for collecting data on socio-demographic characteristics associated with dental caries among patients attending dental clinic at Malindi sub-county. The data were analyzed using statistical package for the Social Sciences (SPSS) Version 21. The descriptive statistics were done on socio-demographic factors, associated with the dental caries among dental patients seeking services in Malindi Sub County. The data was presented in frequency tables. Ethical approval no P688/09/2016) was obtained.

**Findings:** The study recruited 223 participants, 117 (52.5%) female and 106 (47.5%) males. Of the 223 participants, 49 (21.9%) were less than 18 years old, 63 (28.3%), 76 (34.1%) and 35(15.7%) were 18 to 29, 30 to 49 and  $\geq 50$  years old respectively. The prevalence of dental caries found in this study was 72.6% among patients attending Malindi sub county Hospital dental clinic. The socio-demographic factors, associated with the dental caries were those aged 18- 29 years who were 2 times at risk of having dental caries as compared with those aged less than 18years old. Almost two-thirds (n=138, 61.9%) reported to occasionally use sugary food, 72 (32.3%) moderately sugar exposures per day.

#### Unique Contribution to Theory, Practice and Policy:

This study revealed a high prevalence of dental caries among patients visiting the dental clinic in Malindi Hospital. The demographic factors associated with dental caries were among ages 18 to 29 years old. Oral health care should focus on addressing dental caries and emphasized in the policies by Ministry of health aimed at mitigating dental caries among this age group.

**Keywords:** *Dental Caries, Dental Clinic*

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## **INTRODUCTION**

Globally dental caries, severe gum disease, and significant tooth loss have been identified as important oral health issues that impair overall health and quality of life (CDC 2019). According to the Centre of Disease Control (CDC) 2019 Global Report, one out of every four individuals aged 20 to 64 had dental cavities in 2017, and 525 million children had cavities in their primary teeth by the age of eight. According to the survey, low-income children are twice as likely as high-income children to have cavities in their primary (baby) teeth. With a population of more than 892 million people, Africa's oral health burden is estimated to be over 400 million people spread across 47 countries. The disease pattern in the region is changing, owing to rising urbanization and changes in living conditions, increased consumption of free sugars and inadequate fluoride exposure, extensive tobacco use, and increased alcohol usage (WHO 2019). Furthermore, there is an unequal distribution of oral health personnel in Africa, as well as a lack of acceptable and functioning facilities within the primary health care system, resulting in limited or no access to effective oral health care services (WHO, 2017; WHO 2016). Dental caries is frequently overlooked in health planning due to an overestimate of the disease's true burden and impact, as well as a lack of a dedicated oral health budget, which forces people to pay considerable out-of-pocket costs for oral health care. (WHO, 2017).

In Kenya, dentists, dental technologists, and oral health officials provide dental services in . In order to improve dental services in Kenya, the government created a National Oral Health Policy, which intended to reduce the burden of oral illness, provide equitable and cost-effective quality services, and encourage people to follow a healthy lifestyle. The untreated oral diseases affected by social demographic characteristics of participants such as age, education level, gender, marital status posing a challenge in receiving benefits of primary health care services. Therefore, this study aimed to determine socio-demographic characteristics associated with dental caries among patients attending dental clinic at Malindi sub-county.

### **Problem Statement**

Globally Poor dental outcomes have been linked to a variety of socio-demographic and behavioral/lifestyle factors (WHO 2019: CDC 2019). The oral disorders are on the rise in Kenya, with dental caries affecting 47.3 percent of adults and 23.9 percent of children (Wamiti, (2020.)) In Kenya little has been done on socio-demographic factors associated with Dental Caries to inform policy formulation and development of mitigation measures to improve on oral health among Kenyan population. Therefore, the researcher aimed to determine socio-demographic characteristics associated with dental caries among patients attending Malindi Sub-County Dental Clinic, Kenya.

