

# Portuguese self-reported oral-hygiene habits and oral status

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**Background:** Good oral health is essential for good general health and quality of life. In Portugal, there are few studies on oral-health habits and the population's perceptions of this behaviour. **Objective:** The main purpose of this study was to characterise the Portuguese population's self-reported oral-health status, habits and perceptions, as well as their demands regarding national oral health-care services. **Methods:** A randomised group of 1,395 individuals, > 15 years of age, was selected as a representative sample of the Portuguese population. Face-to-face interviews were conducted, based on a structured questionnaire with closed and semi-closed questions. The data were submitted for statistical analysis using SPSS. **Results and Discussion:** A sample of 1,102 individuals answered the questionnaire. The great majority of the sample (97.6%) brushed their teeth daily, 70.3% had lost permanent teeth and 6.4% were edentulous. The loss of permanent teeth was statistically associated with poor oral-hygiene habits ( $P < 0.01$ ). Moreover, 50.1% of the participants had experienced difficulty eating and/or drinking, 18% had felt ashamed of the appearance of their teeth and 69.3% had experienced toothache or gingival pain. A reduction in visits to a dentist in the previous 12 months was identified mainly for people from a lower social class (31.2%) and older people (29.4%). **Conclusion:** Evidence suggests that oral diseases might be more prevalent in Portuguese adults than the European average. Efforts should be made to promote good oral-hygiene habits among older people and people from lower social classes.

**Key words:** Oral health, habits, perceptions, visits, NHS

## INTRODUCTION

The World Health Organization (WHO) defines oral health as 'a state of being free from mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking and psychosocial wellbeing'<sup>1</sup>. Also, as stated by the World Dental Federation (FDI), 'Good oral health enables us to speak, smile, kiss, breathe, whistle, smell, taste, drink, eat, bite, chew, swallow and express feelings. The oral cavity plays a central role for intake of basic nutrition and protection against microbial infections'<sup>2</sup>.

There is a close relationship between oral health of individuals and their social life<sup>3</sup>. Having good oral health implies being caries-free and not having periodontal diseases. Poor oral-hygiene habits promote oral infection, may result in poor oral health<sup>4</sup> and affect the appearance, well-being and self-esteem of the individual. This situation might ultimately be

associated with sleep, mastication and speech problems, as well as cognitive impairment<sup>5–8</sup>.

Diseases of the oral cavity and odontalgia (dental pain) are particularly interesting issues for the WHO<sup>9</sup>, which stated that 'Worldwide, 60–90% of school children and nearly 100% of adults have dental cavities'<sup>1</sup>. The WHO recommended that all countries include a significant annual budget for preventing and treating these diseases<sup>10</sup>. The WHO recognises oral diseases as an important public health problem as a result of the costs involved, their association with other diseases and their strong influence on people's quality of life; accordingly, the FDI suggests that oral health should be included in all national health policies<sup>11–13</sup>. As dental pain is mainly caused by dental caries – a disease that affects a significant proportion of the world's population, especially younger and lower social-class individuals<sup>14</sup> – it is very important to implement preventive programs. Primary prevention is essential to reduce the incidence and prevalence of such oral diseases<sup>11,15</sup>. Behavioural factors, oral as regular

toothbrushing, use of dental floss and mouthwashes, a balanced diet and regular visits to oral-health professionals, are associated with a decreased risk of dental-caries<sup>16,17</sup>. Toothbrushing must include the tongue and gingiva and should be performed at least twice per day, preferably at night before bed and within 30 minutes after every meal. It is after these critical periods that the acids produced by cariogenic bacteria begin to demineralise the tooth structure<sup>18,19</sup>. Dental floss and mouthwash should be used as complementary to toothbrushing, in order to remove the plaque from interdental surfaces more effectively<sup>16</sup>. Furthermore, visits to a dentist should be regular (ideally, once every 6 months), to increase the chance of early detection of oral diseases. During visits, patients can also receive preventive-care procedures specific for their age, mainly regarding brushing techniques, use of the correct dose of fluoride and sealants<sup>16,20</sup>.

Although significant oral-health problems, associated with severe impacts on general health and quality of life, have been detected in the Portuguese population, particularly in the Portuguese Health Plan 2011–2016<sup>21</sup>, few studies quantify and identify behaviours and perceptions among adults. This type of research is essential for imposing regulatory pressure on those involved in advocacy and lobbying activities related to dental public health.

