

## Original Research Article

## Utilization of Dental Services among Beneficiaries of Health Insurance Corporation Khartoum State

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**Abstract:** This study aimed to assess the pattern of dental services utilization and determinants of utilization of oral health services among beneficiaries of Health Insurance Corporation Khartoum State (HICKS). Four hundred and forty two insured individuals under HICKS were randomly selected from twenty one governmental health centers in Khartoum state. Data were collected by pretested and translated questionnaire administered by face to face interview. The questionnaire covered socio-demographic variables, oral health practices, smoking, accessibility of dental clinics covered by HICKS, and reasons for the last dental visits. Of the 442 participants 46% had visited a dental clinic within the previous year, 53.9% out of them used insurance card. The reported reasons of the last dental visit among HICKS beneficiaries included routine dental check-up 8.8%, dental caries 42.8%, dental pain 28% and gingival pain 12%. Logistic regression analysis showed that beneficiaries using the insurance card tended to utilize dental services 8 times more than their counterparts. The utilization pattern of dental services among HICKS beneficiaries was predominantly curative. Availability of insurance card at the point of access of oral healthcare was a determinant for the utilization of dental services.

**Keywords:** Utilization, Health Insurance Corporation Khartoum State (HICKS), Beneficiaries.

### INTRODUCTION

Progress towards eliminating dental health disparities requires addressing barriers to dental care access. Most people in developing countries have limited access to oral health services and proper treatment because of financial barriers (Peterson, PE. 2003). In most industrialized countries oral diseases treatment is estimated to be the 4<sup>th</sup> most expensive therefore affecting the rate of utilization (Yee R, & Sheiham, A. 2002; Babbazono, D. 2008). In low-income countries the cost of dental caries management alone for children would surpass their total health care budget (Yee R, & Sheiham, A. 2002). Over and above, the greatest burden of oral diseases is on disadvantaged and socially marginalized populations (Peterson, PE. 2003). In Sudan 47% of the population are below the poverty line (U.S.C.I.A.2011). Dental insurance is the key to good oral health (Seiber, E.E & Mariotti, A.2012; Kiyak, A, & Marisa, R.2005; Kotagal, M, *et al.* .2014). Grossman demonstrated that the utilization of oral health services is related to factors like money and time

prices, dental insurance, income, oral health indicators, level of education, age, and supply of dentists per capita (Grossman, M.1972).

Health Insurance Corporation Khartoum State (HICKS) is the public insurance institution for Khartoum State, the capital state in Sudan. By November 2011 HICKS coverage reached 45% of its total target population (F.P.H.C 2008). An oral health component was added to the benefit package in 2006. It included extraction, dental filling, scaling, endodontic treatment, X-ray, jaw fracture surgery and oral tumors surgery without co-payment for most procedures (Evolution and progress of health insurance in Sudan 1995- 2006). It is currently being revised. Evidence has shown that insuring people improve their access to oral health care when compared to the uninsured (Seiber, E E, & Mariotti A. 2012; Kiyak A, & Marisa, R.2005). However, the determinants of utilization among the insured have not been explored. The aim of this study

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was to assess the pattern and determinants of utilization of dental services among beneficiaries of HICKS.

## METHODS

A health facility based survey was conducted between February to April 2012, in HICKS centers across the seven localities of Khartoum State. Twenty one out of the total 85 HICKS health centers were sampled in this study. The authors categorized these centers according to patient visit frequency per day as follows: Low (15-29), medium (30-79) and high (80 and above). Centers receiving less than 15 patients per day were excluded.

### Sampling Frame

Three were randomly selected from each of the 7 localities, one from each of the pre-defined patient visit frequency categories.

The study participants were adults (>18 years), randomly recruited from insured patients and co-patients seeking healthcare at HICKS health centers. The sample size was calculated by applying an estimated utilization of dental services of 50% and a precision of 0.05. The minimum sample size to satisfy these requirements was estimated to be 422 beneficiaries with dropouts taken into account. The desired number of participants from every health centre was obtained in proportion to size through simple random sampling. Ethical approval was obtained from the faculty of dentistry at the university of Khartoum and HICKS. Informed, verbal consent was obtained from the participants.

### Data collection tools

A questionnaire was administered in Arabic by the principal investigator (MA).

### Measurements

The Sociodemographic variables included age, gender, marital status, education level, occupation, monthly income and residential location). Oral health

practice (frequency of brushing, flossing, dental attendance), negative health behavior (smoking), accessibility of dental clinic providing dental services covered by (HICKS) (distance between 'home and dental clinic providing dental services covered by (HICKS), transportation need and transportation cost), and reason for the last dental visit. A pilot study was conducted among 30 clients for face validity; consequently the implementation planned was changed from self-administered questionnaire to interviewer administered questionnaire.

