

Evaluation of different oral care systems: Results for Germany and selected highly developed countries. An update of a former study

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Abstract

Objective: Evaluation of different types of oral care systems by means of new analytical tools that facilitate the obtention of quantifiable results.

Methods: Construction of an expanded composite indicator that measures dental health on a population basis in the form of one overall indicator – the Dental Health Index (DHI). If the DHI is combined with a Dental Care Cost Index (DCCI), an efficiency index can be created. The study uses additional contemporary outcome data.

Results: The Swedish population enjoys by far the best dental health status. Successive ranks are occupied by Denmark, Germany, Canada, the United Kingdom, the USA and Japan, whereby the DHIs for these countries differ only slightly. The Dutch and Finnish populations enjoy a lesser degree of dental health. Advanced oral health can be achieved in any oral healthcare system, irrespective of the funding structures. However, the design of an oral health system matters, when it comes to patient satisfaction. On the basis of this criteria, European insurance-based systems perform better. The type of care system also matters, when efficiency considerations come into play. In these instances, national health systems seem to perform better.

Conclusion: Across systems, the comparison shows that systems strengthening preventive and tooth-preserving strategies, inclusive of adults, progress faster and perform better in respect of effectiveness and efficiency. A macroeconomic cost level of between 0.5% and 0.7% of GDP can be regarded as a benchmark for an efficient dental care system in affluent societies.

Introduction

There are numerous cross-national studies that focus on partial aspects of dental status or on certain characteristics of the dental system. However, the results of all of these studies are only valid for the analysed subgroups or objects of investigation and may not be generalised for the whole population or the entire dental care system [1-5]. For, in the past, countries with low caries prevalence in children and adolescents showed high rates of missing teeth already in middle-aged adults paired with extraordinarily high rates of edentulism in seniors (age-bracket 65/74) [6,7]. This means that caries experience does not develop steadily over a lifetime. As a result, a single indicator that corresponds to a certain age-bracket is unable to depict the oral health status of the whole population.

One of the rare residual international comparisons with a genuine population perspective is the work of Crocombe, *et al.* [8], which uses different single indicators for a few age-brackets. However, as their results are contradictory in sub-areas, it is difficult to draw clear, final conclusions.

That is why the present study uses a newly developed overall indicator for measuring the oral health status from a population perspective. This ‘Dental Health Index’ (DHI) of a nation’s population, created by Bauer, *et al.* [9], has proven itself in several studies [10,11] and is used here as a basis.

In addition to measuring a DHI, a cost index for recording the macroeconomic resource consumption by the dental sector is created

(Dental Care Cost Index, DCCI), in order to conduct a benefit/cost analysis of the entire dental care system. This investigation is an update of a former study [12] as important new representative epidemiological studies have become available in the meantime. To ensure that this updated article can be read and understood on its own, a few repetitions of the former text are inevitable.

Material and methods

As dental decay and its implications (tooth loss) account for about 95% of the oral disease burden across the world [13], the DHI focuses on dental decay and its consequences. By doing so, severe periodontal diseases are indirectly included in the oral health status measurement, which is helpful as they may also cause tooth loss at a more advanced age. The DHI is composed of several single indicators for the corresponding WHO standard reference age classes and additionally includes – in contrast to the former study [12] – the indicator ‘missing teeth (MT)’ in seniors. The MT value measures the cumulated oral damage during the course of life and thus enables conclusions on a

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dental care system's effectiveness in achieving the priority aim of the "retention of natural teeth until an advanced age [11]. By including this meaningful cumulative single value in the composite DHI indicator, countries that achieve more elevated rates of retained teeth at senior age are ranked better than others, which seems justified. As a result, the explanatory power of the DHI improves substantially.

Expressed as a formula, the enlarged DHI reads like this:

$$\text{DHI} = (\text{Caries-free Index } 5/6 + \text{DMFT } 12 + \text{DMFT } 35/44 + \text{MT Index } 65/74 + \text{Edentulism Index } 65/74): 5$$

The lower the DHI, the better the population's oral health status. The detailed construction of the DHI is described elsewhere [11,12]. The link between the DHI and the DCCI, defined as a proportion of total oral healthcare costs in relation to Gross Domestic Product (GDP), gives rise to the Efficiency Index (EI). To ensure that both indices indicate improvements in the same manner and direction, the practical link is achieved by adding the two indices together. Thus, better dental health in a country's population, as well as diminishing macroeconomic resources for oral health care, are indicated by decreasing indices. In mathematical terms, the formula reads:

$$\text{Efficiency Index (EI)} = \text{Dental Health Index (DHI)} + \text{Dental Care Cost Index (DCCI)}$$

In other words, the lower the efficiency value, the better the benefit/cost ratio within the dental care sector.

