Changes and Determinants of Unmet Oral Health Treatment Need

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All the authors were responsible for conception, design, and interpretation of the data. ET-S was a major contributor in writing the manuscript and AS, SL and MT critically revised the manuscript. AS was also responsible for data acquisition and MT for analysis of the data. All authors gave full approval and agree to be accountable for all aspects of the work.

Abstract word count: 297

Total word count: 3624

Total number of tables/ figures: 5/0

Number of references: 28

Abstract

Objectives

Our aim was to describe the nature and determinants of the changes in unmet treatment need between the years 2000 and 2011 after a major oral health care reform and a wider supply of subsidized care.

Methods

The study used a longitudinal sample (n=3838) of adults who had participated in both the Health 2000 and 2011 surveys (BRIF 8901). Those reporting self-assessed treatment need without having visited a dentist in the previous 12 months were categorized as having unmet treatment need. Two logistic regression models were applied to determine the effects of predisposing and enabling factors on change in unmet treatment need. Model 1 was conducted among those who reported unmet treatment need in 2000 and evaluated the determinants for improvement. Model 2 was conducted among those who did not have unmet treatment need in 2000 to evaluate the risk factors for having unmet treatment need by 2011.

Results

Unmet treatment need was reported by 25% of the participants in 2000 and by 20% in 2011. Those with unmet treatment need in 2000 were less likely to report improvement by 2011 if they had poor subjective oral health, basic or intermediate education level, or poor perceived economic situation in 2000. Those who did not have unmet treatment need in 2000 were more likely to have it in 2011 if they were males or from northern Finland, and less likely to if they came from central Finland or were older.

Conclusions

The wider supply of subsidized oral health care during the study years did not lead to complete elimination of treatment need. The determinants of unmet treatment need, such as low or intermediate education level and perceived economic difficulties, should be used in targeting the services at those with treatment need to achieve better oral health outcomes.

Introduction

According to Andersen´s behavioral model of service use, both contextual and individual predisposing, enabling and need factors influence service utilization and its outcome, perceived or professionally evaluated health[1]. Contextual enabling factors can include, for example, national health policies, financing, and organization of services. Individual predisposing characteristics can include demographic characteristics and education, while the household finances can be considered as an individual enabling factor. According to the model, the concept of need consists of population health, measured by health indices, as well as individual need expressed by perceived need, and service demand satisfied after professional need evaluation. The factors in the Andersen behavioral model have multidimensional effects on service utilization and service outcomes. The model has also been successfully applied to oral health.[2-4]

One important contextual factor example is the adult oral health care system in Finland, which changed fundamentally in 2002 when the whole adult population gained access to publicly-funded oral health services. Before 2002, only those born in 1956 or after were entitled to these[5]. It was anticipated that the wider provision of subsidized care would lead to more frequent service use and satisfy the need for oral health services. The target was to improve access to oral health care and reduce inequalities. However, in spite of that reform, we found an increase in individual self-assessed treatment need in our longitudinal national study between 2000 and 2011[6]. In the same study, we also found that regular service use led to good subjective oral health, as also suggested by Andersen's model[7].

Services should be targeted to those in need. Failing to do so results in poorer health and wider health inequalities. Inequalities in dental service utilization are considerable and globally consistent[8]. Inappropriate provision and use of services can also affect self-assessed treatment need [1].Unmet treatment need (usually in the previous 12 months) has been used as an indicator of health care access and inequalities.[9,10,11,12] It can be defined as the difference between the healthcare services required to cope with a health problem and the services received. [13]. In Finland, waiting lists, cost, and travel distance have previously been the reported reasons for unmet treatment need [14]. Dental fear also leads to irregular attendance, which may lead to unmet treatment need[15]. Unmet treatment need can be viewed as an indicator of the effectiveness and fairness of a health care

system, and so it is useful for a country to monitor changes in unmet treatment need along with identifying its determinants.

