Greece’s High Dentist to Population Ratio: Comparisons, Causes, and Effects


Abstract: Reaching the optimal dentist to population ratio is a common health policy challenge around the world, but while many countries have too few dentists for their populations, Greece is facing the opposite problem. This study was designed to describe and analyze trends in the number and distribution of dentists in Greece over the last thirty years and compare the Greek dentist to population ratio with that of the other twenty-six European Union (EU) countries. Demographic data for Greece were obtained from the Hellenic Dental Association and the National Statistical Service of Greece and were analyzed using nonparametric statistical tests. Data for the other EU countries were derived from various authoritative sources. In Greece, the number of dentists per 10,000 inhabitants increased significantly (p<0.05) from 1982 (7.7) to 2007 (13.0), ranking Greece first (in 2008) among the EU countries. The proportional increase in the number of dentists during the decade 1979–88 (30.4 percent) was significant (p<0.05), compared to the decade 1989–98 (22.3 percent) and the nine-year period 1999–2007 (23.6 percent). In 1982 and 1992, the majority of dentists practiced in the Attica Prefecture (Athens) (55.2 percent and 52.6 percent, respectively), but this situation changed significantly in 2007 (p<0.05) (40.1 percent for Attica). The percentage of female dentists remained almost the same from 1982 until 2007, but female dentists’ location of practice changed significantly (p<0.05) between 1992 and 2007. After reporting the data, we examine some of the reasons for and effects of the situation and consider the problem that, even with a high dentist to population ratio, Greece has significant oral health access problems.

Dr. Koletsi-Kounari is Associate Professor and Head, Department of Preventive and Community Dentistry, Dental School, University of Athens, Athens, Greece; Dr. Papaioannou is Assistant Professor, Department of Preventive and Community Dentistry, Dental School, University of Athens, Athens, Greece; and Dr. Stefaniotis is Lecturer, Department of Oral Pathology, Dental School, University of Athens, Athens, Greece. Direct correspondence and requests for reprints to Dr. Haroula Koletsi-Kounari, Department of Preventive and Community Dentistry, Dental School, University of Athens, 2 Thivon St., 115-27 Athens, Greece; 302107461291 phone; 302107461132 fax; hkounari@dent.uoa.gr.

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In recent years, changes have come about in dentistry concerning both the dental professional and the consumer of dental services, making dental practice a more complex profession than ever before.1-9 But above this changing world of dental practice, health policy at the national, regional, and global levels is constantly seeking the best ways to meet the health needs of the public with available human resources. On the one hand, there is the open and free market with its theoretical control via supply and demand; on the other hand, the basic health needs of the population must be addressed. In many countries, a national health system attempts to balance pure market forces with the provision of care for those in need; elsewhere, various governmental means are used to seek an appropriate balance. In every place, this process is further complicated by the need to adapt to situations intrinsically in flux.10-12

The effective allocation of human resources in dentistry is a pressing matter globally, and much effort is directed to determining the optimal ratio of dentists to population, considering such factors as dentists’ current and future activities, the role of dental auxiliaries, and dentists’ combined role as health care providers responsible to society as a whole and to the individual patients they serve. The collection of epidemiological data aids in predicting future dental needs, and focusing on oral health outcomes is essential for planning the oral health care workforce. However, for the allocation of human resources, it is necessary to develop prognostic models that incorporate demand for dental services as well.13-16

Since the beginning of the 1980s, the increase in the number of dentists in some countries has led their governments to take measures to curtail the number of new students and to close dental schools. In other countries, no measures have been taken. Overall, planning for a future dental workforce is affected by factors that may significantly modify the initial estimates and forecasts.17-23 Recently in Greece, the government has been planning educational reforms, especially for the universities. Even though closures of departments are being discussed, there are no plans for such action to be taken for the country’s two dental schools. Indeed, it has been the dental schools that lobby for reduced numbers of students.
Researchers and educators continue to ask: what is the optimal dentist to population ratio to competently address the oral health needs of the public? Across the twenty-seven member countries of the European Union (EU), there is no common plan to handle oral health needs, so many different situations exist regarding the supply of dentists. The trend in the Northern European countries is to take measures to reduce the number of dentists, while for the Southern European countries a continuous increase in dentists occurs in the absence of controls. As a result, across the EU, with a total of over 500 million people and over 300,000 dentists, there is considerable variation in dentist to population ratios as well as considerable variations in approaches toward the size of the dental workforce.\(^{24}\)

In Greece over the last thirty years, the dental workforce has grown in the absence of any specific design or policy planning, resulting in an oversupply of dentists and the highest dentist to population ratio in the EU. The aim of our study was to track this trend from the last two decades of the previous century through the first decade of the twenty-first century, by examining the total number of dentists in relation to the population and changes in distribution by place of practice and gender, and to compare these parameters to those of the other twenty-six EU countries.