The new overall indicators for measuring the benefit and cost of an oral care system are applied, in this study, to highly developed countries with different types of health care systems, whose young generations display remarkable level of oral health. These include Social Security models (Germany, France, the Netherlands, Japan), National Health Service models (United Kingdom, Sweden, Denmark, Finland), Private Insurance models (USA, Switzerland, Canada), and mixed private/public models (Australia). Switzerland and Canada, which have a social security system, in principle, are assigned here to the private insurance model as the health legislator in both countries explicitly chose not to include dental care in the healthcare system (except when it relates to children, expectant mothers and public assistance recipients) [14].

As was the case with the preceding study [12], the present study is also a descriptive and cross-sectional investigation, based on existing data. It also includes additional longitudinal findings from regular

surveys and furnishes evidence of relationships and influencing factors. Conclusions on cause and effect are limited.

Results

With a DHI of 3.18, the Swedish population enjoys by far the best oral health status (Table 1). With DHIs of 4.42, 4.53, 4.64 as well as 4.66 and 4.72 Denmark, Germany, Canada, the United Kingdom, USA, and Japan, respectively, occupy ranks two to seven with almost the same results. In the latter six countries, the population's oral health status is roughly 40% to 50% lower than in Sweden.

After a substantial gap, France, Australia and Switzerland occupy the following ranks, leaving the last two places to Finland and the Netherlands, with DHIs of 6.48 and 6.60. However, it must be said that the oral health data for middle-aged adults in both countries are relatively old. A current Finnish study, for example, reveals that the oral health status of middle-aged adults improved between 2000 and 2011[15].

There is a difference of more than 100% in terms of oral health status between the first and the twelfth rank. This means that Swedish people enjoy a level of oral health that is twice as good as that of the Dutch population. Considering the results of the single indicators for the corresponding age-brackets, it is noticeable that great differences in oral health begin only in adulthood (Table 1).

As a complement to the cross-sectional data, Table 2 shows available longitudinal data on the development of the dentition of adults and seniors from several of the countries studied. Especially distinct are the reductions in edentulism in older Swedish, Danish, Japanese and Swiss people. The fact that, in the United Kingdom, caries decline extends to all age brackets proves the degree to which the preventive and tooth preserving approach practised by British dentists is widespread, even among adults [26]. In Germany, it is noticeable that improvements in the oral health status of adults start later and are less distinct than in other countries. All in all, the longitudinal survey data, arranged according to the decrease in edentulous seniors, tend to support the ranking established using DHI.

A general evaluation of the oral health status in the various age brackets shows that further progress in all countries can be expected, if present trends remain stable. Only Denmark and Sweden, with around 80% of caries-free deciduous teeth have exploited their potential to

Table 1. Dental Health Index of the population (DHI) in selected highly developed countries for the period 2006-2014

Country	Survey year	Caries-free 5/6		DMF-T 12 (2)	DMF-T 35/44 (3)	M-T ² 65/74		Edentulism 65/74		DHI ¹⁰ (6)	Rank
		in %	Index (1)			abs.	Index (4)	in %	Index (5)		
SE	2011/13	79	2,1	0,8	9,7 ⁵	4	3	2,7	0,3	3,18	1
DK	2009/14	75	2,5	0,4	13,5	8	5	6,8	0,7	4,42	2
DE	2014/16	>62	3,8	0,44	11,2	11,1	6	12,4	1,2	4,53	3
CA	2007/9	53	4,7	1,0	12,3 ⁸	5,6 ⁹	3	21,7	2,2	4,64	4
UK ¹	2009/13	< 69	3,1	0,8	11,9	11,1	6	15,0	1,5	4,66	5
US	2004/10	53	4,7	1,19	10,91	8,3	5	15,0	1,5	4,66	6
JP	2011	58	4,2	1,4	12,3	9,1	5	6,9	0,7	4,72	7
FR	1994/06/13	63	3,7	1,23	14,6 ³	9	5	9,1	0,9	5,09	8
AU	2005/09/10	49	5,1	1,05	10,7	12	7	21,1 ⁷	2,1	5,19	9
CH	2002/11/13	51	4,9	0,9	14,5 ⁴	8	5	6,7	0,7	5,20	10
FI	2001/09	39	6,1	0,7	16,0	11,7	6	36,0	3,6	6,48	11
NL	1998/09/13	60 ⁵	4,0	0,8 ⁶	17,4	14	8	27,6	2,8	6,60	12

