International Journal of Dental Hygiene

Official Journal of the International Federation of Dental Hygienists

ORIGINAL ARTICLE

MM Montenegro
MF Flores
PRG Colussi
RV Oppermann
AN Haas
CK Rösing

Authors' affiliations:
PRG Colussi, Federal University of Rio Grande do Sul, Porto Alegre, Brazil
PRG Colussi, Department of Periodontology, University of Passo Fundo, Passo Fundo, Brazil
RV Oppermann, *AN Haas*, *CK Rösing*, *MM Montenegro*, *MF Flores*, Department of Periodontology, Federal University of Rio Grande do Sul, Porto Alegre, Brazil

Correspondence to:
C. K. Rösing
Department of Periodontology
Federal University of Rio Grande do Sul
Ramiro Barcelosm, 2492 – Bom Fim
90030-035 Porto Alegre RS
Brazil
Tel./Fax: +55 51 33085318
E-mail: ckrosing@hotmail.com

Dates:
Accepted 25 July 2013

To cite this article:
Int J Dent Hygiene **12**, 2014; 103–107.
DOI: 10.1111/idh.12052
Montenegro MM, Flores MF, Colussi PRG, Oppermann RV, Haas AN, Rösing CK. Factors associated with self-reported use of mouthwashes in southern Brazil in 1996 and 2009.

Factors associated with self-reported use of mouthwashes in southern Brazil in 1996 and 2009

Abstract: *Objective:* To evaluate the association between sociodemographic factors and self-reported use of mouthwashes in a city in the south of Brazil over a time span of 13 years. *Methods:* The study involves a comparison of two household surveys conducted in 1996 and 2009. Respectively, 850 and 982 households were included in each year. The mother of the family answered to a structured questionnaire to provide sociodemographic data. Self-reported use of mouthwash was evaluated in a binary manner (yes/no). Multivariate Poisson regression models were used to estimate proportion ratios (PR) and 95% confidence intervals (95% CI). *Results:* The proportion of mouthwash use increased significantly from 10.8% to 24.2% after 13 years. The probability of using mouthwashes increased more than two times from 1996 to 2009 (PR = 2.25 95% CI 1.80–2.82). Higher probabilities for using mouthwashes were observed in households with higher income (PR = 2.63 95% CI 1.97–3.51) and in those households where the mothers had higher educational levels (PR = 1.46 95% CI 1.05–2.03). *Conclusion:* Higher family income and higher maternal educational level were associated with self-reported use of mouthwashes in a higher proportion of households.

Key words: education; income; mouthwashes; oral hygiene; risk factors

Introduction

It has been demonstrated that the use of mouthwashes containing antiseptics brings clinical benefits in terms of reducing supragingival biofilm and gingivitis (1–3). However, its routine use as part of oral hygiene procedures does not seem to be a reality, especially in Brazil, with efforts including in teaching to stimulate this subject within dental students (4).

Investigating the profile for the use of oral hygiene products is very important in dentistry for two reasons. First, the usage patterns for oral hygiene products have been associated with changes in the epidemiology of the most common oral diseases. Second, the responsibility for indicating and prescribing oral hygiene products to the population lies with dental professionals. The fact that studies about this profile do not exist results in a situation where the profession delegates its responsibility in this area to industry and marketing (1, 3, 5, 6).

Studies with systematized methodologies to evaluate the use of antiseptic solutions are, to date, non-existent. The data observed in non-systematic studies point to a growing use of oral antiseptic solutions (7, 8). Education, family income and age may be associated with changes in the

profile of product use and consumption (9–11) and, therefore, can also have this influence on use of antiseptics. In this respect, in an analysis on the consumption of toothpaste, Colussi *et al.* (12) observed that mother's age and family income were associated with greater use of this oral hygiene product.

Because of the scarcity of studies about the use of oral hygiene products and their effective importance to the epidemiological profile in oral health, it is important that independent studies are performed, so as to generate hypotheses and understand the profile of their use, with the aim of maximizing the possibility of benefits. The aim of this study was to evaluate the association between family income, age and mother's educational level with the increase in self-reported use of mouthwashes in a city in southern Brazil after 13 years.

