# Oral health status of elderly people in Rome-Italy

Licia Manzon [1], Evaristo Ettorre [2], Eros Rossi [1], Laith Kostantino Besharat [1], Piero Romanelli [1] , Giovanni Fratto [1]

[1]Dental Scool University "Sapienza" of Rome, P.le A. Moro 5- 00185 Rome,Italy
[2]Department of Cardiovascular, Respiratory, Nephrologic and Geriatric Sciences, "Sapienza" University of Rome, P.le A. Moro 5- 00185 Rome,Italy

*Corresponding author: Dr. Evaristo Ettorre, Department of Cardiovascular, Respiratory, Nephrologic and Geriatric Sciences, "Sapienza" University of Rome, Viale del Policlinico 155, 00162, Rome, Italy. Tel: +39 064453600; e-mail: evaristo.ettorre@uniroma1.it

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## Abstract

*Background: Actually there is no survey on the oral health of elderly in Lazio region or in Rome. Study aims to assess the dental and oral health status and treatments needs of the elderly population in Rome in order to assess need for care.*
*Materials and Methods: 316 non institutionalized patients all living in Rome underwent a complete oral and dental examination following the WHO's criteria. Statistical analysis was performed using SPSS Inc, ver. 13.0, Chicago, IL, USA. A p-value of less than 0.05 was considered significant.*
*Results: The prevalence of edentulousness was 4.4%. Missing teeth were 3346 (37,81%). After grouping patients by age (65-69, 70-74, 75-79, 80 and over) we found that only in the first group (65-69) women had a lower number ($p<0.001$) of missing teeth than men: women 359 (23,31%), men 393 (35,08%). Mean number of remaining teeth per subject was 17,41. Both genders in the mandible presented a greater number of teeth present (9.02 on average) than the maxilla (8.27 on average; $p=0.002$). Decayed, Missing, Filled Teeth index (DMFT index) was 14.65 (D:7,73%, M:81,57% and F:10,69%.). Regarding Community Periodontal Index (CPI) 14,5% of the sextants resulted healthy, 4.9% had gingival bleeding on probing, 20.7% had dental calculus, 17.0% periodontal pockets 4-5mm deep, 1.4% pockets 6 or more mm deep and 41.5% of the sextants were excluded.*
*Conclusions: The findings illustrated a promising oral and dental health status compared to other European countries. The status of oral health was significantly better in women than in men in the first age group 65-69, increase in age results in a worsening of all indices.*

Keywords: *Geriatric dentistry, oral health, dental caries, periodontal index.*

## 1.Introduction

Over the past decade there has been a significant increase in life expectancy in Europe that is up to 75 years for men and 82 years for women. In 1990 Europeans over 65 years accounted for 15% of the population and it is expected that by 2025 elderly people will represent about 22.4% of the entire population with an increase of 82% [1], whereas newborns will increase by only 3%. Therefore growing need for dental treatment and dental prosthesis is expected. Unfortunately till now in Italy a survey was not carried out on a national scale, but there are limited studies by few areas of the country with different social and economic situation mainly about the institutionalized elderly. Studies involved some Italian cities like Milan [2, 3, 4] and some cities of the Toscana region [5]. Authors retained that a survey regarding non insitutionalised older adults is of greater importance and need as they represent about 96% of the elderly population over 65 years of age in Europe [6]. Actually there is no survey on the oral health of elderly in Lazio region or in Rome. The purposes of this study are:

1- To provide an overview of the elderly in Rome and their oral health treatment needs.
2- To provide clinical epidemiological data for future reference.

## 2. Materials and method

A sample of 316 non institutionalized patients (177 women and 139 men), mean age 75 years , all living in Rome and afferent, between 2008 and 2010, for dental care at the Division of Geriatric Dentistry of the Department of Cardiovascular, Respiratory, Nephrologic and Geriatric Sciences of Policlinico Umberto I Hospital of Rome were submitted to our investigation .

Patients underwent a complete clinical oral examination according to WHO criteria (World Health Organization; 1997).

Clinical examination and evaluation of radiographic exams were conducted by 2 trained and certificated dentists supervised by a dental expert in oral indices and measures. The study was conducted according to the International Ethical Guidelines for Biomedical Research Involving Human Subjects (Declaration of Helsinki). The protocol was approved by the Human Ethics Committee from the Hospital/University "Policlinico Umberto I" of Rome. Written informed consent was obtained from each patient or his family member.