1) Without Scotland; 2) Basis: 28 teeth; 3) Rhone/Alps; 4) Canton Zürich; 5) Jönköping; 6) Den Haag; 7) 65+; 8) 40-59; 9) 60-79; 10) DHI (6)=[(1)+(2)+(3)+(4)+(5)]: 5 [16-25]

Table 2. Changes in the dental status of adults in a selection of highly developed countries for the period 1972-2014

Age class	Country	Period	Indicator	Results in %			Δ in %
65/74	SE	1980-2013	Edentulism	44.2	↘	2.7	-94
35+	DK	1975-2005	Edentulism	36.4	↘	5.0	-86
65/74		1987-2008/9	Edentulism	51.0	↘	6.8	-87
65/74		1987-2000	Functional dentition ²	16.0	↗	40.0	150
20-65+	UK ¹	1978-2009	Edentulism	28.0	↘	6.0	-79
65/74			Edentulism	78.0	↘	15.0	-81
20-65+			Prevalence of dental decay	46.0	↘	28.0	-39
65/74	JP	1987-2011	Functional dentition	22.0	↗	60.0	173
65/74			Edentulism	30.0	↘	6.9	-77
65/74	CH	1992-2002	Missing Teeth (MT)	15.4	↘	10.4	-33
65/74		1992-2013	Edentulism	26.8	↘	6.7	-75
65/74	DE	1997-2014	Functional dentition	22.0	↗	53.4	142
65/74			Edentulism	24.8	↘	12.4	-50
20-79	CA	1972-2010	Edentulism	23.6	↘	6.4	-73
30-75+	FI	1980-2000	Edentulism	29.5	↘	14.5	-51

1) Without Scotland; 2) ≥ 20 retained teeth (FDWHO-Model) [17,18-22,27-29]

the fullest. In French and Japanese adolescents, minor progress can be expected, whereas all other countries already fall into the WHO category with “very low caries” (DMFT < 1.2). Most reserves exist in the adult population. Among middle-aged adults, only Sweden, Australia, the USA, Germany, the United Kingdom, Japan and Canada reveal a “low caries burden” (DMFT 5.0-13.9). Significantly more room for improvement exists in the remaining countries. How realistic this is can be observed in the highly developed Asian countries/regions (South Korea, Singapore, Hong Kong and Taiwan) where this age-bracket is able to achieve DMFT values between 5.5 and 7.4 [11].

A look at the MT values of seniors is particularly enlightening from two perspectives: Firstly, from a methodological perspective, the trend exhibited by the MT values in the countries under study correlates well with the composite indicator DHI, indicating that the DHI reliably reflects a nation’s oral health status (Figure 1).

Secondly, the MT value allows us to generate the number of retained natural teeth of a country’s population, which is meaningful for public health policy as it indicates how successful health policy was in achieving the goal of “tooth retention until advanced age”. Figure 2 shows the results of such a process. According to the results, Sweden and Canada achieved the highest tooth retention levels, with 24 and 22.4 retained teeth, respectively, in 65/74 year olds. With on an average of 20 to 18.9 remaining natural teeth, the level of tooth retention among Danish, Swiss, US-American, French and Japanese seniors is less distinct, but still higher than in Germany, the United Kingdom, Finland and Australia. With 14 retained natural teeth, Dutch seniors exhibit the lowest grade of tooth retention meaning that, on average, they have lost half of their dentition.