Study population and methodology

This is an observational study that involves an analysis of two household cross-sectional surveys performed in an urban area of Passo Fundo, Rio Grande do Sul, Brazil, in 1996 and 2009. This city has approximately 190 000 inhabitants over a territory of 780 km^2 located in southern Brazil (available at: http://www.ibge.gov.br/cidadesat/index.php; accessed 17 August 2012). More than 95% of the population lives in an urban area, with a poverty level of 27.91% and a Gini index of 0.41 (13).

The ethics committee of the University of Passo Fundo approved the study protocol. All participants received information about the study, and after reading and signing the consent form, all participants were included in the study.

Sample

Two convenience samples of 868 and 1111 households were obtained in 1996 and 2009, respectively, with the same methodologies being applied. A map of the urban area of the city of Passo Fundo was used as a basis, selecting at random 30 geographical areas of approximately 3 km^2. Within each area, we defined the streets, with their respective houses, neighbourhoods and/or central areas, to be visited, always starting from the centre of the city in the direction of the outskirts. Prior to the fieldwork, between 30 and 40 households to be included in each area were identified. If, for some reason, the predicted visits to a specific street proved impossible, neighbouring streets were selected to complete the estimated number of households for that area. In case the adult of the house was not home, we revisited it once, and if the adult was still absent, we visited the next home in the same area. Commercial addresses were not included in the study. To be included in the study, the household had to fit one of three distinct income stratum: up to two Brazilian minimum wage salaries (BMS), between 5 and 7 BMS and above 10 BMS (13); moreover, the mother of the household or a responsible adult had to be present at the moment of the interview.

As the present study includes two independent samples obtained 13 years apart, no attempt was made to include the same households in 1996 and 2009. For this study's analysis, households for which there was no data available for the variables to be analysed and those that did not respond to the question about mouthwashes (the study's primary outcome) were not included. We included 850 (97.9%) and 982 (88.4%) households for the years 1996 and 2009, respectively. Therefore, the study included a total of 1832 (92.6%) households. Table 1 shows the characteristics of the samples in the years 1996 and 2009.

Interviews

Heads of the family were interviewed using a structured questionnaire to obtain demographics, socioeconomic information, habits and knowledge related to oral health and oral hygiene product consumption. Specifically, the self-reported use of mouthwashes was obtained via the question 'Do you use any kind of mouthwash product?'

The same interviewer led the fieldwork in 1996 and 2009. Interviewers were informed about the research objectives, instructed on how to perform the visits, trained on filling the questionnaire before the study and they used standardized procedures to increase consistency. Interviews were performed in the same time of each year (1996 and 2009), comprising June and July.

Statistical analysis

The household was the analytical unit in this study. Data analysis was performed using the Stata statistical package (STATA 10 for Macintosh; Stata Corp., College Station, TX, USA), and a 5% significance level was established.

Mouthwash use reported by the mother of the family was considered the dependent variable of this study. The independent variables included mother's age, family income and mother's educational level. Income was evaluated using the household income, categorized in BMS (>10 BMS; 5–7 BMS; ≤2 BMS). The variables of age and educational level were

Table 1. **Characteristics of the samples in the years 1996 and 2009**

	1996		2009	
Variable	*n*	%	*n*	%
Mother's age				
<35 years	255	30.0	205	20.9
35–49 years	398	46.8	416	42.4
≥50 years	197	23.2	361	36.7
Family income				
>10 BMS	189	22.2	127	12.9
5–7 BMS	338	39.8	382	38.9
≤2 BMS	323	38.0	473	48.7
Mother's educational level				
High	124	14.6	224	22.8
Medium	449	52.8	490	49.9
Low	277	32.6	268	27.3
Total	850	100.0	982	100.0

BMS, Brazilian minimum wage salaries.

based only on the mother of the family. Educational level was categorized as high, medium and low according to the number of years the mother had studied (≥12; 8–11 years; 0–7 years, respectively).

The proportion of mouthwash use reported by the mother of the family and the 95% confidence intervals (95% CI) were estimated for 1996 and 2009. Proportion estimates observed in 1996 and 2009 were compared among the independent variables using Wald tests.

