

# Oral health in institutionalized elderly people in 1993 compared with in 1980

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The dental and periodontal status, oral hygiene, and dental visit habits of 250 residents in long-term care (LTC) facilities for the elderly in a suburban community in Norway were recorded. The findings were compared with the data from an identical examination of the residents in the same LTC facilities in 1980. In 1993 the mean number of remaining teeth per person was 11.7 (CI = 10.3–13.1). The mean number of filled teeth was 5.1 (CI = 4.1–6.0), and the mean number of decayed teeth was 1.8 (CI = 1.4–2.2). The mean number of residual roots per person was 0.8 (CI = 0.5–1.1). Periodontal pockets exceeding 4 mm was recorded on 5% of all teeth. In general, the oral hygiene was poor. Edentulousness had decreased from 80% in 1980 to 54% in 1993, and more remaining and filled teeth and fewer residual roots per person were observed in the 1993 population. The findings show that the objective need for resources to prevent periodontal disease and caries among elderly patients in LTC facilities today is higher than previously. □ *Dental caries; dental survey; epidemiology, oral; geriatric dentistry; tooth loss*

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The dental health of the adult population in Norway, as indicated by more remaining teeth and dentate persons, has improved during recent years (1). This statement is based on epidemiologic studies of stratified samples of the general population (2) and of geographically localized populations (3). It is uncertain whether the general improvement in dental health among adults has resulted in an improved dental health status among elderly people in long-term care (LTC) facilities, since there has been a lack of follow-up studies among old-age pensioners.

The dental health status of all the residents in LTC facilities for the elderly in Skedsmo, a suburban community 20 km north of Oslo, Norway, was recorded in 1980 (4, 5). By repeating the study, using the same examination method and evaluation criteria, it was assumed that the dental health status of the LTC residents today could be compared with the status recorded in 1980.

## Materials and methods

All senior citizens in Skedsmo who in 1993 were living in LTC facilities for the elderly owing to poor medical or social conditions formed the study population ( $n = 250$ ). Seven individuals did not participate in the study owing to severe illness or dentophobia. Before a clinical examination the remaining 243 individuals were interviewed about dental health attitudes, behavior, and habits. In case of reduced mental ability, either relatives or nurses answered the questions when possible. Each

interview lasted between 30 and 45 min. In addition, demographic data including patient age, socioeconomic status, and use of medication were supplied by the institutional administration.

The study in 1993 was carried out under the same conditions and using criteria similar to those in 1980 (4, 5). Two dentists carried out the interviews and the clinical examinations, either in a dental office located in one of the LTC facilities or in the resident's room with a focusable head lamp used for illumination. The participants were examined intraorally on the basis of standardized procedures using periodontal and sharp examination probes and plane mirrors. Decayed, missing, and filled teeth, remaining roots, visible plaque, and presence of calculus and gingivitis were recorded for each tooth, as suggested by the World Health Organization (6). The third molars were not included in the examination. Decay was defined as a cavity with softened floor or walls on probing. The periodontal condition was assessed by recording periodontal pockets exceeding 4 mm. Visible plaque was scored in accordance with Silness & Løe (7). Patients with plaque on less than one-third of the teeth were categorized as patients with good oral hygiene. Plaque on more than two-thirds of the remaining teeth resulted in a poor oral hygiene score (5).

For the edentulous participants the time of the last extraction was recorded. For denture wearers, the period of use and the age of the dentures were also assessed (8). Denture stomatitis was recorded on the basis of the criteria suggested by Newton (9).

To obtain the best measurement precision, two

Table 1. The age and gender of the participants ( $n = 243$ )

Age (years)	Male	Female	Total
67 to 79	27	41	68 (24%)
80 to 102	42	133	175 (76%)
	69 (25%)	174 (75%)	243 (100%)

dentists, calibrated in the use of defined diagnostic criteria, examined each subject independently. In cases of disagreement, a joint decision had to be reached. The sensitivity and specificity of the clinical diagnoses versus other diagnostic procedures or tests were not assessed.

