European Journal of Dental and Oral Health
www.ejdent.org

Impact of the COVID-19 Pandemic on the Provision of Dental Care by the Public Dental Services of Cyprus

Chrystala Charalambous, Aristomenis I. Syngelakis, and Marios Kantaris

ABSTRACT

***Background*: During 2020 dentists were included in the group of health professionals that were directly affected by the pandemic. This study aimed to capture the impact of the pandemic in the provision of dental care through the Public Dental Services (PDS) of Cyprus in 2020 and 2021 (during pandemic) compared to 2019 (pre pandemic). More specifically, it examined the consequences in the number of visits, the average number of patients per day, the proportion of new patients to the total number of visits, and the type of services provided.**

***Methodology*: Statistical data from the PDS were analyzed with the help of SPSS2.**

***Results*: Cyprus PDS statistics show a national decline in the number of visits of 41.3% in 2020 compared to 2019 ($p < 0.01$) and a further decline of 9.6% in 2021 (compared to 2020). The decline in the average number of patients per day (37.6%) in 2019-21 was less than the decline in the average number of visits (47.0%). Similarly, there was a 34.7% decrease in work volume ($p < 0.01$) between 2019 and 2020 and a further 2.8% decrease in 2021. These decreases were not consistent both between different types of centres and between different districts.**

In terms of treatments offered nationwide, the largest decrease in 2020 was in dental scaling (53.5%), followed by dental examinations (47.9%), composite fillings (47.5%) and amalgam (45.4%). The share of the most affected dental treatment (scaling, examination, composite and amalgam) in the total workload has decreased from 51% in 2019 to 40% in 2020 ($p < 0.01$). The least affected dental work in 2020 was temporary fillings, which increased by 6.6%. In 2021, the profile of care provision changed as there was an increase in composite fillings, up 45.7% compared to 2020 ($p<0.01$), while all other types of dental work continued to decline. The share of the most affected dental treatments (scaling, examination, composite and amalgam) in the total workload increased (from 40% in 2020 to 43.9% in 2021), but still significantly lower than in 2019 (pre-pandemic - 51%). Interestingly, the share of extractions in total workload increased from 16.6% in 2019 to 21.5% in 2021.

***Conclusion*: The COVID-19 pandemic and the subsequent restrictive measures imposed had a negative impact on the provision and seeking of dental care by the PDS. The decline in the frequency of dental visits, if sustained over a longer period of time and not reversed, will have a negative impact on the level of oral health of people living in Cyprus and will increase the unmet need for dental care. The increase in extractions is expected to have a negative impact on the level of oral health, as it is the most radical dental treatment and the need for prosthetic rehabilitation will also increase. In addition, the economic impact of COVID-19 and the global economic instability, which has reduced family incomes, is expected to drive more patients to the public sector, where fees are quite low, adding to already burdened waiting lists. People with lower socio-economic status are expected to bear the highest burden, which will increase oral health inequalities.**

Keywords: COVID-19, Cyprus, dental health services.

Published Online: April 26, 2023

ISSN: 2684-4443

DOI :10.24018/ejdent.2023.4.2.227

C. Charalambous
School of Dentistry, European University Cyprus, Nicosia, Cyprus.
(e-mail: chrysamarios08@gmail.com)
A. I. Syngelakis
School of Dentistry, European University Cyprus, Nicosia, Cyprus.
School of Dentistry, National and Kapodistrian University of Athens, Athens, Greece.
(e-mail: aristomenis.syngelakis@gmail.com)
M. Kantaris
Health Services and Social Policy Centre, Cyprus.
(e-mail: kantarism@yahoo.com)

Corresponding Author

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I. Introduction

The year 2020 was a milestone for humanity, as the global outbreak of the SARS - CoV-2 virus has resulted in millions of people falling ill and dying [1], [2]. On March 11, 2020, COVID-19 was officially recognised as a pandemic by the WHO [3], whereupon health systems in most countries began a race to strengthen staff and care infrastructure, especially in intensive care units, and to take appropriate preventive measures such as social distancing and the use of protective equipment, and later to introduce vaccination as quickly and efficiently as possible, to effectively cover the population.

Some of the measures taken were harsh in many cases and included the imposition of strict cordons to contain the spread of infection and the consequent congestion of hospitals and intensive care units [4], [5].

In Cyprus, the first case was registered on 12 March 2020 [6]. Based on the experience of other European countries in the fight against the virus and knowing the weaknesses of the health system, Cyprus took drastic measures quite early (February 2020) to contain the invasion of the pandemic, including the first lockdown, which lasted 21 days and took place from March 24th to April 13th, 2020 [7]. A second closure occurred from January 10th to January 31st, 2021, followed by a third closure between April 26th, 2021, and May 4th, 2021.

