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ORAL HEALTH INEQUALITIES IN VULNERABLE POPULATIONS: EVIDENCE FROM THE ABRUZZO REGION

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Abstract

Oral and maxillofacial surgery focuses on the treatment of degenerative or traumatic diseases that mainly affect bone tissue. Therefore, bone reconstruction is an ongoing challenge and widely discussed topic within the scientific community. Each study group described its technique for regenerating bone loss over the past two decades.

The authors present the results after 12 years of treatment of a patient who underwent a total maxillectomy due to complications of osteomyelitis. She underwent revascularized fibula surgery and application of supported implant prostheses. It is agreed that in severe bone loss the best method of reconstruction is with the use of revascularized bone whenever possible, this involves a large study of both the donor and recipient sites, the long-term success is confirmed by follow up.

Keywords: Oral Health, Vulnerable Populations, DMFT index, CPITN index,

INTRODUCTION

Oral health is an integral part of general health and individual well-being, recognized as a fundamental right by the World Health Organization (WHO). A healthy stomatognathic system enables adequate nutrition, effective communication, emotional expression, and satisfactory social interaction. Nevertheless, oral diseases remain among the most widespread and neglected conditions globally, especially among economically disadvantaged populations. According to the WHO, untreated dental caries is the most common chronic disease worldwide.[1] Periodontal diseases, oral cancers, and edentulism represent a significant burden, often associated with disability, chronic pain, reduced functionality, and social marginalization. [3,4]

In Europe, and particularly in Italy, oral health disparities represent a significant public health concern. Scientific evidence demonstrates a strong and systematic correlation between individuals' socioeconomic status and the incidence of oral pathologies. Individuals with low income, limited education, migrants, and the homeless face substantial barriers to accessing dental care, resulting in higher prevalence rates of dental caries, periodontal diseases, and tooth loss. In situations of economic hardship, low education, poor housing conditions, or chronic unemployment, higher levels of untreated oral disease and edentulism are systematically observed. [5]

The Italian healthcare system provides limited public dental services, covering only about 5–8% of oral healthcare needs. As a result, approximately 86% of the population pays out-of-pocket for dental services, and around 60% do not access dental care at all.

These disparities are especially evident in southern regions, where 19% of individuals have never visited a dentist, compared to 7% in the north. Education is also a key determinant: individuals with a university degree are twice as likely to use dental services as those with only primary education. [5,6]

Children from low socioeconomic status families, particularly migrants, are among the most affected. A study of children aged 3 to 5 years found that 71% of migrant children had caries, compared to 52% of non-migrants. The mean dmft (decayed, missing, filled teeth in primary dentition) index was also higher among migrants (3.68 vs. 3.10), indicating a greater need for treatment. Similarly, homeless individuals face severe oral health challenges: an epidemiological study in Rome reported that 63% had high DMFT scores, 73.2% had gingivitis, and 22.9% experienced partial edentulism, often compounded by poor hygiene, malnutrition, and limited care access. [7,8]

These findings highlight the urgent need for targeted public health interventions aimed at reducing inequalities in oral health. Strategies should focus on expanding access to affordable care, enhancing oral health education, and implementing preventive programs tailored to disadvantaged populations. Oral health inequalities are not only a clinical issue but a clear indicator of broader social and health injustices. In this context, the concept of "vulnerable population" must be understood in a multidimensional sense, encompassing not only income but also health literacy, social inclusion, family support, disability, or chronic conditions. Social Dentistry Services are crucial in this framework, as they represent the only public infrastructure capable of ensuring equitable access and an organized clinical response for those in greatest need. [9,10]

The Abruzzo Region, through ASL 02 Lanciano-Vasto-Chieti, has implemented a Social Dentistry project aimed at economically and socially disadvantaged patients (ISEE ≤ €8,000, disability, pathology exemption). Since 2022, the service has provided essential diagnostic, therapeutic, and prosthetic treatments, with particular emphasis on prevention, health promotion, and personalized care based on risk profiles.