We evaluated :

- the average of remaining teeth and percentage of edentulous
- the prevalence and severity of dental caries DMFT
- the prevalence of periodontal disease using the CPI

For this we used periodontal probes recommended by the WHO.

The advantages of the CPI recording system are speed, simplicity, reproducibility and international uniformity [7].

Patients deemed at risk of bacterial endocarditis, in accordance with the guidelines of the American Heart Association, were excluded from the periodontal probing to avoid antibiotic prophylaxis (Prevention of Infective Endocarditis Guidelines From the American Heart Association Circulation, 2007).

- Oral hygiene status, utilizing the Green and Vermillon Semplified Oral Hygyen Index (OHI-S);

- Extent and severity of alveolar bone loss with the joint use of panoramic radiographs and intraoral radiographs in order to provide a general overview of the alveolar bone level. All panoramic radiographs were performed at the Department of Radiology of Policlinico Umberto I Hospital, using the same radiographic device (specify the model and the brand), so as to avoid further enlargement and distortion factors. The two investigators who oversaw the study have the same experience

Only radiographs with sufficient contrast and brightness were chosen. Two investigators measured, using a caliper to the next 0.1 mm, at mesial and distal surface of any erupted tooth, the distance between the tooth's cement enamel junction (or the apical termination of a restoration or crown margin) and the alveolar bone crest if there was no infrabony lesion visible or the bottom of any periodontal defect (measured as the most coronal interproximal projection of periodontal ligament space with a constant width). The normal distance between cement enamel junction and alveolar crest is between 1 and 3 mm [8, 9]. When the distance exceeds 2 or 3 mm bone loss was assesed state of dental prosthesis (removable, fix, partial, complete, presence of implants) and any prosthetic necessities. Assesment was also made according to 4 age groups ( 65-69; 70-74; 75-79; 80 and over). Questionnaire was filled out about the oral hygiene habits of the patients.

### *2.1. Statistical analysis*

Statistical analysis was performed using SPSS Inc, ver. 13.0, Chicago, IL, USA. Chi-squared test was used for statistical evaluation of proportions. Students T-test for 2 independent means was applied. In cases with more than 2 independent means we used the ANOVA test. Moreover wherever necessary a linear regression analysis was performed. A p-value of $\leq 0.05$ was considered statistically significant.

### *2.2. Data reliability*

In order to check intra-examiner and inter-examiner levels of data consistency:

- Both examiners received a 6 month training in assesing these measures and indices;

- Kappa statistics were calculated regarding decayed teeth (DMFT index), CPI scores, oral hygiene status and alveolar bone loss; inter-examiner value for the first examiner respectively was 0.86, 0.84, 0,88, 0.79 and 0.88, 0.86, 0.85, 0.80 for the second one;

- Each examiner was calibrated separately against the experienced supervisor;

- Recalibration sessions were conducted periodically throught data collection; every 15 patients a random sample of three patients were re-examined separately by both investigators in order to ensure data reliability. During the cross-checking sessions each examiner was blinded to previous data collected and to information regarding the patient's anamnesis;

- Upon reexamination no significant differences in scores were noticed.

- Data were entered in two different personal computers by the two examiners, the two data files were compared

in order to detect entry errors. The two files resulted identical.

## 3. Results

The sample was composed of 316 patients; 55.7% were women and 44.3% were men. The mean age of our patients was 73.7 ± 6.5, 30% were living alone, 65% were living with a spouse or cohabitant and 5% were living with other people (sons or caregivers). 21% of our elderly suffered from depression (especially those who were living alone), while 20% of the sample felt cheerful and optimistic. Regarding the dental status of our patients, 3% had all of their own teeth, whereas the prevalence of edentulousness was 4.4% and, as expected, the percentage of edentulous subjects increased with age.

**Table 1.Oral hygiene level in accordance with gender.**

| | | Gender | | Total |
|---|---|---|---|---|
| **Oral Hygiene** | | Male | Female | |
| **Satisfactory (Group 1)** | | | | |
| **Count** | | 49 | 99 | 148 |
| | % of Total | 35% | 56.30% | 46.80% |
| **Medium (Group2)** | | | | |
| **Count** | | 66 | 64 | 130 |
| | % of Total | 47.10% | 36.30 % | 41.10% |
| **Poor (Group3)** | | | | |
| **Count** | | 25 | 13 | 38 |
| | % of Total | 17.90% | 7.40% | 12.00% |
| **Total** | | | | |
| **Count** | | 140 | 176 | 316 |
| | % of Total | 100% | 100% | 100% |

