

Parsimonious Prediction Model for the Prevalence of Dental Visits in Chennai, India

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ABSTRACT

OBJECTIVE: The aim of the study is to analyze the prevalence of dental visits within the last year in the Behavioural Risk Factor Surveillance System or BRFSS by the simple sociodemographic factors among the adults in 10 different areas of Chennai, Tamil Nadu.

METHODS: Cross sectional telephone survey (Behavioural Risk Factor Surveillance System) conducted among 500 adults. Data was collected based on a standardized questionnaire to determine the distribution of risk behaviours and health practices among non-institutionalized adults. A multivariable logistic regression model considers the complex sample design of the BRFSS was used to predict the prevalence of dental visits based on four non-clinic parsimonious variables.

RESULTS Results showed that the adults with the High household income, Religion(Hindu), High Education(> High School Diploma), and marital status were associated with an annual dental visit with the odd ratios of 0.943, 1.161, 1.243, 0.876 respectively. Besant Nagar had the highest percentage (13%) of estimated annual users, while Redhills had the lowest percentage(8%).

CONCLUSION: Health promotion organizations, Local governments, Insurance companies, and organizations that administer public health programs will benefit by applying this model to the available nonclinical databases, and will be able to improve planning of dental health services and required dental workforce.

KEYWORDS: Behavioural Risk Factor Surveillance System, Complex samples; Dental visit, Dentistry, Logistic regression, Oral health survey

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INTRODUCTION

Personal health behaviours play a major role in morbidity and mortality of life, especially the oral health, as the mouth is a valuable body cavity which serves us with smile speech, mastication and also acts as a track, for the entry of multiple infections. So to assess the personal dental health, a telephone survey was conducted using Behavioural Risk Factor Surveillance System, which is a national survey that helps to shape public health policy at many levels in local, state and federal agencies(1). Based on four Non-Clinic variables:

Annual Household Income(2-10), Religion(2,4,11), Marital status(2,3,12-15), and attained Education the survey was conducted amongst the Non-Institutionalized adults. These variables were selected as they serve the goal of pragmatism needed in public health projects, to analyze the prevalence of dental visits within last year.

The proposed model will allow public and private healthcare agencies and dental insurance programs to predict the number and percentages of people, in a specific and simply identified sociodemographic stratum, who will use their programs in a specific year at least once and to plan for future dental workforce needs accordingly. Additionally, the model will help health promoters at the individual or community level to prioritize their target populations according to their risk level of underutilization of dental care services, which ultimately will lead to a better use of resources.

METHODS

Behavioural Risk Factor Surveillance System is a cross-sectional telephone survey and a descriptive study, conducted among the non-institutionalized adults above 18 years of age, in about 10 areas of Chennai, and 50 per area were questioned with the restriction of interviewing one adult per household(1).

Ten areas of Chennai were chosen, namely: Shenoy Nagar, Aminjikarai,

Anna Nagar, Thiyagaraya Nagar, Besant Nagar, Redhills, Vadapalani, Ramapuram, Nungambakkam and Porur to participate in the survey. The response rate was good and the final sample comprised of 500 adults. The sample size was estimated from the information on the prevalence parameters observed in previous epidemiological studies carried out.

The survey involved a structured questionnaire conducted primarily through personal telephone interviews in Tamil (Local Language) or English, and the questions asked during the telephone interview were related to socioeconomic status of the individual and their period of the last dental visit. The home telephone numbers are obtained through the random digit dialing from the telephone directory according to the particular area.

500 samples were taken with 50 per area for 10 different areas of Chennai. The proforma contains the demographic data (Name, Age, Sex), Occupation, Telephone Number, and then questions regarding, i)Their last dental visit whether it was Within Last Year or More Than A Year, ii)Annual Household Income -High or low based on Kuppuswamy’s socioeconomic scale, iii)Religion- Hindu or other Religion, iv)Level of Education- High or Low based on Kuppuswamy’s socioeconomic scale and the Occupation status obtained from the person, v)Marital

Status- Married or Not Married.