Since March 2020 until August 18th, 2022, 568,383 positive cases of COVID-19 were identified in Cyprus (total population 918,100- October 2021) and 1107 died. 14% of the positive cases were people over 60, 26% 40-59, 36% 20-39 and 26% 0-19 years old [8].

Dentists were included in the group of health professionals that were directly affected by the pandemic. Due to the proximity of dentists to patients during dental treatments, and the production of transmissible droplet and aerosol airborne particles during most dental procedures, the dental profession was fundamentally considered a high-risk profession for virus transmission [9], [10]. Therefore, internationally respected organisations [11]-[13] had recommended the provision of only emergency dental care especially during the period of lockdown [14]. In Cyprus, following the recommendations of these organisations, the Ministry of Health (MoH) had suspended the operation of all dental clinics (both public and private) during the lockdown period and allowed only the treatment of dental emergencies

The Public Dental Services (PDS) of the Ministry of Health, which employ 4% of all registered dentists in Cyprus and serve about 10-12% of the population [15], took action from the first moment and developed a strategic plan to prevent the spread of the pandemic in public dental clinics. Similar measures were taken and in the private sector. The strategy was based on three pillars: a) ensuring the continuous provision of the necessary protective equipment for all dental staff, b) updating infection control protocols in dental clinics, training staff and monitoring compliance with these protocols, c) ensuring that dental care was uninterrupted as much as possible. At the same time, some of the PDS personnel assisted in the operation of the Ministry of Health's contact tracing unit and later in the administration of vaccines to the population, demonstrating in practice the multitasking ability and multifaceted role of dental personnel in times of health crisis [16].

After the initial restrictive measures were lifted, the PDS resumed operations. However, they reduced the daily number of appointments, in order to avoid crowding of patients in waiting rooms and also to allow the necessary time for disinfection of surfaces and equipment and adequate ventilation of dental clinics. These measures clearly resulted in a decrease in the number of patients who could be treated on a daily basis compared to the past and consequently increased the waiting lists.

The objective of this study was to assess the impact of the pandemic on the provision of dental care by the PDS in 2020 and 2021 compared to 2019. In particular, the impact of the restrictive measures and the new way of working of the PDS due to the pandemic on the workload and type of services provided by each district and health centre (hospitals, urban and rural health centres) of the PDS was examined in detail. The study also looked at whether the demographic profile of patients (gender and age) who visited the PDS in 2020 and 2021 changed compared to 2019, as well as the proportion of patients who visited the PDS for the first time.

II. Methods

The study identified and analysed statistical data from the PDS to assess the impact of the pandemic on the provision of dental care services by the public sector, mainly by comparing three different years: 2019 (pre-pandemic period) and 2020, 2021 (pandemic period). Specifically for these periods, the following data were accessed:

- Number of visits to the PDS. Comparisons were made by sex, age group, and type/location of centre (hospital, urban or rural health centre) and district.
- Average visits per day by type of centre.
- Percentage of new patients to the total number of visits.
- Type and volume of dental care provided by type of centre, including the construction and repair of partial and full dentures.

The SPSS26 was used for statistical analysis.

III. Results

PDS statistics show a nationwide decrease of 41.3% in the number of visits in 2020 compared with 2019 (83,971 VS 49,264) and a further decrease of 9.6% in 2021. The total reduction of visits during the years 2019-2021 was 47.0%. Similarly, there was a reduction of 34.7% in the volume of work between 2019 and 2020 (75,017 in 2019 compared to 48,974 in 2020) and a further reduction of 2.8% in 2021. The total reduction of workload the years 2019-21 was 36.5% (Fig. 1 and 2).

These reductions were not uniform between the different types of centres during years 2020 and 2021. In terms of visits, a larger percentage decrease was recorded in rural centres (53.1%) in 2020 compared with 39.13% in urban health centres ($p<0.01$). This decrease was further continued during 2021 but with a slower pace (9.19% for hospitals, 15.21% for urban health centers, while rural health centres recorded an increase of 11.36% in the number of visits) ($p<0.01$).

In terms of work volume, a larger percentage decrease was

recorded in 2020 in urban centres 55.4%) compared with 13.5% in hospitals (p<0.01). Similarly, as with the number of visits, the decrease in the workload in 2021 compared with 2020 was lower (2.8%) compared with the respective period of 2019-20 (34.7%). Differences were once more identified between the different type of health facilities. In hospitals there was of further reduction of the workload by 6.0% in 2021, while urban and rural health centres recorded an increase of 0.2% and 9.5% respectively.