Therefore, this study aims to characterise the oral-health habits, behaviours, perceptions and reasons for seeking oral health care in the Portuguese population. Whenever appropriate, demographic aspects, such as age, gender, social classes and regions, were considered.

## METHODS

A national cross-sectional survey was conducted with a sample of 1,395 persons of > 15 years of age, randomly selected from the last population census of Portugal, including the autonomous regions of Madeira and the Azores. The final sample was composed of 1,102 (79%) people, who responded to a face-to-face questionnaire<sup>22</sup>.

A stratified sampling method was used for the age and gender variables, according to data from the Portuguese National Statistics Institute (INE)<sup>23</sup>. Regarding the region variable, the autonomous regions of Madeira and the Azores have relatively few inhabitants and hence a much lower proportional weight compared with the other Portuguese regions. Therefore, the sample was disproportionately stratified by region using a post-sample weighting factor, to ensure a low error rate on the overall performance. National results included a weighting coefficient applied to the residents of each of the seven health regions studied, in order to cancel out the influence of their different

population sizes (Appendix S1). Thus, this sample was considered as representative of the whole Portuguese population > 15 years of age.

A face-to-face questionnaire was administered to all subjects. With the aim to answer the research questions, the questionnaire was composed of questions (constructs) in the following categories: socio-demographic data; oral hygiene habits; oral health perceptions; and oral health-care access. The internal consistency of the model was estimated based on the scale questions (items = 26), obtaining a good Cronbach's alpha coefficient (0.868). Before the interviews, the questionnaire was subjected to a pretest of coherence ( $n = 20$ ) and, after the interviews, logic tests were applied to analyse and revalidate 15% of the interviews.

This research was conducted in full accordance with the Declaration of Helsinki. All participants involved in the study read the answers to the questionnaire and gave verbal consent to take part, declaring that they understood the purpose of the study and consented to data collection. Participants between 16 and 18 years of age gave verbal consent themselves, as allowed by Portuguese law. People who refused to participate were not replaced by others. This study, including the above-mentioned procedures, was independently reviewed and approved by the Ethics Committee of the Faculty of Dental Medicine of the University of Porto.

Data were submitted for statistical analysis using SPSS (v. 22; SPSS Inc., Chicago, IL, USA), as described by Maroco<sup>24</sup>. Statistical descriptive methods, inferential tests (chi-square test), and the multivariate method (Factorial Analysis) were used. All tests were applied at a significance level of 5%.

## RESULTS

The final sample of 1,102 (79%) persons, considered as a representative sample of the whole Portuguese population > 15 years of age, was associated with a theoretical margin of error of 2.95% in the case of maximum indetermination and a confidence interval of 95%. Of the 1,102 individuals, 518 (47.0%) were male and 584 (53.0%) were female. The majority lived in a household with more than three people (60.1%). Regarding social distribution, 47% of respondents were from the lower middle class, 27.3% from the lower class, 15.5% from the middle class and 10.2% from the upper/upper middle classes (Table 1).

According to our sample's population (Table 2), most of the Portuguese population brush their teeth daily (97.6%) but did not use dental floss (76.7%) and/or mouthwash (54.6%). In addition, among those who brush their teeth, 72.7% do it more than twice

**Table 1** Characteristics of the sample

Characteristics	<i>n</i>	%
Region		
Greater Lisbon	203	18.4
Greater Porto	110	10.0
Littoral North	183	16.6
Littoral Center	146	13.2
Interior North	199	18.1
South	111	10.1
Madeira	75	6.8
Azores	75	6.8
Gender		
Male	518	47.0
Female	584	53.0
Age		
16–24 years	143	13.0
25–34 years	162	14.7
35–44 years	186	16.9
45–54 years	192	17.4
55–64 years	167	15.2
>65 years	252	22.9
Education		
Illiterate	27	2.5
Basic education		
1st cycle (age 6–10)	284	25.8
2nd cycle (ages 10–12)	103	9.3
3rd cycle (ages 12–15)	227	20.6
Secondary education	316	28.7
Professional technical education	12	1.1
BA degree	12	1.1
Bachelor's degree	110	10.0
Postgraduate studies	11	1.0
Employment status		
Retired/Pensioner	239	21.7
Unemployed	96	8.7
Housewife/Househusband	40	3.6
Student	93	8.4
Employed	513	46.6
Self-employed	121	11.0
Household (number of people)		
1	133	12.1
2	307	27.9
3	303	27.5
≥ 4	359	32.6
Social class		
Lower	301	27.3
Lower middle	518	47.0
Middle	171	15.5
Upper/Upper middle	112	10.2
Total	1,102	100

