

Social, clinical and psychometric factors affecting self-rated oral health, self-rated health and well-being in elders

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Abstract

Background The study aims to explore the social influences, gradients and predictors of self-rated oral health (SROH) and self-rated health (SRH) and well-being in Greek elders. **Methods** Cross-sectional study, of elderly men and women, aged 65 years and over (N=743), in two municipalities in Greece. Descriptive and statistical analyses were performed for dentate and edentulous participants. For the association between socioeconomic exposures and binary outcomes, logistic regression was performed to estimate odds ratios and 95% confidence intervals (OR, 5% CI); levels of association and Cramer's V were applied to calculate associations and p-values. **Results** Household income, education level and last main occupation were predictors and determinants of both SROH and self-rated health (SRH). All objective socioeconomic measures (income, education and occupation) and subjective social status (SSS) were predictors of SROH and SRH; however, the objective socioeconomic measures were not predictors of satisfaction with life (SWL). SSS was statistically significant for SROH, SRH and SWL, $p < 0.01$. **Conclusions** Gender, municipality, long-standing illness, SSS and loneliness were predictors of SWL in the examined dentate population. For SROH and SRH, the results showed that household income less than 800 euros per month, education level, occupation and SSS were significant predictors. To the best of our knowledge, this is the first study to examine the effect of subjective and objective socioeconomic measures and find inequalities in both oral and general health and in the gradient of SROH among elderly adults in Greece.

Background

Self-rating measures of oral health encompass not only the physical and mental domains of health but also social aspects and everyday functioning. Thus, in the literature, there is an increasing volume of epidemiological studies based on perceptions of health and well-being, oral health-related quality of life (OHRQL) and global self-rated health.

Self-rated health (SRH) is a global measure for recording perceptions of health that is widely used in research. It is a simple and an adequate method in which a single question can capture participants' perceptions of their health. Many studies have shown that this single item is a predictor of health and mortality [1-5]. A systematic review by DeSalvo et al (2005) of 22 cohort studies found a statistically significant relationship between the risk of mortality and poor SRH [6]. Inequalities in health were present in studies that examined SRH and socioeconomic factors [7-12]. Some studies have used both global SRH and comparative SRH [13, 14]. Self-rated oral health (SROH) and socioeconomic factors have been examined in many studies and countries (based on nationally representative samples or not) with interesting results. Many studies reported inequalities in SROH according to income, education and occupation [15-18]; other studies examined SROH in terms of income and education and found inequalities [19-22].

The need to develop subjective measures of oral health status was first proposed by Cohen and Jago (1976), who reported the lack of data related to the psycho-social impact of oral health problems at that

time [23]. Subjective measures and self-ratings of health have been associated with education level, socioeconomic status and ethnicity, and poor SRH is predictor of subsequent mortality as strong as or stronger than physical measures [3, 5, 24]. Moreover, psychosocial factors have been found to affect and predict SRH [25, 26].

In social epidemiology, it is essential to use both clinical and subjective measures of health and oral health; individuals' feelings, personal beliefs, and life experience are fundamental to their own perceptions of well-being. The existence of social inequalities that affect health and mortality is well established. Longevity for those at the lower end of the social status ladder is considerably less attainable than for those higher on the ladder. These social class inequalities exist for almost all chronic diseases in industrial countries; similarly, these inequalities are also apparent in oral health. However, there is relatively little research available regarding these issues, using either clinical or subjective measures, in the aging population of industrialized countries. Aging populations, chronic diseases and social inequalities are all concerns for all industrial countries. Social determinants of health produce inequalities and create a graded distribution of diseases across the whole spectrum of society within and among nations. These social determinants are the underlying causes of health inequalities [27]. Studies reveal the existence of a gradient in general and oral health outcomes that is affected by a patient's socioeconomic position in society. Inequality indicates that individuals in poverty have poorer health, while the gradients show that at each lower level of the social hierarchy, individuals have worse health than those directly above them. Thus, the social gradient is not only for the poor and does not relate solely to absolute deprivation or poverty; instead, it is mainly explained by relative socioeconomic position [28-32]. Individuals with higher SES are exposed to less stress than individuals with lower SES, which reflects the impact of the socioeconomic hierarchy on health [33]. Health, in a wide range of views, includes not only bodily and physical health and the presence or absence of disease, but also personal feelings and spiritual and psychological well-being [34, 35]. Health includes the ideas of strength, vitality, and spirit; a person is healthy when he or she is free from illness, can properly participate in everyday life or has good physical status and well-being [36].