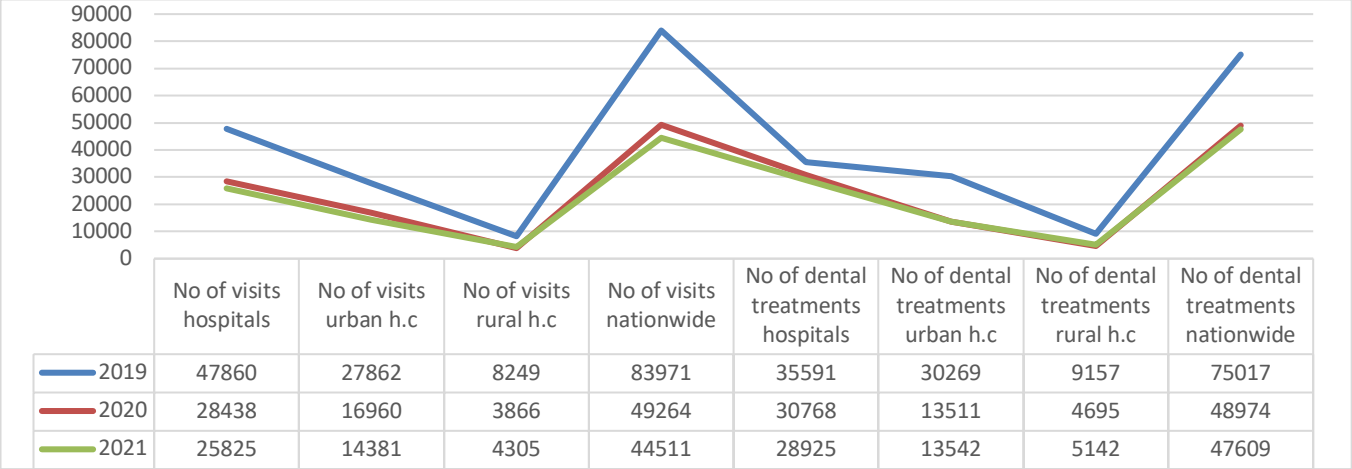
Variations in the reduction in visits were also observed between districts, with the largest percentage decrease between the years 2019-20 being recorded in Larnaca (50.6%) and the smallest in Paphos (33.7%) (p < 0.01). In 2021, some districts recorded increase in the number of visits (Larnaca and Limassol) while the rest of the districts (Nicosia, Paphos, Famagusta) continued to record decreases. Overall, during the period 2019-21 Nicosia recorded the largest decrease in the number of visits (50.5%), while Limassol the smallest (37.0%) (p < 0.01).

TABLE I: AVERAGE NUMBER OF PATIENTS PER DAY PER FACILITY FOR THE YEARS 2019 AND 2020 AND 2021

	Average number of patients/days			% Reduction		
Type of health centre	2019	2020	2021	2019-20	2020-21	2019-21
Hospitals	13.0	8.8	7.0	-32.3%	-20.5%	-46.2%
Urban health centres	15.9	11.6	8.0	-27.0%	-31,0%	-49.7%
Rural health centres	6.7	5.2	7.2	-22.4%	38,5%	7.5%
Nationwide	11.9	8.8	7.4	-26.1%	-15.9%	-37.8%

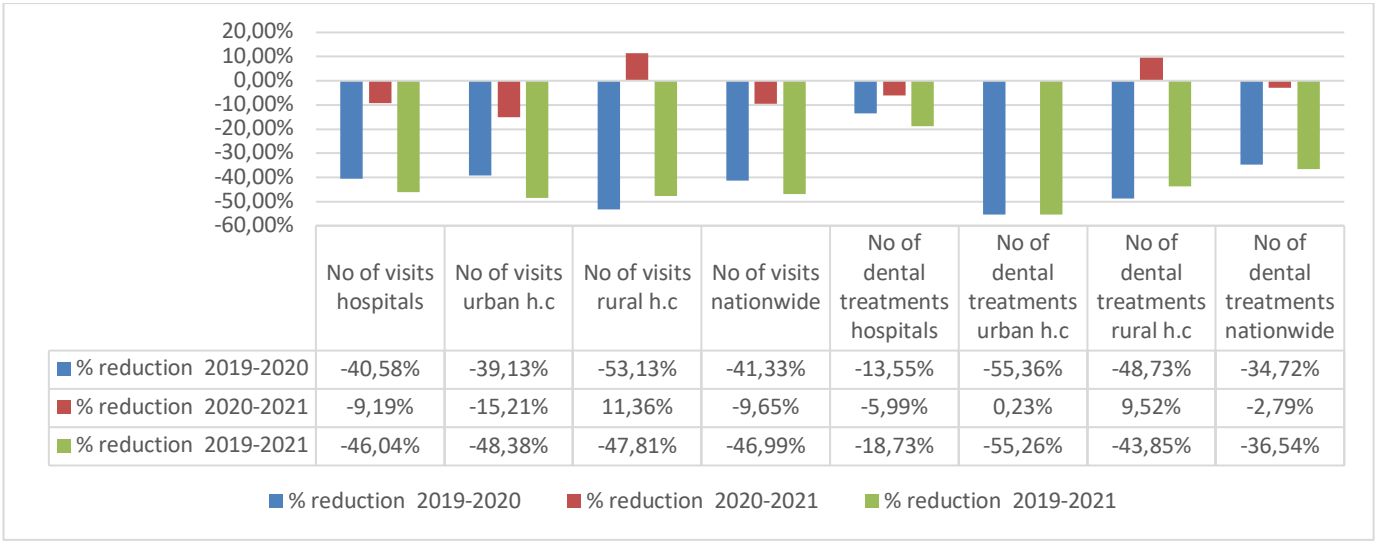
TABLE II: NUMBER OF DENTAL TREATMENTS AND PERCENTAGE REDUCTIONS THE YEARS 2019-2021