per day. Twice-daily toothbrushing was reported by proportionally more women than men (77.3% and 68.9%, respectively,  $P < 0.01$ ). Women also use mouthwash (52.4% vs. 40%,  $P < 0.01$ ) and dental floss (29.3% vs. 17.6%,  $P < 0.01$ ) more frequently than men. Comparing social classes, significantly fewer people from the lower social class brushed their teeth twice a day (65% vs. weighted total of 72.7%,  $P < 0.01$ ).

As indicated in *Table 2*, 32.5% of the population and 70.6% of people older than 65 years of age had lost more than six permanent teeth, not including third molars. Accordingly, loss of permanent teeth was shown to increase significantly with age ( $P < 0.01$ ). Also, 60.5% of those in the lower social-

class had lost more than six permanent teeth, indicating a significantly higher risk of tooth loss in comparison with the other social classes (weighted total of 32.5%,  $P < 0.01$ ). Moreover, the loss of permanent teeth, not accounting for third molars, is correlated ( $r = 0.30$ ;  $P < 0.001$ ) with the toothbrushing habit. The lower social-class population and people older than 65 years of age also showed significantly worse results concerning the loss of all permanent teeth (17.3% and 22.6%, respectively, vs. weighted total of 6.4%;  $P < 0.01$ ). Regarding gender, loss of permanent teeth was higher in women than in men (8.7% vs. 5.0%, respectively). It should also be noted that 56.0% of our sample population who had lost permanent teeth had not replaced them with removable or fixed dental prostheses (*Table 2*). Regarding the other 44% of our sample population, some (16.4%) had fixed dental prostheses; however, the majority (83.6%) had a removable prosthesis.

The data in *Table 3* indicates that half (50.1%) of the sample's population had experienced difficulty in eating and/or drinking because of some problem in their mouth, 18.0% had felt ashamed of the appearance of their teeth at least once in their life and 69.3% had felt pain in the teeth and/or gums. In general, older people reported higher sensitivity to oral problems, either for aesthetic or for health reasons ( $P < 0.01$ ). People living in Greater Porto and Madeira showed statistically ( $P < 0.01$ ) more cases of 'difficulty eating and/or drinking' (62.7% and 76.0%, respectively) and people in the south region and Madeira reported more 'pain in their teeth and/or gums' (82.9% and 82.7%, respectively). On the other hand, significantly ( $P < 0.01$ ) more people were ashamed of the appearance of their teeth in Greater Porto and Greater Lisbon (23.6% and 22.2%, respectively). People older than 45 years of age reported significantly ( $P < 0.01$ ) more problems with their oral health status in general.

*Table 4* shows that 47.4% of our sample's population had not visited a dentist for more than a year and 29.5% did not go to the dentist at all or only went for urgent treatment or because of pain. Conversely, 23.3% visited the dentist more than twice per year. Women reported going to the dentist more often compared with men ( $P < 0.01$ ). People older than 45 years of age stated that they had not visited a dentist for more than a year, or that they did not go to the dentist or only went for urgent treatment or because of pain, significantly more frequently ( $P < 0.01$ ) than did younger people. People living in the Interior North and Littoral Center regions stated that they had not visited a dentist for more than a year significantly more frequently ( $P < 0.01$ ) than did people in other regions. On the other hand, significantly more people living in Madeira, the Azores,

**Table 2** Answers to the survey regarding self-reported oral hygiene habits, loss of more than six permanent teeth or all permanent teeth (not accounting for third molars) and use of a removable prosthesis or fixed dental prosthesis, according to the respondents' characteristics