Even more disparate are the values for edentulism in seniors (Table 1). While the Swedish, Swiss, Danish and Japanese populations enjoy a low prevalence of edentulism among the elderly (2.7%, 6.7%, 6.8% and 6.9% respectively), the rates in Germany, the USA and the United Kingdom are moderate (12.4% to 15.0%). Considerably more edentulous seniors (> 20%) are to be found in Australia and Canada. The rates peak in the Netherlands and Finland (27.6% and 36.0% respectively).

In summary, we may expect a further reduction in the caries prevalence among adults and – especially in the Netherlands – a

decrease in tooth loss in adult age groups as well as – also in Finland – a decrease in total tooth loss at senior age. This process will continue as long as ‘very low’ or ‘low’ levels of caries prevalence in middle-aged adults and of total tooth loss in seniors are achieved [2].

To gain quantifiable results for measuring the efficiency of a dental care system, the level of oral health status (DHI) is linked with the macroeconomic resource consumption (DCCI), whereby Germany is taken as the index baseline (DE=100) (Table 3).

If we look at the benefits and costs simultaneously, Sweden, Denmark and the United Kingdom possess the most efficient oral health care systems. Germany shows almost as little efficiency as Finland, which brings up the rear.

When considering the costs of the dental sector exclusively, all of the countries need far less resources than Germany. Even Sweden, whose inhabitants reveal a significantly higher level of oral health, spends one-fifth less on dental care than Germany; and Switzerland – a country with a substantially higher income – and a correspondingly higher level of expectation, needs 20% fewer resources. In the efficiency chart (Figure 3) Sweden’s outstanding position with regard to oral health status, Denmark’s and the United Kingdom’s in respect of cost-effectiveness and system-efficiency, Germany’s with regard to its extreme resource-intensity and both Finland’s and the Netherlands’ stand out, owing to their low oral health levels. What is also easily recognizable is the fact that the majority of the countries spend about 0.5% to 0.7% of GDP on financing their oral care systems.

Discussion

The results of this study differ from the findings of the earlier study that had the same objective and covered the same participating countries [12]. This is because, in the meantime, it has been possible to include new available survey data [16,21,23] and an extended DHI for measuring the population’s oral health status was chosen. The application of this process resulted in important variations for several countries. Germany, for example, now ranks third in oral health status and the United Kingdom comes in fifth whereas, in the earlier study, they only reached the eighth and tenth position. Consequently, the efficiency of the dental sector in both countries improved from the last to the second to last rank and from sixth to third rank respectively.

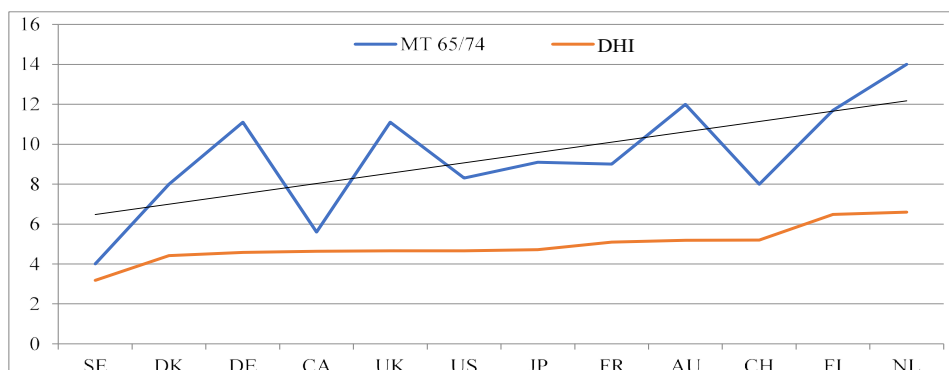


Figure 1. Comparison of MT among seniors (65/74) and DHI for the period 2006-2014