Median and mean values with 95% confidence intervals were calculated for the study population, and for subgroups on the basis of gender and age. The findings were compared with the data from the 1980 study, using the nonparametric Mann-Whitney U test.

## Results

### General condition

The age of the participants varied from 67 to 102 years, with a mean of 83.2 years. Twenty-eight percent of the participants were men and 72% women (Table 1). The mean age, gender, and socioeconomic status of the residents in the 1993 cohort was fairly similar to the situation in 1980.

Ninety-five per cent of the participants were medically compromised, and 89% were receiving continuous medication. Seventy per cent of the participants used drugs with inhibition of the saliva production as a known side effect.

On questioning, 12% of the participants experienced oral pain daily, whereas 21% reported difficulties in chewing food.

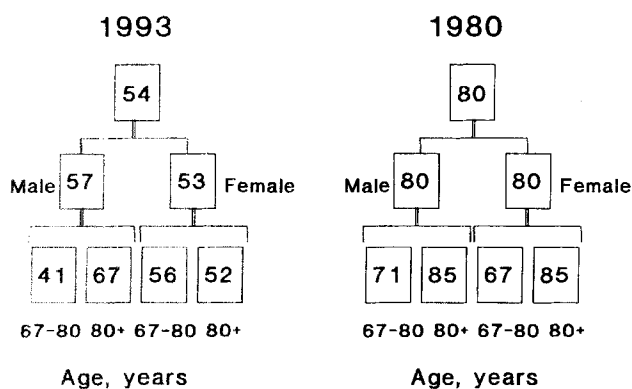


Fig. 1. Percentage figures for edentulousness in long-term care facilities for elderly patients, subgrouped on the basis of age and gender ( $n = 243$ ). Data from a similar survey in 1980 ( $n = 190$ ) are shown for comparison (4, 5).

The oral hygiene was considered good for 7% of the participants, medium for 13%, and poor for 79% of the participants.

### Edentulousness

Fifty-four per cent of the participants were edentulous (CI = 48–60%), varying with age and gender. Male participants between 67 and 80 years old had the lowest proportion of edentulousness (41%), whereas the highest proportion of edentulousness (67%) was recorded among male participants in the oldest age group (80+ years).

Sixty per cent of the participants answered that they had been less than 50 years old at the time they became edentulous, 34% had been between 50 and 70 years, and 5% had been more than 70 years old.

The rate of edentulousness dropped from 80% in the 1980 cohort to 54% in the 1993 cohort. The largest decrease was registered among the youngest men and the oldest women (Fig. 1). In the 1993 cohort fewer individuals had become edentulous before 50 years of age, compared with the 1980 cohort.

### Dental status

The mean number of missing teeth in the dentate subjects (MT) was 16.3 ( $s$ , 7.7) teeth, varying with age (Table 2). The MT scores were similar for the male and female participants. The dentate participants usually had less than 10 teeth (46%), whereas 36% had 10 to 20 teeth, and 18% had more than 20 teeth.

Thirty per cent of the participants had one (11%) or

Table 2. Mean values of different indices of dental health for dentate residents in long-term care facilities for elderly patients ( $n = 112$ ), tabulated by age and by gender. Vertical and horizontal lines with values indicate differences and significance levels computed with the Mann-Whitney U-test

	Female	Male	Total
67–79 years	( $n = 19$ )	( $n = 16$ )	( $n = 35$ )
Dental treatment (DMFT)	21.8	20.6	21.2
Decayed teeth (DT)	1.4	3.1	2.2
Missing teeth (MT)	14.8	11.9	13.5
Filled teeth (FT)	6.1	5.6 0.07	5.9 0.008
Remaining roots (RR)	0.5	0.3	0.4
80+ years	( $n = 63$ )	( $n = 14$ ) 0.02	( $n = 77$ ) 0.005
Dental treatment (DMFT)	23.7 0.06	23.8	23.7
Decayed teeth (DT)	1.4	2.4	1.6
Missing teeth (MT)	17.6	18.2	17.7
Filled teeth (FT)	5.0	3.2	4.7
Remaining roots (RR)	0.9	1.3	0.9
Total	( $n = 82$ )	( $n = 30$ )	( $n = 112$ )
Dental treatment (DMFT)	23.2	22.1	22.9
Decayed teeth (DT)	1.4—0.01—2.7		1.8
Missing teeth (MT)	16.9	14.9	16.3
Filled teeth (FT)	5.3	4.5	5.1
Remaining roots (RR)	0.8	0.8	0.8