This epidemiological study aims to:

- Quantify the impact of socioeconomic inequalities on oral health status;
- Identify the main modifiable risk factors;
- Evaluate the effectiveness of public interventions in reducing access barriers;
- Compare the oral health of patients from Abruzzo with those in other Italian regions using standardized indices such as DMFT and CPITN;
- Provide evidence-based recommendations for more inclusive and sustainable territorial health policies.

By analyzing a representative sample of the vulnerable population residing in the ASL 02 territory, this research contributes to the national scientific debate and supports the dissemination of best practices in public and social dentistry, aligned with the principles of equity, proximity, and universalism that should guide every modern healthcare system.

MATERIALS AND METHODS

Study Deisgn

The study was conducted on a sample of 274 patients (173 males and 101 females), aged between 15 and 92 years, who attended the Social Dentistry Service between 2022 and 2024. Of these, 108 were residents of the Abruzzo region—specifically within the ASL 02 Lanciano-Vasto-Chieti territory—while 166 came from other Italian regions, including Lazio, Campania, Lombardy, and Puglia.

Inclusion criteria encompassed patients identified as socially fragile based on socioeconomic factors such as an ISEE income ≤ €8,000, exemption for pathology or disability, and financial or structural barriers to accessing dental care. Patients with severe non-cooperative cognitive disabilities or with medical contraindications to dental treatment were excluded from the study.

Data Collection and Evaluation

For each patient, a comprehensive clinical record was completed, including both demographic and clinical data. All participants underwent a single standardized clinical examination performed by trained and experienced dentists between 2022 and 2024.

Collected data included:

- **Demographics:** age, gender, nationality, region of residence, and education level.
- **Clinical and dental health:** time since last dental check-up or treatment, and history of hospitalizations or systemic illnesses in the past three years, adverse drug reactions and smoking status. (11)

Clinical evaluations included:

- **DMFT Index (Decayed, Missing, Filled Teeth):** to assess caries experience.
- **CPITN (Community Periodontal Index of Treatment Needs):** to evaluate periodontal status and treatment needs.[12]

These assessments were conducted according to World Health Organization (WHO) guidelines, with the aim of comparing oral health conditions between patients from

the Abruzzo region and those from other Italian regions.(13)

Demographic data collected (Table 1) included: (i) age, (ii) sex, (iii) nationality, and (iv) level of education; while clinical and dental health-related data (Table 2) comprised: (i) time since last dental treatment or check-up, (ii) hospitalizations or illnesses in the past three years, (iii) adverse reactions to medications, (iv) DMFT index, (v) CPITN code, and (vi) smoking status.

Table 1. Demographic data.

Question	Answer
Age	From 15 to 92 years old
Sex	Female
	Male
Nationality	Albanian
	Bengali
	Canadian
	Egyptian
	Italian
	Polonaise
	Romanian
	Sierra Leonean
	Spanish
	Switzerland
	German
	Tunisian
	Turkish
Region of residence	Not specified
	Abruzzo
	Campania
	Lazio
	Lombardia
	Marche
	Piemonte
	Puglia
	Umbria
Level of schooling	Not specified
	No one
	Primary

Table 2. Clinical and dental health-related data.

Question	Response
Time since last dental check-up/treatment	From 7 to 6025 days
Hospitalizations or illnesses in the last 3 years	Yes / No
Adverse reaction to medications	Yes / No
DMFT Index	From 0 to 32 (including wisdom teeth)
CPITN Code	0 = Optimal periodontal health
	1 = Gingival bleeding upon probing
	2 = Presence of calculus and/or iatrogenic marginal defects
	3 = Presence of pathological pockets 4–5 mm
	4 = Presence of pathological pockets > 6 mm
	X = Insufficient elements to assess periodontal health
Smoker	Yes / No

The DMFT index was used to assess dental caries experience by recording decayed (D), missing (M), and filled (F) teeth.
The CPITN was employed to determine periodontal status and the need for treatment by evaluating: (i) gingival bleeding, (ii) the presence of calculus and/or iatrogenic marginal defects, and (iii) the presence of pathological pockets with a depth of at least 4 mm. Clinical assessments were conducted in accordance with World Health Organization (WHO) guidelines. The data were then compared between the sample from the Abruzzo region and those from other Italian regions.

