

On Dental Health in Belgian Population Approaching the 21st Century

by

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Abstract

The present review describes the evolution of dental health in the Belgian population in the last 30 years, comparing it to other West European countries. Moreover, this paper reports on the Belgian achievements regarding the oral health goals established by the WHO for the year 2000. The studies carried out in the individual regions of Wallonia, Brussels and Flanders and in some municipalities, give a general idea about dental health in the country. In the last decade, dental health in Belgian children and adolescents has improved markedly. However, a specific health policy is required for risk groups such as socio-economically underprivileged, disabled and immigrant children. Belgium may be placed among other European countries which show from moderate to low caries prevalence in schoolchildren population. The objective of the WHO for 12-yr-old children has been achieved. Further investigation in young adults and adults are required. The lack of representative data for the whole country suggests that the implementation of a data base system for monitoring the evolution of dental health in Belgium would be useful.

Key-words

Dental caries, epidemiology, child, adult, industrialised country, public health.

Introduction

In general, it is difficult to understand precisely the evolution of a disease over a period of time. From a practical point of view, the characteristics of a sample will change over time and are influenced, among other, by social phenomena. Dental caries patterns in many European countries today are totally different from those observed years ago (1-6). Socio-economic status, population migrations and the process of acculturation of immigrants have undoubtedly influenced caries patterns in some industrialised countries (7, 8). These factors are particularly relevant when evaluating existing dental health policy or predicting future developments in dental health (6-9).

In Belgium, there is a lack of epidemiological studies on dental health in populations which are representative for the whole country. This is true for the entire population; children, adolescents, young adults and adults. The studies carried out in the individual regions of Wallonia, Brussels and Flanders and in some municipalities, give a general idea about dental health in the country, but few studies allow evaluation of trends over time.

In order to allow a better allocation of professional resources and considering the need for representative information on dental health status, certain age groups are often selected for epidemiological surveys. As far as possible these age groups are presented in this paper under the categories of children and adolescents, young adults and adults.

The World Health Organisation (WHO) and the International Dental Federation (FDI) have established oral health goals for the year 2000 as follows: 50% of 5-6-yr old children should be caries-free; 12-yr-olds with no more than 3 teeth with caries experience; 85% of 18-yr-olds with all their teeth; 50% reduction of edentulousness at the age of 35-44 should be achieved; 25% reduction of edentulousness at the age of 65 years should be achieved, and a data base system for monitoring evolution in dental health should be implemented (4). These goals are likely to be met by the majority of Western European countries.

The first part of this review describes the evolution of dental caries in the Belgian population in the last 30 years. In order to situate Belgium in

the international context, the second part compares dental caries data from Belgium with those from other Western European countries. The final part, discusses Belgian achievements for the oral health goals established by the WHO for the year 2000.

Evolution of Dental Caries in Belgium in the last 30 years

Children and adolescents – In 1967, the first cross-sectional study on caries prevalence in 2503 2-26-yr old individuals was performed in Liège and in 1983, a second investigation including 735 7-12-yr old schoolchildren was carried out at the same municipality (10, 11). The results of these two studies were then compared for the age groups from seven to twelve years. For the youngest children data related to the primary dentition revealed that the percentage of caries free children increased from 2% to 26% at the same time that their deft index¹ was reduced from 7.1 to 4.1, i.e. 42% of caries reduction. The authors also observed an increased percentage of caries-free 12-yr-olds from 2% to 12%. The prevalence of dental caries was reduced 47% and the DMFT index² was decreased from 7.3 to 3.9. These results, however, should be interpreted with caution due to differences in methodology (12).

In 1980, a study performed in 3-6-yr old children in East Flanders (n = 491) recorded 30% of caries-free children and the deft index equal to 3.6. Only 4% of the teeth had been treated (13).

Between 1983 and 1986 a series of clinical investigations into the effect on caries prevalence of fluorides and socio-economic factors were conducted in the Region of Brussels (n = 2003) and in the municipality of Mouscron (n = 1234) (14-22). Individuals from 5 to 21 years of age were sampled. The findings of these studies demonstrated that 41% and 5% of children were free from caries at the age of 6 and 12, respectively. The DMFT index, including cavitated enamel lesions, showed scores of 1.7 at the age of six and 6.9 at the age of twelve (14-15). The effectiveness of a collective method of caries prevention, the naturally fluoridated water in Mouscron (1.35 ± 0.15 ppm F) was revealed and the problems related to enamel opacities were identified (16-18). The socio-economic

¹ deft index = mean number of decayed, extracted and filled primary teeth.

