

THIRTY YEARS OF EVOLUTION OF ORAL HEALTH BEHAVIORS IN THE WORKING-AGE POLES

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Abstract

Introduction: In an average Polish person aged 35–44, more than 16 teeth have or had been affected by dental caries. Of that number, almost half of the teeth have already been extracted. Oral health behaviours contribute to this civilization disease in 50%. Such poor oral health status limits the ability of the affected people to take many social and professional roles. **Objectives:** To evaluate current oral health behaviours and their trends among 35–44 year old Polish people during the period of recent 30 years. **Material and Methods:** The data were obtained from the International Collaborative Studies conducted in 1978 and 1988 at the Nofer Institute of Occupational Medicine, Łódź, Poland, under the auspices of the World Health Organization (WHO) as well as from 3 stages of the study on Nationwide Monitoring of Oral Health Status and Its Conditioning performed in 1998, 2002 and 2010. The researchers evaluated oral health behaviours and oral health condition of 5425 subjects. **Results:** Despite a noticeable improvement, poor oral health behaviours are observed in 30%–40% of the adults. In the analysed period, the number of people brushing their teeth at least twice a day increased by more than 10% and the number of people using dental floss increased by 38%. Only 60% of the adults visited a dentist at least once a year. Reduced accessibility of state-run, free-of-charge dental care has caused that over 58% of Poles paid for their dental services. Every 3rd person of working age has not visited a dentist for longer than 2.5 half years, primarily due to behavioural and financial reasons. Oral health behaviours of Polish people are among the poorest in Europe. **Conclusions:** Despite a noticeable improvement of the behaviours, gap between the Poles and citizens of other highly developed countries is around 20 years. A health promotion programme including oral health issues, if implemented in workplaces, might considerably reduce this gap.

Key words:

Oral health, Oral health behaviours, Production age, Dental health surveys

INTRODUCTION

Lifestyle of an individual is in 50% responsible for the incidence and prevalence of 2 major oral diseases, i.e., caries and parodontium diseases [1].

In Poland, the incidence of dental caries among people of working age has remained very high for many years. In an average Polish person aged 35–44 years, more than 16 teeth have or had been affected by dental caries.

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Three of those teeth have been affected by active caries, and 11 teeth have already been removed because of untreated dental caries [2].

Wrong oral health behaviours result in a very poor dental condition and they are passed on to younger generations during long years of social education. As a result, already in the developmental stage, i.e., in an average 6-year-old child, dental caries is very common; more than 5 deciduous teeth are affected by dental caries and only 1 of them has been treated [3]. This very poor epidemiological status observed both in children and adults causes that we feel obliged to analyse the reason for these poor oral health behaviours – 1st of all in adults.

Social and political transformations initiated at the beginning of the 1980s and joining the European Union in 2004 have contributed to the development of Poland, which is now perceived as a boosted economy country. Those transformations were accompanied by cultural ones and oral health status has been recognised as a value, which should be given due consideration. Although the gross domestic product has increased almost 4 times over the 3 recent decades, the money allocated by the government for financing health care is one of the lowest compared with other European countries. It constitutes about 6% of the GDP, out of which about 40 PLN is spent on dental care per person every year [4]. Limited financial resources allocated to health care, first of all, resulted in a severe reduction of the number of the state-run dental surgeries.

In 1978, i.e., in the year when International Collaborative Studies on Dental Manpower in Relation to Oral Health Status (ICS-I) were carried out, more than 98% of adults obtained dental services free of charge and in 2010 the proportion of the dental patients treated free of charge fell down to 28% [2,5]. The fact that patients were forced to use private dental services resulted in increased expenses on such services in household budgets. People with lower social and economic status had to face up a financial

barrier and, for them, dental services were no longer easily accessible. Many authors point out that social and economic status constitute the very factor which determines oral health behaviours and status [6,7].