STATISTICS

STATA version 8.0 was used to conduct all statistical analyses. The analysis considered the complex design of the BRFSS sample using a Taylor expansion to calculate the standard errors and assuming the first stage sampling fraction is small (randomly selected geographical regions or districts). Frequently tables for each of the dependant and independent variables in addition were generated. A logistic regression model was calculated and evaluated using the classification table method. Expectations for the number of dental visitors (or the estimated prevalence of dental visits) in all the areas were calculated based on these estimated probabilities.

RESULTS

The sample consisted of 500 adults above 18 years of age. 10 areas of Chennai was selected to participate in the oral module of the cross sectional BRFSS telephone survey. This included 500 Non-Institutionalized adults (representing different households) who answered the five questions regarding the time of their last dental visit, annual household income, religion, level of education, and marital status in an informative way.

The mean percentage of people who visited the dental clinic within the last year is 62.8%. The lowest percentage

Table 1: Percentages of participants visited a dental clinic within last year and their sociodemographic characteristics by certain areas in Chennai

Area	N	% Visited a dental clinic within last year	% High annual household income	% Hindu (religion)	% High education	% Marital status
Shenoy nagar	50	5.8%	4.6	5.2	5.8	4.6
Aminjikarai	50	6.2%	4.2	4.2	4.4	4.2
Anna nagar	50	6.4%	4.8	4.2	5.0	3.6
T.Nagar	50	6.4%	5.2	4.6	4.6	4.4
Besant nagar	50	7.4%	5.6	4.8	6.4	3.2
Redhills	50	5.2%	2.8	5.2	3.6	3.4
Vadapalani	50	6.2%	5.0	5.0	4.8	4.2
Ramapuram	50	6.4%	4.0	5.8	5.8	4.4
Nungambakkam	50	7.0%	5.4	4.6	6.6	3.0
Porur	50	5.8%	3.2	6.0	4.8	5.6

Table 2: Percentages of participants visited a dental clinic within last year and odds ratios by sociodemographic characteristics

Satus	Visited A Dental Clinic Within The Last Year	Odd Ratio
Income		
High Annual Household Income	171 (34%)	1.035*
Low Annual Household Income	143(29%)	
Religion		
Hindu	157(33%)	0.916*
Other Religion	157(31%)	
Education		
Higher Education (> High School Diploma)	159(32%)	0.881*
Lower Education (< High School Diploma)	155(27%)	
Marital Status		
Married	173(36%)	1.080*
Not Married	141(28%)	
*P Value < 0.0001		

of visitors to a dental clinic within the last year was in Redhills with 5.2% and the highest was in Besant Nagar with 7.4%.The weighted percentages

for visiting a dental clinic within the last year as well as each of the four main sociodemographic characteristics analyzed as explanatory variables are

detailed in Table 1.

The estimated percentage of the sampled population persons who visited a dental clinic within the last year and who were positive in at least one of the main sociodemographic characteristics ranged from 32% to 36% with the highest percentage among those whose indicated as married and the lowest percentage among those who had lower education. Table 2 also details the individual odds ratios for the different sociodemographic characteristics.

The four non-clinic parsimonious variables i.e. all the four main sociodemographic characteristics related to dental visits were superiorly beneficial (P-value < 0.0001) in a multivariable regression model, also the multivariable Wald test was highly significant, as shown in Table 3.The odd ratio between the Hindu and the other religions (Christians, Muslims, etc.) was

Table 3: Odd ratios relating sociodemographic characteristics to likelihood of an annual dental visit

Variable	Parameter Coeficients(Se)	Odd Ratio	Or (95% Ci)	P-Value
High Annual Household Income	0.185	0.943	0.763 – 1.578	<0.0001
Religion(Hindu)	0.186	1.161	0.548 – 1.135	<0.0001
High Education (> High School Dipolma)	0.187	1.243	0.491 – 1.023	<0.0001
Married	0.188	0.876	0.853 – 1.783	<0.0001

Table 4: Expected probabilities of visiting a dental clinic within last year by the different sociodemographic types