This study utilized longitudinal survey data from a nationally representative health survey, the Health 2000 and the follow-up to that, the Health 2011.[16,17] Our aim was to describe the changes in unmet oral health treatment need and to analyze the determinants of change between the years 2000 and 2011 after a major oral health reform among Finnish adults.

Material and methods

Study design

The Health 2000 Survey, a population-based survey of adults aged ≥ 18, was conducted in 2000, with a follow-up undertaken in 2011 (BRIF 8901). All of those who were invited to participate in 2000 were re-invited in 2011, unless they had at baseline refused to take part in any follow-up. In the 2000 survey, a stratified two-stage cluster sampling design was used. From each of the five university hospital districts used as strata covering the whole country, 16 clusters (health centers) were selected. The 15 largest cities and towns were included, and 65 other health centers were added according to the probability-proportional-to-size method. Systematic random sampling was used to select individuals from these 80 health centers. To match the population sizes in different clusters and to form a nationally representative data set of adults Finns, the participants were weighted using inverse probability weighting, which is a statistical technique for calculating statistics standardized to a population different from in which the data were collected. The Ethical Committee of the Helsinki University Hospital approved both of the studies, and informed consent was obtained from each participant. The self-reported data used in this study in 2000 were collected both by structured interview and self-performed questionnaires during the health examination, and in 2011 by structured interview during the health examination[16,17]. Of the updated Health 2000 Survey main sample, that is, those aged 30 years or over; (n=7979), 89% (n=7087) participated in the interview. During the Health 2011 follow-up survey, they were 41 years or older, and 4283 of them participated in the interview again in 2011. This is 68% of the updated Health 2011 follow-up sample of this age group (n=6319). The follow-up data in this study included dentate participants who were born in 1970 or after and who had in interviews answered the questions on perceived oral health and service use in both 2000 and 2011 (n=3838); this was 61% of the updated Health 2011

sample. Analysis of loss showed that those having lost during the follow-up were more often male, less educated, older, resided in Central Finland and had more unmet treatment need than those who were followed up. (Table 1).

Measurements

Information on perceived oral health and service use both in 2000 and 2011 was used in the analyses. Subjective oral health was determined by the global single-item question: "How do you rate the status of your teeth and oral health?" with the response options: very good, good, average, poor and very poor. For analyses, subjective oral health was dichotomized to good (very good or good) or poor (average, poor or very poor). Self-assessed treatment need was determined by the question: "Do you think you currently need dental treatment?" with response options: yes or no. Last visit to a dentist was determined from the response options: during the past 12 months, 1-2 years ago, 3-5 years ago, over 5 years ago or never. Those reporting self-assessed treatment need but not having visited a dentist during the previous 12 months were categorized as having unmet treatment need. All of the other options (no self-assessed need or visits within 12 months) were considered as not having unmet need. Unmet treatment need was categorized as having unmet treatment need either in 2000, in 2011, in both years, or in neither of these years.

Background and other health-related variables used in analyses were based on the Andersen model and determined in both 2000 and 2011 except for self-perceived health only in 2000. They consisted of contextual and individual *predisposing* factors (area of residence, gender, education), *enabling* factors (perceived economic situation, self-perceived health, dental fear) and *need* (pain or discomfort with teeth or dentures). Age was grouped by year of birth: 1956-1970, 1946-1955 and 1945 or before. Age cohorts were determined on differences in access to subsidized oral health care. The younger cohort had been entitled to subsidized care, whereas the two older cohorts gained access to it after the baseline examination in 2000. Education level was categorized as basic, (12 or less years of basic education), intermediate (vocational education), or higher (college or university). The area of residence in Finland was defined as the university hospital districts of Helsinki (southern), Turku (western), Tampere (central), Kuopio (eastern), or Oulu (northern). Perceived household economic situation was determined by the question: "How do you describe the current balance between income and expenditure in your household?" with the response options: more than enough to cover our needs; enough to cover our needs; we have to compromise to some extent; we

have to cut our consumption; we have to compromise a lot but manage; or we have to make major compromises and do not manage on our own. Answers were grouped into three categories: very good (more than enough to cover our needs), good (enough to cover our needs), and poor in the cases of compromising or cutting down in consumption. Self-perceived health was determined by the question: "What is your present state of health?" with the response options: good, fairly good, average, fairly poor, or poor. Answers were grouped into good (good or fairly good) or poor (average, fairly poor or poor). Pain and discomfort was determined by the question: "Have you during the past 12 months had toothache or any other trouble related to your teeth or dentures?" with response options: yes or no. Dental fear was assessed with the question: "Do you think that visiting a dentist is: not at all frightening, somewhat frightening, or very frightening?"