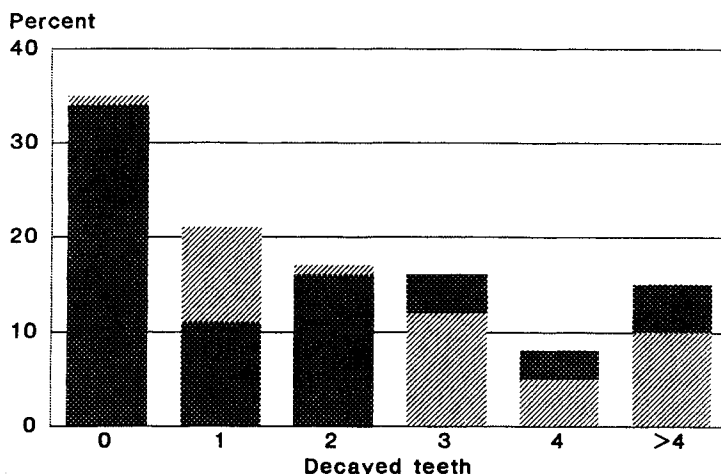


Fig. 2. Teeth with untreated carious lesions among dentate residents in long-term care facilities for elderly patients ( $n = 112$ ). Data from a similar survey in 1980 ( $n = 38$ ) are shown for comparison (4, 5). Light shading represents the population in 1980; the dark shade in 1993.

more (19%) remaining roots (RR), with a mean  $RR = 0.8$  ( $s, 1.6$ ), varying slightly with age (Table 2). The RR scores were similar for the male and female participants.

The present caries situation and measure of previous dental treatment, DMFT, was 22.9 ( $s, 4.8$ ) teeth, varying slightly with age (Table 2). The DMFT scores were similar for the male and female participants.

The mean number of filled teeth per person (FT) was 5.1 ( $s, 5.1$ ) teeth, varying slightly with age (Table 2). The FT scores were similar for the male and female participants.

Approximately two-thirds of the dentate participants had one or more teeth with decay (Fig. 2), and the mean number of decayed teeth per person (DT) was 1.8 ( $s, 2.0$ ) teeth. Lower scores were recorded for the oldest (80+ years) than for the remaining participants (Table 2). The DT scores were also lower for the female (1.4 ( $s, 1.5$ )) than for the male (2.7 ( $s, 2.8$ )) participants.

Compared with in 1980, the participants had more teeth, fewer remaining roots, and lower DMFT scores. The improvement from 1980 to 1993 was, in general, more pronounced for the older than for the younger age groups (Table 3, Fig. 3).

Table 3. Mean values and estimated confidence intervals (CI) of the mean of different indices of dental health for dentate residents in long-term care (LTC) facilities for elderly patients ( $n = 112$ ). Data from an examination of the residents in the same LTC facilities in 1980 (4, 5) are shown for comparison