	Daily toothbrushing		Toothbrushing twice per day		Use of dental floss		Use of mouth wash		Loss of permanent teeth		Loss of more than six permanent teeth		Loss of all permanent teeth		Replacement of lost teeth*	
	n	%	n	%	n	%	n	%	n	%	n	%	N	%	n	%
Yes	1,072	97.3	787	73.4	262	23.8	513	46.6	778	70.6	360	32.7	77	7.0	342	44.0
No	30	2.7	315	28.6	840	76.2	589	53.4	324	29.4	742	67.3	1,025	93.0	436	56.0
Gender																
Male	499	96.3	344	68.9	91	17.6	207	40.0	346	66.8	148	28.6	26	5.0	133	38.4
Female	573	98.1	443	77.3	171	29.3	306	52.4	432	74.0	212	36.3	51	8.7	209	48.4
P	0.069		<0.01		<0.01		<0.01		0.015		0.274		0.016		0.021	
Age																
16-24 years	143	100.0	120	83.9	46	32.2	78	54.5	27	18.9	0	0	0	0	2	7.4
25-34 years	162	100.0	134	82.7	59	36.4	80	49.4	78	48.1	4	2.5	0	0	12	15.4
35-44 years	186	100.0	145	78.0	61	32.8	92	49.5	122	65.6	25	13.4	0	0	34	27.9
45-54 years	191	99.5	131	68.6	53	27.6	94	49.0	157	81.8	63	32.8	8	4.2	60	38.2
55-64 years	164	98.2	116	70.7	27	16.2	74	44.3	152	91.0	90	53.9	12	7.2	80	52.6
>65 years	226	89.7	141	62.4	16	6.3	95	37.7	242	96.0	178	70.6	57	22.6	154	63.6
P	<0.01		<0.01		<0.01		0.019		<0.01		<0.01		0.00 (0.00-0.00)†		<0.01	
Social class																
Lower	274	91.0	178	65.0	20	6.6	111	36.9	263	70.1	182	60.5	52	17.3	146	55.5
Lower middle	515	99.4	372	72.2	137	26.4	246	47.5	327	63.1	123	23.7	18	3.5	116	35.5
Middle	171	100.0	137	80.1	50	29.2	91	53.2	124	72.5	43	25.1	7	4.1	50	40.3
Upper/Upper middle	112	100.0	100	89.3	55	49.1	65	58.0	64	57.1	12	10.7	0	0	30	46.9
P	<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		0.00 (0.00-0.00)†		<0.01	
Total	1,072	97.3	787	73.4	262	23.8	513	46.6	778	70.6	360	32.7	77	7.0	342	44.0
Weighted total	1,076	97.6	782	72.7	257	23.3	501	45.4	775	70.3	358	32.5	74	6.4	340	43.9

\*Removable prosthesis (83.6%) or fixed dental prosthesis (16.4%).

†Chi-square Monte-Carlo simulation.

**Table 3** Answers to the survey regarding oral health perceptions, according to the respondents' characteristics

	Difficulty eating and/or drinking		Have felt ashamed of their appearance		Have felt pain in the teeth and/or gums	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender						
Male	247	47.7	76	14.7	349	67.4
Female	316	54.1	120	20.5	422	72.3
<i>P</i>	0.033		0.011		0.077	
Age						
16–24 years	58	40.6	15	10.5	80	55.9
25–34 years	71	43.8	19	11.7	104	64.2
35–44 years	86	46.2	28	15.1	128	68.8
45–54 years	111	57.8	39	20.3	147	76.6
55–64 years	102	61.1	32	19.2	126	75.4
>65 years	135	53.6	63	25.0	186	73.8
<i>P</i>	<0.01		0.01 (0.00–0.002)*		<0.01	
Region						
Greater Lisbon	104	51.2	45	22.2	150	73.9
Greater Porto	69	62.7	26	23.6	80	72.7
Littoral North	74	40.4	26	14.2	99	54.1
Littoral Center	62	42.5	24	16.4	109	74.7
Interior North	96	48.2	32	16.1	126	63.3
South	67	60.4	20	18.0	92	82.9
Madeira	57	76.0	4	5.3	62	82.7
Azores	34	45.3	19	25.3	53	70.7
<i>P</i>	<0.01		0.012 (0.009–0.015)*		<0.01	
Social class						
Lower	150	49.8	73	24.3	222	73.8
Lower middle	267	51.5	73	14.1	364	70.3
Middle	92	53.8	34	19.9	117	68.4
Upper/Upper middle	54	48.2	16	14.3	68	60.7
<i>P</i>	0.775		0.02 (0.001–0.003)*		0.077	
Total	563	51.1	196	17.8	771	70.0
Weighted total	552	50.1	199	18.0	763	69.3

\*Chi-square Monte-Carlo simulation.