High Annual Household @Income	High Education (> High School Diploma)	Religion (Hindu)	Marital Status	Lower Bound of Estimated Probability (95%)	Estimated Probability (%)	Upper Bound of Estimated Probability (95%)
N	N	N	N	43.40	42.12	48.94
N	N	N	Y	47.07	52.36	55.17
N	N	Y	N	54.03	59.83	61.23
N	N	Y	Y	61.20	64.20	68.13
N	Y	N	N	65.23	67.65	71.21
N	Y	N	Y	72.35	74.21	77.25
N	Y	Y	N	75.32	76.89	78.32
N	Y	Y	Y	75.72	77.65	79.63
Y	N	N	N	53.17	55.64	59.02
Y	N	N	Y	57.13	59.26	61.23
Y	N	Y	N	64.52	66.35	68.26
Y	N	Y	Y	68.06	70.15	72.09
Y	Y	N	N	69.12	71.21	74.06
Y	Y	N	Y	73.25	75.29	76.12
Y	Y	Y	N	79.21	81.21	81.93
Y	Y	Y	Y	81.10	82.31	83.33

Table 5: Expected Probabilities of Visiting a Dental Clinic within Last Year by Ten Different Areas of Chennai

Area	Lower Bound (95%)	Expected Probability	Upper bound (95%)
	Shenoy Nagar	6.6%	9.2% 12.38%
Aminjikarai	6.8%	9.8%	13.72%
Annanagar	7.0%	10.1%	14.08%
T.Nagar	7.0%	10.1%	14.08%
Besant Nagar	8.6%	11.78%	15.85%
Redhills	5.48%	8.2%	11.90%
Vadapalani	7.01%	9.87%	13.71%
Ramapuram	7.28%	10.19%	14.07%
Nungambakkam	7.89%	11.15%	15.16%
Porur	6.27%	9.24%	12.97%

the highest; and the lowest was associated with the Marital Status.

There are 16 possible combinations of the main sociodemographic characteristics as listed in Table 4.

Elaboration of the expected percentages of annual users of dental services i.e. the prevalence of dental visits by the ten different areas of Chennai is listed in Table 5. The expectations were based on the expected probabilities of visiting a dental clinic within the last year for each sociodemographic combination in the ten different areas of Chennai. The results showed that the prevalence of an annual dental visit was highest in Besant Nagar (13%) of estimated annual users, while Redhills had the lowest percentage(8%).

DISCUSSION

The study of this paper is related to the determination of the prevalence of dental visits within the last year, in ten different areas of Chennai based on four main binary and parsimonious sociodemographic characteristics, which are available in many datasets of public and private sectors, e.g., Health promotion organisations, Insurance Companies and the Organisations that administer Public Health Programs. And by applying this proposed model to these populations will help those entities in planning dental health services and required dental workforce(16).

The data collected in the present study was through the Behavioural Risk

Factor Surveillance System, a cross sectional telephone survey conducted in about the ten different areas of Chennai: Shenoy Nagar, Aminjikarai, Anna Nagar, Thiyagaraya Nagar, Besant Nagar, Redhills, Vadapalani, Ramapuram, Nungambakkam and Porur. The study population comprises Non-institutionalized adults of 18 years of age and above. In this survey program, data collection is conducted primarily through personal telephone interviews by random digit dialing from the directory in the ten particular areas of Chennai participating in the survey, and experience has shown that a personal telephone interview yields a high quality of collected data and generally a higher rate of participation is achieved than through use of self-administered questionnaire.

Based on the BRFSS survey, the model was proposed which gives, a limited number of 16 risk categories with the expected probability of not visiting a dental clinic within a year ranging from 48 to 59%. This method seems beneficial for those promoting health at the individual or community level to direct their efforts towards the populations in the highest risk categories, and to prioritize their resources to include the populations in the different risk categories appropriately.