Utilization of dental services in this study refers to the participants who visited the dental clinic for treatment within the past twelve months.

No utilization of dental services means the participants who did not visit dental clinic in the past 12 months. They could have visited the clinic for treatment prior to the examined 12 month period or have never visited a dental clinic for treatment at all.

### Test-retest reproducibility:

Twenty beneficiaries were interviewed and after 10 days minimally were re-interviewed so as to evaluate consistency agreement. Kappa test was used to measure agreement. Kappa value ranged from 0.75 for socio-demographic variables, 0.54 for oral health practice variables and for Accessibility of dental services offered by HICKS. These values are in the interval from moderate to substantial agreement according to Landis and Koch (14).

## RESULTS

### Sample profile

The response rate was 98.3% (n=442), with high female representation (71%). Majority of the participants earned less than 750 SDG per month (65.8%), were married (63.3%) and obtained at least secondary education (69.3%). Table 1 illustrates utilization of dental services according to sociodemographic variables.

**Table-1: Utilization of dental services in frequency (percent) among HICKS beneficiaries according to sociodemographic variables**

Sociodemographic variables	Utilization during previous year n (%)	No utilization during previous year n(%)	Total n(%)	p-value
<b>Gender</b>				0.00
Male	43 (21.2)	81(34.2)	124 (28.2)	
Female	160 (78.8)	156 (65.8)	316 (71.8)	
<b>Age group</b>				0.43
18-35	86 (42.1)	89 (37.3)	175 (35.6)	
35-59	95 (46.5)	114 (47.9)	209 (47.7)	
≥ 60	23 (11.3)	35 (14.7)	58 (17.1)	
<b>Income</b>				0.05
≤ 250	25 (12.3)	49 (20.6)	74 (16.8)	
250-500	60 (29.5)	67 (23.9)	127(28.8)	
500-750	50 (24.6)	39 (16.4)	89 (20.2)	
750-1000	38 (18.7)	40 (16.8)	78 (17.7)	

≥ 1000	30 (14.7)	43 (18.1)	73 (16.5)	
<b>Occupation</b>				0.14
Class 1	10 (4.9)	12 (5.0)	22 (5)	
Class 2	72 (35.7)	62 (26.0)	134 (30.5)	
Class 3	14 (6.9)	25 (10.5)	39 (8.9)	
Class 4	106 (52.4)	139 (58.4)	245 (55.7)	
<b>Marital status</b>				0.00
Single	61 (29.9)	48 (20.2)	109 (24.7)	
Married	116 (56.9)	164 (68.9)	280 (63.3)	
Divorced	14 (6.8)	6 (2.5)	20 (4.5)	
Widow	13 (6.3)	20 (8.4)	33 (7.5)	
<b>Residence</b>				0.01
Khartoum	34 (16.7)	26 (10.9)	60 (13.6)	
Jabal Awlia	19 (9.3)	46 (19.3)	65 (14.7)	
Umdruman	25 (12.3)	36 (15.1)	61 (13.8)	
Karari	31 (15.3)	33 (13.9)	64 (14.5)	
Umbada	35 (16.2)	22 (9.2)	57 (12.9)	
Bahri	30 (14.7)	41 (17.2)	71 (16.1)	
Sharig Elnil	30 (14.7)	34 (14.3)	64 (14.5)	
<b>Level of education</b>				
Illiterate	17 (8.3)	30 (12.6)	47 (10.6)	0.06
Primary	41(20.2)	47 (19.7)	88 (19.9)	
Secondary	68 (33.4)	79 (33.2)	146 (33.1)	
University	69 (33.9)	75 (31.5)	144 (32.6)	
Higher education	9 (4.4)	7 (2.9)	16 (3.6)	

#Chi-square test to test the difference between proportions. Statistical significance at <0.05

Oral hygiene habits: Most of the participants brushed their teeth twice everyday (65.8%), but did not use dental floss regularly (92.5%). Seven percent of participants smoked cigarette. The most frequent

reported reasons for visiting a dentist were due to dental caries (38.9%) and dental pain (36.5%). Very few visited the dentist for routine check-up (5.4%). Table 2 illustrates details of the reported oral hygiene habits.

