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Barriers to access and utilization of dental services in the adult population of Twin Cities: a cross-sectional study

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ABSTRACT

Background: Oral hygiene is essential to overall health, influencing physical, mental, and social well-being. In spite of advancements in oral hygiene, significant inequalities remain, particularly in developing nations. This study aims to investigate the barriers to accessing and utilizing dental services in the adult population of Rawalpindi and Islamabad, Pakistan. **Methodology:** This descriptive cross-sectional study was conducted from March 2024 to November 2024 in public and private dental clinics in the Twin Cities. An organized questionnaire appraised socio-demographic characteristics, behavioral traits, and barriers to dental service utilization. **Results:** The study population involved adult patients aged above 40 years, and data were analyzed using SPSS, with both descriptive and inferential statistical approaches. Out of 245 participants, 75.5% were from Rawalpindi and 24.5% from Islamabad, with a mean age of 50.2 years. Significant associations were found between socio-demographic factors and perceived barriers such as unaffordability and fear of dental treatment. Females, unemployed individuals, and those with lower education levels reported higher levels of dental anxiety and perceived barriers. The study highlights key demographic influences on dental service utilization and identifies financial constraints, anxiety, and social factors as major barriers. **Conclusion:** The analytic analysis of unaffordability indicates that gender, occupational status, and educational attainment are linked to the probability of financial constraint, as women, and in fact those persons working in lower-paying jobs or with a lower level of education, are more likely to suffer economic stress.

Keywords: Oral health, dental services, barriers, dental anxiety, Pakistan, cross-sectional study.

INTRODUCTION

Being healthy requires good oral health, which is a basic human right that significantly influences a person's physical, mental, and social well-being regarding life quality [1]. There are numerous and intricate connections between overall health and dental health [2]. Systemic disorders have the potential to impact oral health either directly via their pathological processes or indirectly by behavioral changes connected to the condition. For example, endocarditis and diabetes mellitus are linked to periodontitis, a dental disease. Better overall health can enhance the quality of life for older persons by preventing oral disorders and promoting oral health [3].

By closing the gap between the aforementioned criteria, wealthy nations have significantly improved access around the world. Unfortunately, the gap persists in underdeveloped nations, where untreated dental decay frequently results in tooth extractions [4]. Numerous investigations have been conducted to determine the causes of dental visit avoidance. For example, the most common responses to a poll done in the USA were "cost" (40.2%), "no perceived reason to go to the dentist" (32.7%), and "lack of time" (14.1%) [5].

Dental disorders are a widespread issue in the world. When primary preventive measures are no longer effective, treating oral diseases can be expensive. Dental care accounts for 5% to 10% of public spending in developed nations, but in low-income nations, the cost of treatment is higher than the funds available to provide a basic public health package [6]. Two significant financial repercussions for those in need of dental care are the high direct cost of care and the indirect loss of income and productivity due to service attendance.

Dental anxiety is a significant and unjustified negative psychological condition that can affect patients undergoing dental treatment. Dental anxiety can stem from past traumatic experiences, including intense pain or discomfort during or after dental procedures, along with negative perceptions. These characteristics might impact the individual's dental health, accompany them to have negative thoughts, obstruct their social relationships, affect their work quality, and overall lead to feelings of depression. A notable figure of patients visiting oral surgery clinics who tolerate dental anxiety, with remarkable events noted in females contrast to males. Characteristics associated with this anxiety include previous nightmares, fear of irritation, and worry about freaking out during the treatment process [7].

This study is directed to assess barriers associated with access and utilization of dental services among the adult population in the twin cities of Pakistan, utilizing Andersen's Behavioral Model of Health Services Use as the theoretical framework. This model provides a comprehensive structure for understanding how predisposing characteristics (demographics, social structure), enabling resources (family income, insurance), and need factors (perceived health status) interact to influence healthcare utilization [8].

METHODOLOGY

This is a descriptive cross-sectional study designed to assess the barriers to access and utilization of dental services in the adult population of the Twin Cities. This study made use of a descriptive cross-sectional design. The study was conducted in the dental clinics in the Twin Cities. It includes both public and private dental clinics in Rawalpindi and Islamabad. This was picked out for numerous justifications. These cities have a multicultural population. On top of that, Rawalpindi has a bustling metropolis, and Islamabad has a well-organized. This location's accessibility to significant healthcare institutions establishes the collection of data regarding service availability and current trends. This study was conducted from March 2024 until November 2024.