² DMFT index = mean number of decayed, missing and filled permanent teeth.

aspects of the water fluoridation and the delivery of fluoride at individual level on caries prevention were analysed aiming an approximation between underprivileged and privileged children and a better cost-benefit ratio (18-20).

In 1989-1991, an epidemiological survey was conducted in Flanders in 5 (n = 3534) and 12 (n = 4162) years old children. The percentages of caries-free children were 59% and 25.4%, respectively. Further, the deft was 1.65 and the DMFT was 2.72. Only 30% of primary teeth were treated. Non West European children presented higher caries experience than Belgian ones in both age groups (23).

In 1993-1994, caries prevalence in 12-yr-old disabled children was investigated. In the studied population 21.8% was free from caries. The prevalence of dental caries varied according to the type of disability ranging from 53.3% in children with physical disability to 83.9% in cases of mild mental disability. The mean DMFT was 2.89 and the DMFS index³ 4.62 (24).

In 1994, a collaborative study on children's dental health in eight European countries collected data from the municipality of Gent at the ages of 5 (n = 200) and 12 (n = 200). The percentages of caries-free children were 56% (5 yr) and 37.5% (12 yr). The dmft index⁴ was 1.38 and the DMFT 1.93. In the primary dentition the restorative index was 38.8% and in the permanent dentition 80% of tooth surfaces with caries experience were filled. Twenty nine percent of children had sealed teeth (25).

In 1995, 3-5-yr-old children in the municipality of Leuven were examined for caries and dental fluorosis. The sample consisted of 750 children. The percentages of caries-free children were 69% (3 yr), 57% (4 yr) and 52% (5 yr). The mean deft were 1.37 (3 yr), 1.76 (4 yr) and 2.03 (5 yr). The corresponding defs index⁵ was 2.04, 2.46 and 3.75, respectively. Non cavitated active lesions were responsible for half of the defs scores. The number of filled teeth was limited. Early signs of dental fluorosis were identified in 19% (3 yr), 17% (4 yr) and 9% (5 yr) of children (26).

³ DMFS index = mean number of decayed, missing, filled permanent tooth surfaces.

⁴ dmft index = mean number of decayed, missing, filled primary teeth.

⁵ defs index = mean number of decayed, extracted and filled primary tooth surfaces.

In 1998, a collaborative study on dental health in 4351 7-yr-old children in Flanders revealed that 44% of children were free from caries in the primary dentition. The restorative index was 42%. The use of systemic fluoride did not present a significantly reduced probability of caries (27).

In 1998, a survey of trends in caries over time in 12-yr-olds ($n = 496$) in the Region of Brussels was performed using the same methodology previously applied in 1983 ($n = 533$) (14). The percentage of caries-free children during a 15 year period increased from 4% to 50% simultaneously with a caries reduction of 78%. The DMFT index dropped from 7.5 to 1.6 and the DMFS index from 11.5 to 2.5. The percentage of filled surfaces increased from 30 to 75%. Additionally, the intake of fluoride tablets as well as the identification of early signs of dental fluorosis augmented 6 times (28).

Young adults – Improvement in dental health was recorded for a group of dental students attending the 4th and the 5th year at the Catholic University of Louvain in 1989 ($n = 57$) and 1994 ($n = 50$). The percentage of caries-free individuals rose from 2% to 8.7%. The DMFT scores changed from 11.3 to 9.0 ($p = 0.001$). The decayed component was almost exclusively represented by lesions without cavitation and with cavitation in enamel. Filled component represented about 90% of the DMFS scores in both cohorts with a significant decrease during the study period. The number of individuals with extracted first molars due to caries was 8 in 1989 and 3 in 1994 (29). Further improvement seems to take place in 1999 with the preliminary results of DMFT scores equal to 7.0⁶.

Adults – Data on dental caries and dental treatment in an adult Belgian population from the Catholic University of Louvain were reported in 1995. The age groups of 35-44, 45-54 and older than 55 years were involved in a randomly selected sample. The mean DMFT scores were 15.4, 15.6 and 16.4, respectively. The mean number of extracted teeth were 2.8 (35-44 yr), 5.7 (45-54 yr) and 5.5 (> 55 yr). Fifty one percent of the sample had a university education and 35% had a non university education. The level of education may be considered as a good indicator for dental health in adults of high and medium socio-economic status in Belgium (30-31).

⁶ Van Nieuwenhuysen, personal communication.