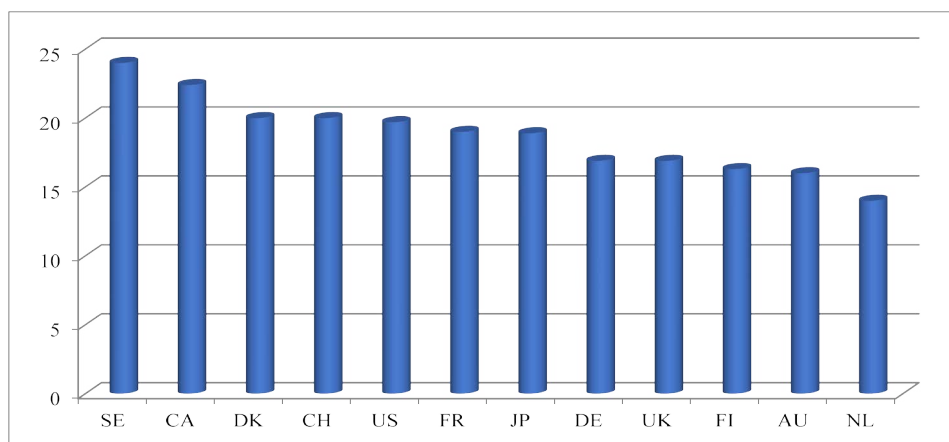


Figure 2. Amount of retained teeth in seniors (65/74) in selected highly developed countries 2006-2014¹
¹Calculated from MT values in Table 1

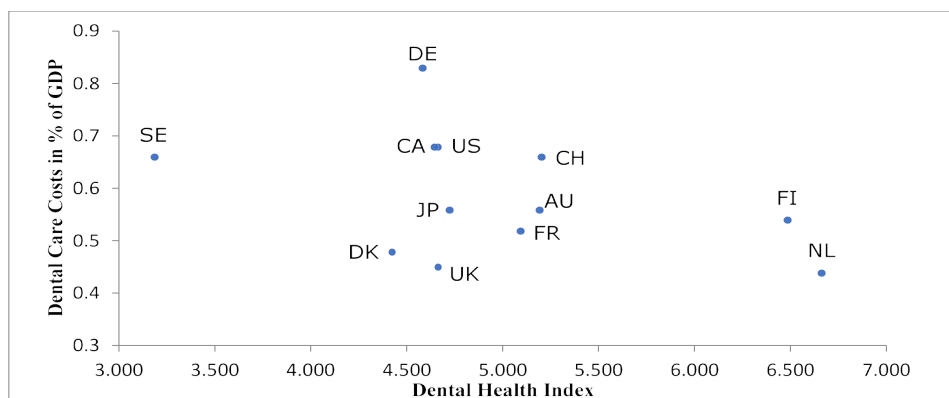


Figure 3. Efficiency matrix of the dental sector in selected highly developed countries 2012

Possible reasons for variations in system performance

Independently of the type of the oral health care system, its supply structures (public, private or mixed) and its terms of financing, good oral health can be achieved in any system, as can be seen in Table 1. Consequently, different oral care systems cannot explain variations in the effectiveness of dental care sectors. This is not surprising as, in spite of relevant divergences in the general health care types, it may not be overlooked that, in all of the different types of health care systems, dental care is regulated and financed differently from medical care. This is due to the higher demand elasticity on the part of patients and the lower intrinsic risk for oral diseases. While, in the medical sector,

only a low proportion of private financing is required, the dental sector requires significantly higher private payments in order to avoid moral hazard (see Figure 4).

In respect of system-efficiency (EI), countries with a national health system occupy the first three places indicating that, in this regard, the type of oral health care system matters. The reason for this might be that, in these countries, oral health policy is more active and goal-oriented when it comes to outcomes and cost-awareness.

In most countries, patients have to pay high co-payments for each treatment [31]. With the exception of Germany and France, where co-payments for tooth preserving procedures are non-existent or very low,

the provision of prosthetics has largely been removed from universal insurance coverage. Additionally, some countries offering universal health coverage have switched their dental treatment coverage from a benefit-in-kind coverage to a predetermined reimbursement amount for standardised benefits. This happened, for example, in Germany, the United Kingdom and Sweden [12]. On the whole, it can be asserted that, even if all treatments have to be financed privately, it is possible for the entire population to enjoy a good dental health status, as can be observed in Canada and Switzerland.

However, when looking at patient satisfaction with access to care, affordability, a safety net for low income earners and quality of care, the way in which a dental care system is designed does matter, once again. In this respect, especially US-American and Australian patients express a level of discontent with their health system that is several times higher than that of patients from European insurance-based systems [5,34,35].