Additionally, the follow-up survey in 2011 asked about people´s reasons for not attending a dentist. The response options were: queueing, travelling connections, and service fees. The question was answered by 3644 respondents.

Statistical analysis

The occurrence of unmet treatment need and changes in it were examined and cross-tabulations were used to evaluate their associations with gender, age group, education, area of residence, general health, pain or discomfort, subjective oral health, perceived economic situation, and dental fear.

Two logistic regression models were applied to determine the associations of gender, subjective oral health, pain and discomfort, area of residence, age, education, dental fear, and economic attainment at baseline with improvement or worsening in unmet treatment need. Model 1 was applied to those who reported unmet treatment need in 2000 and evaluated the determinants for improvement (that is not having unmet treatment need) in 2011. Model 2 was applied to those who did not have unmet treatment need in 2000 and evaluated the risk factors for having it by 2011. Analyses were conducted using weighted data. The weights in 2000 were based on age, gender, living area, and mother tongue[18]and updated for 2011. All analyses were conducted using weighted data, taking cluster design into account. According to Härkänen et al.[19], statistical methods based on weighting provide quite accurate results. All analyses used IBM SPSS 25.0.

Results

The gender distribution among the age groups was fairly even. Of males, 41% were born in 1956-1970, 30% were born in 1946-1955, and 29% were born in 1945 or before. Of the females, 42% were born in 1956-1970, 30% were born in 1946-1955, and 28% were born in 1945 or before. Unmet treatment need diminished over the years and was reported by 25% of participants in 2000 and by 20% in 2011 (Table 2). The prevalence of unmet treatment need for females was lower than for males both in 2000 and in 2011. There was a cohort-gradient of unmet treatment need, with a smaller proportion of the oldest cohort reporting it than the younger cohorts in 2000 and 2011. A bigger proportion of the basic and intermediate educated groups reported unmet treatment need than the highest educated group. Unmet treatment need prevalence differed across the country, with eastern and northern Finland having the highest.

A higher proportion of those reporting unmet treatment need in both years were male (Table 3). There was no difference in poor subjective oral health in 2000 within the unmet treatment groups. The majority of those who had unmet treatment need in both years, also had poor subjective oral health but reported less pain or discomfort related to teeth or dentures than those with no unmet treatment need. A higher proportion of those with unmet treatment need in both years reported poor perceived economic situation and high dental fear.

Unmet treatment need and subjective oral health were associated among both genders. (Table 4). Those with unmet treatment need in both years reported most often also poor subjective oral health in both years. Accordingly, those with no unmet treatment need in both years reported also good subjective oral health in both years.

In the logistic regression, (Table 5), Model 1 applied to those who had unmet treatment need in 2000 and compared those who improved (coded as 1) to those who still had unmet treatment need in 2011 (coded as 0). Those with unmet treatment need in 2000 were less likely to report improvement by 2011 if they had poor subjective oral health, basic or intermediate education level, or poor perceived economic situation in 2000. Model 2 was conducted among those who did not have unmet treatment need in 2000 and compared those who developed unmet treatment need by 2011, (that is, worsened, coded as1), to those who did not develop it (coded as 0). Those who did not have unmet treatment need in 2000 were more likely to have it in 2011 if they were male or from northern Finland, and less likely if they came from central Finland or were older.

Reasons given for non-attendance were: queueing (18% of participants) and service fees (7% of participants). Only 1% of respondents mentioned travelling difficulties.