In our study in a total of 316 patients examined whose complete dentition would be composed from 8848 teeth, we registered only 5502 teeth. Missed teeth were 3346 (37.81%). After dividing patients into 4 age groups (65-69, 70-74, 75-79, 80 and over) we found that only in the first group age (65-69) women had a significant lower number of missing teeth than men: female: 359 (23.31%), men: 393 (35.08%). Considering the group as a whole, the mean number of remaining natural teeth per subject was 17.41. More specifically the average was 17.87 for women and 16.84 for men. This difference, however, was not statistically significant in Student's t test ($p > 0.05$). Our study also showed that both sexes in the mandible presented a greater number of teeth present (9.02 on average) than the maxilla (8.27 on average). This difference was statistically significant ($p = 0.002$) to the Student t test (2 paired means).

### *3.1 Green and vermillon semplified index*

The oral hygiene of our patient group was evaluated using the Green Vermillon Semplified Index [10]. 46.8% of patients showed values between 0.3 and 0.6, as evidence of a satisfactory state of oral hygiene (Group 1), 41.1% showed values between 0.7 and 1.8 as evidence of a medium degree of oral hygiene (Group 2); 12.0% reported values between 1.9 and 3.0 corresponding to a poor oral hygiene (Group 3). Males showed a lower index of oral hygiene than females and that value was statistically significant at the $\chi^2$ test ($p<0.001$). (Table 1).

Specifically, we note that subjects with satisfactory hygiene were more likely to be women, as well as men were more likely to exhibit poorer hygiene.

As expected, we found that the higher was the age the poorer was the oral hygiene (Table 2), in fact oral hygiene decreases with increasing age. The worsening of oral hygiene in relation to the average age of each group resulted statistically significant ($p = 0.012$) between satisfactory-poor and medium-poor (Tukey post hoc test).

Applying the ANOVA test it was assessed that the difference in average age in the three groups with different oral hygiene is statistically significant (Table 3). The majority of patients with poor oral hygiene (Group 3) performed oral care once a day. Only 2% of the sample used dental floss and 1.5% used the interdental brush.

### *3.2 Caries*

The DMFT index was calculated excluding the wisdom teeth as provided by WHO. DMFT index was 14.65 with: 7.73 decayed teeth, 81.57 missing teeth and 10.69 filled teeth. After dividing all the patients by age (65-69, 70-74, 75-79, 80 and over) regardless of sex, it was found that the DMFT index value increased with age and these differences were statistically significant (ANOVA, $p <0.0001$). In particular, the post hoc (Tukey) showed significant difference between the first group of age and all the others and between the third and fourth groups and not between the second and third (Table 3).

However, it was shown that, in the first age group and only in this (65-69 years), the dental health situation of women was better than men. In fact, women in this group show a DMFT index better than men.

Differences concerning Missing ($p<0.001$) and Filled teeth ($p=0.01$) between the two sexes resulted statistically significant (Table 4). There was no statistically significant difference in regard to Decayed teeth between the two sexes ($p=0.061$). However, after the 69 years of age, the dental condition was the same in both groups.

Table 2. Oral hygiene in accordance with age.

| Groups | Number of patients | Mean age | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound | | |
| 1sat | | | | | | | | |
| 148 | 72.51 | 5.750 | .473 | 71.57 | 73.44 | 60 | 97 | |
| 2 med | 130 | 73.13 | 6.186 | .543 | 72.06 | 74.20 | 60 | 92 |
| 3 poor | 38 | 75.82 | 7.021 | 1.139 | 73.51 | 78.12 | 65 | 92 |
| Total | 316 | 73.16 | 6.160 | .347 | 72.48 | 73.84 | 60 | 97 |

Group1:satisfactory; group 2:medium; group 3:poor

Table 3. DMFT index in accordance with age.

| | N° | | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| Age group | Pat. | DMFT Mean | | | | | | |
| | | | | | Lower Bound | Upper Bound | | |
| 65-69 | 95 | 12.31 | 6.726 | 0.690 | 10.94 | 13.68 | 0 | 28 |
| 70-74 | 106 | 14.42 | 7.163 | 0.696 | 13.04 | 15.80 | 1 | 28 |
| 75-79 | 63 | 15.94 | 7.594 | 0.957 | 14.02 | 17.85 | 0 | 28 |
| 80- >80 | 52 | 17.83 | 6.984 | 0.968 | 15.88 | 19.77 | 4 | 28 |
| Total | 316 | 14.65 | 7.316 | 0.412 | 13.84 | 15.46 | 0 | 28 |

### *3.3 Periodontal Status*

Percentage of sextants with CPI scores describes the intensity of periodontal conditions. On 316 patients examined for periodontal disease: 14.5% healthy sextant (score 0), 4.9% of sextant had gingival bleeding on probing (score 1), 20.7% of sextant had dental calculus (score 2), 17.0% of sextant had periodontal pockets 4-5 mm deep (score 3), 1.4% of sextant had periodontal pockets 6 or more mm deep (score 4), 41.5% excluded sextant because of less than two teeth present (score X).