	No 2019	No 2020	Reduction 2019-20 (%)	No 2021	Reduction 2020-21 (%)	Reduction 2019-21 (%)
Scaling	11418	5307	53.5	4718	11.1	58.7
Examination	11478	5983	47.9	5335	10.8	53.5
Composite filling	12089	6348	47.5	9248	+45.7	23.5
Amalgam filling	3402	1858	45.4	1666	10.3	51.0
Extraction	12477	10844	13.1	10284	5.2	17.6
Temporary filling	5314	5664	+6.6	4764	15.9	10.4



	No of visits hospitals	No of visits urban h.c	No of visits rural h.c	No of visits nationwide	No of dental treatments hospitals	No of dental treatments urban h.c	No of dental treatments rural h.c	No of dental treatments nationwide
2019	47860	27862	8249	83971	35591	30269	9157	75017
2020	28438	16960	3866	49264	30768	13511	4695	48974
2021	25825	14381	4305	44511	28925	13542	5142	47609

Fig. 1. Number of visits and volume of work at the PDS for the years 2019-2020 -2021 per centre type and location.



	No of visits hospitals	No of visits urban h.c	No of visits rural h.c	No of visits nationwide	No of dental treatments hospitals	No of dental treatments urban h.c	No of dental treatments rural h.c	No of dental treatments nationwide
% reduction 2019-2020	-40,58%	-39,13%	-53,13%	-41,33%	-13,55%	-55,36%	-48,73%	-34,72%
% reduction 2020-2021	-9,19%	-15,21%	11,36%	-9,65%	-5,99%	0,23%	9,52%	-2,79%
% reduction 2019-2021	-46,04%	-48,38%	-47,81%	-46,99%	-18,73%	-55,26%	-43,85%	-36,54%

Fig. 2. Relative percentage reduction in the number of visits and work activity by type of facility in 2020 and 2021 compared to 2019.

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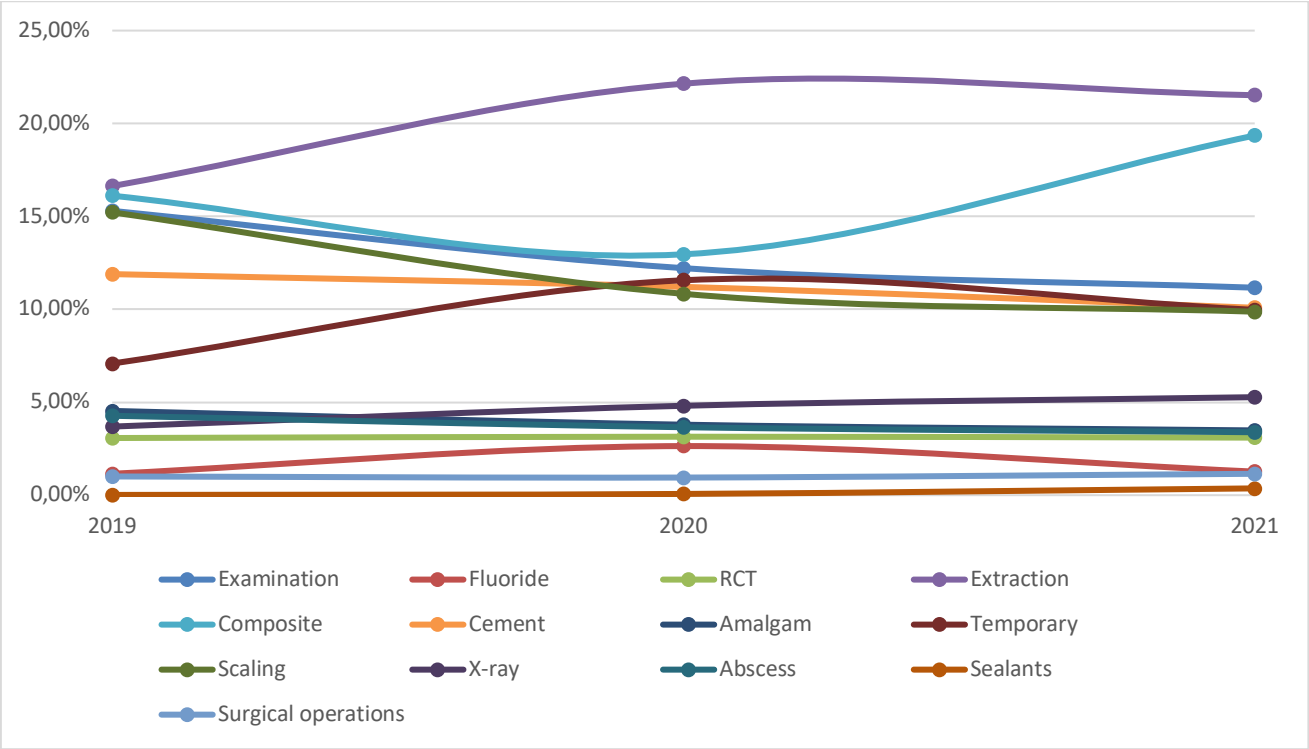