	1993			1980			Mann-Whitney U-test <i>P</i> values
	Mean	CI	Median	Mean	CI	Median	
Total		$n = 112$			$n = 38$		
Dental treatment (DMFT)	22.9	22.0-23.8	23.7	25.7	24.5-26.9	26.3	<0.001
Missing teeth (MT)	16.3	14.9-17.8	16.6	20.0	17.9-22.1	21.5	0.01
Filled teeth (FT)	5.1	4.1-6.0	3.6	3.6	2.3-4.9	2.5	0.16
Decayed teeth (DT)	1.8	1.4-2.2	1.2	2.1	1.4-2.8	1.8	0.35
Remaining roots (RR)	0.8	0.5-1.1	0.2	1.6	0.7-2.5	0.4	0.04
According to age		$n = 35$			$n = 19$		
67 to 79 years							
Dental treatment (DMFT)	21.2	22.6-24.8		23.7	21.7-25.8		0.04
Missing teeth (MT)	13.5	11.1-15.8		18.0	14.2-21.8		0.04
Filled teeth (FT)	5.9	4.1-7.6		3.9	2.8-6.1		0.16
Decayed teeth (DT)	2.2	1.3-3.1		1.8	0.7-2.8		0.45
Remaining roots (RR)	0.4	0.1-0.7		1.0	0.3-1.7		0.03
80+ years		$n = 77$			$n = 19$		
Dental treatment (DMFT)	23.7	22.6-24.8		27.7	26.8-28.5		<0.00
Missing teeth (MT)	17.7	15.9-19.4		22.2	20-24		0.05
Filled teeth (FT)	4.7	3.5-5.9		3.1	1.7-4.9		0.44
Decayed teeth (DT)	1.6	1.1-2.1		2.4	1.5-3.4		0.08
Remaining roots (RR)	0.9	0.5-1.4		2.2	0.5-3.9		0.10

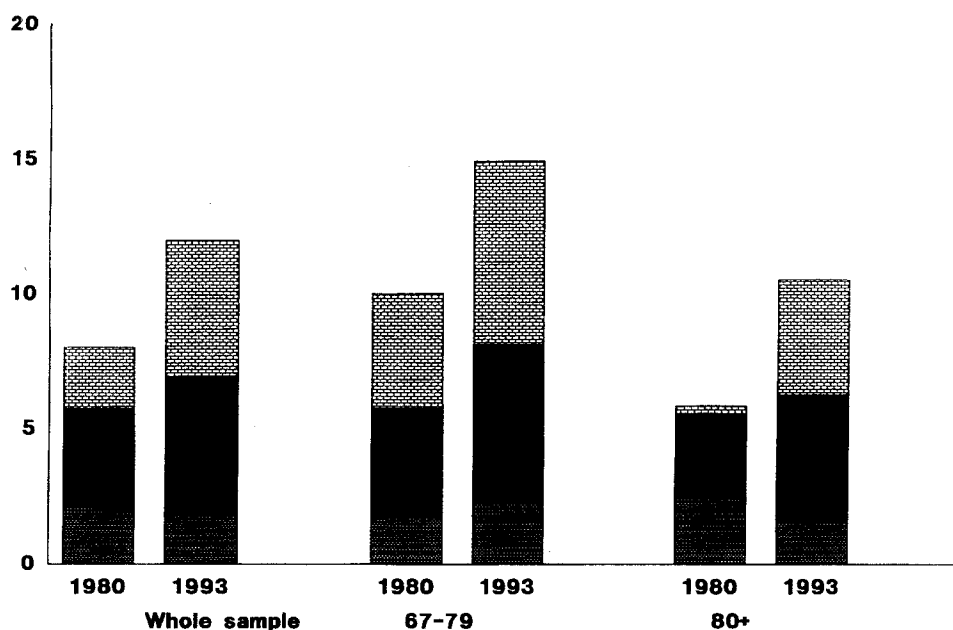


Fig. 3. The mean number of decayed (dark shade), filled (black), and sound intact (light shade) teeth among dentate residents in long-term care facilities for elderly patients. Data from a similar survey in 1980 (4, 5) are shown for comparison. The vertical axis indicates number of teeth. Data shown for the whole sample ( $n = 38$ , 1980;  $n = 112$ , 1993), age group below 80 years ( $n = 19$ , 1980;  $n = 35$ , 1993), and age group 80+ years ( $n = 19$ , 1980;  $n = 77$ , 1993).