The aim of the work is to evaluate current oral health behaviours and their trends in a period of the recent 3 decades in people of working age as well as to present barriers contributing to unhealthy behaviours, one of which is avoiding visits to a dentist for many years.

MATERIAL AND METHODS

The data were obtained from 5 social and epidemiological studies conducted all over the country during the last 3 decades. Two oldest studies – ICS-I from 1978 and International Collaborative Studies – Comparing Oral Health Care Systems (ICS-II) from 1988 – were conducted at the Nofer Institute of Occupational Medicine, Łódź, Poland, under the auspices of the World Health Organization (WHO) [5,8]. Three “contemporary” studies were financed by the Ministry of Health and were a part of the study called the Nationwide Monitoring of Oral Health Status and Its Conditioning. They were carried out in 1998, 2002 and 2010 [2,9,10]. Sampling was performed in the Department of Civil Service Ministry of the Interior, Warszawa, Poland.

From the whole country 8 voivodships were randomly selected, then in each voivodship 2 districts were chosen – one metro, another non-metro (small town or rural). In the case of this division the number of inhabitants, structure of employment and infrastructure were taken into account. In the next step, 2 locations in each district were randomly selected: in rural districts – 2 villages and in towns – 2 streets, and then households inhabited by 35–44 years old individuals. In case of disagreement or a double absence of a chosen individual, another adequate households were chosen from the previously prepared reserve list in order to achieve at least 80% response rate.

In 1978 and in 1988 selection was performed on the basis of voting lists. Reliability of sampling and methodology was monitored by Roving – an epidemiologist from WHO. Standard procedures were followed all the time. The applied sampling methods allowed the data from the urban (metro) and rural – including small-towns – less than 20 thousands inhabitants (non-metro) settings to be analysed separately (Table 1).

The authors selected households and by the use of a fibre-optic apparatus they examined oral health status of their inhabitants and conducted a questionnaire survey. During the 5 studies quoted above, information concerning 5425 people of working age, sampled from birth-cohorts born between 1934–1943, 1944–1953, 1954–1963, 1958–1967, 1966–1976, respectively in 1978, 1988, 1998, 2002, 2010, was collected. The original questionnaires were pre-tested in order to verify reliability and validity of questions in several international surveys carried out by the WHO Collaborating Centre for Community Oral Health Programmes and Research, University of Copenhagen.

Due to the changes in oral health behaviours observed during the 32 elapsed years, some questionnaire items applied in the consecutive surveys were modified. For example, in the ICS-I the respondents were asked only about brushing the teeth during the previous day, while in the consecutive studies the respondents were asked about

details of the frequency of brushing their teeth during particular parts of the day. As a result, some data is missing. Only those persons who underwent dental examination and responded in full to the questionnaire survey were included in the final statistical analysis.

All data were statistically analysed by means of Statistica v. 10.0 software. Stratified sampling was performed for each study year. Statistical analyses were conducted between the years 1978 and 2010, test for 2 indicators of the structure was applied and $p < 0.05$ was considered as statistically significant.

RESULTS

Oral health behaviours

In all 5 stages of the national studies the authors evaluated how much the subjects cared about the hygiene of their oral cavity, i.e., how often they cleaned their teeth, used dental floss and toothpaste containing fluoride (Table 2).

The results of the comparative analysis confirm there is a slow, but systematic increase in the percentage of people who clean their teeth twice a day, especially in the rural environment. The percentage of people inhabiting rural areas who brushed their teeth at least twice a day has increased during the recent three decades by 12.7%

Table 1. Populations included in the social and epidemiological studies in 1978–2010

Study (year)	Total (n)	Place of living (n)		Sex (n)	
		metro	non-metro	males	females
ICS-I (1978)	779	316	463	329	450
ICS-II (1988)	844	371	473	380	464
Monit-I (1998)	829	344	485	293	536
Monit-II (2002)	815	423	392	282	533
Monit-III (2010)	2 158	1 265	893	820	1 301
Total	5 425	2 719	2 706	2 104	3 284

ICS-I – International Collaborative Studies on Dental Manpower in Relation to Oral Health Status; ICS-II – International Collaborative Studies – Comparing Oral Health Care Systems; Monit – Nationwide Monitoring of Oral Health Status and Its Conditioning.