Theoretical Framework: This study employed Andersen's Behavioural Model of Health Services Use to classify and analyze barriers to dental care access [8]. According to this model, healthcare utilization is determined by three main components: (1) Predisposing characteristics: Demographic factors (age, gender), social structure (education, occupation, marital status), and health beliefs; (2) Enabling resources: Family income, insurance coverage, and availability of regular source of care; and (3) Need factors: Perceived health status and evaluated health status. Barriers were categorized following the Penchansky-Thomas framework as: availability (services exist), accessibility (services reachable), accommodation (services organized to accept patients), affordability (ability to pay), and acceptability (willingness to seek care) [9]. The specific barriers examined in this study—perceived lack of need, unaffordability, and fear of dental treatment—were mapped to the acceptability and affordability dimensions of this framework.

Primary data was collected through a structured questionnaire: The questionnaire contained four parts to assess the barriers to access and dental service utilization behavior in the adult population. Part A: gathered the data related to social demographic characteristics, Part B gathered data related to behavioral characteristics, and Part C gathered information on different barriers (financial barriers, social barriers, patient-related, and dental-related barriers). Additionally, a dental anxiety scale is used to measure dental phobia. The study population was adult patients aged above 40 years, who visit the Twin Cities hospital or dental clinic would be the study population. In Pakistan, Rawalpindi and Islamabad are commonly referred to as the twin cities.

Non-probability convenience sampling has been used. In this instance, we conducted interviews with those who were accessible to us at the hospital or dental clinic during the data collection period. Then we asked the questions and conducted in-person interviews. This sampling strategy introduces selection bias and limits generalizability; findings should be interpreted with

caution and not assumed to represent the broader population of Rawalpindi and Islamabad. The sample may over-represent individuals already accessing dental care and under-represent those facing the most severe access barriers.

Based on the 19% [10] prevalence of adults who face barriers to receiving dental care, the sample size was estimated using a desired margin of error (E) of 5% (0.05) and a Z-value that corresponds to a 95% confidence level (roughly 1.96). With a sample size of 234 for this study, we took 257 participants to account for a 10% dropout rate.

Participant Flow: A total of 257 participants were enrolled in the study. Of these, 12 participants were excluded: 7 did not meet inclusion criteria (residency outside study area or no history of dental care utilization), 3 withdrew consent, and 2 provided incomplete questionnaires. The final analytical sample comprised 245 participants (response rate: 95.3%).

For inclusion criteria, Participants aged 40 years and above were included. Residents of Islamabad and Rawalpindi were included to guarantee applicability to the local population. Participants with both regular and irregular dental care practice patterns were appraised. In the exclusion criteria, individuals residing outside of Islamabad and Rawalpindi were excluded from the study. Additionally, individuals with no history of dental care utilization were excluded, as their experiences were not aligned with the study objectives. And the individuals who spoke languages other than Urdu were also excluded to maintain linguistic consistency in data collection and analysis.

The principal method of gathering data for this research was through the distribution of questionnaires. The purpose of the surveys was to collect data on socio-demographic, behavioral, medical, and health status characteristics as well as barriers to accessing and using dental care. We posed the questions to the attendees to assess the barriers to access and dental service utilization behavior in the adult population of the Twin Cities.

To assess dental anxiety, the standard modified dental anxiety scale was adopted. There are five items on the Modified Dental Anxiety Scale (MDAS), each including a five-category rating scale that goes from 0 "not anxious" to 4 "extremely anxious," yielding a total score ranging from 0 to 20. Scores of 5-9 indicate low anxiety, 10-14 moderate anxiety, and 15-20 high anxiety [11]. The relevant article was the source of the questionnaire, which was taken to guarantee its validity and reliability. The target population received the questions in an easy-to-access format. In the Pakistani twin cities, this was accomplished through working with both public and private dental practices.

The analysis was carried out using statistical software, such as SPSS (Statistical Package for the Social Sciences). Mean and standard deviation were calculated for quantitative variables. Frequency and percentages were calculated for qualitative variables. The chi-square test was used to assess the statistical relation between the defined dependent and independent variables. A p-value < 0.05 was considered significant.

Multivariate analysis: Binary logistic regression was conducted to identify independent predictors of each barrier type (perceived lack of need, unaffordability, fear of dental treatment) after controlling for potential confounders. Variables with $p < 0.20$ in bivariate analysis were entered into multivariate models. Results are presented as adjusted odds ratios (aOR) with 95% confidence intervals.

