



Original Research Article

A geospatial analysis of factors influencing clinical decision-making of rural and urban dental practitioners in Tiruppur district

Sakthi Soundarya Lakshmi¹, S. Aparna¹, P. D. Madankumar¹

¹Department of Public Health Dentistry, Ragas Dental College and Hospital, Chennai, Tamil Nadu, India.

ABSTRACT

Objectives: The core of dental practice is clinical decision-making. Geographic information system was used in our study to evaluate the clinical decision-making of dental practitioners in urban and rural Tiruppur district, Tamil Nadu.

Materials and Methods: This cross-sectional study included 50 certified dental practitioners from both urban and rural areas. The research was conducted in June 2022. The ten-item and self-administered questionnaire was designed to collect data on practitioner, patient, and provider characteristics. The questionnaire was distributed to participants through an online Google form forum, and the results, clinical decision-making, were quantified using a series of hypothetical case situations. The association between rural and urban dental practitioners was assessed using the “Chi-square test.”

Results: Twenty-six (14 [56%] urban and 12 [48%] rural practitioners) chosen the most conservative treatment approach of coronoplasty for asymptomatic impacted mandibular 3rd molar. Thirty (17 [68%] urban and 13 [52%]) rural practitioners preferred the conservative treatment plan of removal of caries followed by GIC Restoration for class I dental caries in a 7-year-old child. For the case scenario relation to class I malocclusion with spacing, 16 (64%) of urban dental practitioners preferred aligner-based treatment rather than fixed orthodontic appliance. This treatment choice differs statistically between urban and rural practitioners.

Conclusion: The current research revealed an association between non-clinical features and dental professionals’ self-reported treatment preferences. It provides a foundation for future research into the elements hypothesized to impact dentists’ treatment decisions.

Keywords: Clinical decision-making, Dentist, Rural, Urban, Geographic information systems

INTRODUCTION

The core of dental practice is clinical decision-making. Clinical decision-making has several meanings, but one of the most basic is the process of deciding between multiple treatment possibilities or options. These decisions are rarely simple and involve a complex procedure that necessitates the collection and analysis of clinical and other data to draw conclusions.^[1]

Some of the aspects in medicine and dentistry have been studied in the previous works, and they can be divided into “clinical” (or occasionally “technical”) and “non-clinical” factors.^[1] Clinical factors are aspects of a patient’s health that relates to their current state of illness, their history of symptoms in the past, and the likelihood of developing a disease in the future. Non-clinical factors are elements that affect a clinician’s behavior, such as the amount of time, they spend working in a dental office and other individual traits

of the doctor and patient.^[2] Research has shown that dentists’ clinical decisions are influenced by non-clinical factors such as provider age, years of experience, and place of first training.^[3] For instance, Grembowski *et al.* found that young dentists usually employ more aggressive clinical techniques and carry out more needless treatments than their older counterparts.^[4]

Inadequate dental practitioner distribution between urban and rural locations is the other issue that has an impact on or influences clinical decision-making. Furthermore, regions with concentrated providers are thought to be more competitive.^[5] Due to the concentration of dental professionals in urban rather than rural areas, the oral health of the urban population in India has improved more than that of its rural counterparts.^[6] One of the main reasons of disparities in oral health is access to oral health-care providers, with this issue being exacerbated by the uneven geographic distribution of dental professionals.^[7]

*Corresponding author: Sakthi Soundarya Lakshmi, Department of Public Health Dentistry, Ragas Dental College and Hospital, 2/102, East coast road, Uthandi, Chennai, Tamil Nadu, India. sakthivaradara77@gmail.com

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Geographic information systems (GISs), which have been utilized in dentistry since the 1960s, can be used to locate the distribution of dental clinics.^[8] Prior research has examined the distribution of dental clinics using GIS and how it may affect the availability of dental treatment in a number of nations, including Australia, Brazil,^[9-11] New Zealand,^[12] and Malaysia.^[13]

To this end, no studies were conducted in India regarding the clinical decision-making of a dental practitioners. Hence, this present study was aimed to assess the clinical decision-making of the dental practitioners in rural and urban areas of Tiruppur district, Tamil Nadu through GIS.

MATERIALS AND METHODS

The Institutional Ethical Committee board in Chennai provided ethical approval for the project (IEC No). This cross-sectional study was conducted in June 2022 across diverse regions of rural and urban area dental practitioners in Tiruppur district.