#### Periodontal status

Bleeding on probing was recorded on approximately one-fourth of all teeth examined ( $n = 1300$ ). The number of teeth with bleeding on probing per person varied from 0 to 20 teeth, with a mean of 3.0 ( $s$ , 4.2).

Teeth with gingival pockets exceeding 4 mm was recorded on 5% of all examined teeth ( $n = 1300$ ). The number of teeth with gingival pockets deeper than 4 mm per person varied from 0 to 11 teeth, with a mean of 0.7 ( $s$ , 1.6) teeth.

The number of teeth with bleeding on probing and with gingival pockets exceeding 4 mm was similar for the male and female participants.

The periodontal status, described in terms of gingivitis and periodontal pockets exceeding 4 mm, did not differ from the status recorded in 1980.

#### Dentures

One hundred and sixty-seven participants (69%) had an edentulous upper jaw, and 92% of these used a maxillary denture. Edentulous lower jaws were recorded for 137 participants (55%), and 71% of these used a mandibular denture.

Fifty-one per cent of the participants with one or two dentures used these at all times. Thirty-eight per cent used the dentures only during the daytime, 7% used their dentures seldom, whereas 4% never used their

dentures. According to the patients who were able to answer this question (20 of 27) the main reason for not using the dentures was either pain or loose fit or both.

A larger proportion of the study population in 1980 was edentulous in the upper jaw (91%) than in 1993. Furthermore, approximately the same proportion of these as in 1993 used their maxillary denture (87%), and 50% used their denture regularly all the time.

Stomatitis associated with the use of dentures in the maxilla was recorded in 25% of the denture users. The stomatitis was usually mild (score 1, 14%), whereas stomatitis scores 2 and 3 accounted for 9% and 2%, respectively. The frequency of denture stomatitis in the upper jaw was comparable to the status in 1980 (16%).

#### Use of dental services

The use of dental services differed markedly depending on the dental status, and the use of dental services was higher among the dentate than among the edentulous participants. Fifty-five per cent of the dentate participants reported that they had been examined by a dentist during the past year, whereas 22% had not been examined the past 5 years. Corresponding figures for the edentulous participants were 38% and 42%. The use of dental services was similar in the age and gender subgroups.

The use of dental services in 1993 was significantly

higher than in 1980. In 1980 only 7% of the edentulous and 18% of the dentate had visited a dentist during that year.

## Discussion

The present study population seems representative for individuals in LTC facilities for the elderly in the eastern urban and suburban areas of Norway (10). The present data, therefore, probably give a fair impression of the dental health of individuals in LTC facilities for the elderly in the most densely populated parts of Norway.

When the dental health status was compared with the situation in 1980, it would have been useful if an age cohort from the 1980 study could have been compared with the cohort 13 years older in 1993. Unfortunately, only three patients who participated in the 1980 study remained in the institutions in 1993.

Caries and periodontal conditions were recorded by clinical examination alone, without the aid of radiography. This may theoretically increase the risk of underdiagnosing caries and periodontal disease. On the other hand, adjacent teeth in the molar regions were seldom observed, and the illumination used was good. It was therefore assumed that radiographs would not significantly improve the recordings of caries and periodontal disease. Furthermore, the recordings compare well with those of other studies. Caries found among two-thirds of the participants and a DT score of 1.7 is fairly similar to the results in two Danish studies, in which the caries prevalences were 55% (11) and 70% (17), and the DS score was 8.6 (12). A mean DMFT value of 22.9 is identical to observations by Altieri et al. (13), and a finding of 45% remaining roots in the participants is comparable to previously reported prevalences of 34% (11) and 48% (13).

The caries prevalence observed in the present study can be considered high, considering that two-thirds of the patients had untreated decay. The high number of decayed teeth cannot be explained by diagnostic criteria causing overestimation in the present study. Caries were strictly defined as cavities with softened walls—that is, minor lesions were not included—thus leading to a possible underestimate rather than an overestimate of the caries prevalence in the present study.