**Table-2: Utilization of dental services in frequency (percent) among HICKS beneficiaries based on oral health practice, smoking and reason of dental visit.**

Frequency of brushing	Utilization n during previous year (%)	No utilization during previous year n (%)	Total	p-value
Once per day	31 (15.2)	35(14.7)	66 (14.9)	0.30
Twice	140 (68.6)	150 (63.3)	290(65.8)	
More than twice	33 (16.2)	52 (21.9)	85 (19.3)	
<b>Using dental floss</b>				0.01
Use dental floss	22 (10.7)	11(4.6)	33 (7.5)	
Not use dental floss	182 (89.2)	227 (95.4)	409(92.5)	
<b>Cigarette smoking</b>				0.41
Smoker	13 (6.4)	20 (8.4)	33 (7.5)	
Non smoker	191 (93.6)	218 (91.5)	409(92.7)	
<b>Reason of dental visit</b>				0.00
Routine dental check up	18 (8.8)	2 (1.2)	20 (5.4)	
Dental pain	57 (28.1)	77 (46.9)	134(36.5)	
Gingival pain	25 (12.3)	19 (11.6)	44 (11.9)	
Dental caries	87 (42.8)	56 (34.1)	143(38.9)	
Other	16 (7.9)	10 (6.1)	26 (7.1)	
Total	203 (55.3)	164 (44.7)	367	

# p value for Chi-square test to test the difference between proportions.

**Determinants of Utilization of Dental Services**

When studied without statistical adjustment for other variables, the utilization of dental services was found to be significantly associated with several factors. Those that were positive predictors, suggesting an increase in the likeliness to use dental services, were female gender, visiting for routine check-up and having a past experience of dental fear. Women were almost twice as likely to utilize dental services. Beneficiaries were 12 times more likely to utilize services for routine dental check-up than for dental pain. Beneficiaries living in Jabal Awlia were three times less likely to use dental services when compared to Khartoum residents. Some participants did not use their insurance cards to receive the subsidized service. These were found to be

less likely to use dental services. Beneficiaries who did not use dental floss regularly were also less likely to use dental services.

**Multivariate Analysis**

Determinants that demonstrated statistically significant associations with utilization of dental services were modeled in a multiple logistic regression model to adjust for confounding factors. It was found that using the insurance card encouraged beneficiaries to use dental services. It was the only statistically significant determinant. Beneficiaries were 8 times more likely, when adjusting for all other variables, to use dental services, if they had their insurance cards.

**Table-3: Determinants of utilization of dental services (Bivariate and multivariate analysis) with OR (CI).**

<b>Gender</b>		
Male	1	
Female	1.9 (1.26–2.97)*	1.43 (.19–9.96)
<b>Residence</b>		
Khartoum	1	
Jabal Awlia	0.32 (.15–.66)*	0.92 (.17–4.94)
<b>Marital status</b>		
Single	1	
Married	0.55 (.36–.87)*	0.33 (.00–1.85)
<b>Dental floss</b>		
Use dental floss	1	
Not use dental floss	0.4 (.19–.85)*	0.35 (.03–2.62)
<b>Use of insurance card</b>		
Use insurance card	1	
Not use insurance card	0.35 (.23–.54) *	0.12 (.02–.79)*
<b>Reason for dental visit</b>		
Dental pain	1	
Routine dental check up	12 (2.7–54.5)*	9.01 (.00–1.88)
<b>Suffering of dental fear</b>		
Suffering dental fear	1	
Not suffering dental fear	0.48 (.23- .72)*	3.91 (.50- 30.78)

P value < .05 Nagelkerke R<sup>2</sup> = .46 chi =22.02

**DISCUSSION**

The findings of this study can be generalized to all adults residing in Khartoum state, using state health centers and benefiting from HICKS. Beneficiaries reported good oral health habits, and were encouraged to utilize dental services when they were carrying their insurance cards. This is the first study reporting on the pattern and determinants of dental service utilization among the beneficiaries of HICKS, or any national health insurance scheme.

To access oral health services under insurance scheme, the beneficiaries have to show their insurance card to HICKS staff at the health facility to prove eligibility before they can access health care. This study showed that the beneficiaries who were unable to demonstrate eligibility at point of access were unable to benefit from the insurance scheme, and this was the

only determinant of utilization. The paper based system has therefore prevented beneficiaries from obtaining their right to subsidized care. This could explain the curative approach, as people would be willing to pay full fees if they are in pain, as they have no alternative, but not for follow ups and check up. HICKS may need to revise its verification system, a possibility is to establish a digital data base that they can tap into from anywhere and are able to verify beneficiaries even if they have forgotten or lost their card. Some beneficiaries might not use their insurance card because they think dentist in governmental clinic will not care enough about them.

The multivariate model revealed that the purpose behind the dentist visit was not a predictor of utilization. In the current study about 83% of the participants reported that the reasons for the last dental

visit were either pain (gingival or dental) or dental caries indicating that the pattern of dental services utilization was curative. This is similar to studies conducted in the sub-Saharan African countries (Varenne, B. *et al.*, 2005; Varenne, B. *et al.*, 2006; Adegbenbo, AO.1994). Nevertheless, despite the curative approach the study showed that the number of beneficiaries who came for routine dental check-up has increased which may indicate an improvement in the people's attitude towards oral health and oral health care.

Gender also did not determine utilization of dental services. A study in Nigerian students was in accordance with this finding (Bamise, C. T., 2008).