A relevant degree of influence on the level of oral health status is exerted by the patient's oral health behaviour and attitude. 'Regular dental attendance' is chosen as the key indicator for this area because many studies show a strong relationship between the regular use of dental services and improved dental health [23,26,36-38]. Studies with divergent results concerning the relationship between regular check-ups and oral health status are hardly reliable because, in most instances, DMFT/DMFS values for oral health outcome were used and only small

numbers of teenagers were studied for short periods [39-41]. In order to test whether there is a correlation between dental attendance and oral health benefits, more rigorous indicators such as 'MT' and/or 'edentulism' should be chosen and sufficient numbers of adult patients should be observed over a long period. The DMFT/DMFS value is not an appropriate measurement for such studies.

When using 'regular dental visits' as an indicator, findings show that regular dental attendance in adulthood is well established in Sweden and applies to 85% of the population. The majority (70% to 80%) are enrolled in a recall system, on the clinician's initiative [42]. In Denmark, dental attendance rates rose steadily to over 88% among the 35- to 75+ age group [27]. The increased use of regular dental visits from 74% (2005) to 81% (2014) of 35- to 74 year old Germans and the improvement in oral hygiene among seniors [23] might be responsible for raising the oral health status of adults in Germany over the last decade. Furthermore, during the same period, German dentists strengthened their preventive and tooth preserving activities [43]. Significantly lower are the rates of dental attendance in Canada, the USA, the United Kingdom, Australia and Japan (68%, 65%, 61%, 45% and 40% respectively). If these countries nevertheless achieve a good level of oral health, this – in the case of the USA, Australia, and Canada – might be due to the widespread use of water fluoridation (75%, 67%, and 43% respectively) [44-46]. Table 4 shows Germany's

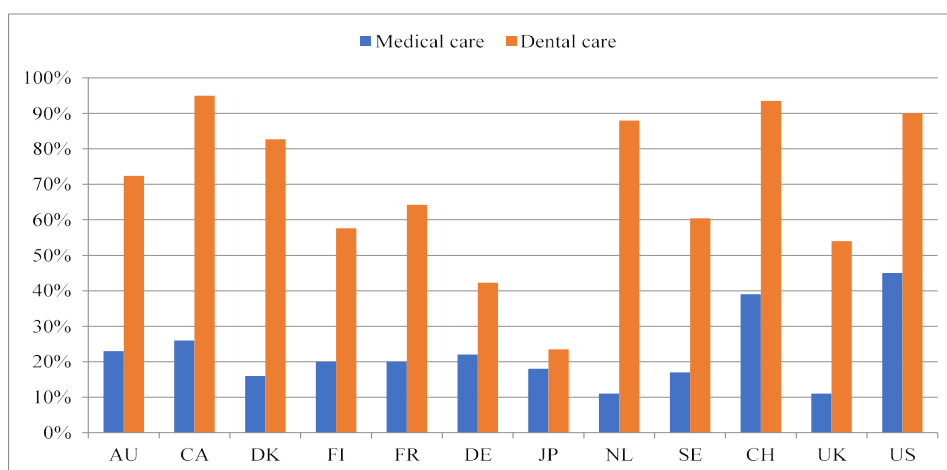


Figure 4. Total private payments (out-of-pocket-, private insurance payments) for medical and dental care in (%) in selected highly developed countries 2010 [30,32,33]

Table 3. Efficiency index of the dental care sector in selected highly developed countries 2012

Country	Dental Health Index (DHI)		Dental Care Cost Index (DCCI)		Efficiency index ² (3)	Rank
	Value (abs.)	Index (1)	Total oral health care costs in % of GDP ¹	Index (2)		
SE	3.18	70	0.66	80	150	1
DK	4.42	98	0.48	58	156	2
UK	4.66	103	0.45	54	157	3
JP	4.72	104	0.56	67	171	4
FR	5.09	112	0.52	63	175	5
AU	5.19	115	0.56	67	182	6
CA	4.64	102	0.68	82	184	7
US	4.66	103	0.68	82	185	8
CH	5.20	115	0.66	80	195	9
NL	6.60	146	0.44	53	199	10
DE	4.53	100	0.83	100	200	11
FI	6.48	143	0.54	65	208	12

1) Data from 2012 2) (3) = (1)+(2)

room for improvement in oral health behaviour – in comparison with the country that enjoys the best oral health status, which is Sweden.