RESULTS

A statistical analysis was conducted on the two primary variables—CPITN code and DMFT index—to compare oral health status between patients residing in the Abruzzo region and those from other Italian regions. This analysis aimed to provide scientific evidence supporting the trends previously observed in the graphical data. (14,15)
Specifically, the objective was to determine whether patients residing in Abruzzo demonstrated greater awareness of oral hygiene and improved access to dental care.

DMFT Index Analysis

The analysis of the DMFT index (Decayed, Missing, and Filled Teeth**)** represents a standardized method for assessing patients' dental health. [14]
the aim was to compare DMFT values between the sample of patients residing in the Abruzzo region (n=108) (Table 5) and those residing in other Italian regions (n=166) (Table 6), in order to identify any statistically significant differences between the two groups.

In the sample from the Abruzzo region, the mean DMFT index was 6.69, significantly lower than the mean value of 11.34 observed in the sample from other regions (Tables 3a and 3b). Patients from the Abruzzo region exhibited a lower incidence of decayed, missing (due to caries), and filled teeth, suggesting better dental prevention and care, which led to a reduced need for dental treatments compared to patients from other regions.
The 16.67% of patients in Abruzzo reported a DMFT score of 3, whereas in other regions the most common value was 9, observed in 8.43% of the sample (Tables 4 and 5).

Table 3a

DMFT Index	Abruzzo Region	Other Regions	p-value
Mean	6.69	11.34	
Mode	$1 \leq X \leq 8$	$9 \leq X \leq 16$	
Median	5	10	
Standard Deviation	7.02	7.31	
Shapiro-Wilk	$W = 0.780$, p-value = 2.02×10^{-2}	$W = 0.927$, p-value = 2.04×10^{-4}	< 0.05

Note: The analyzed data do not follow a normal distribution

Table 3b

DMFT Index			
	Value	p-value	Comparison
Levene's test	W = 2,034	0,155	Homogeneous variances (p-value > 0,05)
Mann Whitney's U test	U = 4522,0	1,15 x 10^{-7}	There is a statistically significant difference

DMFT Abruzzo Region

Value	Patients	Prevalence
0	12	11,1%
1<=X<=8	73	67,6%
9<=x<=16	12	11,1%
17<=x<=24	7	6,5%
25<=x<=32	4	3,7%
TOTAL	**108**	**100,0%**

Table 4. DMFT Index Values in Patients from the Abruzzo Region

DMFT other regions

Value	Patients	Prevalence
0	6	3,6%
1<=X<=8	59	35,5%
9<=x<=16	66	39,8%
17<=x<=24	25	15,1%
25<=x<=32	10	6,0%
TOTAL	**166**	**100,0%**

Table 5. DMFT Index Values in Patients from Other Regions

	DMFT other regions	
Value	**Patients**	**Prevalence**
0	6	3,6%
1<=X<=8	59	35,5%
9<=x<=16	66	39,8%
17<=x<=24	25	15,1%
25<=x<=32	10	6,0%
TOTAL	**166**	**100,0%**

CPITN Code Analysis

The **Community Periodontal Index of Treatment Needs (CPITN)** is a standardized tool used to assess periodontal conditions and treatment needs, as detailed in previous sections. (15)
The data related to the CPITN revealed a higher prevalence of periodontal diseases in the sample from the other Italian regions considered. In the "Abruzzo" sample, 42.6% of patients reported a CPITN code of 2, indicating the presence of calculus and/or marginal iatrogenic defects, whereas in the other regions this percentage was 27.7%. The sample from the Abruzzo region showed an overall better periodontal condition, with a higher percentage of patients not requiring periodontal treatment compared to the other regions.
The details and comparisons regarding periodontal health in both groups are further elucidated in Table 6 and Table 7, which provide comprehensive insights into the prevalence and severity of periodontal diseases across the studied populations. Tables 6a and 6b show a statistical analysis of the CPITN code; Table 7 shows the CPITN code values of patients from the Abruzzo region, while Table 8 shows the same values for patients residing in other regions.