Table 2. Oral hygiene behaviours

Behaviour	Respondents (%)				
	1978	1988	1998	2002	2010
Frequency of brushing teeth					
at least twice a day	n.a.	58.1	51.8	62.2*	67.5*
once a day	78.0	23.0	29.0	21.7**	23.1
seldom	n.a.	10.0	19.0	15.1**	8.2**
no data	n.a.	8.9	0.2	1.0	1.2
total	–	100.0	100.0	100.0	100.0
Using dental floss					
yes	n.a.	3.1	21.2*	23.7	41.3*
does not know what it is	n.a.	86.3	n.a.	21.0**	13.2**
Cleaning teeth with toothpaste containing fluoride	27.9	n.a.	94.0	91.8	93.3

* A significant increase in healthy behaviours compared to the former study.

** A significant decrease in healthy behaviours compared to the former study.

n.a. – not analysed.

Table 3. Relationship between favourable oral health behaviours and the place of living and gender

Behaviour	Respondents (%)				
	1978	1988	1998	2002	2010
Brushing their teeth at least twice a day					
metro	n.a.	70.1	59.0	74.2	72.2
non-metro	n.a.	48.8*	44.8*	50.3*	61.5*
male	n.a.	45.8	33.2	50.5	60.1
female	n.a.	68.9**	61.3**	67.1**	73.3**
Using dental floss					
metro	n.a.	n.a.	33.1	30.1	45.0
non-metro	n.a.	n.a.	12.8*	17.0*	35.9*
male	n.a.	n.a.	13.4	17.3	31.8
female	n.a.	n.a.	25.2**	27.1**	48.2**
Brushing teeth with toothpaste containing fluoride					
metro	37.8	n.a.	94.0	93.3	93.2
non-metro	20.9*	n.a.	94.2	90.1	92.9
male	24.3	n.a.	93.9	90.2	93.1
female	31.1**	n.a.	94.1	92.3	93.0

* Significant difference metro vs. non-metro.

** Significant difference male vs. female.

n.a. – as in Table 2.

(Table 3). Nevertheless, the percentage of people who clean their teeth less than once a day is still high and the drop is almost none – from 10% in 1998 to 8.2% in 2010. There has been a significant increase in the percentage of people who are aware of the necessity of cleaning their teeth with toothpaste containing fluoride and now it reaches above 90% (Tables 2 and 3).

In the analysed period there was an increase in the number of people who used dental floss and who knew how to floss their teeth. However, more than a half of the adult respondents did not use dental floss at all (Tables 2 and 3).

Frequency of visits to a dentist and the characteristics of the place of the last visit

In 2010 more than 59% of people aged 35–44 visited a dental surgeon at least once in a period of 12 months. The percentage of people who demonstrated extremely unhealthy dental behaviours, i.e., those who did not

visit a dentist for 2 years or longer, dropped from 31.8% in 1998 to 15.4% in 2010.

Over the 3 decades, the number of adults using dental services offered by state dental clinics free of charge has decreased almost 3 times. Besides, a very large percentage of the subjects, almost 30% in 2002 and 10% in 2010, found it difficult to tell whether the clinic they visited, was state-run or public – *vide* “no data” in Table 4. This situation resulted from organizational changes in the dental care system. Patients have been obliged to pay for some treatments offered by the public health outpatient clinics, while in some private dental clinics, certain medical procedures were partially financed by the state health care system (Tables 4 and 5).