## **LITERATURE REVIEW**

### **Social Demographic Characteristic**

According to the World Health Organization (WHO), dental caries is common or severe among underprivileged groups of children around the world because access to dental care is inequitable. Dental carries are frequently manifests in children from poor families or living in poor environmental settings (WHO, 2019). Adults are at danger of dental illnesses, particularly dental caries, according to another WHO report, but children and adolescents are the most vulnerable. Because dental disease is a cumulative disease, the majority of cases develop in adults. Sugar consumption and dental disorders such as dental caries have a clear dose-response

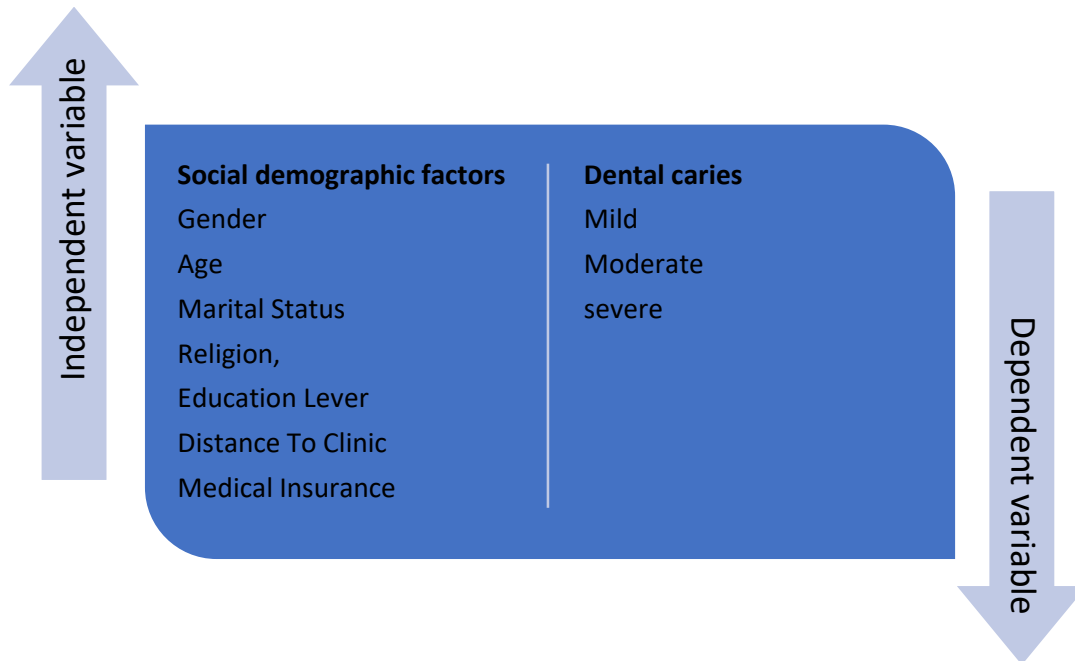
association. The disease is also linked to socioeconomic level, with significant rates of prevalence among the poor and disadvantaged (WHO 2017).

Dental caries affects both men and women depending on their behavior on oral health care. Men have significantly higher chances of tooth loss than women, as women are more likely to attend dental oral clinic than men. In developed countries, a report titled "The Surgeon General's Report" described tooth decay as a "silent epidemic," stating that 78 percent of 17-year-olds had tooth decay with an average of 7 affected tooth surfaces, and 98 percent of 40–44-year-olds had tooth decay with an average of 45 affected tooth surfaces. According to the survey, three out of every ten Americans over the age of 65 had no teeth at all (CDC, 2019).

Poverty is a major risk factor for poor oral health, as low socioeconomic position is typically associated with the highest prevalence of oral disorders (Broadbent et al., 2016; WHO, 2019). Increased access to sugar-containing foods and beverages, which are major risk factors for dental caries, is linked to an increase in the prevalence of various oral disorders among working class group of young adults. Increased alcohol consumption by employed youth and young adult is linked to a higher rate of facial and dental injuries as a result of violence and accidents (Broadbent et al., 2016; WHO, 2017). Dental care is costly to treat and therefore prevention is better in improving quality of life. Poor dental health causes millions of people to experience excruciating pain, increases society's out-of-pocket financial burden, and negatively impacts people's quality of life and well-being (WHO, 2017).