Materials and Methods

Data on the number of dentists in Greece and their distribution across the country by gender for the years 1982, 1992, and 2007 were obtained from the Hellenic Dental Association. Demographic data concerning the Greek population were derived from the population censuses of 1981, 1991, and 2001 of the National Statistical Service of Greece (NSSG), and the numbers of dentists in EU countries for a series of years were obtained and matched as possible using various authoritative sources.\(^{19,24-32}\)

The statistical analysis was based on nonparametric tests. Outcome variables were the total number of dentists per 10,000 inhabitants, proportional changes in numbers for the selected decades, and proportional distribution by region and gender. The analysis of coded data was carried out using SPSS software, version 16.0. For the number of dentists per inhabitants, the McNemar test was used, while all other outcomes were examined by chi-square test. The level of statistical significance was set at \(p<0.05\).

Table 1. Number of dentists, dentist to population ratio, and dentists to 10,000 inhabitants in Greece in 1982, 1992, and 2007

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Number</th>
<th>Dentist/Population</th>
<th>Dentists/10,000 Inhabitants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>7,486</td>
<td>1:1,301</td>
<td>7.7*</td>
</tr>
<tr>
<td>1992</td>
<td>10,392</td>
<td>1:987</td>
<td>10.1</td>
</tr>
<tr>
<td>2007</td>
<td>14,273</td>
<td>1:766</td>
<td>13.0*</td>
</tr>
</tbody>
</table>

\(p<0.05\)

Results

The absolute number of dentists, the dentist to population ratio, and the dentists to 10,000 inhabitants for 1982, 1992, and 2007 are shown in Table 1. The number of dentists per 10,000 inhabitants greatly increased from 1982 to 2007 (7.7 and 13.0, respectively), and this difference is statistically significant (McNemar test, \(p<0.05\)). Between 1982 and 1992 no statistically significant difference was found.

Figure 1 presents the EU countries’ average of dentists per 10,000 inhabitants for 1990 and 2008, as well as this ratio for each individual EU country for 1990 and 2008. According to these figures, Greece ranked first in 2008 for the number of dentists per 10,000 inhabitants (13.0) and is far above the average of 7.1 of the EU countries. The proportional change in the number of dentists for the decades 1979–88 and 1989–98 and the nine-year period 1999–2007 (Figure 2) reveals that in the 1980s the number of dentists was increasing significantly more than the two later periods (chi-square test, \(p<0.05\)). However, the proportional change in number of dentists during 1989–98 and 1999–2007, although lower than that in 1979–88 (22.3 percent and 23.6 percent, respectively), is still relatively high.

In 1982 and 1992 (Figure 3), the majority of dentists practiced in Attica Prefecture (Athens) (55.2 percent and 52.6 percent, respectively), but this situation changed significantly in 2007 (only 40.1 percent) (chi-square test, \(p<0.05\)). Correspondingly, the proportion of dentists practicing in the rest of the country showed a large increase over those years: from 30.3 percent of dentists nationally in 1982 to nearly half (47.1 percent) in 2007. The differences between 1982 and 2007 are statistically significant (chi-square test, \(p<0.05\)). In Thessaloniki a declin-
ing trend was observed from 1982 to 2007, but the differences are not statistically significant.

The distribution of female dentists in total and by area of practice in the years 1992 and 2007 is shown in Figure 4. The percentage of female dentists has remained almost the same from the last decade of the twentieth century until 2007. Insignificant differences concerning the proportion of female dentists were observed in the two largest prefectures of Greece. However, a significant increase was observed between 1992 and 2007 in the distribution of female dentists practicing in the rest of Greece (chi-square test, p<0.05).