Particularly the approximal cleaning, the snacking and the smoking habits of German adults need to be improved, whereby the high smoking rates combined with low approximal self-care might be responsible for the comparatively poor periodontal status of the adult German population [18,23,47].

In the cluster that comprises a predominantly preventive and tooth-preserving approach, the existence of a goal-setting and goal-monitoring oral health policy, combined with the availability of accompanying scientific dental services research, it is possible to observe another factor that influences the performance of dental care systems. All of these conditions are present in Sweden, Denmark, the United Kingdom, the USA, Japan and Australia. Particularly in Japan, this combination of factors seems to explain why, in spite of low rates of regular dental visits, the population's oral health level, at a DHI of 4.72, is relatively high [18,50,51]. In the case of Germany, these framework conditions are widely lacking.

Despite a strong decline in caries prevalence in Sweden and Germany, great differences exist with respect to treatment philosophies as can be seen from the provision of crowns and endodontic measures. While these treatment measures have been on the decrease for a long time in Sweden, the provision with crowns continues to rise and the endodontic treatments per patient remain constant in Germany [18,23,52]. In contrast to Denmark, which introduced preventive benefits for adults into its social benefits catalogue [36], no such step has been taken thus far in Germany, since the self-administration bodies of the dentists and sickness funds have so far failed to reach an agreement on the corresponding benefits.

The level of expenditure on dental care depends, inter alia, on the form and size of out-of-pocket payments, as well as on the average per capita income of the population [53,54]. The most influence is exerted on the results by the out-of-pocket proportion, which is most pronounced in Switzerland and is lowest in the Netherlands, Japan, Germany and France (Figure 5).

However, in countries where dental care for adults has largely been privatised, patients often feel compelled to take out private insurance, which attenuates the effect of a patient's co-payment. This pattern is widespread in the Netherlands, the USA, France and Canada. Therefore, out-of-pocket and private insurance contributions must be considered together, to be able to capture the real effect of private expenditure on a dental sector's level of cost. If this is done, the total private payments turn out to be highest in Canada, Switzerland, the USA, the Netherlands and Denmark and lowest in Japan and Germany (Figure 5). In line with the principles of health economy theory, one should expect the macroeconomic costs for dental care to be relatively low in Canada, Switzerland, the USA, the Netherlands and Denmark. In fact, this is true for the Netherlands and Denmark and – to a lesser degree (because of substantially higher levels of income per capita) – also for Switzerland and the US as we can see from Table 3, column 4. On the other hand, in both countries with the lowest share of private payments, Japan and Germany, one would expect the macroeconomic consumption of resources to be the most elevated. The figures confirm this for Germany, but not for Japan (Table 3). It is quite possible that, in Japan, other factors effectively limit the trend towards rising dental care costs. Such factors could include Japan's below average income level, as well as the strict tooth-preserving treatment approaches that are favoured by oral health policy and practised by Japanese dentists. Similar causes might explain why the United Kingdom manages its

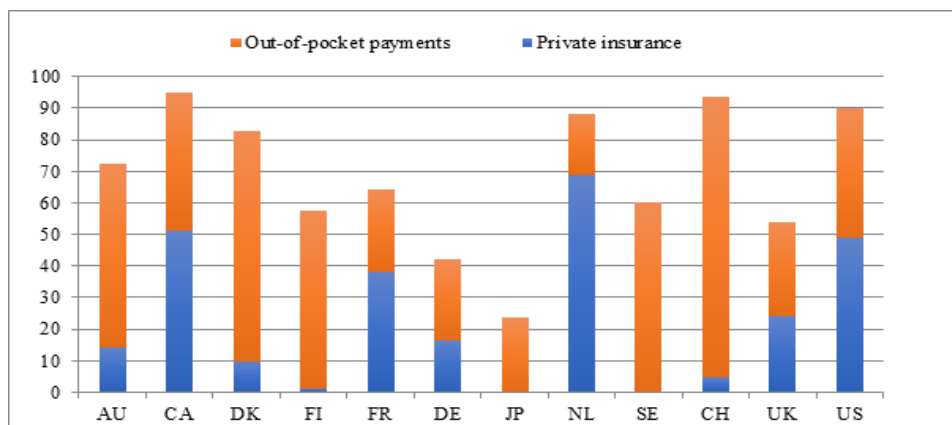


Figure 5. Distribution of private payments (out-of-pocket and private insurance) for dental care (%) in a selection of highly developed countries 2010