Synopsis – Table 1 summarises the epidemiological studies carried out in Belgium reporting data in the primary dentition in 5-7-yr old children. No data on caries reduction in the primary dentition are available. However, based on the results obtained from the epidemiological surveys it is reasonable to believe that at the age of five, 50-60% of Belgian children are free of caries and the mean deft score ranges from 1.6 to 2.4.

Table 2 illustrates dental health status in the permanent dentition from various investigations and ages groups. The two studies carried out in 12-yr-olds in Flanders disclosed that caries experience is similar between disabled and non disabled children with a mean DMFT of 2.9 and 2.7, respectively. However, disabled children had more decayed and fewer filled teeth than non disabled ones. More recent data from the municipality of Gent presented DMFT values of 1.9. In the Region of Brussels, 78% reduction of caries in 12-yr-olds was documented in the last 15 years. The percentage of caries-free children reached 50% and the DMFT score showed a value of 1.6 (table 3). However, underprivileged children always scored much higher caries experience than privileged children and Non West European children presented higher caries experience than Belgian counterparts.

TABLE 1
Published studies on caries prevalence in the primary dentition of Belgian children

Author and year of examination	Region or municipality	Age	Number	% Caries-free	deft	defs
Kohl 1967	Liège	7 yr	222	2%	7.13	–
De Vis 1980	East Flanders	3-6 yr	491	30%	3.60	–
Büttner and Kolh 1983	Liège	7 yr	109	26%	4.10	7.4
Van Nieuwenhuysen 1983	Bruxelles	6 yr	261	20%*	3.86	6.97
Declerck et al. 1989	Flanders	5 yr	3534	59%	1.65	–
Bolin et al. 1994	Gent	5 yr	200	56%	1.38	2.46
Carvalho et al. 1995	Leuven	5 yr	350	52%	2.03	3.75
Declerck et al 1998	Flanders	7 yr	4351	44%	–	–
Van Nieuwenhuysen et al. 1998**	Bruxelles	6 yr	473	49%	2.40	5.10

* = primary and permanent dentition together

** = unpublished data

TABLE 2
Published studies on caries prevalence in the permanent dentition of
Belgian adolescents and adults

Author and year of examination	Region or municipality	Age	Number	% Caries-free	DMFT	DMFS
Kohl 1967	Liège	12yr	123	2%	7.30	–
Büttner and Kolh 1983	Liège	12 yr	113	12%	3.90	7.20
Van Nieuwenhuysen 1983	Bruxelles	12 yr	533	5%	6.90	10.20
Declerck et al. 1989	Flanders	12 yr	4162	25%	2.72	–
Gizani-Papaioannou 1993	Flanders	12 yr*	751	22%	2.89	4.62
Bolin et al. 1994	Gent	12 yr	200	37%	1.93	3.00
Lambert et al. 1997	Bruxelles	35-44 yr	112	–	15.40	–
		45-54 yr	178	–	15.60	–
		> 55 yr	112	–	16.4	–

* = 12-yr-old disabled children

TABLE 3
Published studies on caries reduction in Belgian adolescents and young adults

Author	12 yr-old children		Caries reduction
	Year of examination		
Kohl 1984	1967 (n = 123)	1983 (n = 113)	
DMFT (s.e)	7.4	3.9	47%
	12 yr-old children		
	Year of examination		
Van Nieuwenhuysen et al. 1998	1983 (n = 533)	1998 (n = 496)	
DMFT (s.e)	7.5 (0.2)	1.6 (0.1)***	78%
DMFS (s.e)	11.5 (0.3)	2.5 (0.0)***	78%
	23-26-yr-old dental students		
	Year of examination		
Van Nieuwenhuysen et al. 1998	1989 (n = 50)	1994 (n = 57)	
DMFT (s.e)	11.3 (0.7)	9.0 (0.7)**	21%
DMFS (s.e)	25.8 (2.3)	18.6 (1.9)**	28%

(s.e) standard error of the mean

** p = 0.01

*** p = 0.001

Belgian young adults have also shown improvement in dental health. Significant reduction in the number of missing first molars and filled tooth/tooth surfaces was observed between 1989 and 1994. The small

sample and the specific group of dental students do not allow generalisation to all Belgian young adults. The overall reduction of operative dental care indicates a trend towards a decrease in caries prevalence and reflected changes in criteria for placement of fillings over time at least to a group of individuals with easy access to dental care (table 3). Further studies are required to deepen the knowledge on dental status in Belgian adults.