Fig. 3. Share of each dental treatment to the total workload during the years 2019-2020-2021.

The average number of patients seen per day is perhaps the most representative and meaningful statistic, as it reflects the actual working days of PDS clinics, having in mind that for a specific period dental clinics provided only emergency care. Here, a decrease of 26.0% was recorded in 2020 compared to 2019, with the largest decrease recorded in hospitals (32.3%) and the smallest in rural health centres (22.4%) (Table I) ($p < 0.01$). The decrease in the average amount of patients/day in 2020 was less than the decrease in the total number of visits in the same year (26.0% vs. 41.3%). In 2021, the decrease in the average number of patients per day, was further continued, however in a slower rate (15.9%), with the largest decrease recorded in urban health centres (31.0%), while rural health centres recorded an increase in the average number of patients seen per day (38.5%). Overall, during the period 2019-21, there was a decrease of 37.8% in the average number of visits per day (on average 12 patients were examined per day in 2019 VS 7.4 in 2021). What is worthy to mention is that in 2021 in all types of centres the same average number of patients was examined (n=7,4) and no variations are examined between the centres as it was the case in 2019 where on average 16 patients were examined per day in urban health centres compared with 7 in rural centres.

Although the average number of patients per day has decreased in 2020 compared to 2019, the proportion of new patients (patients coming to the PDS for the first time) to the total number of patients has remained almost the same (15.4% in 2020 compared to 16.2% in 2019), showing that the PDS continued to attract new patients. In 2021, PDS continued to attract new patients, but at a lower rate (14.8%).

In terms of gender and age group of patients attending PDS clinics, there was a slight increase in females in 2020 compared to 2019 (52% compared to 48% in 2019), while their share drops again to 49% in 2021. About 70% of visits in 2019 were from people aged 45 and over, while 41% were from people aged 65 and over. The percentages for 2020 were 70% and 44% respectively. In 2021, 65.2% of patients were over 45 years of age and 36.1% were over 65 years of age, indicating a decrease in the proportion of older people in PDS visits.

Interestingly, the decline in work activity nationwide was lower than the number of visits in both 2020 and 2021. This is most evident in hospitals, where although the number of visits fell by 40.6% and the daily number of patients fell by 32.3% in 2020 compared to 2019, work activity only fell by 13.6%. The same trend continued in 2021, where although the number of hospital visits decreased by 9.2%, workload only decreased by 6.0%. Overall, there was a 47.0% decrease in number of visits and 36.5% decrease in workload across all centres in 2019-2021 (Fig. 2).

Table II shows dental activity in 2020 and 2021 compared to 2019. In 2020, across Cyprus, the largest decrease was recorded in scaling (53.5%), followed by dental examinations (47.9%), composite fillings (47.5%) and amalgam (45.4%). The least affected dental work was temporary fillings, which increased by 6.6%, followed by extractions, which decreased by 13.1%. The share of the most affected dental treatment (scaling, examination, composite and amalgam) to the total workload has been decreased from 51% in 2019 to 40% in 2020 ($p<0.01$).

In 2021 the profile of the offering care has changed as there was an increase in composite fillings by 45.7% ($p<0.01$), compared with 2020, while all other type of dental treatments continues to further decrease. The largest decrease was recorded in temporary fillings (15.9%) and scaling (11.1%), while extractions and root canal treatments were the least affected 5.2% and 4% respectively. Regarding the percentage of each dental treatment to the whole workload, in 2021 extractions represent 21.5% (compared with 16.6% in 2019 and 22.1% in 2020), scaling 9.9% (compared with 15.2% in 2019 and 10.8% in 2020), composite fillings 19.3% (compared with 16.1% in 2019 and 13.0% in 2020) and

temporary fillings 10% (compared with 7.1% in 2019 and 11.6% in 2020) (Fig. 3). The share of the most affected dental treatment (scaling, examination, composite and amalgam) to the total workload has been increased from 40% in 2020 to 43.9% in 2020, but still remaining quite lower compared with that of 2019 (pre-pandemic period 51%).

