

Patterns, barriers, and utilization of oral healthcare provided at primary health centers (PHCs) and its association with oral health status among rural population in Rohtak district, Haryana: A household cross-sectional study

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ABSTRACT

Introduction: Access to oral healthcare is limited in rural areas, resulting in disparities in oral health services. Primary health centers (PHCs) are essential for providing integrated oral healthcare to rural populations. This study examines the patterns, barriers, and utilization of oral healthcare at PHCs in Rohtak district, Haryana. **Materials and Methods:** In this 6-month household cross-sectional study, data were collected from a sample of 600 participants residing in rural areas under the jurisdiction of three randomly selected PHCs in Rohtak district. The study employed multistage cluster systematic random sampling procedures. Data collection included structured questionnaires and clinical oral examinations following the type-III ADA classification. Participants' oral health status was evaluated using the WHO oral health assessment form for adults (2013). Descriptive and analytical statistics were used for data analysis. **Results and Discussion:** Dental caries and periodontal diseases were more common in older age groups. Barriers to oral healthcare among the elderly include fear of dental procedures and low dental literacy. Proximity to PHCs influenced dental service utilization, with higher rates among participants living near a PHC, that is, within 5 km of a PHC. **Conclusion:** Age, gender, proximity to PHCs, household size, and socioeconomic status play crucial roles in the utilization of oral health services among the rural population. Addressing these factors is essential for improving oral healthcare and overcoming barriers. It is crucial to enhance the accessibility, affordability, and availability of oral health services at PHCs to promote better oral health and overall well-being in rural areas.

Keywords: Barriers, oral healthcare, primary health centers, utilization

Introduction

Oral health is a functional, structural, cosmetic, physiologic, and psychological state of well-being that is important to one's overall health and quality of life.^[1] Good oral health contributes to general health and well-being.^[2] General conditions such as

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diabetes, hypertension, obesity, and maternal and child health are some of the systemic disorders that are highly influenced by oral cavity conditions in people of all ages all over the world.^[3]

Poor oral health and hygiene can impact quality of life, sleep, behavior, and development. It can lead to dental diseases and contribute to serious general medical conditions such as diabetes and respiratory diseases. Early diagnosis and treatment are crucial for prevention and effective management.^[3]

According to the National Oral Health Survey done by the Dental Council of India in 2002–2003, Dental caries affects 63.1% of 15-year-olds and 80.2% of adults in the age range of 35–44 years (very high in northern states: 85%–90%). Nine periodontal diseases affect 67.7% of 15-year-olds and up to 89.6% of 35–44-year-olds. In 15-year-olds, the average DMFT (decayed, missing, filled teeth) score is 2.4, whereas in 35–44-year-olds, the average DMFT score is 5.4.^[4,5]

Disparities in oral health services exist across urban, suburban, and rural areas in India. Rural and suburban residents experience higher unmet dental needs compared to urban populations. The inverse square law supports this finding, highlighting the inverse relationship between medical care availability and population needs.^[6]

PHCs play a crucial role in promoting equitable access to healthcare by providing integrated and preventive services to communities, focusing on both curative and preventive aspects of health.^[7]

In Haryana, India, the private sector plays a significant role in addressing oral health needs, given its large population of 25.35 million. However, despite a well-established healthcare system in Haryana, oral diseases continue to increase due to neglect from individuals and political entities.^[8]

Haryana has made great progress in strengthening the state's social infrastructure during the last decade. Between 1999 and 2010, the annual funding for health infrastructure was increased, resulting in the addition of 16 hospitals, 32 community health centers (CHCs), 41 primary health centers (PHCs), and 32 subcenters (SCs).^[9] Now, Haryana's network of health infrastructure comprises 441 PHCs, 97 CHCs, and 52 general hospitals (GHs).^[10]

This study investigates oral healthcare utilization in PHCs for the rural population in Rohtak district, Haryana. It aims to identify utilization patterns and barriers to accessing oral health services in rural areas where limited literature exists on this topic.

Materials and Methods

A cross-sectional household study was carried out for 6-month duration among the rural population in Rohtak district, Haryana. Participants were people residing in rural areas coming under

the jurisdiction of PHCs. Recruitment for 6 months was done to collect the required 600 sample size. The Institution Ethics Committee of the Post Graduate Institute of Dental Sciences, Rohtak granted ethical clearance vide letter no. "PGIDS/IEC/41" after understanding the study's objectives and significance.