The principal aim of this study is to determine whether social influences and gradients are present in relation to the global SRH (oral and general health) of elders. Furthermore, the study aims to investigate how Greek elders self-rate their oral and general health and to determine the influence of socioeconomic status and well-being. SROH, SRH and satisfaction with life were examined as dependent variables in relation to explanatory variables, education, household income, occupation and subjective social status (SSS).

Methods

This cross-sectional study aims to examine the SROH and SRH, socioeconomic inequalities and well-being of 743 elderly Greek adults (males and females) aged 65 years or older living in the municipalities of Athens and Piraeus and visiting day centers. Details on the methodology, design and clustering sampling method of the study have been described previously [37]. In brief, permission from both

municipalities was received, and an advertisement for the study was placed in each day center. Prospective participants were enrolled in the study only after indicating that they understood the aim of the study and were able to participate of their own free will. Visits to the day centers were arranged by appointment, either by telephone or personal communication. The clinical examination procedure was standardized in accordance with WHO guidelines [38] for oral health surveys.

Outcome variables

For the study, we used SROH, SRH and satisfaction with life as outcome (dependent) variables.

Self-rated oral health. Self-reported oral health (SROH) was recorded using a 5-point scale. The participants were asked to answer the question 'How would you rate your oral health today?' Possible answers were poor, fair, good, very good, and excellent. For the binary analysis, the answers were merged into two categories; excellent, very good and good were grouped together as good; poor and fair were grouped together as poor.

Self-rated health. Self-reported health (SRH) was recorded using a 5-point scale. The participants were asked to answer the question 'How would you rate your health today?' Possible answers were poor, fair, good, very good, and excellent. For the binary analysis, the answers were merged into two categories: excellent, very good and good were grouped together as good; poor and fair were grouped together as poor.

Satisfaction with life. Satisfaction with life (SWL) was measured through the Satisfaction with Life Scale [39], which includes five items: 'In most ways, my life is close to my ideal'; 'The conditions of my life are excellent'; 'I am satisfied with my life'; 'So far, I have gotten the important things I want in life'; and 'If I could live my life over and over, I would change almost nothing'. The participants answered using the following 7-point scale: strongly disagree, disagree, slightly disagree, neither agree nor disagree, slightly agree, agree, strongly agree.

Other variables

Age. All the participants were 65 years old or older. For the binary analysis, two groups were formed: 65-74 years and 75-94 years.

Marital status was recorded using four categories: married, widowed, divorced or separated/single. For the analysis, this variable was recoded into three new groups - married, widowed and divorced-separated-single, and into the dichotomous variable married vs all others.

Oral Hygiene Index-Simplified (OHI-S): The average individual or group debris and calculus scores were combined to produce the OHI-S.

Oral health-related quality of life (OHRQL). We used the Oral Impacts on Daily Performance (OIDP) to assess OHRQL. For the binary analysis we used the dichotomous has impact (score 5 or more) vs has no

impact (score less than 5).

Long-standing illness and *long-standing illness limiting daily activity* were scored dichotomously (yes vs no).

Subjective social status (SSS) was assessed by the MacArthur social status scale (represented as a ladder with 10 steps). This social status measure was developed by the MacArthur Network on SES and Health to represent and record an individual's perception of their place on the social ladder, which takes into account multiple elements of socioeconomic status and social position.