The work of the prosthetic clinic also decreased. In 2019, 5,173 partial or complete dentures were manufactured or repaired. This number decreased to 3,427 in 2020 (33,8%) and further decreased to 3,234 in 2021 (5.6%). The decrease was greater in constructions compared to repairs (35.8% VS 31.0%).

IV. Discussion

The present study is the first conducted in Cyprus to capture the impact of COVID-19 pandemic in dental care provision from the Public Dental Services in 2020 and 2021.

The survey showed a decrease in the total number of visits at the PDS by 41.3% and by 34.7% of the treatment in 2020 compared to 2019. This decrease was further continued, but with a slower rate in 2021, (by 9.6% in the number of visits and 2.8% in the workload), showing a trend of stabilizing the situation.

A more reliable indication of the impact of the pandemic on dental care through the PDS is to examine the average number of patients per day, as in both 2020 and 2021 dental clinics were closed on several days due to lockdown, offering only emergency care. Again, there was a decrease of 26.1% in 2020, but this was less than the decrease in the total number of visits (41.3%). In 2021, there was a further decrease of 15.9% in the average number of patients per day. Overall, there was a 37.8% decrease in the average number of patients per day in 2019-21, but this was less than the decrease in the total number of visits to the PDS (47%).

Other studies also found reductions in both visits and work activity, but the range of reductions varied, which may be related to the timing, duration and location of the study (e.g. public or private clinics, university hospitals, emergency departments, etc.). Specifically, a study in Brazil in 2020 showed a clear reduction of 55% of dental services provided in the public system in March 2020 for all procedures compared to 2019 [17]. An even greater decline in dental treatments offered was recorded in the NHS in England. More specifically, 12.0 million treatments were provided in 2020-21, a 68.8% decrease from the previous year [18].

In terms of visits, research in the US recorded a 33% decrease in the number of visits to dental clinics in March - August 2020 compared to the corresponding period in 2019 [19]. Correspondingly, lower dental visits in 2020 were found in surveys in Hungary [20], India [21] and Australia [22]. In England, 21 million adults had seen a dentist within the last two years in June 2020 (47.7% of the population). This was a decrease from December 2019, when six months earlier 21.8 million adults had seen a dentist within the last two years (49.6% of the population) [23]. In general, the pandemic appears to have had a negative impact on visits to doctors in various specialties as well as emergency departments [24], [25].

Several factors contributed to the decline in PDS visits in 2020 compared to 2019, primarily the extraordinary decrees and dental clinics operating guidelines that were enacted and regularly reviewed, as well as the period of general lockdown, which limited work to emergencies that couldn't be handled by telephone instructions. Even after the lockdown was lifted, several dental clinics remained closed for some time as staff were part of the vulnerable groups and were instructed to stay at home. With the reopening of the dental clinics, strict instructions were given to strictly keep appointments, keep empty time slots between patients to avoid crowding in the waiting area, and disinfect the area, which also led to a reduction in the number of patients that could be served daily and consequently a reduction in overall visits.

An important driver of the decline in patient numbers may have been patients' phobia of getting infected during the dental visit. In a survey of adults in the United States in May 2020, 75% of respondents said they had postponed their dental visits because of the pandemic [19]. The fear and initial uncertainty, especially about contracting the virus, forced many patients to avoid hospitals and health centres even after they reopened [26], [27]. Even in dental emergencies, patients were reluctant to see a dentist because of fear, posing a visible risk burden to oral and possibly general health [19], [24], [28]-[30].

The above factors (two lockdowns periods from 10 to 31 January 2021 and 26 April 2021 to 4 May 2021, new operating guidelines, patient anxiety, etc.) continue to play a catalytic role, leading to a further decline in the number of visits and workload in 2021, albeit at a slower pace.

A greater decrease in the number of visits was recorded in the most populous district of Nicosia, which also had the highest number of COVID-19 cases [8]. The same conclusion was reached in a study in the USA, where on average 34% fewer dental visits were recorded in the states with the highest number of cases [19].