This parsimonious model can be used for the prediction at the state, country, city, small community or specific population level; wherever the sociodemographic characteristics

about the population is already known and there is no need to make such a prediction based on a parsimonious model to improve planning. Exertion of the parsimonious model suits the macro level population better than micro level population, as for micro it may become less robust or beneficial. Thus, the usage of the model should be cautious, until it proves valid for a particular population especially smaller populations whose specific characteristics makes them unique(17).

CONCLUSION

The study developed a simple model designed for health administrators to estimate the prevalence of dental visit within last year for different combinations of sociodemographic characteristics, and in working to improve the planning of the dental health services and required dental workforce in the areas of Chennai.

REFERENCES

1. National Center for Chronic Disease Prevention and Health Promotion. Behavioural Risk Factor Surveillance System BRFSS updated: 4-9-2005. Available at <http://www.cdc.gov/brfss/about.htm> (accessed on 20 June 2005).Centers for Disease Control and Prevention, Atlanta,GA.
2. Macek MD, Cohen LA, Reid BC, Manski RJ. Dental visits among older U.S. adults, 1999: The roles of dentition status and cost. *J Am Dent Assoc* 2004;**135**:1154-62.
3. Sohn W, Ismail AI, Regular dental visits and dental anxiety in an adult dentate population. *J Am Dent Assoc* 2004;**135**:1011-17.
4. Macek MD, Edelstein BL, Manski RJ. An analysis of dental visits in US children, by category of service and sociodemographic factors, 1996. *Paediatr Dent* 2001;**23**:383-89.
5. Petersen PE, Kjoller M, Christensen LB, Krustup U. Changing dentate status of adults, use of dental health services, and achievement of national dental health goals in Denmark by the year 2000. *J Public Health Dent* 2004;**64**:127-35.
6. Simpson L, Owens PL, Zodet MW, Chevarley FM, Dougherty D, Elixhauser A *et al*. Health care for children and youth in the United states:annual report on patterns of coverage, utilization, quality, and expenditures by income. *Ambul Pediatr* 2005;**5**:6-44.
7. Kim YO, Telleen S. Predictors of the utilization of oral health services by

- children of low-income families in the United States: beliefs, costs or provider? *Taehan Kanho Hakhoe Chi* 2004;**34**:1460-67.
8. Kronstrom M, palmqvist S, Soderfeldt B, Vigild M. Utilisation of dental services among middle aged people in Sweden and Denmark. *Acta Odontol Scand* 2002;**60**:276-80.
 9. Suominen-Taipale AL, Nordblad A, Alanen P, Alha, Koskinen S. Self- reported dental health, treatment need and attendance among older adults in two areas of Finland. *Community Dent Health* 2001;**18**:20-26.
 10. Vargas CM, Yellowitz JA, Hayes KL. Oral health status of older rural adults in the United States. *J Am Dent Assoc* 2003;**134**:479-86.
 11. Wall TP, Brown LJ. Dental visits among Hispanics in the United States, 1999. *J Am Dent Assoc* 2004;**135**:1011-17.
 12. Mumcu G, Sur H, Yildirim C, Soylemez D, Atli H, Haryan O. Utilisation of dental services in Turkey: a cross-sectional survey. *Int Dent J* 2004;**54**:90-96.
 13. Okunseri C, Born D, Chattopadhyay A. Self-reported dental visits among adults in Benin city, Nigeria. *Int Dent J* 2004;**54**:450-456.
 14. Petersen PE, Aleksejuniene J, Christensen LB, Eriksen HM, Kalo I. Oral health behaviour and attitudes of adults in Lithuania. *Acta Odontol Scand* 2000;**58**:243-48.
 15. Vazquez L, Swan JH. Access and attitudes toward oral health care among Hispanics in Wichita, Kansas. *J Dent Hyg* 2003;**77**:85-96.
 16. Association between sociodemographic factors and dental service utilisation among people visiting a dental college hospital in India-a descriptive cross sectional study.
 17. Gilbert GH, Rose JS, Shelton BJ. A prospective study of the validity of self reported use of specific types of dental services. *Public Health Rep* 2003;**118**:18-26.