Discussion

This study shows the large increase in the Greek dental workforce from the last decades of the nineteenth century to the beginning of the twenty-first century, a period of more than twenty-five years. As a result, among the twenty-seven EU countries, Greece ranks highest in dentists per 10,000 inhabitants, and its dentist to population ratio is far above the EU average of 7.1 (Figure 1). During the same period, Greek’s population growth rate was very low (0.33–0.40 in 2007), ranking the country lowest among EU countries. The Greek health care system is also characterized by a high physician to population ratio, ranking first among EU countries in practicing physicians per 1,000 inhabitants (for 2007). The large number of dentists and doctors in Greece that has existed since the 1980s may be attributed to challenges in central planning of the health workforce and to social and cultural reasons. A large proportion of Greek society is attracted to the health care professions as they are perceived to be highly prestigious, so every year a very large number of students wish to pursue dental and medical studies, even though both dental and medical schools demand top scores on entrance exams. Students who fail to gain a position in the dental and medical schools of Greece often go on to study dentistry or medicine abroad. A large number of these students choose to
Figure 2. Proportional change in number of Greek dentists for the decades 1979–88 and 1989–98 and the nine-year period 1999–2007

Figure 3. Distribution of dentists in the two largest prefectures of Greece—Attica (Athens) and Thessaloniki—and the rest of the country for 1982, 1992, and 2007
study in Eastern European countries where school admission is relatively easy to obtain but, unfortunately, the educational rigor of the curricula is questionable. Upon completion of their studies and graduation, almost all of these graduates then return to Greece for practice.

As a result, since 1998 the Athens Dental Association has reported 5.5 percent unemployment among dentists in Athens. Greece is one of only four EU countries (along with Finland, Germany, and Italy) with reported unemployment in the dental profession. Despite this, the number of dentists is still increasing in Greece, and our study found that the percentage change in the number of dentists from 1989 to 2007, although significantly lower than that of the previous decade (1979–88), is still high (Figure 2). Efforts made by the two dental schools in Greece (in Athens and Thessaloniki) to decrease the number of students has not significantly reduced the number of dentists entering the workforce each year since many dentists who were educated abroad come back to Greece to practice. In 1995–2004, 30 percent of the registered dentists in Greece (who are primarily Greeks) studied dentistry abroad. This proportion was lower (21.6 percent), though still notable, in the previous five-year interval (1990–94).

The proportional change in the number of dentists per 10,000 inhabitants between the years 1990 and 2007 was 31.3 percent, ranking Greece eighth among EU countries. However, the seven EU countries holding higher positions in 1990 had a much lower number of dentists per 10,000 inhabitants. In five EU countries (Sweden, France, Finland, Belgium, and Denmark), the number of dentists decreased in the same time period, although others had increases similar to that in Greece.

Although Greece has a limited number of dental technicians and dental chairside assistants, the country does not have dental hygienists. This small number of dental auxiliaries is directly related to the large number of active dentists.

After graduation, dentists are able to choose the area in the country in which they will practice, so distribution depends entirely on their preference. For this reason, in 1982, there was an uneven distribution of dentists resulting in inequities in dental care across Greece. Most dentists prefer to practice in areas with high standards of living and a high GDP per

Figure 4. Total proportion of female dentists in Greece and distribution in the two major Greek prefectures and the rest of the country in 1992 and 2007
capita, so with 70 percent of the dentists practicing in the two largest cities (Athens and Thessaloniki), only 30 percent were providing care for the remaining 56 percent of the population.\textsuperscript{31,42} This uneven distribution was balanced somewhat during the last decade by the dentists themselves, partly due to the overcrowding of dentists in Athens (15.2/10,000) and the consequent threat of unemployment. However, the ratio of dentists per 10,000 inhabitants has also increased in the rest of the country (10.9/10,000) and is high enough to rank Greece first among EU countries. Regardless of that, as the majority of dentists practice mainly in urban areas, there are problems concerning access to dental services especially in the mountain and island regions.

The gender distribution of the dental profession also has important consequences for workforce planning.\textsuperscript{43} In Greece, the percentage of female dentists remained almost the same between 1992 and 2007 (45.4 and 46.8 percent, respectively), as well as their distribution in the two largest cities. However, significant differences were noted in their distribution in the rest of the country. One explanation could be that, in previous years, less populated areas did not favor the practice of female dentists for social and cultural reasons. More recently, either a change in this attitude or the greater availability of jobs in areas away from large cities has led to significant increases in the number of practicing female dentists in the rest of the country. In the EU, seventeen countries have higher proportions of female dentists than Greece, ranging from 48 to 88 percent, while nine countries have proportions from 25 to 40 percent.\textsuperscript{24}