Greater Porto and Greater Lisbon stated that they did not go to the dentist or only went for urgent treatment or because of pain ( $P < 0.01$ ) compared with other regions. People from higher social classes and people younger than 45 years of age reported going more often to the dentist ( $P < 0.01$ ).

Financial issues (36.7%) and the perception that visiting the dentist is not necessary (33.3%) were the main reasons for not going to the dentist (Table 4). In the 12 months before the questionnaire, 20.8% of the participants had reduced their number of visits to the dentist. This reduction was mainly reported by women (22.5%), people older than 65 years of age (29.4%), lower social-class individuals (31.2%) and inhabitants of Greater Lisbon (34.5%). Financial issues were the main reason for the decrease in visits (60%). Very few people (0.4%) stated the distance between their area of residence and the dental practice as a reason for visiting the dentist less often. In fact, this variable does not correlate with the frequency of visits ( $r = 0.049$ ;  $P = 0.116$ ).

Finally, 29.3% of the population was aware that the National Health Service (NHS) provides, in some way, dental services, and that dentistry is more expensive than other areas of health care/medicine (71.8%). Accordingly, the majority think that it is important or

very important to facilitate access to this health service, either by making it available on the NHS (97.1%) or by public contributions in the private sector (93.7%).

## DISCUSSION

This research is the first national study conducted in Portuguese adults on the oral-health habits, behaviours, perceptions and reasons for seeking oral health care, analysing populations living in different regions of the country. It should be pointed out that all results refer to responses obtained in the face-to-face survey. Fieldwork was subjected to rigorous analysis to obtain a homogeneous distribution throughout the country and to obtain answers that express the true opinion of the entire Portuguese population, to be considered as valid. Therefore, taking into account that sometimes respondents tend to overestimate their actual behaviours, as they are influenced by the social acceptability of their responses<sup>25</sup>, we consider this study's results an optimistic view of the current actual situation.

The social class of the participants was not indicated by them. It was determined based on the participant's education and employment status and thus should be

**Table 4** Answers to the survey regarding habits of visits to the dentist, reasons for not visiting the dentist, reduction of visits in the previous year, and influence of the residence–practice distance, according to the respondents’ characteristics