Poisson regression models with log link and a robust variance estimator (14) were used to evaluate the association between self-reported mouthwash use and the independent variables. Main-effects models were fitted for each independent variable, adjusting for the year of the survey, and separately for each year. A final multivariable model was fitted including all independent variables and the year of survey. Proportion ratios (PR) and 95% CI were reported.

Results

Between 1996 and 2009, a significant increase from 10.8% to 24.4% in the proportion of self-reported use of mouthwashes was observed (Table 2). Moreover, a significant increase in the proportion for all strata of family income, age and mother's education was observed.

Table 3 presents the evaluation of factors associated with self-reported use of mouthwashes, analysing each survey separately. In 1996, only household income was significantly associated with the use of mouthwashes, with a probability greater than two and a half times (PR = 2.63) in residences with an income above 10 BMS compared with the lowest level of household income (≤2 BSM). Yet in 2009, two income strata – intermediate and high – demonstrated significantly higher probabilities of reporting the use of mouthwash. In addition, there were significantly lower probabilities for the use of mouthwashes in households with mothers in the upper age categories, whereas the probability was significantly higher in those homes with mothers with a higher level of education.

After 13 years, a 2.25 times higher probability (95% CI 1.80–2.82) for the use of mouthwash was observed. When all the individuals were considered in the regression model adjusting for the year of the survey, mother's age was not significantly associated with the reported use of mouthwash (Table 4). Higher family income and mother's educational

Table 2. **The proportion of the use of mouthwashes reported by the mother of the family according to sociodemographic variables in the years 1996 and 2009**

	1996 (n = 850)		2009 (n = 982)		
Variable	%	95% CI	%	95% CI	P*
Mother's age					
<35 years	8.6	5.2–12.1	30.7	24.3–37.0	<0.001
35–49 years	12.8	9.5–16.1	24.5	20.3–28.6	<0.001
≥50 years	9.6	5.5–13.7	20.8	16.5–24.9	<0.001
Family income					
≤2 BMS	6.8	4.0–9.5	15.4	12.1–18.6	<0.001
5–7 BMS	9.1	6.0–12.2	27.7	23.2–32.2	<0.001
>10 BMS	20.6	14.8–26.4	48.0	39.3–56.7	<0.001
Mother's educational level					
Low	7.9	4.7–11.1	14.1	9.9–18.3	0.02
Medium	10.0	7.2–12.8	24.2	20.4–28.0	<0.001
High	20.1	13.0–27.2	37.0	30.7–43.3	<0.001
Total	10.8	8.7–9.1	24.4	21.7–27.1	<0.001

BMS, Brazilian minimum wage salaries; CI, confidence index.
*Wald test.
[Correction added on 6 December 2013, after first online publication: For Table 2, in the first row under 'Family income', '>10' has been corrected to '≤2'; and '≤2' in the third row has been corrected to '>10'. In the first row under 'Mother's educational level', 'High' has been corrected to 'Low'; and 'Low' in the third row has been corrected to 'High'].

Table 3. **Poisson multivariate regression models, for each year separately, of the association between the use of mouthwash reported by the mother of the family and sociodemographic variables**

Variable	1996 (n = 850) PR (95% CI)	2009 (n = 982) PR (95% CI)
Mother's age		
<35 years	1	1
35–49 years	1.24 (0.77–1.98)	0.75 (0.58–0.98)*
≥50 year	1.06 (0.59–1.92)	0.72 (0.54–0.96)*
Family income		
≤2 BMS	1	1
5–7 BMS	1.32 (0.78–2.23)	1.61 (1.22–2.12)*
>10 BMS	2.63 (1.46–4.73)*	2.62 (1.89–3.63)*
Mother's educational level		
Low	1	1
Medium	0.93 (0.56–1.52)	1.39 (0.98–1.96)
High	1.23 (0.64–2.39)	1.57 (1.06–2.32)*

BMS, Brazilian minimum wage salaries; CI, confidence index; PR, proportion ratio.
*P < 0.05.