Reasons for avoiding visits to a dentist

Being fully aware of the necessity of visiting a dentist and at the same time avoiding such a visit is an example

Table 4. Using dental care system

Behaviour	Respondents (%)				
	1978	1988	1998	2002	2010
Last visit to a dentist					
within the last 12 months	45.2	52.1*	50.2	53.4	59.4*
between 1 and 2 years ago	n.a.	n.a.	17.7	18.1	24.8*
more than 2 years ago	n.a.	n.a.	31.8	28.1	15.4
no data	n.a.	n.a.	0.3	0.4	0.4
total	n.a.	n.a.	100.0	100.0	100.0
Place of the last visit					
public sector	92.0	71.1**	59.9**	31.2**	28.3
private sector	n.a.	22.2	35.8*	36.9	58.0*
other	n.a.	5.8	2.3	3.3	4.1
no data	n.a.	0.9	2.0	28.6	9.6
total	n.a.	100.0	100.0	100.0	100.0

* Significant increase in using dental care system vs. former period of time.

** Significant decrease in using dental care system vs. former period of time.

n.a. – as in Table 2.

Table 5. Relationship between visiting a dentist at least once a year and the place of living and gender

Variable	Respondents (%)				
	1978	1988	1998	2002	2010
Metro	54.1	62.1	58.0	54.3	60.1
Non-metro	38.2*	44.2*	44.4*	52.3	55.9*
Male	38.7	42.1	44.1	48.9	52.2
Female	52.0**	60.8**	53.2**	55.7**	53.1

* Significant difference in visiting a dental surgeon, metro vs. non-metro.

** Significant difference in visiting a dental surgeon, males vs. females.

of unhealthy behaviour. After conducting the analysis over the 3 decades, the authors have concluded that the percentage of people who postponed their visits to a dental surgery remains stable but high – around 35%. In ICS-I and ICS-II, the researchers did not analyze the cause of that trend. Studies over this problem were started as late as in 1998 under the study Polish Monitoring of Oral Cavity Health and its Conditions. Avoiding visits to dental clinics confirms the fact that there are real barriers making dental services hardly accessible.

The barriers are connected with the dental care system, e.g., a low quality and a limited range of dental services provided by the state dental care system and high prices in the private dental sector. On the part of individual, avoiding visit to a dental surgeon is attributable to individual's poor health awareness. Postponing a visit to a dentist or avoiding appointments for a few years show that there are the following barriers:

- inability to pay for the services because of low financial status (1 and 5),
- refusal to accept low quality services (2–4),
- fear of pain (6),
- lack of confidence in the dentist (8),
- low health awareness (6–10).

The respondents usually specified more than 1 cause of the particular barrier; thus, the numbers in the

brackets correspond to the cause numbers presented in Table 6.

The greatest number of negative phenomena (barriers), which prevented the respondents from visiting a dental clinic, occurred in 1998. After this year the overall situation (social, economic, organizational, cultural) in Poland started improving gradually. In 1998, every 2nd person at the production age reported a barrier connected with financial problems, whereas in 2010 only slightly over 10% of the respondents reported such barriers.

Despite the 3-fold drop, pain and discomfort expected during a visit to a dentist are still the most frequently specified barriers. In most cases, fear of pain and the economic barrier are reported by the same respondents. A positive feedback occurs in here. Poor economic status and fear of pain are causes of postponing a visit, which *ipso facto* causes that carious focus becomes deeper and deeper. An advanced carious process manifested by very deep cavities, pulpitis, periapical abscesses requires major dental (endodontic and surgical) procedures and such procedures are associated with even greater discomfort and pain as well as with higher costs of medical treatment, which makes the barrier even more difficult to overcome.