RESULTS

The socio-demographic characteristics of 245 participants showed that 24.5% are residents of Islamabad and 75.5% are residents of Rawalpindi. Participants' mean age was 50.2. The majority of participants were female, with 50.2%, and males were 49.8%. The educational background varies; 14.7% of participants were uneducated, 22.3% had a bachelor's degree, and 16.2% had a master's degree. The majority of participants, 41.9%, had less than 50,000 in family income, and only 6.4% of participants had family income of 150,000-200,000.

As shown in Table 3.2 in this study, 245 participants completed the modified dental anxiety scale on their perception and experiences. The mean total MDAS score was 8.2 (SD $\pm$ 4.1), with 42.4% scoring in the low anxiety range (5-9), 31.8% in the moderate range (10-14), and 12.2% in the high anxiety range (15-20); 13.5% scored below 5 (minimal anxiety). It was revealed that 14.3% of the participants became extremely anxious after their dentist asked them to come tomorrow for the treatment. 73.6% of the participants are not anxious while sitting in the waiting room. 32.8% of participants were not anxious about their tooth drilling treatment, whereas 12.1% were extremely anxious during the procedure. Among the 245 participants, 50.6% were not anxious about their scaling and polishing treatment, but 6.0% of participants were extremely anxious. 38.5% of the

population were not anxious about having a local anesthetic injection in their gum, about an upper back tooth, while 10.5% were extremely anxious.

Among 245 participants, 80% are nonsmokers, while 10% have quit smoking. A small portion of the group, 6% smokes regularly, and 5% smokes occasionally or socially. This suggests most participants either avoid smoking or have successfully quit, with only a minority actively engaged in smoking. In Table 3.3, the analysis reveals significant associations between socio-demographic factors and perceptions of a lack of need. Gender ($p = 0.000$), marital status ($p = 0.031$), occupational status ($p = 0.001$), and educational status ($p = 0.000$) are influential, with males, married individuals, employed respondents, and those with higher education levels more likely to report a lack of need. Conversely, residency, family wages, family size, and marital status show insignificant associations. This underscores key demographic guidance on perceived need.

Table 3.1: Socio-demographic Profile of the Respondents

Socio-demographic Variable	Frequencies (n)	Percentages (%)
Gender Distribution		
Male	132	49.8%
Female	133	50.2%
Residency of the Respondents		
Rawalpindi	200	75.5%
Islamabad	65	24.5%
Marital status of the Respondent		
Married	239	90.2%
Unmarried	16	6.0%
Widow/widower	10	3.8%
Occupation of the Respondent		
Private sector	75	28.3%
Public sector	58	21.9%
Own business	34	12.8%
Unemployed	98	37.0%
Educational status of the Respondents		
Uneducated	39	14.7
Primary education	45	17.0
Secondary education	48	18.1
Higher education	31	11.7
Bachelors education	59	22.3
Master's degree	43	16.2
Family income of the Respondent		
>50,000	111	41.9
50,000-10,000	104	39.2
10,000-150,000	33	12.5
150,000-200,000	17	6.4
Number of children of Respondent		
0	30	11.3
1	22	8.3
2	39	14.7
3	69	26.0
More than 3	105	39.6
Spouse status of Respondent		
Live	238	89.8
Dead	13	4.9

Table 3.2: Participants respond on the Modified Dental Anxiety Scale (MDAS)

Variable	Not Anxious (%)	Slightly Anxious (%)	Fairly Anxious (%)	Very Anxious (%)	Extremely Anxious (%)
If you went to your dentist for treatment tomorrow, how would you feel?	43.8	17.7	10.2	14.0	14.3
If you were sitting in the waiting room (waiting for treatment), how would you feel?	73.6	14.0	6.0	2.3	4.2
If you were about to have a tooth drilled, how would you feel?	32.8	23.4	14.7	17.0	12.1
If you were about to have your teeth scaled and polished, how would you feel?	50.6	24.5	9.9	9.1	6.0

In Table 3.3, the scrutiny shows that perceived unaffordability is significantly related with gender ($p = 0.000$), occupational status ($p = 0.002$), education level ($p = 0.001$), and family income ($p = 0.041$). Females, jobless individuals, those who are illiterate, and lower-income groups are liable to consider items as unaffordable. Residency, marital status, family size, and marital status show no significant influence on these insights.