Table 6a

	CPITN code		
	Abruzzo	Other region	p-value
Media	1,54	2,46	
Moda	2	2	
Mediana	2	2	
Standard deviation	1,01	1,48	
Shapiro - Wilk	W = 0,845 e p-value = $2,85 \times 10^{-9}$	W = 0,916 e p-value = $3,28 \times 10^{-8}$	< 0,05

Tabella 6b

	CPITN code		
	Value	**p-value**	**Comparison**
Levene's test	W = 11,76	$6,98 \times 10^{-4}$	Non homogeneous variances (p-value < 0,05)
Mann – Whitney's U test	U = 5685,5	$1,31 \times 10^{-7}$	There is a statistically significant difference

	CPITN Abruzzo	
Value	Patients	Prevalence
0	15	13,9%
1	37	34,3%
2	46	42,6%
3	6	5,6%
4	1	0,9%
X	3	2,8%
TOTAL	108	100,0%

Table 7, CPITN Code Values of Patients in the Abruzzo Region

	CPITN other regions	
Value	**Patients**	**Prevalence**
0	13	7,8%
1	34	20,5%
2	46	27,7%
3	35	21,1%
4	13	7,8%
X	25	15,1%
TOTAL	**166**	**100,0%**

Table 8. CPITN code values of patients living in other regions of Italy

Statistical Analysis

Normality tests (Shapiro-Wilk) indicated that the data were not normally distributed ($p < 0.05$).(16)
Levene's test (17) for homogeneity of variances and Mann-Whitney U tests (18) were conducted:

- DMFT: Levene's test confirmed homogeneity of variances ($p = 0.155$). The Mann-Whitney U test ($U = 4522.0$; $p < 0.05$) indicated a statistically significant difference in DMFT between regions.
- CPITN: Levene's test revealed unequal variances ($p < 0.05$). The Mann-Whitney U test ($U = 5685.5$; $p < 0.05$) confirmed a statistically significant difference in periodontal health status.

DISCUSSION

The results of this study, conducted among a socioeconomically disadvantaged population in the Abruzzo Region, reveal a concerning oral health profile, both in clinical and social terms. The analysis of the DMFT index showed a significantly lower mean value (6.69) in the Abruzzo sample compared to the average of 11.34 recorded in other Italian regions, indicating regional disparities in dental caries experience. These differences likely stem from a complex interplay of socioeconomic, educational, behavioral, and systemic healthcare factors. [11]

In Italy, access to dental care is markedly influenced by socioeconomic status. According to data from the Italian National Institute of Statistics (ISTAT), only 27.7% of individuals over the age of three in Southern Italy visited a dentist or orthodontist, compared to a national average of 37.9%. The proportion of individuals who forgo dental care for economic reasons is also considerably higher in the South than in the North. [19]

Educational attainment is another critical determinant: several epidemiological studies have demonstrated that lower levels of education are significantly associated with higher DMFT and CPITN scores, reflecting poorer oral hygiene practices and reduced awareness of preventive care.

Our findings align with these broader national trends, highlighting how individuals with limited education, unstable employment, and weak social networks are disproportionately affected by poor oral health outcomes. Migrants and homeless populations face compounded risks. A study on homeless individuals in Rome reported that 63% had high DMFT values, 73.2% suffered from gingivitis, and 22.9% experienced partial edentulism. Similarly, migrant populations from low- and middle-income countries exhibited DMFT/dmft scores above 4 in 62.5% of cases, with educational level emerging as a key predictor of oral health status.[14,15]

In our sample, the prevalence of untreated dental and periodontal diseases, alongside significant aesthetic and functional impairments—particularly partial or complete edentulism—underscores the long-term consequences of irregular and delayed access to dental care. These issues are not solely financial; cultural, psychological, and environmental factors significantly influence care-seeking behavior. Low health literacy, especially regarding oral hygiene and preventive care, leads patients to access services only in acute or emergency situations, perpetuating a reactive rather than preventive model of care.