Close ties: We used the number of close ties as a measure of social network/social support.

Loneliness was assessed by the UCLA 3-Item Loneliness Scale. This scale includes three items: 'How often do you feel that you lack companionship?'; 'How often do you feel left out?'; and 'How often do you feel isolated from others?'. Possible answers are hardly ever, some of the time, and often.

Socioeconomic measures: Education level was recorded as the total years of education, the highest certificate of education received, and as an ISCED-97 classification. For the binary analysis, we used a dichotomous categorization of less than a lower secondary education vs a lower secondary education or higher.

Income was recorded as personal and household income (euros per month) before taxes. For the analysis, we used the equivalence scale (square root scale) for household income according to OECD. The square root scale household income was merged into four categories: less than 600, between 600 and 799, between 800 and 999, and more than 999.

Occupation was recorded according to the participant's former main occupation using the International Classification of Occupation (ISCO-88, revised in 2008, ISCO-08). In the present study, we used the dichotomous categorization of manual workers vs. non manual workers.

Ethics

Ethical approval for the study was granted by the Ethics Committee of the Dental School, National and Kapodistrian University of Athens (18/01/2014). All the participants volunteered to participate, and informed consent was obtained from all individual participants included in the study. The ethical considerations of the study were in accordance with the principles of the 1964 Declaration of Helsinki and its later amendments.

Statistical Analysis

The descriptive analysis included sample demographics and socioeconomic characteristics. Statistical analyses were performed for dentate and/or edentulous participants, as shown in each table. The dependent variables were SROH and SRH and satisfaction with life. For the association between socioeconomic exposures and binary outcomes, we used logistic regression to estimate odds ratios and

95% confidence intervals (ORs, 95% CIs). Furthermore, levels of association and Cramer's V were applied to calculate associations and p-values. Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) program, version 20.

Results

The results are presented in seven tables (found in the Supplementary Files): Table 1 summarizes the sample characteristics and dental status. The SROH, SRH, and satisfaction with life of the dentate and edentulous participants are presented in Table 2. Levels of association for SROH, SRH, and SWL, with clinical health, OHRQL, and health behavior are shown in Table 3. Long-standing illness, long-standing illness limiting daily activity, and the number of remaining teeth had significant levels of association for all three outcomes. Moreover, the DMF index (clinical measure) was significant for SROH; OHRQL was significant for both SROH and SRH but was not significant for SWL. While having a reason to visit a dentist was not significantly associated with SROH and SRH, this behavioral variable had a significant association with SWL. As shown in Table 4, only SSS had levels of association (Cramer's V) that were statistically significant for all three outcomes ($p < 0.01$). Age was significantly associated with SROH and SWL, while gender was significantly associated with SROH and SRH. Municipality had significant associations only with SWL; those living in Athens had higher scores for SWL. The three objective socioeconomic measures (household income, education and occupation) had significant levels of association with SROH and SRH ($p < 0.01$), but not with SWL.

Summary models for socioeconomic factors and SSS, SROH and SRH, and the results of logistic regression models for SROH and SRH for each socioeconomic variable are shown in Table 5. In this study, household income, education level and occupation were predictors and determinants of both SROH and SRH (Table 5). For all logistic regression models, the Omnibus Tests of Model Coefficients sig was less than 0.05, and the Hosmer and Lemeshow test's significant values were greater than 0.05. Further analysis of other predictors and the effect of objective socioeconomic factors and SSS on SRO and SRH are presented in Table 6.

Finally, Table 7 summarizes the results of the logistic regression and the predictors of SWL; in the final logistic regression model for SWL, the independent variables that remained statistically significant were gender (male), municipality (Athens), long-standing illness (yes), SSS (low steps) and loneliness (very often). The model as a whole explained between 9.8% (Cox and Snell R square) and 14.3% (Nagelkerke R square) of the variance and correctly classified 77.2% of the cases.