Table 4. **Poisson regression models for the association between the use of mouthwash, as reported by the mother of the family, and sociodemographic variables**

Variable	Adjusted for the year of the survey PR (95% CI)	Complete model† PR (95% CI)
Mother's age		
<35 years	1	1
35–49 years	0.96 (0.76–1.22)	0.87 (0.69–1.09)
≥50 years	0.78 (0.60–1.02)	0.80 (0.61–1.04)
Family income		
≤2 BMS	1	1
5–7 BMS	1.68 (1.32–2.13)*	1.52 (1.19–1.95)*
>10 BMS	3.14 (2.46–4.01)*	2.63 (1.97–3.51)*
Mother's educational level		
Low	1	1
Medium	1.55 (1.18–2.04)*	1.22 (0.92–1.62)
High	2.54 (1.91–3.37)*	1.46 (1.05–2.03)*

BMS, Brazilian minimum wage salaries; CI, confidence index; PR, proportion ratio.
*P < 0.05; **P > 0.25.
†Year of the survey and all the variables included in the model.

level were significantly associated with higher probabilities for using mouthwash in both multivariate models.

Discussion

The aim of this study was to evaluate the factors associated with the use of mouthwashes over the course of 13 years in a city in the south of Brazil. It was demonstrated that higher family income and higher educational level on the part of the mother were associated with an increase in the use of mouthwashes.

This study involved a comparison of two surveys with convenience samples, which were performed in the city of Passo Fundo, Brazil. Although these samples cannot be said to be representative because of the characteristics of this study's intentional sample plan, in terms of the associated factors, the results have the potential for extrapolation. To the best of our knowledge, there are no studies to date on the use of oral antiseptics from a population perspective. This lack of studies demonstrates that this field has been overlooked in systematic research approaches. This fact is worrisome, as changes in the use of oral hygiene products have been associated with changes in health status of both individuals and populations (11, 12, 15), demonstrating their importance in the oral health context.

This sample's study was defined with the specific objective of being able to differentiate the use of oral hygiene products within strata of specific income. For this reason, we intentionally chose three strata of household income, based on the Brazilian minimum wage (BMW) salary system. If converted to American dollars, one BMW represented approximately US $233.00 in 2009. The distributions of income in the present sample aimed to avoid the superimposition of categories found in studies that treat the income variable as continuous or that establish consecutive intervals. Thus, our design allowed for a better differentiation of the economic levels in the sample and the impact of this variable on the use of mouthwashes.

In Brazil, data from patients at university clinics have brought some light to elucidate the profile for the use of oral antiseptics (7). Also, using convenience sampling strategies, it was observed a clear increase in the number of regular consumers of mouthwash, which, in a period of 8 years, has increased nearly four times.

The use of oral antiseptics has become more popular based on different indications, ranging from the possibility of using them instead of mechanical control to using them as a complement to the mechanical control of biofilm, which always has some degree of limitation (16). This analysis probably refers to the routine use of mouthwashes as complementary to traditional mechanical procedures to control biofilm, because it concerns to a study that takes the home as its analytical unit and the daily behaviours of the families.

The surveys in the present study performed in 1996 and in 2009 in the same city suggest a longitudinal behaviour. Sequential cross-sectional studies such as this one have been used to infer evidence of longitudinal behaviours in the literature (17–23). The results observed point to a clear increase in the use of mouthwash. The proportion of mouthwash use increased from approximately 10% in 1996 to nearly 25% in 2009. For all of the economic strata identified in this study, the increases in the use of mouthwashes were statistically significant. These findings point to an incontestable reality that the use of mouthwashes significantly increased over the study period.

When the two surveys were analysed separately, the observations of the three independent variables of this study (i.e. mother's educational level, mother's age, and socioeconomic level) suggest changes in the pattern of mouthwash use. With respect to the mother's age, we observed that this variable did not have an influence on the use of mouthwash in 1996. In 2009, the older the mother was, the less likely mouthwash was to be used in the household. This finding clearly shows a transformation in the pattern of use. Younger mothers had incorporated mouthwash into the set of hygiene products used, but this had not yet happened with the older mothers. This fact was influenced by the pattern of use in the younger mothers' generation. A second important aspect of this study relates to socioeconomic level. Whereas in 1996, the participants from the highest socioeconomic stratum had a significantly higher pattern of use than the reference group with the lowest socioeconomic level, in the year 2009, both the intermediate and the highest socioeconomic bands had a higher use than the reference group. Although mouthwash use was not considered to be very important, over time, the use of this product has tended to grow. Additionally, Brazil experienced high levels of economic growth during the period under analysis, which may also account for the increased consumption of mouthwash (5). In addition, there is a growing knowledge about using different means of oral hygiene other than mechanical control.