Inclusion criteria

Participants aged more than 18 years and those who were present on the day of examination and with the informed consent form (ICF) signed by them were included.

Exclusion criteria

Chronically ill patients with restricted mouth opening and non-residents of Rohtak district were excluded.

The sample size calculation was done based on the multistage cluster systematic random sampling procedure. There are 23 PHCs in Rohtak district, which form mutually homogenous clusters for this study.

Out of these 23 PHCs, we randomly selected three PHCs. Each PHC is established for a target population of 30,000. There are 6–10 villages in each PHC. Each village has 100–150 households. Selection of the household was done based on the systematic random sampling technique where every third house was selected after selecting a starting random point. Utilization of health services was influenced by numerous factors. For sample size calculation, we utilized accessibility of the health center and dichotomized the distance of PHC at 5 km. A sample size of 294 for each group was calculated at 80% power and 95% confidence interval based on 30% utilization of PHC services within a 5-km radius and 20% beyond. A design effect of 2 was used as the study involves cluster design.

One examiner who has been trained and calibrated examined the participants. A questionnaire was used to collect the data, following which there were clinical oral examinations. For the study, a structured questionnaire in Hindi was prepared. The questionnaire of the main survey had questions assessing sociodemographic characteristics and patterns and barriers to the utilization of oral healthcare and its association with oral health status among the rural health population.

The dental examination was performed under the type-III ADA classification for dental examination. Evaluation of the oral health status of participants was done using the WHO oral health assessment form for adults (2014).

Using SPSS version 20.0, the data were coded, tabulated, and subjected to the necessary statistical analysis. Analytic statistics and descriptive statistics (frequency distribution) were applied to the data analysis. The results are presented in the form of tables and graphs. Results on continuous data are presented as Mean \pm SD, and results on categorical variables are presented in the form of numbers (%). Significance was assessed at a 5% level of significance.

Table 1: Distribution of participants according to demographics, socioeconomic status, behavior and practices toward oral health, utilization of dental services, and factors affecting utilization of dental services

Variables	<5 km (n=300)	>5 km (n=300)	Chi-square test (P<0.05)*
Age Groups			
18–25	33 (11.0%)	31 (10.3%)	
26–35	53 (17.7%)	64 (21.3%)	
36–45	72 (24.0%)	72 (24.0%)	
46–55	56 (18.7%)	62 (20.7%)	
56–65	68 (22.7%)	43 (14.3%)	
>65	18 (6.0%)	28 (9.3%)	
Gender			
Male	93 (31%)	130 (43.3%)	
Female	207 (69%)	170 (56.6%)	
Distribution of participants based on being the head of the family			0.07
Yes	152 (50.7%)	130 (43.3%)	
No	148 (49.3%)	170 (56.7%)	
Distribution of participants based on the number of household members			0.004*
<4	109 (36.3%)	94 (31.3%)	
4–7	109 (36.3%)	148 (49.3%)	
>7	82 (36.3%)	58 (19.3%)	
Distribution of participants based on the employment status of the head of the household members			0.001*
Government service	39 (13.0%)	12 (4.0%)	
Business	47 (15.7%)	29 (9.7%)	
Unemployed	46 (15.3%)	67 (22.3%)	
Retired	35 (11.7%)	40 (13.3%)	
Labor	37 (12.3%)	34 (11.3%)	
Farmer	96 (32.0%)	118 (39.3%)	
Distribution of participants based on the education status of the head			0.01*
Primary school	39 (13.0%)	68 (22.7%)	
Secondary school	132 (44.0%)	102 (34.0%)	
High school	35 (11.7%)	36 (12.0%)	
Graduate and Postgraduate school	28 (9.3%)	21 (7.0%)	
Illiterate	66 (22.0%)	73 (24.3%)	
Distribution of participants based on the average monthly income of the household			0.001*
1–9999	81 (27.0%)	138 (46.0%)	
10,000–24,999	142 (47.3%)	119 (39.7%)	
25,000–49,999	55 (18.3%)	22 (7.3%)	
50,000–99,999	19 (6.3%)	14 (4.7%)	
>100,000	3 (1.0%)	7 (2.3%)	
Distribution of participants based on the status of the house			0.70
Owned	296 (98.7%)	297 (99.0%)	
Rented	4 (1.3%)	3 (1.0%)	
Distribution of participants based on using a toothbrush as their cleaning aid?			0.52
Yes	248 (82.7%)	240 (80.0%)	
No	52 (17.3%)	60 (20.0%)	
Utilization of services from a dentist			0.001*
PHC (Reference)	108 (36.0%)	20 (6.7%)	
CHC	14 (4.7%)	22 (7.3%)	
DH	10 (3.3%)	4 (1.3%)	
THC	11 (3.7%)		
Private dentist	140 (46.7%)	195 (65.0%)	
Dental institute	17 (5.7%)	59 (19.7%)	
Distribution of participants based on the reaching time at PHC			0.001*
<10 min	123 (41.0%)	19 (6.3%)	
10–15 min	140 (46.7%)	41 (13.7%)	
15–30 min	33 (11.0%)	20 (6.7%)	