### **Theoretical Framework**

This study conceptual framework was based on the integration of the social ecological model (McLeroy *et al.*, 1988) which state that a person behavior is influenced at multiple levels, including the intrapersonal, interpersonal, organizational, community and policy levels. Individual factors are very important in defining association with dental caries. This framework is important in understanding relationship between individual factors and their association with dental caries. The study will focus on the socio-demographic characteristics associated with dental caries among patients attending Malindi sub-county dental clinic. The study examines the association between socio-demographic factors (gender, age, marital status, religion, education level, distance to the clinic, and medical insurance) and the prevalence of dental caries among patients attending the Malindi Sub-County Dental Clinic in Kenya.



*Figure 1: Conceptual Framework*

### **Conceptual Framework**

This conceptual framework figure 1 shows the relationship between dependents variable and independent variables. the dependent variable was dental caries while independent variables was social demographic factors: gender, age, marital status, religion, education lever, distance to clinic and medical insurance

### **Research Gaps**

Prevalence of dental caries is 47.3% children and 23.9% among adults (Wamiti, (2020.))Dental carries are a multifactorial disease where socio-economic demographic factors play a key role. (Butera et al., 2022). In Kenya there is limited published studies regarding social demographic characteristics associated with dental caries among patients attending dental clinic at Malindi sub-county. Therefore, this study aimed to determine social demographic characteristics associated with dental caries among patients attending dental clinic at Malindi.

### **METHODOLOGY**

The study design was a cross-sectional descriptive study design. The questionnaire was administered to obtain socio-demographic factors, associated with the dental caries among dental patients seeking services in Malindi Sub County.This study took place at the Malindi Sub County Dental Clinic. Malindi sub county clinic is in Malindi sub county hospital, which is in Malindi Sub County, Kilifi County a former administrative district in the Coast province of Kenya. Kilifi county has a population of 15,735 people and spans an area of 12, 245, 90 km<sup>2</sup> according to Kenya census 2019 and projected growth. Malindi Sub County is bordered on the south by Kilifi, on the west by Taita-Taveta, on the northwest by Magarini, and on the east by the Indian Ocean. It is located between 20- and 40-degrees south latitude and 390- and 410-degrees east longitude of the equator (appendix 5). Malindi Sub- County Dental Clinic is the sole referral dental clinic that services both Malindi and Magarini Sub-counties, as well as

neighboring counties Lamu, Tana River, and Garissa. Private dental clinics within and outside of Malindi Town refer patients to the facility. Small-scale farming, fishing, and tourism are among the sub-economic county's activities, which are located in a semi-arid environment. The majority of the sub-county is rural, with no dental services available. The Malindi Sub County Hospital serves a huge portion of the region that is predominantly rural. Every day, the clinic sees around 30 dental patients, both new patients and those returning for treatment. The study recruited 223 dental health clients seeking services in Malindi Sub County Hospital dental clinic from target sample size of 251 participants. The residents aged 18 years and above living at Malindi Sub- County in the past one year, and adult with Presence of dental condition who provided written informed consent voluntarily was included in the study. This study excluded those patients who were very sick and those unable to give sound judgment like the mentally challenged. A systematic random sampling method was used to pick the 223 participants for this study. A semi-structured questionnaire was used to collect the Socio-demographic characteristics data associated with the dental caries among dental patients seeking services in Malindi Sub County dental clinics.