Compared to the type of centre, a greater decline in the number of visits was observed in rural centres in 2020. Due to the decrease in staff resources at the PDS during the pandemic (either because they were positive cases or close contacts and also because some of the staff belonged to the vulnerable groups and were given special permission to stay at home), many of the rural centres with the lowest number of patients were temporarily closed so that staff resources could be used more efficiently. The increased decline in patient numbers in the rural centres could also be related to the profile of patients in these centres, as they are mainly elderly people who may have felt more vulnerable to the virus and therefore restricted their movement. In contrast, in the studies by [30] (30) in Saudi Arabia and [19] in the USA, there was a greater reduction in urban areas, which may be related to the fact that patients in urban areas may have been better informed about COVID-19 and the mode of transmission, and consequently were more vigilant and cautious. However, in 2021, the situation reversed as there was an increase in the number of patients visiting rural health centres, while the other two types of centres (hospitals and urban centres) continue to experience decreases. The increase in the number of visits to rural health centres in 2021 can be partly attributed to the fact that some rural health centres that were closed in 2020 resumed operations. Also, the fact that in 2021, the vast majority of the elderly (more than 75% of those over 65 and more than 85% of those over 70), who form the

main category of patients at rural health centres, have been vaccinated with at least one dose, has made them feel less at risk and reduced their fear of visiting the dentist.

What is important to mention is that patients attending the PDS clinics are from the lower socio-economic strata, as fees are very low (patients pay €3 per visit regardless of the offering care). The limited number of dentists working in PDS, as well as the limited work hours (07:30 -15:00), act as a barrier, preventing patients, especially from middle and upper class to visit them. Therefore it is not expected that the patients of the PDS would have sought dental care in the private sector neither in 2020 nor in 2021. Consequently, non-attendance at the dentist, if sustained over time, is expected to lead to an increase in unmet need for dental care. In a survey conducted in the United States, 52.8% of participants reported that they had postponed their dental visit indicated that they intended to postpone it in 3 months and 25.2% in 6 months, while a smaller percentage of patients (21.9%) indicated that they would not seek dental care for a year or more [19]. Already in 2019, 5.2% of Cypriots reported an unmet need for dental care, a percentage higher than the EU-27 average (4%). The middle age group (persons aged 45–64) was the most likely to report unmet needs for a dental examination or treatment due to high costs [31]. Unmet need for dental care is greater among people from lower socioeconomic classes [32].

If this trend of postponing dental care continues in the coming years, not only will the unmet need for dental care increase, with all the corresponding consequences for oral and general health, but oral health inequalities are also likely to increase in the coming years [16]. This has also been highlighted by [33] who emphasizes in their article that oral health inequalities in England have been exacerbated by the COVID-19 as more vulnerable groups are less able to navigate the changing architecture of the NHS than the more vulnerable, and these people who are most vulnerable are more reliant on the NHS for their dental care.

Another interesting finding of the study is the fact that nationwide the proportion of new patients in the total number of patients has slightly decreased, in 2021 compared with 2019, showing that PDS continue to attract new patients. It remains to be seen how this trend will develop in the coming years, when the economic impact of the pandemic may be more intense, as the pandemic continues to disrupt the economy and reduce family income. The negative consequences of the war in Ukraine and the global economic instability are also expected to further reduce family income. In this possible scenario, a shift of patients from the private to the public sector (as fees for dental care are extremely low) is very likely, which will lead to an increase in waiting lists, a phenomenon also observed at the beginning of the 2013 financial crisis [15]. The increase in public sector waiting lists is likely to disproportionately burden people from lower socio-economic backgrounds who do not have the option of choosing the private sector and consequently further increase oral health inequalities.

The age profile of patients remained about the same, with the majority being middle-aged and elderly, highlighting some of the unique sociodemographic characteristics of patients in the public sector.

In this study, the decline in the total work volume in 2019-21 was less than the decline in total visits (36.5% vs. 47.0%). This suggests that the number of dental treatments per patient increased in 2020 and 2021 compared to 2019. This is due to the guidelines imposed on staff to use as much working time per patient as possible and to complete treatment in as few sessions as possible. The increase in the number of treatments per patient is a factor in making the PDS more efficient. Reducing the total number of visits a patient needs to complete the required treatment plan also creates the opportunity to serve new patients and reduce waiting lists.

Of course, there was a great deal of inhomogeneity here too, with the smallest reduction in workload in 2020 seen in hospitals and the largest in urban and rural health centres. It seems that while staff had the same instructions, they took different approaches. Staff fear of the risk of being infected is an important factor that may have influenced their clinical behaviour. In a Pakistani study of 313 dentists, 75% of dentists were afraid of being infected and 88% of them were anxious during treatment [34]. This was considered by the PDS management and staff were further guided and supported in 2021 to treat patients effectively and efficiently. The interventions and actions taken are considered effective as in 2021, urban and rural health centres recorded an increase in the number of treatments.