An online survey with ten questions was created to collect information on practice, patient, and provider characteristics. The survey included inquiries about the respondent's age, sex, number of years of experience, location, and ownership of the practice. A number of hypothetical case scenarios were used to quantify the result, clinical decision-making. The case scenarios presented typical clinical situations, such as deciding to harvest asymptomatic third molars to cure proximal caries rather than offering a prophylactic treatment. Each scenario offered four alternative options. The treatment options included both very aggressive and very conservative methods. The most conservative approach received a "1," and the most aggressive one received a "4." The respondent's score for treatment intensity was, then, calculated by averaging the results from each question. The dental faculty members at the Ragas Dental College and Hospital helped with the case scenario questions' development by analyzing the literature. In addition, ten dental professionals were asked to pilot test the questions to determine their face validity. The G-Power software version 3.1 study by Ghoneim *et al.* in 2020 was used to determine the sample size. Thirty people were determined to be the bare minimum sample size with 80% power and $\alpha = 0.05$. A total of 50 registered dental practitioners (25 urban and 25 rural) participated in this cross-sectional survey. Dental clinics in Tiruppur district that were within a 5–10 km radius of both urban and rural areas were chosen using GIS. Following the receipt of informed consent, the participants were given the questionnaire to complete using a Google form forum to gather information about the factors impacting dental practitioners' clinical decision-making.

Inclusion and exclusion criteria

Dental professionals with at least 1 year of experience who were registered with the Tamil Nadu Dental Council of India and were currently in practice were included in the study.

The following were the exclusion criteria: (1) Specialists; (2) non-practicing lecturers and dental faculty members; and (3) participants in the survey's pilot testing.

Statistical analysis

The data were imported into Microsoft Excel 2010 and the statistics was examined using SPSS 20.0. "Descriptive statistics" was run as well as a "Chi-square test" to determine whether there was a difference in dental participants from rural and urban areas. Responses from the participants' perspectives on the factors impacting clinical decision-making were gathered for further investigation. Statistics were deemed significant at $P = 0.05$.

RESULTS

[Table 1] denotes the demographic details of study participants.

A total of 50 registered dental professionals participated in this cross-sectional survey, of which 25 (50%) were urban and the remaining 25 (50%) were rural. With a mean experience of 6.98 ± 4.57 years and an average age of 28.4 ± 5 years, all 50 (100%) of the certified dental practitioners were working in clinical practice individually. Of these, 35 (70%) were men and 15, (30%) were women.

[Table 2] denotes the clinical decision-making among dental practitioners in rural and urban areas.

More than half of the study participants 26 (14 [56%] urban and 12 [48%]) rural practitioners chose the most conservative treatment approach of coronoplasty for asymptomatic impacted mandibular 3rd molar. Similarly, most of the dental practitioners 30 (17 [68%] urban and 13 [52%]) rural practitioners preferred the conservative treatment plan of removal of caries followed by GIC restoration for class I dental caries in a 7-year-old child. In both these clinical scenarios, there is no statistical difference in treatment choice of urban and rural practitioners. For the case scenario relation to class I malocclusion with spacing, 16 (64%) of urban dental practitioners preferred aligner-based treatment rather

Table 1: Demographic details of study participants.

Demographic characters	n (%)
Age (years)	
≤30	22 (44%)
>30	28 (56%)
Gender	
Male	35 (70%)
Female	15 (30%)
Years of practice	6.98±4.57
Type of dental practice	
Individual practice	50 (100%)
Locality	
Urban	25 (50%)
Rural	25 (50%)

Table 2: Questionnaire related to clinical decision-making among dental professionals in rural and urban areas.