Discussion

In this study, we examined socioeconomic, clinical and psychometric factors affecting SROH and self-rated general health and satisfaction with life in elders. The study showed the association between household income, education level, occupation and clinical measures of health, and SROH and SRH, in Greek elders in Athens and Piraeus. All three objective socioeconomic measures used in the study were

predictors of SROH and SRH ($p < 0.01$), and SSS, a subjective socioeconomic measure, was also found predict SROH and SRH; however, the objective socioeconomic measures were not predictors of SWL. Gender, municipality, long-standing illness, SSS and loneliness were predictors of SWL. Finally, it is interesting to highlight that remaining teeth was a significant predictor of SROH ($p = 0.01$), SRH ($P = 0.01$), and SWL ($p = 0.05$), while municipality and reason for dental visits were statistically significant predictors only of SWL ($p = 0.01$). The DMF index had a significant statistical association with SROH ($p = 0.05$), while the OHI-S index had no statistical association with the examined outcomes. Levels of associations of OHRQL were statistically significant for both SROH and SRH. The analysis revealed the presence of health inequalities in SROH and SRH; socioeconomic factors impacted perceptions of health and showed inequalities and educational, income and occupation gradients. Inequalities and the social gradient in clinical and subjective oral health were reported in 2014 for Greek elders in a preliminary analysis of data [40]. To the best of our knowledge, our 2014 study and the present study are the first to report oral health inequalities and the social gradient among Greek elders, and we found that the gradient was partly explained by education, income, and cognitive ability. Furthermore, the present study (i) examined the effect of objective and subjective socioeconomic measures and found that self-rated oral health inequalities and a gradient were present among Greeks; (ii) used both objective and subjective socioeconomic measures and found health inequalities and a gradient for SRH among Greek elders; and (iii) examined predictors of SWL and health in Greek elders.

Self-rated general health and the presence of a gradient among Greek adults was reported by Theodosiou and Zingelides in 2009 [41]. A recent study in Greek adults examined SRH and SSS and found that age and the presence of a chronic disease affect SRH and that the higher the perceived SSS, the higher the odds of reporting very good SRH [42]. A study that examined SRH, socioeconomic status (objective measures) and indebtedness in Greek adults found that males and younger individuals with a higher SES had a higher probability of reporting better SRH [8], which is in agreement with the results of the present study. Daniilidou et al. [43], in a study of Greek adults (aged 18 years and over), found that SRH was influenced by income, education, age and gender; however, variables such as physical activity and psychometric factors were not used in that study [43]. In our study, there was no significant relationship between age and SRH; however, gender was significantly associated with SRH and SROH. Long-standing illness and long-standing illness that limited daily activity were significantly associated with SRH in the present study; these results are in accordance with previous studies worldwide that revealed that socioeconomic measures (income, education, occupation) were determinants of SRH [12, 44-46] and mortality [47-49].

The results of the European Project "Enabling Autonomy, Participation, and Well-Being in Older Age: The Home Environment as a Determinant for Healthy Aging" based on Latvian and Swedish data showed that poor perceived mobility was associated with poor SRH, while education was a determinant of SRH only for the Latvian sample. Age was not a significant determinant for either population [50]. Our results showed that for dentate participants, age was significantly associated with SROH and SWL ($p = 0.001$); however, the findings for SRH were not significant, in accordance with the Latvian and Swedish data, as reported by Harschel et al., 2015. In the present study, education, income and occupation were

statistically significantly associated with both SROH and SRH ($p=0.01$). Income inequalities in SRH were also reported in Japan; at the prefecture level, the association between income and SRH was especially strong [51]; in Russia, education, material deprivation and perceived control were related to SRH [52].