	Less than once a year		Once a year		More than twice a year		Do not go/go only in urgency or pain		Financial issues		Think it is unnecessary		Reduced visits in the previous year		Reduced visits for financial reasons		Residence–practice distance	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
<b>Gender</b>																		
Male	96	18.5	144	27.8	99	19.1	179	34.6	62	31.6	71	36.2	93	19.3	58	53.7	0	0.0
Female	87	14.9	180	30.8	154	26.4	163	27.9	64	41.3	49	31.6	128	22.5	88	60.3	1	0.7
<i>P</i>				<0.01						0.046		0.304		<0.01		<0.01		NA
<b>Age</b>																		
16–24 years	12	8.4	48	33.6	42	29.4	41	28.7	7	19.4	15	41.7	18	13.5	7	35.0	0	0.0
25–34 years	21	13.0	63	38.9	43	26.5	35	21.6	15	37.5	9	22.5	31	19.3	21	56.8	0	0.0
35–44 years	19	10.2	70	37.6	60	32.3	37	19.9	18	48.6	12	32.4	27	15.1	15	53.6	0	0.0
45–54 years	30	15.6	59	30.7	44	22.9	59	30.7	24	40.0	14	23.3	41	22.5	30	65.2	1	2.2
55–64 years	33	19.8	47	28.1	23	13.8	64	38.3	22	43.1	16	22	35	21.5	27	61.4	0	0.0
>65 years	68	27.0	37	14.7	41	16.3	106	42.1	40	31.5	54	42.5	69	29.4	46	58.2	0	0.0
<i>P</i>				<0.01						0.029 (0.025–0.033)*		0.071 (0.065–0.078)*		<0.01		<0.01		NA
<b>Region</b>																		
Greater Lisbon	33	16.3	63	31.0	34	16.7	73	36.0	49	54.4	11	12.2	69	34.5	60	69.8	0	0.0
Greater Porto	14	12.7	30	27.3	25	22.7	41	37.3	4	14.3	13	46.4	11	10.6	8	72.7	0	0.0
Littoral North	18	9.8	67	36.6	52	28.4	46	25.1	12	30.0	16	40.0	27	16.1	17	58.6	0	0.0
Littoral Center	37	25.3	38	26.0	39	26.7	32	21.9	22	37.9	14	24.1	30	20.7	26	66.7	0	0.0
Interior North	48	24.1	57	28.6	48	24.1	46	23.1	21	26.3	40	50.0	26	14.1	15	48.4	1	3.2
South	27	24.3	24	21.6	25	22.5	35	31.5	15	41.7	15	41.7	26	23.6	10	38.5	0	0.0
Madeira	3	4.0	24	32.0	17	22.7	31	41.3	3	33.3	5	55.6	10	13.9	8	80.0	0	0.0
Azores	3	4.0	21	28.0	13	17.3	38	50.7	0	0.00	6	60.0	22	31.9	2	9.1	0	0.0
<i>P</i>				<0.01						<0.01		0.00 (0.00–0.00)*		<0.01		<0.01		NA
<b>Social class</b>																		
Lower	79	26.2	53	17.6	48	15.9	121	40.2	61	39.6	62	40.3	86	31.2	60	57.7	1	1.0
Lower middle	82	15.8	163	31.5	120	23.2	153	29.5	52	32.7	46	28.9	96	19.3	68	62.4	0	0.0
Middle	16	9.4	63	36.8	44	25.7	48	28.1	12	38.7	8	25.8	30	17.9	14	43.8	0	0.0
Upper/Upper middle	6	5.4	45	40.2	41	36.6	20	17.9	1	14.3	4	57.1	9	8.0	4	44.4	0	0.0
<i>P</i>				<0.01						0.425 (0.412–0.437)*		0.232 (0.238–0.260)*		<0.01		<0.01		NA
Total	183	16.6	324	29.4	253	23.0	342	31.0	126	35.9	120	34.2	221	21.0	146	57.5	1	0.4
Weighted total	197	17.9	323	29.4	256	23.3	325	29.5	137	36.7	124	33.3	219	20.8	153	60.0	1	0.4

\*Chi-square Monte-Carlo simulation.

interpreted with caution. Nonetheless, the distribution of this variable is consistent with the data available on the Portuguese population, which reports that 26.7% are from the lower social class, 31.0% from the lower middle social class, 24.9% from the middle social class and 17.4% from the upper/upper middle social classes<sup>26</sup>.

Toothbrushing is a general habit among the Portuguese as 97.6% of our study's population claims to brush at least once a day. Accordingly, in 2014, Veiga *et al.*<sup>27</sup> found that 96.8% of Portuguese adolescents brushed their teeth at least once a day. Similar results have been reported in other countries. In Poland, Skorupka *et al.*<sup>28</sup> found that 80% of Polish people older than 65 years of age brushed their teeth at least once a day. In New Zealand, Broadbent *et al.*<sup>29</sup> reported, based on a sample of 32-year-old participants living in that country, that 96.4% of women and 85% of men brushed their teeth at least once a day. In the USA, Liu *et al.*<sup>30</sup>, with a sample of 505 adults, reported that almost 98% had that habit. In Italy, Villa *et al.*<sup>31</sup>, from a sample of postpartum Italian women, concluded that 99.3% of them brushed their teeth daily. On the other hand, 72.7% of our sample of the Portuguese population claimed that they brushed their teeth twice a day, which is a very good result compared with other European results<sup>32,33</sup> but still lower than what has been reported<sup>34</sup>. Other associated habits, such as using dental floss and mouthwash, were not performed as frequently in Portugal as they are in other countries<sup>30,31</sup>. Lower social-class individuals, older people and men seem to be less prone to daily toothbrushing. Accordingly, efforts must be made to improve toothbrushing habits, focussing mainly on older individuals and less-educated people, as they are more likely to have poor oral-hygiene habits.