Another interesting finding of this study was that the mother's educational level was associated with a higher probability of using antiseptic solutions. The higher the mother's educational level, the greater the self-reported use of mouthwashes. The role of education in promoting health practices is undeniable (17, 23–26). Studies have clearly demonstrated that educational levels influence the oral health condition (6, 21, 22, 27, 28). Thus, it may be supposed that the higher the mother's educational level, the higher the chances that products that can improve oral health may be consumed.

We cannot deny that dentistry has neglected the subject of mouthwashes use by the population. Recently, Oppermann *et al.* (4) noted that teaching about the chemical control of biofilm was very rudimentary in Brazilian dental faculties and proposed that systematic approaches be adopted to support these needs. This proposal has the potential to influence the results of the present study, in that dental professionals themselves may need better preparation to inform the population about the adequate use of antiseptic solutions.

This study has methodological advantages and limitations that need to be taken into account when interpreting the results. Among the limitations, we should mention the non-random sampling strategy and the lack of information about

what type of mouthwashes were being consumed. On the other hand, important advantages must be highlighted, such as the large sample size, high response rate and the fact that data were obtained from a broad range of the population. Additionally, reasons for using mouthwashes were not assessed, as the aim of the study was to determine consumption.

The results of the present study are intriguing and point to the need for providing more information to the population about the use of mouthwashes. Additionally, they demonstrate that family income and mother's educational level are associated with an increase in the self-reported use of mouthwashes over a period of 13 years in an urban population in southern Brazil.

Clinical relevance

Scientific rationale

Mouthwashes are available as part of the oral hygiene methods. The use of mouthwashes seems to be increasing.

Principle findings

Principal findings: The present study evaluated a trend in mouthwash use over 13 years in Brazil and has demonstrated that an important increase in mouthwash use took place over time. This household survey demonstrated that family income and educational level were associated with the increased use of mouthwashes. It is of great importance that information is given by the profession to the population to guide mouthwash choice and rational use.

References

1 Teles RP, Teles FR. Antimicrobial agents used in the control of periodontal biofilms: effective adjuncts to mechanical plaque control? *Braz Oral Res* 2009; **23**(Suppl. 1): 39–48.

2 Gunsolley JC. A meta-analysis of six-month studies of antiplaque and antigingivitis agents. *J Am Dent Assoc* 2006; **137**: 1649–1657.

3 Gunsolley JC. Clinical efficacy of antimicrobial mouthrinses. *J Dent* 2010; **38** (Suppl. 1): S6–S10.

4 Oppermann RV, Haas AN, Villoria GE *et al.* Proposal for the teaching of the chemical control of supragingival biofilm. *Braz Oral Res* 2010; **24** (Suppl. 1): 33–36.

5 Jardim JJ, Alves LS, Maltz M. The history and global market of oral home-care products. *Braz Oral Res* 2009; **23**(Suppl. 1): 17–22.

6 West NX, Moran JM. Home-use preventive and therapeutic oral products. *Periodontol 2000* 2008; **48**: 7–9.

7 Cantarelli R, Ribas ME, Daudt FA, Rösing CK. [Perfil de uso de colutórios utilizados pelos pacientes da Faculdade de Odontologia da UFRGS]. *Perionews* 2011; **5**: 361–367 [in Portuguese].

8 Dalla Vecchia GF, Moreira CH, Chiapinotto GA, Rosing CK, Oppermann RV. [Análise do perfil de consumo de colutórios bucais por pacientes das clínicas da Universidade Luterana do Brasil]. *Odonto* 2003; **11**: 18–26 [in Portuguese].