Table 4. DMFT index age group 65-69.

| | Gender | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| DMFT index | M | 40 | 14.23 | 6.95 | 1.09 |
| | F | 55 | 10.91 | 6.25 | 0.84 |

Distribution of persons by maximum CPI scores expresses the prevalence of periodontal conditions. 45.68% of the patients showed pockets of 4-5-mm (3 index) as the highest value of CPI (Table 5).

### *3.4 Alveolar bone loss measured on panoramic radiographs*

Our findings have shown a linear increase of bone loss with aging (Figure 1). The average bone loss was of 0.043 mm per year ($p<0.05$). No significant differences were observed, on average, at distal and mesial sites of teeth. However, female's mesial ($p=0.022$) and distal ($p=0.041$) average bone resorption was lower than that of males, this statistically significant difference resulted to the T- Student's test (Table 6). Bone resorption was favored by the presence of fillings and crowns badly manufactured.

### *3.5 Prosthetic status*

Our research show that 27% of our sample wore removable prosthesis, 44% wore fixed prosthesis, 8% wore a prosthetic rehabilitation combined fixed and mobile. 16 % was not wearing any type of prosthesis in spite of compromised mastication. With regard to the removable prosthesis: 11.97% wore lower complete prosthesis, 36.61% wore lower partial prosthesis, 30.9% wore upper partial prosthesis, 20.42% wore upper complete prosthesis.

None of the patients had mobile or fixed prosthesis on implants. Regarding satisfaction of the prosthesis, 80% of patients with fixed, removable prosthesis and with a rehabilitation combined fixed and mobile declared themselves satisfied whereas 40% of patients wearing full dentures were not satisfied. Especially lower denture wearers complained about limited retention and stability of the prosthesis. Among individuals who wore complete lower and upper dentures, no one used a toothbrush.

Table 5. Percentage values of 0, X, 1, 2, 3, 4, in every age group.

| CPI indices | 65-69 years | | 70-74 years | | 75-80 years | | <80 years | |
|---|---|---|---|---|---|---|---|---|
| | % | "C.I 95%" | % | "C.I 95%" | % | "C.I 95%" | % | "C.I 95%" |
| 0 | 25.1 | 0.205-0.297 | 9.4 | 0.063-0.124 | 10.3 | 0.058-0.149 | 4.4 | 0.014-0.099 |
| 1 | 5 | 0.027-0.073 | 5.6 | 0.031-0.08 | 4.6 | 0.02-0.089 | 3.5 | 0.01-0.087 |
| 2 | 13.5 | 0.098-0.171 | 24.2 | 0.197-0.288 | 27 | 0.204-0.336 | 21.9 | 0.143-0.295 |
| 3 | 15.8 | 0.119-0.197 | 19.8 | 0.157-0.241 | 14.4 | 0.092-0.196 | 15.8 | 0.091-0.225 |
| 4 | 2.3 | 0.01-0.046 | 0.9 | 0.002-0.025 | 0.6 | 0-0.032 | 1.8 | 0.002-0.062 |
| X | 38.3 | 0.332-0.435 | 40.1 | 0.349-0.453 | 43.1 | 0.357-0.505 | 52.6 | 0.435-0.618 |
| TOTAL | 100 | | 100 | | 100 | | 100 | |

## 4. Discussion

Regarding the average number of remaining teeth per person in our non-institutionalized patients, the resulting value of 17.41, was superior to that described in studies conducted in Milan-Italy (10.02) in 2006 (3), in Spain (14.18) in 2006 [11], in Denmark (13.3) in 2007 [12] while it was very close to the value of 17.1 reported by a study conducted in 2010 in the province of Valencia-Spain [13]. Missing teeth in our survey corresponded to the 37.1% of the total dentition of all the patients. This percentage is lower than those found in other similar international studies [14].