The data collection tools were pretested at Kilifi Sub County Hospital using 10 percent of participants at least 2 weeks before actual data collection. A sample of 25 participants was recruited using the same eligibility criteria. After pretesting, all problematic questions were identified and modified accordingly. Pretested questionnaires were used to collect data on socio-demographic factors, associated with the dental caries among dental patients seeking services in Malindi Sub County. Four trained research assistants, who are qualified community oral health officers assisted in data collection and for dental examination respectively. The research assistants were first trained by the researcher on how to use the tools and about purpose of the study. Eligible participants were recruited at the Malindi sub county dental clinic and interviewed separately to give independent answers to questions. The survey involved a semi-structured questionnaire to collect data, followed by an oral examination to identify the presence, severity or absence of dental caries cases. After completion of the questionnaire, the dental examination was performed afterward. A dental examination was carried out to participants who consented. The dental examination was done at the dental chair. Disposable wooden spatulas, disposable mirrors and disposable probe and was used to visually check the presence of decay or infection. The presence or absence of dental caries was recorded and severity of dental decay was recorded using decayed teeth, missing teeth filled teeth, and decayed missing and filled teeth. Approval to carry out research was sought from the Pwani University research and ethics committee under approval No (ISERC/MSc/041/2022). The permission to carry out the study was sort from Kilifi County's research and ethics committee and site approval from the sub-county medical officer of health. Participants were informed on free will to take part in the study or withdraw from the study at any time.

The study independent variables were; Social demographic related factors- age, gender, education, ethnicity, occupation source of income, amount of income, medical insurance. The dependent variable was measured as either presence or absence of dental caries which was determined after the researcher examines the patient. The severity of the dental caries was recorded using WHO standard assessment forms as mild, moderate and severe. Study data were collected using standard questionnaire and cleaned before analysis. All data errors flagged were corrected by checking correct values in participant records. Data were assumed not to be missing at random, an extra category 'missing/unknown' was added to each variable with missing values to ensure all participants were included in the regression models. All categorical

variables were reported as counts with their respective percentages. The study exposures were socio-demographic factors. The outcome/dependent variable was presence of dental caries. Presence of dental caries was determined via oral health assessment and classified into a binary variable, i.e. present or absent. Data were analyzed using statistical package for the Social Sciences (SPSS) Version 21. The descriptive statistics were done on socio-demographic factors, associated with the dental caries among dental patients seeking services in Malindi Sub County. The data was presented in frequency tables.

## **RESULTS**

### **Participant Demographics**

The study recruited 223 participants, 117 (52.5%) female and 106 (47.5%) males. Of the 223 participants, 49 (21.9%) were less than 18 years old, 63 (28.3%), 76 (34.1%) and 35 (15.7%) were 18 to 29, 30 to 49 and  $\geq 50$  years old respectively. Slightly higher than one-half ( $n=113$ , 50.7%) had primary level as their highest level of education. There were 89 (39.9%) respondents who were single while 128 (57.4%) were married. Approximately two-thirds ( $n=146$ , 65.5%) were Christians and 73 ( $n=32.7\%$ ) were Muslim. Overall, 102 (45.7%) lived  $\geq 10$  KM from the nearest dental health facility. Only one-quarter ( $n=55$ , 24.7%) were employed, 72 (32.3%) were self-employed and 33 (14.8%) were not working. Slightly higher than one-fifth ( $n=48$ , 21.5%) were earning  $\geq 20000$  KES per month. A total of 192 (86.1%) paid for the dental services using cash, only 31 (13.9%) paid via insurance. Approximately two-thirds ( $n=145$ , 65.0%) paid between KES 500 to 1000 for the dental services. Table 1.

**Table 1: The Demographic Profile of the Research Participants**

Social-demographics characteristics	N	(%)
<b>Sex</b>		
Female	117	52.5
Male	106	47.5
<b>Age in years</b>		
<18	49	21.9
18 to 29	63	28.3
30 to 49	76	34.1
≥50	35	15.7
<b>Highest level of education</b>		
None	20	8.9
Primary	113	50.7
Secondary	65	29.2
Tertiary	25	11.2
<b>Marital status</b>		
Single	89	39.9
Married	128	57.4
Divorced/widowed	6	2.7
<b>Religion</b>		
Christian	146	65.5
Muslim	73	32.7
Traditional	4	1.8
<b>Distance to nearest dental facility (Km)</b>		
<5	65	29.2
5 to 9	56	25.1
≥10	102	45.7
<b>Occupation</b>		
Student	63	28.3
Not working	33	14.8
Self-employed	72	32.3
Employed	55	24.7
<b>Monthly income (Kes)</b>		
None	112	50.2
<10000	33	14.8
10000 to 19000	30	13.5
≥20000	48	21.5
<b>Mode of payment for dental services</b>		
Cash	192	86.1
Insurance	31	13.9
<b>Cost of dental services (Kes)</b>		
None	4	1.8
1 to 500	44	19.7
500 to 1000	145	65.0
>1000	30	13.5