Q. No.	Question	Options	Urban	Rural	P-value
1	A 24-year-old patient reports the clinic with the asymptomatic impacted mandibular 3 rd molar. What will be your treatment option?	a. Advise surgical extraction under LA b. Advice IOPAR followed by coronoplasty c. Wait and watch with topical application d. None of the above	3 (25%) 14 (56%) 7 (28%) 1 (4%)	7 (28%) 12 (48%) 5 (20%) 1 (4%)	0.555
2	A 19-year-old patient has been diagnosed with mandibular class I dental caries. What will be your treatment option?	a. Excavation of caries followed by conventional class I GIC or composite Restoration b. Root canal treatment with aesthetic crown c. Antibiotic therapy d. None of the above	25 (100%) - - -	25 (100%) - - -	-
3	An 18-year-old patient came with class I malocclusion with spacing in relation to upper and lower anteriors. What will be your treatment option?	a. Fixed orthodontic appliance b. Invisalign c. Extraction of anteriors followed by FPD d. None of the above	9 (36%) 16 (64%) - -	21 (84%) 4 (16%) - -	0.001
4	A 7-years-old patient reported to the dental clinic with class I dental caries in relation to 36. What will be your treatment option?	a. Excavate the caries followed by preventive resin restoration b. Pulpectomy with stainless crown c. Excavate the caries followed by GIC Restoration d. No treatment	8 (32%) - 17 (68%) -	12 (48%) - 13 (52%) -	0.248

than fixed orthodontic appliance. This treatment choice differs statistically between urban and rural practitioners. Furthermore, all the 50 (100%) participants (25 urban and 25 rural dental practitioners) selected the conservative approach of class I GIC or composite restoration for class I dental caries management in a 19-year-old patient.

DISCUSSION

The present study discovered an association between many non-clinical features and clinical decision-making in a representative sample of dental practitioners in the Tiruppur area. Clinical decision-making is a complex process that is impacted by both clinical and non-clinical factors. The findings are supported by previous research. Studies by Traebert *et al.* and Zadik and Levin found that older dentists chose more conservative treatments.^[3,14]

Dental professionals may now be competent to assess clinical cases more accurately due to their increased competence from recent years of practice. Others believe that senior dentists are less swayed by financial incentives and more inclined toward ethics when recommending treatments.^[15]

Holden *et al.* 2020 state that dentistry is referred to as a profession, with the professional's "profession" being to protect and advance the "public good." Dentists are often viewed as either business people or members of the health-care profession, which has led to some controversy. This implies that the interests of the patient are always put ahead of those of the dentist.^[16] However, some claim that because dentistry is a health profession, its values and conventions frequently conflict with those of its other culture, which is business, which prioritizes profit and high income. This can occur when dentists prioritize patients who desire pricey

procedures (veneers) above those who require simpler procedures (basic restorations) to increase revenue. This may aid in explaining the differences in clinical decision-making between those who identify as predominantly business people and those who identify as health-care professionals.^[17] In contrast to the previous study by Ghoneim *et al.*, which found that most dental practitioners in urban areas prefer to use aggressive treatment methods over conservative ones,^[11] the majority of dental professionals in our present study chose conservative methods over aggressive ones for the majority of clinical scenarios. However, most metropolitan dental professionals recommended aligner-based treatment rather than a fixed orthodontic device for the management of class I malocclusion with spacing, crediting the association between location and clinical decision-making. One possible explanation for the aforesaid scenario is that dentists practicing in cities may prefer the aligner due to the socioeconomic status and affordability of their patients in cities rather than rural locations.

The majority of dentists may have a propensity to intervene more forcefully when in doubt, because they worry that patients won't have access to proper follow-up in the future, according to previously published literature by Ghoneim *et al.* This can be very important when opting to remove an asymptomatic third molar rather than taking a "watch and see" approach or when choosing to treat an early carious lesion rather than waiting to treat it if it progresses to the dentin.^[5]

Clinical decision-making by dental practitioners has previously been studied. Radiographic images appear to be the most commonly used tool for determining the depth of

a carious lesion, where a dentist would perform restorative treatment.^[18] Another technique involves the “ethical” calibration of offered treatment choices to a hypothetical setting^[19,20] and contrasting discrepancies between procedures suggested and performed by dentists under various payment regimes.^[21]

Limitation

The limitation of our study outcome measure is the social desirability bias, which impacts the distribution of treatment intensity scores. When given multiple-choice case scenarios, dentists may select what they believe to be “the proper answers,” which may not always correspond to their real clinical judgments. In spite of the fact that social desirability bias is almost always present in self-administered surveys, we made an effort to lessen its occurrence in our study. For example, when conducting the survey, dentists were urged to select the option that best reflected their clinical decisions in the situations offered, with no right or wrong answers.