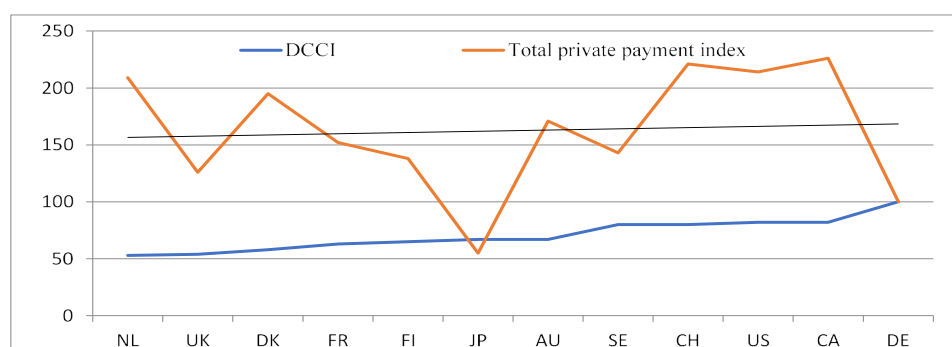


Figure 6. Comparison of total private payment index and dental care cost index

Table 4: Oral health behaviour in Swedish and German adults (35-74 yrs) 2013/14

Country	Oral health behaviour					
	Regular dental visits (in %)	Daily tooth brushing \geq twice (in %)	Regular use of tooth picks (in %)	Sugar intake/capita p.a. (in kg)	Snacks between meals (1-2 times) (in %)	Smokers ¹ (in %)
SE	85	85	33	36.5	23	23
DE	81	80.5	11.5	36.9	54.6	32

1) Average of women and men

dental care system so effectively, cost-consciously and efficiently, with just half of the resources expended by Germany. This assessment also holds true, if it is assumed that the National Health Service (NHS) is underfinanced, as was recently again determined by a parliamentary commission [56].

Thus, the assumption that sensible co-payments for adults reduce overall dental expenditure and limit a dental system's costs is confirmed by our study as well. Figure 6 provides a graphical demonstration. What is striking is the parallel between the trend curve of the country's total private payment index values and the DCCI values, indicating a relationship between both indices.

Germany had proven this assumption to be valid, already in the decade 1980 to 1990, when the country first introduced a 20% co-payment for prosthetic treatments (1978), which was later doubled (1989), leading to a decrease in total dental care costs, in terms of % of GDP, from 1.16% (1980) to 0.84% (1990) [10] which have remained stable at this level. The relatively low co-payment level currently in place in Germany seems to be responsible – in combination with the known inefficiencies in the German system [10,57,58] – for the still extraordinarily high macroeconomic resource consumption by the dental care sector. The mere fact that Germany has a particularly dense social security net (no co-payments for the needy, ceilings on out-of-pocket payments for patients and families) which results in practically no barriers to access, cannot explain the excessive levels of expenditure. In this regard, a great deal of anecdotal evidence exists to suggest that Germany has great potential for increasing the efficiency of its dental care sector.

Conclusion

This international comparison using the new instruments of analysis opens up new horizons for optimising dental care systems. The findings show that good dental status on a population basis can be achieved in any health system, irrespective of the structures used in funding dental care. However, when it comes to patient satisfaction, the manner in which an oral health system is designed matters. Seen from this perspective, the European insurance-based systems perform better. The type of system also matters, when it comes to efficiency considerations. Here, national health systems seem to perform better.

Across systems, the comparison shows that systems that foster preventive and tooth-preserving strategies, also for adults, progress faster and perform better in terms of effectiveness and efficiency. In highly developed countries, depending on a country's income level, a macroeconomic cost level of between 0.5% and 0.7% can be regarded as a benchmark for an efficient dental care system. While Germany meanwhile ranks third in oral health status (system-effectiveness) among the countries under study, its performance in terms of system-efficiency remains rather substandard.

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