9 Sausenthaler S, Standl M, Buyken A *et al.* Regional and socio-economic differences in food, nutrient and supplement intake in school-age children in Germany: results from the GINIplus and the LISAplus studies. *Public Health Nutr* 2011; **14**: 1724–1735.

10 Ricciuto L, Tarasuk V, Yatchew A. Socio-demographic influences on food purchasing among Canadian households. *Eur J Clin Nutr* 2006; **60**: 778–790.

11 Grembowski D, Spiekerman C, Milgrom P. Linking mother access to dental care and child oral health. *Community Dent Oral Epidemiol* 2009; **37**: 381–390.

12 Colussi PR, Haas AN, Oppermann RV, Rösing CK. Factors associated with changes in self-reported dentifrice consumption in a Brazilian group from 1996 and 2009. *Braz Dent J* 2012; **23**: 737–745.

13 Instituto Brasileiro de Geografia e Estatística. *[Censo Demográfico 2000: Características da População e dos Domicílios: Resultados do Universo]*. Available at: http://www.ibge.gov.br/home/estatistica/populacao/censo2000 (accessed 17 August 2012) [in Portuguese].

14 Kirkwood BR, Sterne JAC. *Essential Medical Statistics*, 2nd edn. London, UK: Blackwell; 2003.

15 Gjermo P, Rösing CK, Susin C, Oppermann R. Periodontal diseases in Central and South America. *Periodontol 2000* 2002; **29**: 70–78.

16 Van der Weijden F, Slot DE. Oral hygiene in the prevention of periodontal diseases: the evidence. *Periodontol 2000* 2011; **55**: 104–123.

17 Celeste RK, Nadanovsky P, Fritzell J. Trends in socioeconomic disparities in oral health in Brazil and Sweden. *Community Dent Oral Epidemiol* 2011; **39**: 204–212.

18 Kunst AE, Bos V, Lahelma E *et al.* Trends in socioeconomic inequalities in self-assessed health in 10 European countries. *Int J Epidemiol* 2005; **34**: 295–305.

19 Ahacic K, Thorslund M. Changes in dental status and dental care utilization in the Swedish population over three decades: age, period, or cohort effects? *Community Dent Oral Epidemiol* 2008; **36**: 118–127.

20 Osterberg T, Johanson C, Sundh V, Steen B, Birkhed D. Secular trends of dental status in five 70-year-old cohorts between 1971 and 2001. *Community Dent Oral Epidemiol* 2006; **34**: 446–454.

21 Holst D. Oral health equality during 30 years in Norway. *Community Dent Oral Epidemiol* 2008; **36**: 326–334.

22 Holst D, Schuller AA. Equality in adults' oral health in Norway. Cohort and cross-sectional results over 33 years. *Community Dent Oral Epidemiol* 2011; **39**: 488–497.

23 Celeste RK, Nadanovsky P, Fritzell J. Trends in socioeconomic disparities in the utilization of dental care in Brazil and Sweden. *Scand J Public Health* 2011; **39**: 640–648.

24 Deshmukh-Taskar P, Nicklas TA, Yang SJ, Berenson GS. Does food group consumption vary by differences in socioeconomic, demographic, and lifestyle factors in young adults? The Bogalusa Heart Study. *J Am Diet Assoc* 2007; **107**: 223–234.

25 Boylan S, Lallukka T, Lahelma E *et al.* Socio-economic circumstances and food habits in Eastern, Central and Western European populations. *Public Health Nutr* 2011; **14**: 678–687.

26 Lallukka T, Laaksonen M, Rahkonen O, Roos E, Lahelma E. Multiple socio-economic circumstances and healthy food habits. *Eur J Clin Nutr* 2007; **61**: 701–710.

27 Susin C, Dalla Vecchia CF, Oppermann RV, Haugejorden O, Albandar JM. Periodontal attachment loss in an urban population of Brazilian adults: effect of demographic, behavioral, and environmental risk indicators. *J Periodontol* 2004; **75**: 1033–1041.

28 Axelsson P, Albandar JM, Rams TE. Prevention and control of periodontal diseases in developing and industrialized nations. *Periodontol 2000* 2002; **29**: 235–246.