**Univariable Analysis on Demographic Factors Associated With Dental Caries**

In the univariable analysis, compared to respondents aged <18 years, older respondents; 18 to 29 years (CRR 2.10, 95% CI 1.26–3.51), 30 to 49 years (CRR 1.91, 95%CI 1.15–3.16) and ≥50 (CRR 2.03, 95% CI 1.15–3.59) were significantly associated with higher risk of having



dental caries. No other social-demographic characteristics were associated with having dental caries (all P-value>0.05) as shown in Table 2.

**Table 2: Univariable Analysis of Factors Associated With Dental Caries**

Variable	Dental caries		Univariable analysis	
	Absent (N=61)	Present (N=162)	Crude Risk Ratio (95% CI)	Pvalue
<b>Social-demographics characteristics</b>				
<b>Age in years</b>				
<18	29 (59.2)	20 (40.8)	Reference	
18 to 29	9 (14.3)	54 (85.7)	2.10 (1.26–3.51)	0.005
30 to 49	17 (22.4)	59 (77.6)	1.91 (1.15–3.16)	0.01
≥50	6 (17.1)	29 (82.9)	2.03 (1.15–3.59)	0.02
<b>Sex</b>				
Female	27 (23.1)	90 (76.9)	Reference	
Male	34 (32.1)	72 (67.9)	0.88 (0.65–1.20)	0.43
<b>Highest education level</b>				
None	4 (20.0)	16 (80.0)	Reference	
Primary	36 (31.9)	77 (68.1)	0.85 (0.50–1.46)	0.56
Secondary	20 (30.8)	45 (69.2)	0.87 (0.49–1.53)	0.62
Tertiary	1 (4.0)	24 (96.0)	1.21 (0.64–2.26)	0.57
<b>Marital status</b>				
Single	25 (19.5)	103 (80.5)	Reference	
Married	36 (40.5)	53 (59.6)	0.74 (0.53–1.03)	0.08
Divorced/widowed	0	6 (100)	1.24 (0.55–2.83)	0.61
<b>Religion</b>				
Christian	33 (22.6)	113 (77.4)	Reference	
Muslim	27 (37.0)	46 (63.0)	0.81 (0.58–1.15)	0.24
Traditional	1 (25.0)	3 (75.0)	0.97 (0.31–3.05)	0.96
<b>Distance to nearest dental facility (KM)</b>				
<5	13 (20.0)	52 (80.0)	Reference	
5 to 9	14 (25.0)	42 (75.0)	0.94 (0.62–1.41)	0.76
≥10	34 (33.3)	68 (66.7)	0.83 (0.58–1.20)	0.32
<b>Monthly income (Kes)</b>				
None	40 (35.7)	72 (64.3)	Reference	
<10000	6(18.2)	27 (81.8)	1.27 (0.82–1.98)	0.29
10000 to 19000	7(23.3)	23 (76.7)	1.19 (0.75–1.91)	0.46
≥20000	8 (16.7)	40 (83.3)	1.30 (0.88–1.91)	0.19
<b>Mode of payment for dental services</b>				
Cash	58 (30.2)	134 (69.8)	Reference	
Insurance	3 (9.7)	28 (90.3)	1.29 (0.86–1.94)	0.22

### Multivariable Analysis on Demographic Factors Associated With Dental Caries

In the multivariable model, only age 18 to 29 years (aRR 1.94, 95%CI 1.12–3.38) was associated with almost 2times risk of having dental caries compared to respondents aged <18 years. The others social-demographic characteristics were not significantly associated with having dental caries as shown in Table 3.