When analyzing the profile of the different treatments offered in 2020, a larger reduction in scaling was found nationwide. The reduction in scaling (53.5%), but also in composite resin (47.5%) and amalgam fillings (45.4%) was greater than the reduction in the number of visits (41.3%), a finding that suggests that during the first year of the pandemic, dentists have chosen to limit work that generates a large number of airborne droplets and poses a higher risk of transmitting the virus [9]. Examinations also decreased by 47.9%, in 2020 compared with 2019, which was to be expected since patients mostly came for a specific problem and not for preventive reasons. The share of the most affected dental treatment (scaling, examination, composite and amalgam) to the total workload has been decreased from 51% in 2019 to 40% in 2020 ($p<0.01$). Similarly, a study in Sweden found that of all dental treatments, those involving airborne droplets decreased the most. Their share of total work decreased from 56.1% before lockdown to 21.3% during lockdown [35].

It is interesting to note that the only work that not only did not decrease but increased in the first year of the pandemic (2020) was that of temporary fillings. This can be explained by the fact that, in order to avoid the creation of air droplets, dentists may have used the non-traumatic technique (ART), i.e. removing caries with hand tools and placing temporary fillings.

In 2021, the situation looks somewhat different, which is due to the fact that dentists were more familiar and confident with personal protective equipment and knew more about the modes of transmission of the virus. In addition, most dentists and their assistants, as well as the general public, were vaccinated. Although the number of scaling procedures decreased by 11.10%, composite fillings recorded an increase of 45.7%, while temporary fillings decreased by 15.9% (as they were no longer needed).

Apart from temporary fillings, the smallest decrease was recorded in extractions in 2020 compared to 2019. It is

interesting to note that extractions as a percentage of total workload increased from 16.6% in 2019 to 22.1% in 2020 and 21.5% in 2021. This was to be expected as extractions are not particularly associated with the production of air droplets and therefore do not pose a particular risk of transmitting the virus. On the other hand, extractions are among the most radical procedures in dentistry. The increase in extractions during the pandemic period has also been noted in other surveys [14], [21], [36] and consequently is likely to increase the need for additional prosthetic rehabilitation, which is likely to further exacerbate health inequalities as prosthodontics is the most expensive work in dentistry.

In the case of removable prostheses, there has been a decline in both the construction of new prostheses and the repair of existing ones. According to PDS statistics, removable prostheses are mainly made for people over 65, i.e. pensioners with low incomes. The postponement of making dentures may have had a negative impact on the quality of life of these people, as it may have affected their ability to chew, speak, etc. The decrease in repairs was lower than in the construction of new dentures, which is partly related to the instruction to continue repairs during the period of restrictive measures, but also to the fact that the cost of repairing a denture is lower than that of construction (€24 versus €100).

V. Conclusions

This study has shown that the COVID-19 pandemic and the restrictive measures imposed have negatively affected the provision and seeking of dental care by the PDS in 2020 and 2021. Although the situation seems to be stabilizing in 2021, there were still only 44,511 visits in 2021, compared to 83,971 in 2019. If this situation is not reversed within 2022 (and preliminary data show that is not), unmet need for dental care is expected to increase. The lower socio-economic strata in particular are likely to be burdened by a further increase in oral health inequalities, an aspect that should be further explored.

The further postponement of dental visits in combination with the increase in radical procedures such as extractions, but also the fact that the PDS have suspended the prevention programmes they implemented in 2020 and partly in 2021, which included screening in the paediatric population, is likely to have an impact on the medium and long-term level of oral health of the citizens of Cyprus, which should also be investigated in another study.

It is also expected that the broader economic impact of the pandemic and the reduction in family incomes [37], also due to global economic instability, will result in a proportion of citizens seeking cheaper dental services from the PDS, although this was not evident in 2020 or 2021, as the Cyprus National Health System unfortunately only covers preventive services (one oral examination and scaling per year). The shift of citizens to the public sector was also noted during the 2012 financial crisis [15]. This situation is expected to add to the pressure already on the public sector, lengthening waiting lists and potentially affecting the quality of care. The increase in waiting lists will especially affect people from lower socio-economic classes, as they do not have the option of going to the private sector, which further increases oral health inequalities. Therefore, this study has once again highlighted that health systems do not give much importance to oral health. It highlights the need to rethink this policy and include a broader range of dental services in the health package reimbursed by health insurance to ensure that all citizens have access to at least a basic package of dental services according to the historic WHO 74.5 Resolution on Oral Health [38]. In addition, it points out that the management of PDS, based on the better epidemiological profile of the country, the high percentage of people who are vaccinated as well as the better knowledge about the routes of the virus transmission and the existence of the necessary protective equipment, has to revise its protocols and encourage dentists to further increase the average number of patients, examined per day, in order to reduce waiting lists and increase the number of patients that are treated by the PDS.

However, the pandemic should not only be seen as the cause of a number of negative consequences for the health sector and the economy, but also as an opportunity for broader change and reform. In this sense, the pandemic was a good opportunity for the PDS to make organizational changes, reform the appointment system and update protocols and staff training on cross-infection control. One positive outcome of these measures was an increase in the number of treatments per patient, which made the work of the PDS more efficient.

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