Contd...

Table 1: Contd...

Variables	<5 km (n=300)	>5 km (n=300)	Chi-square test ($P<0.05$)*
>30 min	2 (0.7%)	33 (11.0%)	
Don't know	2 (0.7%)	187 (62.3%)	

P values were based on the Chi-square test; * $P<0.05$ was considered significant

Results and Discussion

Oral health and general health status are included in the maintenance and promotion of health, in addition to medical and psychological health. It is critical to have a comprehensive understanding of the patterns of oral health service consumption and the barriers to these services to promote and maintain good oral health. With this in mind, the goal of this study was to determine oral healthcare utilization trends and barriers among the rural population in Haryana's Rohtak district.

In the present study, the distribution of participants (<5 km vs. >5 km) based on demographics, socioeconomic factors, and oral health practices, with significant associations revealed through Chi-square tests ($P<0.05$), highlighting disparities in age, gender, household characteristics, employment, education, income, dental service utilization, and reaching time at primary health centers [Table 1].

Age

In the present study, when compared to 18-25 years age group, 56-65 years are 3.5 times, 46 to 55 years are 1.9 times, 36-45 years are 1.8 times and more than 65 years 1.0 times showed the presence of dental caries [Table 2]. When compared to 18-25 years age group, 56-65 years are 6.9 times, 46-55 years are 4.9 times, 36-45 years are 3.8 times, 26-35 years 1.7 times and more than 65 years 1.1 times have been affected with periodontal diseases. (Table 3) This suggests that older age is suffering more with periodontal diseases and dental caries than the younger ones.

India's life expectancy is projected to increase from 63.6 years (2001–2006) to 72.7 years (2031–2036), resulting in a larger elderly population. However, this poses challenges for the oral health of the elderly due to increased treatment needs and barriers to accessing care such as low income, poor literacy, poor health, and the perception of oral health as optional. These challenges are particularly amplified in the Indian population.^[11]

Fear of dental operations (52.5%) was identified as a barrier to oral healthcare utilization among the elderly in a study conducted by Salim R *et al.* 2021.^[12] People were put off by the fear of dental injections, as well as the sound of the drill and tools. The phenomenon of avoiding dental treatment due to fear is well-known. Older people are more likely to avoid stressful situations, and dental literacy is also important. Dental fear is linked to dental attendance, according to Kakatkar G *et al.* 2011.^[13]

In the study conducted by Nagarjuna P *et al.* 2016,^[14] the younger age group visited the dentist more regularly in comparison to

the older age group, which was similar to other studies. This may be due to the fact that the younger age group had more knowledge and fewer barriers.^[15] However, a study conducted by Devaraj C *et al.* 2011^[16] from India reported that older dentate adults were more likely to attend a dentist on a regular basis than the younger ones.

Gender

In the present study, males are most likely 1.1 times to be affected with dental caries when compared to the females (Table 2) and females are most likely 1.2 times to be affected with periodontal diseases when compared to the males [Table 3].

In contrast to our findings, the study conducted by Bhoomireddy VS *et al.* 2016^[17] showed no statistically significant difference in the utilization of dental services based on gender.

Females have a higher level of dental dread, according to studies by Gururaj *et al.* 2014.^[18] In contrast to our findings, in a 2016 study, Nagarjuna P *et al.*^[14] found that ladies see the dentist less frequently than males. This is because females are heavily reliant on other family members, and decisions about things such as dentist appointments are made by others.