**Table 3: Multivariable Analysis of Factors Associated With Dental Caries**

Variable	Dental caries		Univariable analysis		
	Absent (N=61)	Present (N=162)	Crude Ratio (95% CI)	Risk	Pvalue
<b>Social-demographics characteristics</b>					
Age in years					
<18	29 (59.2)	20 (40.8)	Reference		
18 to 29	9 (14.3)	54 (85.7)	1.94 (1.12–3.38)		0.02
30 to 49	17 (22.4)	59 (77.6)	1.55 (0.80–3.00)		0.20
≥50	6 (17.1)	29 (82.9)	1.65 (0.79–3.44)		0.19
Marital status					
Single	25 (19.5)	103 (80.5)	Reference		
Married	36 (40.5)	53 (59.6)	0.97 (0.61–1.53)		0.89
Divorced/widowed	0	6 (100)	1.37 (0.58–3.21)		0.47

## Discussion

This study assessed the prevalence and associated factors of dental caries among patients attending Malindi sub county Hospital dental clinic. The prevalence of dental caries found in this study was 72.6% which was lower compared with 78.2% in Ethiopia (Tafere et al., 2018), and (78.3%) in Lithuania (Zemaitiene et al., 2016). (68.9%) in Turkey (Onur et al., 2020), 70.9% in Sudan (Ibrahim et al., 2021; Wamiti, 2020), 46.9% among Primary School Children in Ethiopia (Shitie et al., 2021) and 21.8% in Kenya. The high prevalence of dental caries in this study could be explained by the fact that there were variations in study population, time and study setting, in this study since it was hospital based there might be high patient flow in health institutions compared to the community level. This finding highlights the need to promote oral health activities including outreaches around catchment population of Malindi sub county hospital. Notably, the difference with the Brazil, Turkey, Kenya, and Sudan studies might be due study population variation and, the socio-demographic differences between those countries.

Our study finding are comparable to those of a studies conducted in Riyadh, Soudi Arabia and Philippines which reported the prevalence of caries to be 59%–92% (Alhabdan et al., 2018; These observations are explained by a systematic review on the global prevalence and severity of dental caries among racially minoritized children which reported high caries burden among minoritized children estimating overall trends and comparing against factors including time, country, and world income (Nath et al., 2023). Moreover, these findings can be ascribed to the synergistic effect of high snacking frequency, late initiation of tooth brushing among the children, lack of prenatal dental advice at early age, and lack of dental care education among children and adolescent group. Additionally, this present finding is in tandem with a meta-analysis study on prevalence of Dental Caries in India among the WHO Index Age Groups which reported different age cohort prevalence 5 years and 12 years at 49%, 15 years (60%), 35-44 years (78%) and peaks at 65–74-year group (84%) (Janakiram et al., 2018).

This finding resonates well with our present study highlighting ages 18 to 29 years significantly associated with higher risk of having dental caries. Although this finding is in contrary with a study Ethiopia, which reported knowledge about prevention and causes of dental caries, oral

hygiene status, monthly income, place of resident, educational status, and marital status as factors associated with dental caries (Tafere et al., 2018).

The strength of this study was that there was fully participation of the respondents at dental clinic. All dental care services were provided and assessed as per the established standard guidelines. The clinic had trained health care workers to perform dental care assessment. The weakness of this study is collecting data from one facility. The recruited of many participants by researcher was to provide reasonable number to give reliable results.

## **CONCLUSION AND RECOMMENDATIONS**

### **Conclusion**

This study revealed a high prevalence of dental caries among patients visiting the dental clinic in Malindi Hospital. The demographic factors associated with dental caries were among ages 18 to 29 years old and almost two times risk of developing dental caries.

### **Recommendations**

#### **Unique Contribution to Theory, Practice and Policy:**

This study revealed a high prevalence of dental caries among patients visiting the dental clinic in Malindi Hospital. The age is the main socialdemographic characteristics associated with development of dental caries, with those aged 18 to 29 years old being at highest risk compared with other age group. Oral health care provided by health care workers among dental patients should focus on mitigation measures on reduction of dental caries among this age group. Intervention should focus on integrating oral health promotion service to reduce prevalence of dental caries among this age group. The dental care among patients visiting the dental clinic aged 18 to 29 years old should be emphasized in the policies by Ministry of health aimed at mitigating dental caries.

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