Table 3.3: Association between Socio-demographic and Perceived Lack of Need for a Specified dental services

Socio-demographic	Perceive the lack of need for a specified dental service				
	Yes %	Occasionally %	Rare %	Never %	p-value
Gender of respondent					
Male	66	11	19	36	0.000*
Female	5	6	16	106	
Residency					
Rawalpindi	46	14	29	111	0.94
Islamabad	25	3	6	31	
Marital Status					
Married	68	13	33	125	0.031*
Unmarried	3	1	1	11	
Widow/widower	0	3	1	6	
Occupational Status					
Public	16	7	6	29	
Private	25	6	13	31	

Own business	13	0	8	13	0.001*
Unemployed	17	4	8	69	
Educational Status					
Uneducated	0	1	2	36	0.000*
Primary education	5	3	5	32	
Secondary education	21	4	8	15	
Higher education	12	2	7	10	
Bachelor's degree	21	5	6	27	
Master's degree	12	2	7	22	
Family income					
>50,000	35	7	9	60	0.291
50,000-100,000	24	8	22	50	
100,000-150,000	9	1	1	22	
150,000-200,000	3	1	3	10	
No of children					
0	9	1	7	13	0.291
1	5	3	3	11	
2	13	3	2	21	
3	14	6	13	36	
More than 3	30	4	10	61	
Spouse status					
Live	69	13	32	124	0.24
Dead	0	3	0	10	

In Table 3.4, the analysis discloses the strong relationship between fear of dental treatment and gender ($p = 0.000$), occupation ($p = 0.029$), education ($p = 0.006$), and residency ($p = 0.053$). Females, jobless individuals, illiterate respondents, and those residing in Rawalpindi report higher fear levels. Marital status, family income, number of children, and spouse status show no significant impact; gender, occupation, education, and residency are the key factors influencing dental treatment fear.

Table 3.4: Association between Socio-demographic Factors and Fear of Dental Treatment

Socio-demographic	Afraid of dental treatment			P value
	Yes	Sometime	No	
Gender of respondent				
Male	37	87	8	<0.0001*
Female	73	42	18	
Residency:				
Rawalpindi	89	89	22	0.053*
Islamabad	21	40	4	
Marital Status				
Married	100	118	21	0.302
Unmarried	5	7	4	
Widow/widower	5	4	1	
Occupation Status				
Public	23	29	6	0.029*
Private	30	41	4	
Own business	7	23	4	
Unemployed	50	36	12	
Educational Status				
Uneducated	26	8	5	0.006*
Primary education	22	18	5	
Secondary education	15	31	2	
Higher education	12	18	1	
Bachelor's degree	21	32	6	
Master's degree	14	22	7	

Family income				
>50,000	53	50	8	0.566
50,000-100,000	37	54	13	
100,000-150,000	12	17	4	
150,000-200,000	8	8	1	
No of children				
0	12	14	4	0.823
1	9	12	1	
2	18	16	5	
3	24	37	8	
More than 3	47	50	8	
Spouse status				
Live	98	120	20	0.158
Dead	5	5	3	

Binary logistic regression analysis revealed that after controlling for other socio-demographic variables (Figure 1), female gender remained significantly associated with perceived unaffordability (aOR 2.34, 95% CI 1.42-3.87, $p = 0.001$) and fear of dental treatment (aOR 3.21, 95% CI 1.98-5.20, $p < 0.001$). Unemployment independently predicted both unaffordability (aOR 2.89, 95% CI 1.56-5.34, $p = 0.001$) and fear (aOR 1.67, 95% CI 1.02-2.74, $p = 0.042$). Lower education (primary or less) was associated with unaffordability (aOR 2.12, 95% CI 1.23-3.65, $p = 0.007$) and fear (aOR 1.94, 95% CI 1.18-3.19, $p = 0.009$). Family income <50,000 PKR independently predicted unaffordability (aOR 1.78, 95% CI 1.12-2.83, $p = 0.015$), while Rawalpindi residency predicted fear (aOR 1.56, 95% CI 1.08-2.25, $p = 0.018$). For perceived lack of need, male gender (aOR 2.15, 95% CI 1.38-3.35, $p = 0.001$), married status (aOR 1.89, 95% CI 1.12-3.19, $p = 0.017$), and lower education (aOR 2.34, 95% CI 1.45-3.78, $p = 0.001$) were significant predictors.