Distance from PHC

Distance from the PHC is also an important factor in the utilization of dental services. When compared to the participants living in places less than 5 km away from the PHC, participants living at a distance of more than 5 km showed 1.4 times showed the presence of dental caries and periodontal diseases [Tables 2 and 3]. This suggests that the lesser the distance from the PHC, the greater the utilization of dental services leading to decreased oral diseases.

Distance from the PHC was reported as a reason for not utilizing dental services by 26.3% of participants in the study conducted by Nagarjuna *et al.* 2016.^[14] Health centers should have a complete oral health setup so that all the services can be provided to the rural people in their village and they do not have to travel long distances to get oral healthcare.

Number of household members

The study found that larger household size was associated with a lower likelihood of caries and periodontal diseases. Families with more than seven members had reduced rates of caries and periodontal diseases compared to those with less than four members. Similarly, families with 4–7 members also had lower rates of periodontal diseases.

Table 2: Binary logistic regression analysis of factors associated with the presence of dental caries

Independent variable	Odds ratio	P	95% confidence interval	
			Lower	Upper
Age groups				
18–25 years (Reference)				
26–35	1.6	0.16	0.81	3.27
36–45	1.8*	0.05	0.94	3.61
46–55	1.9*	0.05	0.94	3.73
56–65	3.5*	0.00	1.79	7.11
>65	1.0	0.95	0.42	2.50
Gender				
Male	1.1	0.48	0.80	1.59
Female (Reference)				
Distance				
<5 km (Reference)				
>5 km	1.4*	0.02	1.04	2.03
Employment status of the head of household members				
Government service (Reference)				
Business	1.1	0.79	0.51	2.39
Unemployed	1.3	0.39	0.66	2.79
Retired	1.2	0.64	0.55	2.59
Labor	2.0*	0.05	0.97	4.46
Farmer	1.1	0.28	0.73	2.78
Education status of the head of the family				
Illiterate (Reference)				
Primary school	1.1	0.70	0.65	1.86
Secondary school	0.9	0.98	0.64	1.54
High school	1.1	0.62	0.64	2.08
Graduate and post-graduate student	0.7	0.49	0.39	1.58
Avg. monthly income of the household				
1-9999 (Reference)				
10000-24999	0.6*	0.03	0.45	0.96
25000-49999	0.6	0.09	0.36	1.08
50000-99999	0.2*	0.009	0.11	0.73
>100000	0.8	0.83	0.23	3.17
Cleaning with a toothbrush				
Yes (Reference)				
No	0.9	0.66	0.58	1.40
Utilization of services from a dentist				
PHC (Reference)				
CHC	1.1	0.77	0.51	2.42
DH	1.0	0.87	0.34	3.47
THC	1.1	0.85	0.31	4.07
Private dentist	1.1	0.61	0.72	1.71
Dental institute	1.4	0.22	0.80	2.58
Time to reach the PHC				
<10 min (Reference)				
10–15 min	0.9	0.94	0.62	1.55
15–30 min	0.9	0.87	0.48	1.83
>30 min	0.7	0.45	0.32	1.65
Don't know	1.2	0.30	0.80	1.98
Distance to PHC				
1–5 km (Reference)				
5–10 km	1.0	0.68	0.70	1.70
10–15 km	1.1	0.49	0.75	1.78
>15 km	1.2	0.39	0.71	2.34

*P<0.05 was considered significant for odds ratio

Table 3: Binary logistic regression analysis of factors associated with periodontal disease