In the present study, SROH (poor vs good) was predicted by education ($p=0.000$), occupation ($p=0.004$), SSS ($p=0.000$) and household income ($p=0.007$ for those with less than 800 euros per month; $p=0.008$ for less than 600 euros per month). Mejia et al. [53] examined SROH and social inequality among Australians (Australia's National Survey of Adult Oral Health, 2004-2006) and found that those who reported an annual income less than 20,000 Aus \$ and those who were less educated or unemployed were more likely to report poor oral health; this finding is in accordance with our results. However, an income of 20,000 Aus \$ (~12.482 euros) is much higher than 800 euros per month (approximately 9600 euros per year; 1 Aus \$ equals 0.62 euros), and Greece is a country in economic recession with reduced pensions and salaries because of the Memorandum. Additionally, a more recent study in Australia reported that poor SROH and income inequality in Local Government Areas (LGAs) had no associations among Australians [54].

In our study, we found that participants with no teeth (edentulous) were more likely to report poor SROH, poor SRH and low SWL scores. This is not in line with the results of Northridge et al. [55], who found that edentulous participants reported better SRH than the dentate participants. However, our results are in agreement with Farmer's et al.'s [56] results regarding education and income in a study in Canada. SROH was examined (using a nationally representative Canadian survey), and poor SROH was found to be inversely related to education and income; both socioeconomic measures were evenly balanced with the gradients [56]. In the present study, the participants were 65 years old or older (65 to 94 years), and we found that those in the 75- to 94-year-old group had significant inequalities compared to the younger group of 65- to 74-year-olds. A study in England, Wales and Northern Ireland found oral health inequalities in the UK adult population that tended to diminish with age; for those aged 65 years and over, these inequalities were not statistically significant [57]. In contrast, our results showed that inequalities did not fade with age in the examined population. In the literature, there is conflicting evidence regarding whether inequalities in health diminish or persist in older age [58-60].

Limitations

The study has some limitations because of its design. This is a cross-sectional study with an observational study design in which the outcome and exposures were examined at the same time, which makes causal relationships difficult to conclude; thus, the results should be treated with caution. However, the strengths of the study are the use of multilevel sampling procedures, stratified and clustering methods according to postal codes, municipalities and day centers; the participants were elders aged 65 to 94 years (males and females); both clinical and subjective measures were used, and psychometric factors were also considered. This cross-sectional study could be used as a baseline for a future cohort study.

Conclusion

The present study's results confirmed the presence of socioeconomic influences on SROH and SRH in Greek elders. Socioeconomic inequalities and a gradient exist, and SROH can be a helpful measure of health in epidemiological studies. Household income, education level, last main occupation and SSS were predictors of SROH and SRH. Regarding SWL among socioeconomic indicators, only SSS was significant, but other factors, including gender, municipality, long-standing illness and loneliness, were significant and predictors of well-being. To the best of our knowledge, this is the first study to explore and find socioeconomic inequalities and the gradient in oral health. The first study examined SSS and oral health in Greece, and the first study examined SRH and socioeconomic inequalities in both objective and subjective socioeconomic measures and found graded inequalities. Policy makers, health planning and welfare can gain experience and focus on methods and strategies aiming to eliminate income and educational inequalities on oral health and general health. The use of a simple question for self-rating health is an essential and useful instrument for epidemiologists and health care workers.

Abbreviations

OR= Odds ratio

CI= Confidence interval

SROH= Self-rated-oral health

SRH= Self-rated health

SWL= Satisfaction with life

SSS= Subjective social status

OHI-S= Oral Hygiene Index Simplified

WHO= World Health Organization

OHRQL= Oral health-related quality of life

OIDP=Oral Impacts on Daily Performance

OECD= Organization for Economic Cooperation and Development

ISCED= International Standard Classification of Education

ISCO= International Standard Classification of Occupation

Declarations

Ethics approval and consent to participate: Not applicable in this section

Consent for publication: Not applicable

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Availability of Data and Materials:

The datasets generated and analyzed during the current study are not publicly available due to the University's Policy but are available from the corresponding author on reasonable request.

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Tables

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