Evolution of Dental Caries in other West European countries

Children and adolescents – In the Netherlands, in the mid 80s, the percentages of caries-free children at the age of 5 and 12 were 60% and 50%, respectively. Investigations pointed out a halt in caries decline and even an increase (6, 7, 32). Between 1980 and 1990, a meta-analysis confirmed a halt in 5-yr-olds, whereas the continuous decline in 12-yr-old children was explained by the cohort effect (33). In 1993, a study on caries prevalence and socio-economic status showed that differences were pronounced for 5-yr olds but not for those at the age of 11 (2). The authors observed that similarity in caries prevalence was neither linked to changes in diet pattern nor to public health measures. But, it was related to individual oral hygiene including the use of fluoridated toothpaste and professionally applied fluoride. The mean DMFS was 1.5 (2, 32). In the municipality of The Hague, in 1996, a study showed that the percentages of caries-free children from medium and high socio-economic levels were still increasing reaching 83% (6 yr) and 86% (12 yr). The mean DMFT was very low in both socio-economic groups, 1.1 for underprivileged 12-yr-old children and 0.3 for privileged ones. For all children together, the average percentage of caries-free children was more than 70% and the mean DMFT of 0.7 was the lowest in Europe. According to the authors this remarkable dental health status was mainly the result of regular toothbrushing with fluoridated toothpaste. The importance of promoting oral hygiene measures for children from low socio-economic status was stressed (8).

In France, caries reduction in the primary dentition was observed between 1987 and 1991. At the age of 6 the dft⁷ decreased from 3.5 to 2.5 (34, 35). In 1993, the percentage of caries-free 12-yr-olds was 34.7% and the DMFT equal to 2.1 (36).

⁷ dft = mean number of decayed and filled primary teeth.

In 1994, eight European countries participated in a collaborative study on caries treatment need in 5- and 12-year-old children (37). Standardised conditions for dental examination were established in one municipality of each following countries: Belgium, Germany, Greece, Ireland, Italy, Scotland, Spain, and Sweden. An overview of the results is presented in table 4. Important differences in the analysed variables were mainly found at the age of 5.

Table 5 summarises the data from European countries in different age groups between 1990 and 1995 (4). It can be seen that many of

TABLE 4
Mean def and DMF scores in 5- and 12-yr-old children from eight European municipalities in 1994-1995 ³⁷

Municipality	5 years			12 years		
	% CF	deft	defs	% CF	DMFT	DMFS
Athens	54.5	1.62	3.49	38.0	2.35	4.52
Berlin	37.5	2.99	6.06	27.5	2.58	4.09
Cork	46.0	2.09	4.41	38.5	1.85	3.21
Dundee	37.5	3.06	7.93	38.5	1.82	3.17
Gent	56.0	1.38	2.46	37.5	1.93	3.00
Sassari	48.0	2.81	7.22	39.0	2.24	3.77
Stockholm	74.0	0.80	1.23	35.0	1.94	2.27
Valencia	71.5	0.85	1.86	43.5	1.75	3.18

% CF = percentage of caries-free children

TABLE 5
Dental status in different age groups in European countries between 1990 and 1995 ⁴

Country	Age in years							
	5-6 yr		12 yr		15 yr		18 yr	
	% CF	deft	% CF	DMFT	% CF	DMFT	% CF	DMFT
Austria	—	2.0	55	1.2	—	—	—	—
Belgium	59	1.6	25	2.7	—	—	—	—
Denmark	61	1.5	49	1.3	25	3.1	14	4.6
England	55	1.8	50	1.1	40	2.1	—	—
Finland	60	1.4	30	1.2	23	3.1	11	5.3
Germany	—	—	—	2.5	—	—	—	—
Holland	55	1.3	60	—	—	—	—	—
Island	40	2.9	23	2.5	9	5.3	—	—
Norway	63	1.4	36	2.2	—	—	9	7.0
Sweden	64	—	48	1.5	70	3.6	58	5.2
Switzerland	—	1.6	—	1.1	—	2.2	—	—

% CF = percentage of caries-free individuals

these countries had already 50% of caries-free 5-yr-old children and a DMFT score less than 3 for 12-yr-old children. More than 60% of the European countries have reached the objectives of the WHO for the year 2000 concerning 12-yr-olds, i.e. DMFT less than 3 (4, 38). Belgium may be placed among these European countries with DMFT less than 3 in 12-yr-olds.