Independent variable	Odds ratio	P	95% confidence interval	
			Lower	Upper
Age groups				
18–25 years (Reference)				
26–35	1.6	0.16	0.81	3.27
36–45	1.8*	0.05	0.94	3.61
46–55	1.9*	0.05	0.94	3.73
56–65	3.5*	0.00	1.79	7.11
>65	1.0	0.95	0.42	2.50
Gender				
Male	1.1	0.48	0.80	1.59
Female (Reference)				
Distance				
<5 km (Reference)				
>5 km	1.4*	0.02	1.04	2.03
Employment status of the head of household members				
Government service (Reference)				
Business	1.1	0.79	0.51	2.39
Unemployed	1.3	0.39	0.66	2.79
Retired	1.2	0.64	0.55	2.59
Labor	2.0*	0.05	0.97	4.46
Farmer	1.1	0.28	0.73	2.78
Education status of the head of the family				
Illiterate (Reference)				
Primary school	1.1	0.70	0.65	1.86
Secondary school	0.9	0.98	0.64	1.54
High school	1.1	0.62	0.64	2.08
Graduate and post-graduate student	0.7	0.49	0.39	1.58
Avg. monthly income of the household				
1-9999 (Reference)				
10,000–24,999	0.6*	0.03	0.45	0.96
25,000–49,999	0.6	0.09	0.36	1.08
50,000–99,999	0.2*	0.009	0.11	0.73
>100,000	0.8	0.83	0.23	3.17
Cleaning with a toothbrush				
Yes (Reference)				
No	0.9	0.66	0.58	1.40
Utilization of services from a dentist				
PHC (Reference)				
CHC	1.1	0.77	0.51	2.42
DH	1.0	0.87	0.34	3.47
THC	1.1	0.85	0.31	4.07
Private dentist	1.1	0.61	0.72	1.71
Dental institute	1.4	0.22	0.80	2.58
Time to reach PHC				
<10 min (Reference)				
10–15 min	0.9	0.94	0.62	1.55
15–30 min	0.9	0.87	0.48	1.83
>30 min	0.7	0.45	0.32	1.65
Don't know	1.2	0.30	0.80	1.98
Distance to PHC				
1–5 km (Reference)				
5–10 km	1.0	0.68	0.70	1.70
10–15 km	1.1	0.49	0.75	1.78
>15 km	1.2	0.39	0.71	2.34

*P<0.05 was considered significant for odds ratio

Socioeconomic status

The employment status of the head of the family influenced the occurrence of caries. Laborers had twice the rate of caries, unemployed individuals had a 1.3 times higher rate, retired heads had a 1.2 times higher rate, and households with heads employed as farmers or businesspeople had a 1.1 times higher rate [Table 2].

The employment status of the head of the family impacted the occurrence of periodontal diseases. Laborers, unemployed individuals, retired heads, households with heads employed as farmers, and households with heads employed as businesspeople had lower rates compared to those in government service [Table 3].

When the average monthly income of a household was taken as a factor, the risk of dental caries was less likely to occur in families with a monthly income of 50,000–99,999, followed by 10,000–24,999 and 25,000–49,999 and with income greater than 1 lakh compared to the families with income ranging from 1 to 9999 [Table 2]. When the average monthly income of a household was taken as a factor, the risk of periodontal diseases was more likely to occur in families with an income greater than 1 lakh, 0.9 times in families with a monthly income of 50,000–99,999, followed by 1.2 times in families with a monthly income of 10,000–24,999 and 1.6 times in families with a monthly income 25,000–49,999 and compared to the families with monthly income ranging from 1 to 9999 [Table 3].

These results are in accordance with the study done by Ferreira Cde O *et al.* 2013 on the Brazilian elderly, where significant differences were found in the utilization of dental services based on the socioeconomic status of the study population.^[19]

Income and dental service utilization: Bommireddy VS *et al.* (2016) found no significant differences in dental service utilization based on the socioeconomic status.^[17] However, higher-income individuals used dental services more frequently. Limited social security and dental insurance for the elderly in India lead to expense-related barriers.^[14] Salim R *et al.* (2021) observed that lower-income individuals are less likely to seek dental services unless in extreme pain, neglecting preventive care. Financial constraints affect oral healthcare utilization and emphasize the need for accessible and affordable dental services.^[12]

Level of education

When the educational status of the head of the family was taken as a factor, when illiterate was used as a reference, the risk of dental caries was higher in primary school and high school and the risk was lower in graduate and post-graduate students and secondary school students [Table 2]. The risk of periodontal diseases was higher in primary school and high school students, graduate and post-graduate students, and secondary school students when illiterate was used as a reference [Table 3].