Another reason for avoiding a visit to a dentist for a longer period of time is the economic barrier, which limits the accessibility of private dental services. At the same time the

Table 6. Reasons for avoiding a visit to a dental surgery

Reason	Respondents (%) ^a		
	1998	2002	2010
1. Respondent cannot afford a visit to a dentist in a private dental surgery and a queue in a state dental surgery is long	55.1	19.0	14.7*
2. Respondent cannot afford a visit to a dentist in a private dental surgery and a dental surgeon in a state dental surgery does not provide good quality materials	51.1	13.3	12.8*
3. Respondent cannot afford a visit to a dentist in a private dental surgery and a dental surgeon in a state dental surgery does not do his work properly	31.2	9.5	9.8*
4. Respondent cannot afford a visit to a dentist in a private dental surgery and a dental surgeon in a state dental surgery is impolite	21.1	6.2	5.4*
5. Respondent cannot afford a visit to a dentist in a private dental surgery and a dental surgeon in a state dental surgery does not provide the respondents with required dental procedures	25.4	8.7	10.5*
6. Respondent is afraid of potential pain	66.3	24.4	20.2*
7. Respondent thinks that his/her oral health problems will resolve on their own	32.4	6.1	5.0*
8. Respondent does not visit a dentist as he/she does not believe the visit will be of any help	18.1	4.8	3.9*
9. Respondent does not care about his/her health as he/she has more serious problems	46.0	14.2	14.6*
10. Other people at the same age also complain of similar problems but avoid visits to a dentist	59.2	16.7	18.1*

^a The percentages do not add up to 100% because the respondents reported more than 1 reason each.

* Significant difference 1998 vs. 2010.

range of services offered to the patient by the state-run dental clinics is limited, they are of poor quality and the patient has to wait long time for particular dental procedures to be performed.

The next cause of avoiding a dentist results from the low health awareness and negative examples from a patient's milieu. Very often a patient's friends and relatives do not encourage him/her to visit a dentist or are not sufficiently persuasive in motivating him/her to care about his/her health.

Apart from these negative observations (barriers), there has been a positive trend noticed for longer than a decade, i.e., growing confidence in dentists. In 2010, only 4% of adults who had avoided a dental surgeon for longer time did not trust the dentist.

Relationship between gender, habitat, and oral health behaviour patterns

The results of the comparative analysis confirm better behaviour patterns in women rather than in men. Women clean their teeth more frequently than men, they use dental floss and regularly go to a dentist (Tables 3 and 5). Women also demonstrate another positive trend. In comparison with men they postpone visits to a dentist significantly less frequently (Table 7).

With regard to a place of living, the authors observed that people from rural environment or little towns, rather than from the cities, demonstrated significantly more unhealthy oral behaviours. Here, all the 5 mentioned barriers were stronger and due to them the respondents avoided visiting a dentist. These strong environmental differences

Table 7. Relationship between avoiding a visit to a dentist and the place of living and gender

Variable	Respondents (%)			
	1978	1998	2002	2010
Total	36.2	35.5	37.8	32.1
Metro	39.2	31.0	37.3	30.1
Non-metro	41.9	37.8*	40.1	36.5*
Male	39.8	40.1	40.2	37.2
Female	40.9	32.2**	37.3	21.4**

* Significant difference metro vs. non-metro.

** Significant difference male vs. female.

which were visible 2 or 3 decades ago are not so strong any longer.

DISCUSSION

Favourable dental health behaviour consists of 4 basic elements: effective removal of dental plaque by brushing teeth at least twice a day and flossing once a day, regular visits to a dentist (in adults at least once a year), providing a reasonable amounts of fluoride, restricted consumption of cariogenic food.

These favourable oral behaviours are constantly enhanced by oral health awareness of the individual. On the basis of the achieved education level (in 2010 the majority of the respondents had post-secondary education level, bachelor's or master's degree), it can be concluded that an individual enjoys the most optimal oral health awareness at the age 35–44. Oral health patterns are already well fixed at that age [11–13]. The majority of respondents were parents who brought up their children who, in turn, imitated their parents' behaviours.

Social, economic, civilization and cultural development contributes to an increase in the number of favourable oral health behaviours. In the recent 3 decades, the GDP has increased 4 times and the increase of favourable oral health behaviours in adults has been 2-fold.