Young Adults – Data on dental health in young adults are still missing for many countries in Europe (4). DMFT in male military recruits in Norway and in Finland were 10.2 in 1990 and 7.3 in 1991 (39, 40). Danish military conscripts in 1991 had 8.7 filled surfaces and no missing teeth due to caries (41). In Holland, the mean DMFS in 1993, was 16.9 at the age of 23 (32). As observed in table 6 Belgian young adults with easy and frequent access to dental care showed DMFT scores close to that from the Scandinavian countries. However, these data are limited and need to be supported by other investigations in the future.

Adults – For the adults at the age group of 30-54 in some European countries the DMFT varies from 14.3 to 25 (table 7). Caries experience is mainly represented by filled teeth even though extracted teeth count for reasonable part of the scores (42-48.). In France, in 1995, the DMFT 65-74-yr-old adults was 23.2 of which 16.9 was extracted teeth (46). The principal reason of tooth extraction in individuals under the age of 50 was dental caries whereas after this age the main reason was periodontal disease (47). As only one study in Belgian adult population is available for comparison, one may consider these data as an indicator for dental status in this population.

Discussion and Conclusions

There is no doubt that, in the last decade, dental health status in Belgian children and adolescents has improved significantly as observed in most of the industrialised countries (tables 4, 5). Although only one study showed over time trends in 12-yr-olds (28), the available data from epidemiological studies placed Belgian schoolchildren among those in European countries with from moderate to low caries prevalence. However, attention should be paid to socio-economically underprivileged children whose dental health status is significantly worse than privileged ones (28). Another group of children requiring more frequent dental care treatment is disabled children (24). A specific health policy is required for these risk groups.

TABLE 6
Mean DMFS/T index in young adults in European countries

Country	Year	Age	DS	MS	FS	DMFT	DMFS	Reference
Belgium	1994	23-26	0.9	0.5	17.2	9.0	18.6	28
Denmark	1991	20	–	0.0	8.7	–	–	41
			DT	MT	FT	DMFT		
Finland	1991	17-29	1.3	0.1	5.9	7.3	–	39
Norway	1990	19-20	0.9	0.1	9.2	10.2	–	40

TABLE 7
Mean DMFT index in adults in European countries

Country	Year	Age	DT	MT	FT	DMFT	Reference
Belgium	1997	35-44	–	2.8	–	15.4	29-30
		45-54	–	5.7	–	15.6	29-30
		> 55	–	5.5	–	16.4	29-30
France	1994	35-44	1.2	3.0	10.4	14.6	44
Germany	1991	35-44	1.1	6.6	8.6	16.3	45
Holland	1995	30-34	1.3	1.8	11.3	14.3	43
		40-44	1.1	5.5	11.2	17.8	43
		50-54	1.2	6.8	10.2	18.2	43
Norway	1994	35	–	4.8	–	25.0	48
Poland	1993	35-44	3.8	10.9	4.5	19.3	45
Portugal	1994	30-39	–	6.6	–	13.8	48
Slovene	1986	35-44	1.4	8.3	9.7	19.4	38

Caries reduction in young adults is also likely, even though the available data is limited to individuals with easy and frequent access to dental care. For the latter group the DMF scores in the 90s were close to those of the Scandinavian countries (table 6). Concerning the adult population, further studies are necessary to answer the question about a probable improvement in their dental health. Table 7 gives details about dental status in adult population in some European countries. Large variation in the mean number of filled and extracted teeth is seen.

The presence of early signs of dental fluorosis have been identified in the primary dentition as well as in the permanent dentition of Belgian children (26, 28). Yet, from 1983 to 1998 the frequency of fluorosis augmented sixfold concomitantly with the ingestion of fluoride tablets (28). More recently, it has been shown that the use of systemic fluoride in Belgian 7-yr-olds did not present a significantly reduced probability of

caries (27). It is well known that in low caries prevalence individuals the regular use of fluoridated toothpaste is sufficient to control caries progression. Individual caries activity and caries risk determine the need for other types of topically applied fluorides. The prescription of fluoride tablets and drops as a preventive measure to caries control has been dropped in the majority of industrialised countries (49). In Belgium, this measure has not yet been completely abandoned (26, 27, 28), but the observed prevalence of dental fluorosis in Belgian children and adolescents indicates that this measure needs to be dropped (26, 28).

On dental health in Belgian population approaching the 21st century we may conclude that dental health status in Belgian children and adolescents has improved markedly in the last decade. The objective of the WHO for 12-yr-old children has been achieved. Further investigation in young adults and adults are required.

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