The decreased proportion of edentulous participants in 1993 compared with in 1980 confirms previously projected estimates of edentulousness among elderly people (1, 14, 15). The decrease in edentulousness was especially apparent for the men aged between 67 and 80 years, and for the female participants in the oldest age group (80+ years). One explanation may be that after 1980 LTC residents have been recruited from a dentate population, in which the use of dental services has been common (1). Furthermore, during the past decade it has become less socially acceptable to be

edentulous than earlier. Finally, the municipality of Skedsmo has during the same period shifted towards a more urban area than before. The data thus support the hypothesis that the level of urbanization is an important explanatory factor for the variation of edentulousness (1, 14).

The oral hygiene of the participants was relatively poor, with frequent heavy plaque accumulation and bleeding on probing. This has also been noted in other studies (11, 15–18). The situation may be due to lack of assigning health personnel with special knowledge in oral hygiene maintenance to geriatric institutions. It has been suggested that most health personnel working in medical institutions lack knowledge about how to carry out preventive dentistry (19).

The present data (Fig. 1, Table 2) indicate an improvement in dental health from 1980 to 1993. The changes could not be explained by a marked improvement in the socioeconomic status of the residents in the two cohorts. It is probable that the improvement is related more to different treatment aims today, which have gradually developed during the past 13 years, than to changes in the pattern of dental diseases.

The improvement in dental health may also be explained by factors such as general changes in attitude and behavior and increased use of dental services by elderly patients before the institutionalization (1). The use of dental services among the residents had also increased markedly from 1980 to 1993. In 1993 more than half of the participants had been examined by a dentist within the past year, compared with only 18% in 1980 (4). The finding may perhaps reflect that the elderly patients today are more receptive to alternative treatments instead of extractions than previously.

Several studies have indicated that dental health status varies among different age groups and with gender. The prevailing view is that in the oldest age groups, women have better teeth than men (5, 14), although the differences seem to diminish when the elderly become institutionalized (5, 11, 12, 17, 18). On the other hand, it has been hypothesized that even under poor general health conditions, women still maintain a satisfactory dental health despite becoming institutionalized (5). The present findings, showing similar or only slightly better (DT score) dental health indices for the female than the male participants, could not confirm this hypothesis.

The present recordings cannot be used directly to determine the potential treatment need in geriatric institutions since the need for treatment can be measured in several ways. Three potential measurements are (i) patient demand for treatment, (ii) patients' perceived need for treatment, and (iii) objective oral health indices (20). Using the demand for treatment as a measure presumes that the patients can best decide what treatment they need by means of such information as symptoms or the advice of dental health care professionals. Several signs and symptoms that may

affect the patients' demand for treatment were not addressed in this study, including transitional orofacial pain and oral infections, difficulty in chewing food, halitosis, dry or burning mouth, and soft-tissue lesions. Moreover, signs and symptoms related to loose, ill-fitting, or worn dentures, missing denture teeth, and home repairs were not addressed in the present study. Patients' perceived need for treatment is related to attitudinal and belief factors such as the relative value attributed to good oral health (21). Both these measures—that is, patients' demand and perceived need of treatment—are unreliable when applied to institutionalized elderly patients, who often are debilitated and/or medically compromised. It has been suggested that when the general health condition deteriorates, priority of dental health decreases (11, 18). There is agreement that the most correct method of estimating treatment need is by using objective oral health indices, with or without modifications due to the physical and psychosocial condition of the patient. Unfortunately, this method is also associated with problems such as lack of universal criteria for evaluation and inter- and intra-examiner disagreement (20). Furthermore, the lack of correlation between the objective treatment need and subjective patient opinions or dental problems has been described in many studies (20–24).

Regardless of what is the most valid and precise method of estimating treatment need, the present study shows that residents in LTC facilities for the elderly today have more remaining teeth than earlier. This means that the potential risk of periodontitis, caries, and other tooth-related complications among institutionalized elderly patients today is higher than previously. Consequently, more time and effort are needed to prevent dental diseases. Further studies should be initiated to elucidate how resources should be allocated to meet current and future demand in the dental health care of geriatric patients.