In Portugal, the loss of permanent teeth is frequent, as about 70.3% of our sample of the Portuguese population had lost at least one permanent tooth, not including third molars, and 32.5% had lost more than six permanent teeth. The exact number of lost teeth and the conditions that required tooth replacement are unknown<sup>35</sup>. However, we can presume that the loss of more than six permanent teeth causes significant changes in the facial and intraoral tissues, thus compromising mastication and muscle function, as well as interfering with psychosocial behaviours, and perhaps with cognitive function<sup>7,36</sup>. In the present study, the higher number of teeth lost in women is in line with the results from other reports<sup>7,37</sup>. The loss of all permanent teeth found in 6.4% of our sample of the Portuguese population confirms the results from the European Commission Eurobarometer<sup>38</sup>. The percentage of edentulous people older than 65 years of age, in our sample, was higher (22.6%) than in that

study, but not as high as for Polish people (36%)<sup>28</sup>. This percentage is expected to increase with age, as older people tend to have more dental problems<sup>39-41</sup>. This study also revealed that the loss of permanent teeth, not including third molars, is correlated with the toothbrushing habit. These results are consistent with other studies that reported tooth loss as a result of poor oral-hygiene habits that can result in caries and periodontal diseases<sup>31,42</sup>. According to our study, in Portugal, being older than 65 years of age, being a woman and from a lower social class seems to increase the risk of tooth loss.

There is a huge difference between our sample of the Portuguese population (47.9%) and the European population in general (31%) regarding people who replaced lost permanent teeth with a removable prosthesis<sup>38</sup>. As expected, our study showed that the rate of Portuguese people who had their teeth replaced (with a removable prosthesis or a fixed dental prosthesis) was directly proportional to the number of lost permanent teeth. This situation might be due to financial reasons or because of not understanding the relevance of replacing missing teeth, regardless of the number<sup>36</sup>. Ghorbani *et al.*<sup>43</sup> found the same results in Tehran, Iran, where the most frequent behaviour among lower social-class people was not to replace teeth.

The analysis of our data regarding self-reported difficulty eating and/or drinking as a result of problems in the mouth (50.1%), feeling ashamed of the appearance of their teeth (18.0%) and experiencing toothache or gingival pain (69.3%) shows that Portuguese people have more oral problems than the average of the European population (15%, 16% and 7%, respectively)<sup>38</sup>. These situations are worse for people older than 45 years of age. Accordingly, efforts should be made to promote good oral-hygiene habits among older persons and persons of lower social classes as they are more likely to have poor oral-hygiene practices that lead to poor oral-health.

Almost 50% of the population reported not having visited a dentist for more than a year. This result might be related to the economic crisis in Portugal, as well as the fact that the public health system does not offer oral health services in most regions of the country. However, these results are similar to those of the UK, where 46% of the population do not visit a dentist<sup>44</sup>. Thus, costs associated with private services of dentistry may be the main reason for the high percentage of people who had not visited the dentist for more than a year. According to these results, Portuguese people older than 45 years of age and men are more likely to not visiting a dentist for more than a year. This study also showed that the distance between the area of residence and the dental practice is not an inhibitor of visits, which is in line with the idea that Portugal has

good oral-health coverage regarding dental practices, as do the majority of European countries<sup>38</sup>. On the other hand, it revealed that financial issues and the perception of no need are the most frequent reasons for not visiting a dentist.

Regarding the options for NHS services or a public contribution in the private sector for oral health, this study showed that there is no preference at this time. However, people have the perception that dentistry is more expensive than other areas of health care/medicine and that is important to make it more accessible. Accordingly, it should be noted that the WHO has stated oral disease as the fourth most expensive disease to treat<sup>9</sup>. Considering the results, to increase the use of dental services in Portugal, the integration of oral health in the NHS or a public contribution in the private sector for this area could be considered.

## CONCLUSION

Portuguese oral-health habits, as well as the loss of teeth, are similar to the reported European average. Nevertheless, signs show that, in Portugal, oral diseases might be more prevalent in adults when compared with the Europeans in general. In particular, people from a lower social-class and older people seem to be more prone to having worse oral-health status and more difficulty in accessing oral health care. Efforts should be made to promote good oral-hygiene habits among risk groups. Furthermore, the Portuguese feel that visits to oral-health professionals should be partially funded by the public service so that more people can regularly visit a dentist.

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## Conflict of Interests

The authors do not have any conflict of interest to disclose.

## SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

**Appendix S1.** Proportion and weighting factor of each region.

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