A factor of growing importance lately is the migration of health personnel across the borders of the EU member countries. Health professionals have always moved between countries in Europe, but the global economic crisis may lead to rapid changes in these patterns in the future. In Greece, economic problems combined with the oversupply of dentists may create a demand to pursue employment abroad. In the United Kingdom, for example, which has a shortage of dentists and employs numerous dental professionals from overseas,\textsuperscript{19} the total number of Greek dentists registered with the General Dental Council from 1994 to 2005 was 399, showing a gradual annual increase from fourteen in 1994 to seventy in 2005.\textsuperscript{44}

In Greece, oral health care is primarily delivered by dental practitioners in private practice, and dental services constitute a significant part (40 percent) of the total health expenditure of household budgets.\textsuperscript{45} According to the Greek Ministry of Health and Social Solidarity,\textsuperscript{30} 1.1 percent of the GDP is spent on oral health care, and 95.7 percent of this is private.\textsuperscript{29} Comparably high percentages of GDP are spent on oral health care in two other EU countries: Cyprus (2007, 97 percent) and Italy (2004, 97 percent).\textsuperscript{28} These data in combination with the high cost of dental treatment, the extremely low dental expenditure in the public sector, and the absence of private dental insurance illustrate the social inequities in the use of dental services in Greece.\textsuperscript{47} Recent studies have shown that the utilization of dental services is low (47 percent in adults) and so are regular dental visits (31.7 percent).\textsuperscript{48} In addition, people with higher education level and socioeconomic status are more likely to visit the dentist more frequently and on a more regular basis.\textsuperscript{47,51} However, these more privileged groups are also the ones with better oral health status and health behavior and, as such, are probably less in need of significant dental therapy.\textsuperscript{72-54} Across the EU, Southern Europeans visit dentists regularly the least often (Italy 51.3 percent, Spain 41.7 percent, Portugal 35.5 percent, and Greece 48.6 percent), while those in Germany (73.3 percent), the Netherlands (81.0 percent), and Luxembourg (79.7 percent) visit dentists the most. Overall, it was reported in 2003 that roughly 60 percent of Europeans had visited a dentist in the previous twelve months.\textsuperscript{55}

It is especially discouraging that the large number of dentists in Greece has not led to improvement in the oral health of the population. The results of an epidemiological study published in 2009\textsuperscript{31} revealed that a large percentage of the country’s dental needs remain untreated. This 2009 data showed there had been a significant decrease in the DMFT index for twelve-year-olds since the National Oral Health Pathfinder Survey in 1985 (from 4.3 to 2.05).\textsuperscript{56} Regardless of the decline of 42 percent, the 2009 DMFT score ranked Greece seventeenth among the EU countries.\textsuperscript{24,31} However, Greece was able to meet the World Health Organization target of no more than three DMFT for twelve-year-old children by the year 2000, as did most of the EU countries (Figure 5). In 2006, or the closest available year, Belgium, Denmark, Germany, Luxembourg, the Netherlands, Sweden, and the UK had a DMFT score at the age of twelve years of one or less. Figure 5 shows there is little association between the number of DMFT among children and the number of dentists per 10,000. There are substantial differences in DMFT index scores among countries that have the same number of dentists per capita, indicating that many
other factors affect dental health beyond the availability of dentists. In adults aged thirty-five to forty-four years, no changes have occurred between the two surveys. The Care Index scores revealed that in the middle-age groups 50 percent of the dental needs were treated, while in the age groups of five and under and sixty-five to seventy-four-year-olds almost all dental needs remain untreated. Large inequities in unmet dental care needs were evident between high- and low-income groups in Greece, Portugal, and Denmark as well as in Belgium, although in the latter country the average level of unmet needs was low. The results of our study cannot be interpreted without taking into consideration certain limitations. Primarily, the dentist to population ratio was utilized as a measure because of the availability of data. This limitation is not mitigated by taking into consideration the data on other clinical indices regarding the Greek population. It is obvious that using this measure to plan and allocate the dental workforce will result in needs remaining unmet and inequities not addressed. Recently, attention has focused on more advanced and refined models for workforce distribution. Of particular interest is a sociodental approach in determining the needs of various patient groups. By focusing on those patients who can more likely benefit from dental treatment, a more logical method of measuring treatment needs and the resources necessary to meet them could lead to better allocation and utilization of services and resources. For this to happen, an organized national health system is necessary to ensure the distribution according to sociodental needs and not only the laws of supply and demand.

Conclusions

Greece continues to show a yearly increase in the number of dentists, so its high dentist to population ratio seems likely to continue, along with employment problems for Greek dentists. At the same time, oral health care remains expensive and unavailable to large parts of the population. Solving all these problems will require both informed public policy makers and public policies, based on the best available data.

REFERENCES