There was no significant association between the level of education and utilization of oral health services in the study conducted by Bommireddy VS *et al.* 2016.^[17] In the study

conducted by Roberts-Thomson K *et al.* 1995 in Australia, participants who continued their education beyond 16 years of age were 1.85 times more likely to have visited a dentist in the past year than those who had never attended school or had quit at age 15.^[20]

In the studies conducted by Nagarjuna P *et al.* (2016) and Kadaluru UG *et al.* (2012), the higher-education group showed higher dental visits than the lower-education group because education may be correlated with high health awareness, which in turn stimulates preventive behavior such as regular visits for a checkup.^[14,1]

Mode of transport

Mode of transport was associated with the presence of dental caries and periodontal diseases. Families using four-wheelers had lower caries rates, whereas those using bicycles and walking had higher rates. For periodontal diseases, four-wheelers had higher rates, whereas walking had the lowest. Transportation also acted as a barrier to accessing dental services.

Behavior and practices regarding oral health

The study found that not cleaning teeth with a toothbrush was associated with a higher likelihood of caries and periodontal diseases. Participants who did not clean their teeth with a toothbrush had increased rates of caries, whereas those who did not clean their teeth had a 1.0 times higher likelihood of periodontal diseases.

Frequency of tooth brushing was associated with the presence of dental caries and periodontal diseases. Participants who brushed their teeth twice a day had the lowest risk, whereas brushing once a day or less frequently increased the risk of caries. Similarly, for periodontal diseases, brushing twice a day was associated with the lowest risk, whereas brushing less frequently or not at all increased the risk.

Tooth brushing is a health behavior, which indicates oral health attitudes. In the study conducted by Nagarjuna P *et al.* 2016, only 25% of the subjects used to brush twice daily. The positive association between tooth brushing frequency and utilization of dental services was also supported in the study done by Kadaluru UG *et al.* 2012.^[14,1]

Utilization of services from a dentist

Utilization of services from a dentist: When PHC was used as reference, caries was more in the participants visiting dental institute (1.4 times), CHC, private dentist, THC (1.1 times) and least likely to occur in participants visiting DH [Table 2].

Utilization of services from a dentist: When PHC was used as reference, periodontal diseases were more common in the participants visiting the THC (3.3 times), dental institute (1.4 times), CHC (1.1 times), and DH (1.2 times) and least likely to occur in participants visiting a private dentist (0.7 times) [Table 3].

In the study conducted by Salim R *et al.* (2021), 51.4% of the participants reported past dental visits sought care at a private hospital, followed by government hospitals (17.7%) and private

dental colleges (6.2%). The reason for selecting a particular center is the accessibility of the center, as reported by 42.1%. Older people had 79.4% of one of their relatives to accompany them to the dental clinic, and 28.3% reported that their spouses accompanying them for dental treatment.^[12]

Time and distance to reach PHC

When the time to reach PHC of less than 10 min was used as reference, caries risk was least likely (0.7 times) in participants who took more than 30 min to reach the PHC from their home, 0.9 times in participants who took 10–15 min and 15–30 min to reach the PHC, and most likely to occur in the participants who did not know the time taken to reach the PHC [Table 2]. In terms of distance to a PHC, caries was most likely (1.2 times) to occur in the participants residing in places more than 15 km away, followed by 10–15 km (1.1 times) away and 5–10 km (1.0 times) away when compared to the participants residing within 1–5 km [Table 2]. In terms of distance to PHC, periodontal diseases were most likely (1.3 times) to occur in the participants residing in places 5–10 km away, followed by 10–15 km away (1.0 times) and greater than 15 km away (0.8s times) when compared to the participants residing within 1–5 km [Table 3].

When time taken to reach PHC less than 10 min was used as reference, periodontal diseases risk was most likely (1.6 times) in participants who took 15–30 min to reach the PHC from their home, 1.4 times in participants who took 10–15 min, 1.0 times more than 30 minutes time to reach the PHC, and 1.1 times likely to occur in the participants who did not know the time taken to reach the PHC. Lack of time was also reported as a barrier for not visiting a dentist by 45.3% of participants in the study conducted by Nagarjuna P *et al.* 2016.^[14]

Conclusion

- Study on oral healthcare in the rural Rohtak district of Haryana reveals gaps and challenges.
- Factors such as age, gender, and education influence dental caries rates.
- PHCs play a crucial role in addressing rural oral health needs.
- Barriers include limited dental services, financial constraints, and lack of awareness.
- Recommendations: increase PHC dental services, provide financial support, and promote oral health education.
- Enhancing oral healthcare will improve overall well-being in rural communities.

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Conflicts of interest

There are no conflicts of interest.

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