## References

1. Heløe LA, Holst D, Rise J. Development of dental status and treatment behavior among Norwegian adults 1973–1985. *Community Dent Oral Epidemiol* 1988;16:52–7.
2. Bjertness E. A multidimensional study of dental health in urban Norwegian adults [dissertation]. Oslo: University of Oslo, 1990.
3. Rise J. A community dentistry research approach to the study of old-age pensioners: empirical studies in urban Norway [dissertation]. Oslo: University of Oslo, 1984.
4. Ambjørnsen E. Decayed, missing, and filled teeth among elderly people in a Norwegian municipality. *Acta Odontol Scand* 1986;46:123–30.
5. Ambjørnsen E. Oral health in old age [dissertation]. Oslo: University of Oslo, 1986.
6. World Health Organization. Oral health surveys. Basic methods. 2nd ed. Geneva: World Health Organization, 1977:34–41.
7. Silness J, Løe H. Periodontal disease in pregnancy. II. Correlation between oral hygiene and periodontal conditions. *Acta Odontol Scand* 1964;22:121–35.
8. Ambjørnsen E, Rise J, Haugejorden O. A study of examiner errors associated with measurement of denture plaque. *Acta Odontol Scand* 1984;42:183–91.
9. Newton AV. Denture sore mouth. A possible aetiology. *Br Dent J* 1962;112:357–60.
10. National Health Survey 1975. Oslo: Norwegian Central Bureau of Statistics, 1977.
11. Vigild M, Brinck JJ, Christensen J. Oral health and treatment needs among patients in psychiatric institutions for the elderly. *Community Dent Oral Epidemiol* 1993;21:169–71.
12. Vigild M. Dental caries and the need for treatment among institutionalized elderly. *Community Dent Oral Epidemiol* 1989;17:102–5.
13. Altieri JV, Vogler JC, Goldblatt R, Katz, RV. The dental status of dentate institutionalized older adults: consideration of retained roots. *Spec Care Dent* 1993;13:66–70.
14. Österberg T, Carlsson GE, Mellström D, Sundh, N. Cohort comparisons of dental status in the adult Swedish population between 1975 and 1981. *Community Dent Oral Epidemiol* 1991;19:195–200.
15. Nordenram G, Bohlin E. Dental status in the elderly: a review of the Swedish literature. *Gerodontology* 1985;4:3–24.
16. Stuck AE, Chappuis C, Flury H, Lang NP. Dental treatment needs in an elderly population referred to a geriatric hospital in Switzerland. *Community Dent Oral Epidemiol* 1989;17:267–72.
17. Brauer L, Besserman M, Frijs-Madsen B, Brauer E. Oral health status and needs for dental treatment in geriatric patients in a Danish district hospital. *Community Dent Oral Epidemiol* 1986;14:132–5.
18. Vigild M. Oral hygiene and periodontal conditions among 201 dentate institutionalized elderly in Denmark. *Gerodontology* 1988; 4:21–4.
19. Munnhygiene i eldre år. Exam project, group 12. Drammen: Buskerud sykepleiehøgskole, 1995.
20. Gordon, S. Measurement of oral status and treatment need among subjects with dental prostheses: are the measures less reliable than the prostheses? *J Prosthet Dent* 1991;61:801–3.
21. Kiyak HA. Utilization of dental services by the elderly. *Gerodontology* 1984;3:17–25.
22. Ettinger RL, Beck JD, Jakobsen J. Prediction of need and acceptance of dental services for institutionalized patients. *Gerodontology* 1988;4:109–13.
23. MacEntee MI, Hill PM, Wong G, Mojon P, Berkowitz J, Glick, N. Predicting concerns for the mouth among institutionalized elders. *J Public Health Dent* 1991;51:82–90.
24. Mojon P, MacEntee MI. Discrepancy between need for prosthodontic treatment and complaints in an elderly edentulous population. *Community Dent Oral Epidemiol* 1992;20:48–52.

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