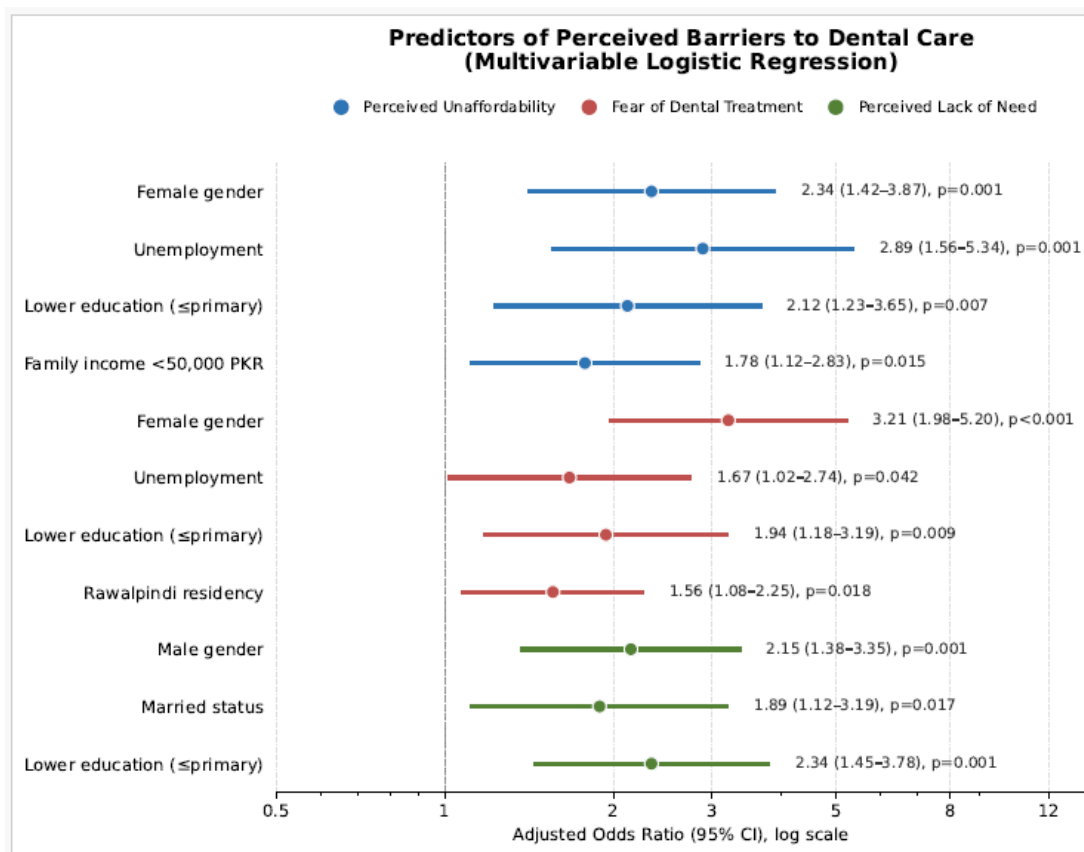


Figure 1: Forest plot of adjusted odds ratios (95% CI) for predictors of perceived barriers to dental care (unaffordability, fear, and lack of need) from multivariable logistic regression

DISCUSSION

This study examined barriers to dental care access among adults in Rawalpindi and Islamabad, Pakistan, utilizing Andersen's Behavioural Model and the Penchansky-Thomas access framework. Our findings reveal that financial constraints, dental anxiety, and perceived lack of need constitute primary barriers, with distinct socio-demographic patterns that have important implications for health policy.

Our study showed that 50% of the participants felt dental services are unaffordable for them. These findings are similar to a study conducted in Tehran, which shows that the financial cost is one of the major factors in not able to access dental care due to an insignificant insurance status, about 27 % of the participants don't have any Insurance [12]. A study conducted in India, where private practitioners provide the majority of dental services, shows that 31.1% of participants cannot afford dental care and that their needs, along with other factors, influenced the number of dental visits [13].

Multivariate analysis revealed that gender, employment status, and education independently predicted perceived unaffordability, even after controlling for income. This suggests that financial barriers are not merely a function of absolute income but reflect broader socioeconomic vulnerability. Women in this context may face constrained financial autonomy within household decision-making, while unemployment and low education limit both resources and awareness of available services. These findings extend previous research by demonstrating that affordability concerns persist across income levels when other socioeconomic disadvantages are present.