CONCLUSION

This study shows an association between non-clinical characteristics and the self-reported treatment choices of dental professionals. This is the first study to investigate the factors influencing dental practitioners’ clinical decision-making in the Tiruppur district. Furthermore, it serves as a foundation for future studies that will employ a novel measurement approach to study characteristics that are believed to impact dentists’ clinical decisions.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Ghoneim A, Yu B, Lawrence H, Glogauer M, Shankardass K, Quiñonez C. What influences the clinical decision-making of dentists? A cross-sectional study. *PLoS One* 2020;15:e0233652.
- Hajjaj FM, Salek MS, Basra MK, Finlay AY. Non-clinical influences on clinical decision-making: A major challenge to evidence-based practice. *J R Soc Med* 2010;103:178-87.
- Traebert J, Marcenes W, Kreutz JV, Oliveira R, Piazza CH, Peres MA.

- Brazilian dentists’ restorative treatment decisions. *Oral Health Prev Dent* 2005;3:53-60.
- Grembowski D, Fiset L, Milgrom P, Forrester K, Spadafora A. Factors influencing the appropriateness of restorative dental treatment: An epidemiologic perspective. *J Public Health Dent* 1997;57:19-30.
- Ghoneim A, Yu B, Lawrence HP, Glogauer M, Shankardass K, Quiñonez C. Does competition affect the clinical decision-making of dentists? A geospatial analysis. *Community Dent Oral Epidemiol* 2020;48:152-62.
- Yadav S, Rawal G. The current status of dental graduates in India. *Pan Afr Med J* 2016;23:22.
- Jo O, Kruger E, Tennant M. Geospatial analysis of the urban and rural/remote distribution of dental services in Scotland, Wales and Northern Ireland. *Int Dent J* 2020;70:444-54.
- Broomhead T, Ballas D, Baker SR. Application of geographic information systems and simulation modelling to dental public health: where next? *Community Dent Oral Epidemiol* 2019;47:1-11.
- Kruger E, Tennant M, George R. Application of geographic information systems to the analysis of private dental practices distribution in Western Australia. *Rural Remote Health* 2011;11:1736.
- Shiikha Y, Kruger E, Tennant M. Rural and remote dental services shortages: Filling the gaps through geo-spatial analysis evidence-based targeting. *Health Inf Manag J* 2015;44:39-44.
- Almado H, Kruger E, Tennant M. Application of spatial analysis technology to the planning of access to oral health care for at-risk populations in Australian capital cities. *Aust J Prim Health* 2015;21:221-6.
- Kruger E, Whyman R, Tennant M. High-acuity GIS mapping of private practice dental services in New Zealand: Does service match need? *Int Dent J* 2012;62:95-9.
- Bohari NF, Kruger E, John J, Tennant M. Analysis of dental services distribution in Malaysia: A geographic information systems-based approach. *Int Dent J* 2019;69:223-9.
- Zadik Y, Levin L. Clinical decision making in restorative dentistry, endodontics, and antibiotic prescription. *J Dent Educ* 2008;72:81-6.
- Walker I, Gilbert D, Asimakopoulou K. Are clinical decisions in endodontics influenced by the patient’s fee-paying status? *Br Dent J* 2015;219:541-5.
- Welie JV. Is dentistry a profession? Part 1. Professionalism defined. *J Can Dent Assoc* 2004;70:529-32.
- Franzen C. Balancing costs and patients’ health: Dental students’ perception of economics in dentistry. *Prof Prof* 2015;5:1-12.
- Gordan VV, Garvan CW, Heft MW, Fellows JL, Qvist V, Rindal DB, *et al.* Restorative treatment thresholds for interproximal primary caries based on radiographic images: Findings from the Dental PBRN. *Gen Dent* 2009;57:654-63.
- Kazemian A, Berg I, Finkel C, Yazdani S, Zeilhofer HF, Juergens P, *et al.* How much dentists are ethically concerned about overtreatment; A vignette-based survey in Switzerland. *BMC Medical Ethics* 2015;16:43.
- Tickle M, McDonald R, Franklin J, Aggarwal VR, Milsom K, Reeves D. Paying for the wrong kind of performance? Financial incentives and behaviour changes in national health service dentistry 1992-2009. *Community Dentistry Oral Epidemiol* 2011;39:465-73.
- Holden ACL, Quiñonez C. The role of the dental professional association in the 21st Century. *Int Dent J* 2020;70:239-44.

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