This improvement in oral health behaviours resulted in the decreased prevalence of dental caries and lower incidence of parodontium diseases. At the same time, the average number of natural teeth which are preserved has been slowly increasing [2,5,8–10]. In the analysed period the authors observed a slow but systematic decrease in the number of teeth affected by carious process in an individual at this age. On average, in 1978 the number of teeth with carious process was 22 and in 2010 it was 17. The level of dental caries in the Poles of working age is comparable to the level characteristic for Eastern and Central Europe but it is much higher than in the Scandinavian countries [10,14–16]. This gap between Poland and the developed countries is also visible in the rate of successful treatment procedures (the percentage of teeth successfully healed from dental caries). In Poland this rate is only 70%. In the Scandinavian countries, the rate exceeds 92%. Having analysed the data, we can conclude that the oral health level which is now observed in Poland is similar to the one observed in the developed countries 20 years ago.

The results of the international study (ICS-I and ICS-II) confirm that of 9 countries taking part in these social and epidemiological studies 20 and 30 years ago, adults from Poland and Japan demonstrated definitely poorer dental health behaviour patterns than people of their age from Norway, Ireland, New Zealand, the US or West

Germany [5,8]. The frequency of brushing teeth and using toothpaste containing fluorine by the Poles in 2010 was similar to the results obtained in 1988 in the studies conducted on Norwegian people. At that time more than 63% of adult Norwegians brushed their teeth at least twice a day and 91% used toothpaste containing fluoride [17]. In New Zealand and West Germany as many as 85% of people claimed that they brushed their teeth at least twice a day [18,19].

In Poland the percentage of people using dental floss (41%) is the same as the percentage of inhabitants of well-developed countries 15–20 years ago. Significant increase in the percentage of people cleaning their teeth with toothpaste containing fluorine should be emphasized as the content of fluoride in portable water is very low in almost all regions of Poland (0.0–0.3 mg fluoride per litre (F/l)). Also consumption of food which is rich in fluorine, i.e., sea fish, is low. The optimal content of fluoride in drinking water – the main natural source of food stuff needed for human body – is estimated to be 0.8 mg F/l [20].

The authors observed that the percentage of people of working age visiting a dentist at least once a year increased significantly between 1978 and 2010 from 45% to 59%, which is a positive trend. These findings are slightly better than they are in Greece and Portugal [21,22]. It should be stressed that in the developed countries already 20 years ago more than 70% of adults visited a dental surgeon at least once a year. People of working age have been forced to follow such healthy patterns by the system of health insurance co-financed by the employers [6,7].

The results of the 5 social and epidemiological studies conducted in Poland over the period of 32 years confirmed a rapid decrease in the number of people visiting state dental surgery centres (from 92% in 1978 to 28% in 2010). Social and political transformations reported above have resulted in leaving the state dental sector by dentists and starting to be employed in the public, i.e., paid dental sector. In 1978 there were 5.4 dentists employed in the state

sector per 10 000 people. By 2010 the rate fell down to 0.5 per 10 000 people [23].

Considering political, social, economic, cultural and organizational transformations, which took place in the last 3 decades, the authors have decided to use 2 distinct concepts: the availability and the accessibility of dental services in Polish medical care. The fact of avoiding a visit to a dentist can be briefly concluded – despite a huge availability of dentists and dental clinics, the required dental services remain still inaccessible for about 50% of Polish adults. The same is true for prophylactic dental services. During the 20 years that had elapsed since the liquidation of dental clinics located within the premises of industrial plants and offering free-of-charge services to the employees of the plants, no steps have been taken or mechanisms introduced by the state medical system or occupational medicine centres, intended to improve oral health behaviours. The slight improvement in oral health behaviour patterns has resulted mainly from a general cultural development of the society.

CONCLUSIONS

Pace of the improvement of health behaviour patterns is connected with Poland's overall social, economic and cultural development. Despite a noticeable improvement in the adult Polish population over the period of 3 decades, the gap between the Poles and the inhabitants of the developed countries is estimated to be 15–20 years. The gap might decrease if the current occupational medicine systems include oral health problems in their health promotion programmes.

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