The Social Dentistry Service implemented by ASL 02 has demonstrated significant potential in addressing these disparities, successfully reaching a previously underserved population. However, critical limitations remain, including shortages in human resources, limited access to prosthetic materials, and fragmented integration between health and social care systems. The notably high demand for complete and partial removable prostheses in this population reflects not only the inadequacy of previous preventive and conservative interventions but also points to systemic gaps in the private dental sector's ability to meet the needs of fragile populations.

There is a pressing need for a paradigm shift toward a risk-based, multidisciplinary public dental care model, fully integrated into Regional Health Plans and supported by stable funding and measurable outcomes. Preventive strategies, community-based oral health promotion, and enhanced coordination between health and social services are essential to mitigate existing inequalities.

Finally, oral health should be recognized as a broader indicator of social wellbeing. These findings do not simply highlight gaps in dental service provision, but reveal a more systemic problem of healthcare and cultural exclusion. Addressing oral health disparities must therefore be part of comprehensive strategies for poverty reduction, social inclusion, and public health advancement.

CONCLUSIONS

The present analysis reveals significant regional differences in oral health, as evidenced by the DMFT index, with the Abruzzo Region displaying notably better outcomes than other Italian regions. The mean DMFT value of 6.69 in Abruzzo is substantially lower than the average of 11.34 observed in other regions, suggesting a lower incidence of decayed, missing (due to caries), and filled teeth. These differences likely reflect a combination of more effective prevention strategies, improved patient awareness, and potentially better access to dental care within this specific population subset. [14,15]

However, broader national data continue to indicate pronounced disparities in oral health across Italy, largely influenced by socioeconomic, educational, and geographical factors. Populations with lower income, limited educational attainment, and restricted access to healthcare—particularly in southern regions or among migrant and homeless groups—exhibit higher rates of untreated dental caries, tooth loss, and periodontal disease.

For instance, studies have shown that over 60% of homeless individuals and migrants from low- and middle-income countries present with high DMFT scores, significant gingival inflammation, and varying degrees of edentulism. These findings confirm that socioeconomic inequalities represent a structural and cross-cutting determinant of oral health.

Socioeconomically disadvantaged individuals—often invisible to the traditional healthcare system—bear a disproportionately high burden of oral disease. The lack of resources, absence of preventive measures, and limited access to dental care contribute to a vicious cycle of neglected conditions, chronic disease progression, loss of masticatory function, and ultimately, diminished quality of life. Moreover, cultural, psychological, and environmental barriers—including low oral health literacy and mistrust of medical institutions—further hinder timely access to care, often relegating treatment to emergency-based settings. [20]

The experience of the Abruzzo Region demonstrates that it is possible to implement public dentistry models that prioritize equity, accessibility, and sustainability. The Social Dentistry Service of ASL 02, for example, has proven effective in reaching previously underserved populations and addressing unmet oral health needs. Nonetheless, limitations persist, such as shortages of specialized personnel, inadequate prosthetic supplies, and fragmented coordination between health and social services.

To reduce oral health disparities and promote health equity, the following strategic actions are recommended:

- Expansion of public dental services, particularly in rural and underserved areas;
- Implementation of school-based prevention and screening programs;
- Strengthening of oral health literacy through culturally competent, community-based education;
- Financial support mechanisms for vulnerable populations to access essential dental care;
- Integration of oral health promotion into primary care frameworks and public health agendas;
- Development of robust national surveillance systems to monitor oral health indicators and inform timely, data-driven policy responses.

In addition, academic institutions and postgraduate programs should incorporate dedicated modules on social and community dentistry, training future professionals to effectively address social vulnerabilities, provide culturally sensitive care, and contribute to inclusive service models.

Ultimately, tackling oral health disparities is not only about improving dental outcomes; it is a matter of promoting social justice, enhancing community well-being, and ensuring a more equitable and humane healthcare system. The encouraging results from Abruzzo must serve as a catalyst for broader systemic reform—one that embraces oral health as an essential component of public health and social inclusion strategies at the national level.

DECLARATIONS

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable.

Competing interests

The authors declare no conflict of interest.

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