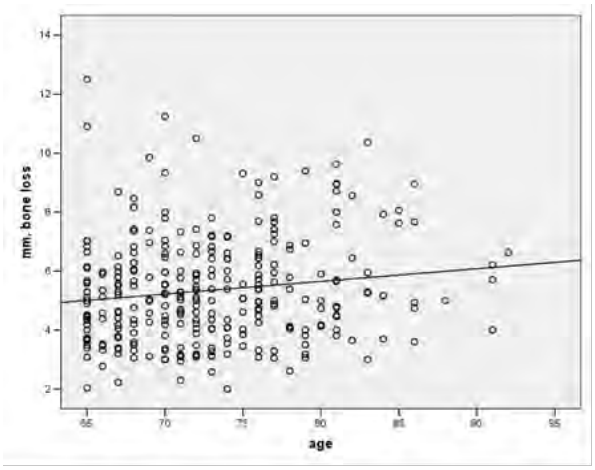


Figure 1. Bone loss in accordance with age.

Women have shown, only for the younger age group (65-69) a significant lower number of missing teeth. The lower jaw had on average significantly more teeth (9.02) than the upper (8.27), in line with previous studies [15]. Also the prevalence of edentulousness (4.4%), the main indicator of elderly oral health status, was found to be lower than that reported elsewhere [16]. Our investigation reveals, as expected, a worsening due to increased age. During recent decades there has been a notable decline in edentulism.

### *4.1 Oral hygiene*

Oral hygiene was found to be almost satisfactory: only 38 (group 3) out of 316 people had poor oral hygiene. These persons were mostly neglected depressed elderly living on their own. Increasing age involves a significant worsening of oral hygiene. This finding was certainly related to the higher physical and functional limitations of aging, resulting in worsen manual skills. In accordance with literature women showed significantly better results than men: the group with satisfactory oral hygiene is composed predominantly of women, while the group with poor oral hygiene was composed of a greater percentage of men [17]. In all groups we noticed a really poor use of very important aids for oral hygiene such as dental floss and interdental brush, mainly considering the increasing of the spaces between the teeth due to the age-related bone resorption. We found an overall lack of information on oral hygiene, that is the most important tool to avoid supra-and subgingival plaque, the main cause of tooth decay and periodontal disease [18]. To counter the decline of manual ability, in the elderly would be better to personalize the methods and tools for oral hygiene, resorting electric toothbrushes, interdental brushes, and if necessary, to a person who is concerned with the oral hygiene of the older patients.

### *4.2 Periodontal Status*

Our values are generally better than those of other European countries. In fact, the percentage of healthy sextants detected in our study, was higher (14.51%) than those reported in Spain, Austria, Bulgaria, Germany, Hungary, Lithuania and in Valencia–Spain [19]. The mild periodontal disease average value (calculus 20,7% + bleeding gums 4,9%) is lower than that reported in Valencia-Spain (13), in Pomerania and in Austria, while is close to value reported for Denmark [19]. The percentage of sextants with pathologic pockets (17,18 % 4-5 mm deep pockets and 1,44 % 6 or more mm deep pockets), are close to the values reported in a 2006 study

conducted in Milan on non-institutionalized patients [3] and lower in comparison to data reported in Austria, in Bulgaria, in Lithuania, in Norway, in Sweden, in United Kingdom, in Pomerania [19] and in Valencia-Spain [13].

As expected, the status of periodontal tissues worsens with age: in fact, the percentage of healthy sextants goes from 25.1% in the age group between 65-69 years, to 4.4% in the age group <80 years. The progress of periodontal destruction with age is especially highlighted by the increased tooth loss that causes the increase of excluded sextants moving from 38.3% in the first age group, to 52.6% in the fourth age group. We didn't find any gender difference, other Authors, instead, found that the prevalence of periodontal pocket was higher in men than in women [20].

**Table 6. Mesial and distal bone loss in accordance with gender.**

| | Gender | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| MESIAL | Men | 134 | 5.60 | 1.923 | .166 |
| | Women | 153 | 5.11 | 1.743 | .141 |
| DISTAL | Men | 134 | 5.59 | 1.821 | .157 |
| | Women | 153 | 5.16 | 1.752 | .142 |

It is important to underline that in our study the percentage (14.5%) of individuals with periodontal health CPI=0 reached the goal fixed by SESPO Expert Panel for the adult Spanish population on 2010 [21].