Another study showed that 93% of the patients only visited the dentist when the pain is excruciating. An effective and appropriate dentist-patient relationship is necessary for increasing the patient's trust in the dentist and thus influences the health-seeking behavior of the patient. Lack of confidence in providers has also become one of the barriers to accessing health care, as shown in Mohammad Pour's study [14].

The mean MDAS score of 8.2 indicates low-to-moderate anxiety in this population, though 12.2% exhibited high anxiety levels. Notably, multivariate analysis confirmed female gender as the strongest independent predictor of dental fear (aOR 3.21), consistent with established literature on gender differences in dental anxiety [7]. This disparity may reflect both biological factors (hormonal influences on stress response) and social factors (greater willingness among women to acknowledge anxiety). The finding that Rawalpindi residents reported higher fear levels than Islamabad residents (aOR 1.56) may reflect differences in healthcare infrastructure quality or patient-provider communication patterns between these cities.

In our study, the analysis of socio-demographic variables reveals several interesting patterns in how individuals perceive the lack of need for specific items. A significant association was found between gender and perceived need ($p = 0.000$), with 66% of males more likely to report a lack of need compared to 5% of females. This finding may throw back traditional gender characters, where men may sense less cultural norms to come in for certain items, while women, especially in some cultures, may be more attuned to meeting family or societal assurances. Additionally, marital status and educational level also showed significant alliance with perceived lack of need ($p = 0.031$ and $p = 0.000$, respectively). Married individuals were presumably to report a lack of need, which could be imputed to the shared financial obligations and priorities in a family setting.

The paradox that married men with higher education were more likely to report lack of need—while simultaneously having better access—suggests a disconnect between objective oral health requirements and subjective perceptions. This aligns with health belief model predictions that perceived susceptibility and severity influence service utilization [15]. The finding that 93% of patients in one study visited dentists only when experiencing excruciating pain underscores the reactive rather than preventive orientation toward dental care in this population.

Mapping our findings to Andersen's model reveals that predisposing characteristics (gender, education) and enabling resources (income, employment) predominate over need factors in determining access. This suggests that policy interventions targeting enabling resources—such as subsidized care for unemployed individuals or educational campaigns—may be more effective than approaches focusing solely on perceived need.

In our study, the marital and family dynamics did not show secure associations with inaccessibility, proposing that while family remuneration and residence are more prognostic of financial hardships, other factors, such as the family size or marital status,

may not have as remarkable an impact. This is consistent with studies which found that while marital status could impact household spending, income, and occupation were far more predictive of financial limitations [16].

A limitation for this study is its cross-sectional design rules out the drawing of hypotheses on causality. Additionally, there can be recollection or social conformity biases because the data were acquired from self-reporting. The study was conducted on certain urban areas, counting Islamabad and Rawalpindi. This brings down the findings' applicability to other locations, particularly rural ones with varying socioeconomic affairs and health care accessibility. The use of non-probability convenience sampling introduces selection bias and severely limits generalizability; our sample over-represents individuals already accessing dental clinics, likely underestimating barriers among those who never seek care. Cultural philosophy, mental health challenges, and health care accessibility are some of the influences that are likely to be overlooked. Convenience sampling may further moderate the sample representativeness; for stronger, generalized results, future studies should employ extensive, randomized samples.

CONCLUSION

This study emphasizes the enormous influence of socio-demographic parameters on health-related behaviors, health care access, conveyance barriers, dental treatment fear, and fiscal soundness perception. This suggests the type of public health ambitions that may be developed to ease inequalities, intensify access to healthcare, and provide financial aid to those who are vulnerable. Joint efforts by legislators, healthcare professionals, and community organizations are imperative to label these problems and ensure that all elements of society have equitable access to and an occasion for treatment.

DECLARATIONS

Ethical approval: Ethical approval of this study was obtained from National University of Medical Science, Rawalpindi, Pakistan (NUMS/SECT/21/BSPH/025) before start of this study.

Availability of data and materials: The data used and/or analyzed during the current study are available from the corresponding author on reasonable request.

AUTHORS' CONTRIBUTIONS

FS and HS contributed to study conception, design and data collection. MAY performed statistical analysis. RA supervised all study. All authors contributed to interpretation of results and manuscript drafting. All authors reviewed and approved the final manuscript.

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