However, literature has shown that there is a gender predilection, dental services were used more by females than males and that nonattendance was more prevalent among men (Listl S, *et al.*, 2014; Dasanayake, AP. *et al.*, 2002; Sergio,S. *et al.*,2007; Burr. J,& Lee H. 2012; Gustavo D *et al.*,2010), these finding in Khartoum state could have been due to the urbanized style of the city, where men and women both are able to move around independently and therefore can easily reach health facilities. Few studies investigated utilization of dental services among insured, but they verify variables different from those investigated in the current study (Donald L, *et al.*, 2010; Al Agili. DE, *et al.*, 2005)

Socio-economic status (SES) was not a determinant of utilization in this population, although evidence has shown that SES is a known determinant of health service utilization. Consistent with a study conducted in India (Poudyal. SI, *et al.*, 2010), no significant association was found between socio-economic status and utilization of dental services. This is different from many studies conducted in USA which showed that nonattendance was more prevalent among people at the lower end of the socio-economic scale (Listl S, *et al.*, 2014; Kaylor. MB, *et al.*, 190-197), and another study which reported that socio-economic status of participants is an important determinant of oral health care seeking (Sangaré, AD. *et al.*,2012). In the current study more than 64% of the participants belong to class 3 and class 4, also income variations between the participants were not high, this might have masked the effect of socio-economic status in utilization of dental services.

In this study income had no effect on dental services use in contrast to two studies conducted in Australia (Slack-smith L, &Hyndman J.2004) and Japan (Babbazono, D.2008) which revealed that income affect use of dental services in spite of insurance coverage. In the present study the percentage of participants with monthly income of more than 1000 SDG (166 Dollars) is 16.5% this means that the majority of the participant's monthly income is less than 1000 SDG.

The income variations between participants were not high so it might have masked the effect of income.

This study showed no association between accessibility and utilization of dental services; contrary to a study conducted in USA (Milgrom P, *et al.*, 1998) which revealed that, subjects who were eligible for Medicaid were more likely to obtain care. Accessibility in this study was obtained by the distance between clients' home and HICKS dental clinic which is self estimated, so there might be information bias, this may affect the result.

In this study, dental fear has no association with dental services use. However, in many studies dental fear acts as a barrier to oral health services use. In accordance, a study conducted in USA investigating utilization of dental care among children (Milgrom P, *et al.*, 1998) revealed that child dental fear was associated with lower rates of utilization; the difference of findings might be due to difference in age group of population under the study. This finding is in agreement with another study conducted in Nigeria (Ajayi. DM, &Angbede AO. *et al.*, 2012)but surprisingly this is not the case in a study conducted in Burkina Faso in which people who suffer dental fear use dental services more than their counterparts (Varenne, B. *et al.*, 2005).

The literature in utilization in African countries is scarce, so many variables were compared with result of studies conducted in US, and many factors affecting use of dental services in other studies had no effect on use of services in this study. In Sudan patients visit dentist when they were in pain, 83% of participants of this study reported visiting dentist when feeling pain. Feeling of pain make people visit dentist in any age and whatever their income and socioeconomic status.

This study demonstrated that 46% of the participants had visited dental clinic within the previous year, although they are all insured only 53.9% out of them used insurance card. More studies are needed to explain the limited use of services with the insurance card.

Utilization of insurance card was positively associated with dental services use. Participants who visited the dentist using the insurance card were 8 times more likely to visit dentist than their counterparts, this result agreed with studies conducted in USA revealing that individuals with medical coverage used emergency department more than uninsured individuals (Coulter. ID, *et al.*, 2000; Taubman. SL, *et al.*, 2014) this is reasonable because recently in Sudan the cost of daily living was increased due to economic inflation, with no exception to medical and dental services. Health insurance removes the cost at the service point, so that use of insurance card is a determinant of utilization of dental services



### Limitation of the study

Information on utilization of care was self-reported hence; there might be a recall bias.

### CONCLUSIONS

The utilization pattern of dental services among HICKS beneficiaries is curative.

Utilization of insurance card is a determinant to utilization of dental services among HICKS.

### RECOMMENDATIONS

State Ministry of Health (SMOH) and Health Insurance Corporation Khartoum state (HICKS) are recommended to work together to promote preventive dental care, and encourage people covered by HICKS to use the services.

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### List of abbreviations

- HICKS: Health Insurance Corporation Khartoum State.
- SES: Socio-economic status.
- SDG: Sudanese Genaih.
- SMOH: State Ministry of Health.

### Competing interests

The authors declare that they have no competing interests.

### Authors' contributions

MAA was the principal investigator, who designed the study, performed the data collection, data analysis and write-up of the manuscript.

AMM main supervisor of the study, contributed to the design, data analysis and write-up of the manuscript.

NMN contributed to the data analysis, construct design and write-up of the manuscript.

All authors have read and approved the final manuscript.

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