### *4.3 Caries*

In our sample the mean DMFT index was 14.65, that is lower than that reported from other European indexes, ranging from 16.38 to 30.02. In our study the DMFT average values increased significantly with age, rising from 12.31 for those aged between 65-69 years, to 15.94 for patients aged between 75 and 79 and to 17.83 in patients with more than 80 years. Our patients, especially in the first group (65-69 years) show a satisfactory dental health. Only in the first group age (65-69 years) women showed a statistically significant lower number of missing teeth and higher number of filled teeth than men. This finding proves that up to 69 years, women care more about their oral health, however with increasing age there is a worsening due probably to a diminished physical capacity.

### *4.4 Alveolar bone level assessed on panoramic and intraoral radiographs*

Our research provides only a general screening to overview the extent and distribution of osseous defects on a large population sample limiting radiation doses and financial costs [22]. Many authors support the use of panoramics for this purpose [23], whereas other authors consider panoramics unreliable by the frequent and unpredictable distortion and dimensional changes [24]. Authors, though aware of the lack of precision of these exams , used them simply as a method of screening and preorientation. In agreement with the literature [25] we found that the average bone loss after 65 years, amounted to 0.043mm per year of age (<0.05) showing a worsening that increased with age. However, we haven't found any intrabony defects prevalence at mesial or distal sites as found by other authors. Resorption in women was significantly lower than that of men both in the mesial and distal sites of teeth. This could be probably related to better oral hygiene. As other authors [26] we noticed that infrabony lesions were strongly associated with imperfect restorations or inadequate fixed prothesis.

### *4.5 Prosthesis*

In accordance with literature we found a greater prevalence of upper complete prosthesis than lower ones. This finding is in accordance with the higher number of remaining natural teeth in mandible than in maxilla. A low percentage of combined prosthetic rehabilitation fixed and mobile was documented as well as the absence of implant-supported denture even where they would be useful for better sealing of dentures [13].

## 5. Conclusions

Our patients demonstrated an acceptable number of remnant teeth (17.41), approaching the WHO goal of retaining at least 20 teeth at the age of 80 years. Moreover we noted a lower value of edentulism (4.4%) and missed teeth (37.81%) compared to other Italian and European studies. Decline of edentulism may imply that a greater number of elderly people with their natural dentition and supporting structures are at risk of dental diseases. Oral hygiene has proved to be acceptable with the prevalence of 46.8% of satisfactory hygiene, even if we must consider the non-use of dental floss and interdental brush. Also the prevalence of DMFT index (14.65) and CPI index 0 (14.5%) is promising compared to other European countries; both indices are used by many countries in order to establish national targets for public oral health.

One of the most worth noting result of our study is that the status of oral health expressed by all the oral indices that we investigated was significantly better in women than in men only in the first age group (65-69 years). Given the cross-sectional nature of these data it is difficult to assign the precise reason for this gender difference in the specific age group. Probably this is due to a different use of preventive dental services and self-

care. The worsening of all indices with age both in men and women is securely related to the increase in general diseases the decrease in motor skills.

Nearly half of older adults aged between 73 and 85 develop a form of dementia [27] that usually cause severe disability of patients and overload of caregivers [28]. The low value of edentulism (4%) and denture needs (16%), are probably to be linked with the program of social dentistry promoted from 2003 until 2008 from Lazio Region to provide free dentures for the elderly who receive only social pension. This initiative has prompted a very wide range of older people to go to the dentist to perform treatment and certainly has reduced the need for dentist and prosthetic of most of the elderly of our region. The findings of our study lead to the conclusion that Public health services should prevent edentulism to avoid compromised masticatory ability and to improve the quality of life in elderly. For this purpose Public Health must increase general prevention measures such as:

- promoting an effective oral health education programs in different social and economic context integrating dentist's work with Dental hygiene educators that promote also the use of devices such as dental floss and interdental brush.
- intensifying prevention treatments such as professional prophylaxis and dental hygiene.

In most cases of edentulism we found that the elderly are forced to settle for unstable dentures, expecially in the lower jaw, because of bone resorption over the years. The lack of disposable income does not allow them to take advantage of dentures anchored in implants that are more stable but more expensive. Considering the importance of dental health to ensure both a good social life and an adequate dietary intake, Public Health should ensure the use of implants to guarantee stable and functional dentures. From the literature review that we performed during our study we confirmed the lack of oral epidemiologic studies concerning the elderly in Europe and worldwidely; only large nationwide surveys can provide a most reliable picture of oral health in a country. Finally authors consider necessary the establishment of specific courses such as Master's courses in Geriatric Dentistry because of the increase in the number of elderly and of the fast evolution of Gerodontology.

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