Discussion

Unmet treatment need for oral health care in the Finnish adult population diminished between 2000 and 2011, but was substantial, being reported by 25% of the population in 2000 and by 20% in 2011. Prevalence of unmet treatment need varied by age cohort, the lowest prevalence was in the older cohorts in both years. Females reported less unmet treatment need than males. Those having no unmet treatment need also reported better subjective oral health. Basic or intermediate education, poor subjective oral health, and perceived economic difficulties at baseline determined the persisting 8% of unmet treatment need. Those with no unmet treatment need in 2000 also were less likely to have it in 2011 if they lived in central Finland or belonged to the older birth cohorts. Conversely, males or those living in northern Finland were more likely to have accrued unmet treatment need in 2011. The determinants of change thus differed depending on the direction of the change.

Our findings suggest that the change in contextual enabling factors seemed to be effective in diminishing unmet treatment need during the 11-year period. In terms of contextual change, age limits on subsidized care were removed and access to care universally guaranteed. This contextual change in service provision seems to have provided opportunities for dental care, as need for care due to pain and other dental problems was less prevalent in 2011. Of these contextual factors, equitable access was also found to be important in reducing social inequality in a Swedish cohort study after their health care reform in 2008 [20]. In a French cohort, prevalence of need for dental care was higher among participants of low socio-economic status. In that study, income level and national origin were more strongly associated with need for dental care than insurance cover level. Although the findings of that study are from a country with a different service provision context to Finland, they nevertheless confirm these factors as strong determinants[21].

All of the predisposing factors according to the Andersen model (that is, area of residence, gender, and education) were strong determinants of unmet treatment need. They also determined the changes in unmet treatment need. Since the regions have differences in contextual factors, such as

availability, the area differences might be via those, because the regions have differences in them. The regions with highest unmet treatment need have had the highest prevalence of edentulousness in the past, and their service provision has remained low[16]. Perceived economic troubles, living in eastern or northern Finland, male gender, dental fear, and intermediate or basic education level in 2000 led to higher prevalence of unmet treatment need in 2011. These may, again, be consequences of contextual factors that is finding service fees too high, and difficulty accessing services due to long travel distances, which are more typical in eastern and northern parts of the country. Some further changes should be implemented to target these contextual factors and the changing need for services. Similar findings to ours have been reported from a study in Sweden[22] in which factors such as long-term illness and financial problems were associated with refraining from seeking dental care among adults.

The pain or discomfort related to teeth or dentures need factor seemed to lead to service use, but those without this factor in 2000 more often had unmet treatment need in 2011. The persistence of unmet treatment need means that the outcome and organization of urgent care should also be examined in Finland, as suggested by a recent review[23].

Inequalities in Finnish oral health care use and self-rated oral health were identified in a study carried out from 2001 to 2007[24]. In that study, reduction in pain and discomfort was greater in the more advantaged portion of the population, indicating persisting inequalities in oral health and service use. One reason for this might be that awareness of oral health care reform may also differ among different socioeconomic status groups. Variation in oral health service utilization in Europe is large, and some countries with universal health care seem to encourage the use of preventive services[25]. According to our findings, Andersen´s behavioral model seemed useful in identifying different determinants of unmet treatment need in oral health services. The Andersen model has also been found to be useful in previous studies[26]. However, the determinants of change in unmet treatment need have not been investigated in those previous studies.

The high response rates in the Health 2000 Survey and the 2011 follow-up are strengths of this study. Even though the participation rates were lower in the Health 2011 Survey than the Health 2000 Survey, over 70% had participated in both surveys, which is high for longitudinal studies. Lowest participation rates were seen among the youngest men. Our longitudinal cohort included 61% of those having participated in both surveys, and this can also be regarded as very good. Loss to follow-up is nevertheless always a problem and is most likely to concern those at greater risk of

treatment need and non-use of services. This is the case also in our longitudinal study, which is a limitation. The weights provided by the survey were used to correct it, but the findings may be affected by recall bias[19]. The data were weighted based on age, gender, living area, and mother tongue to form a nationally representative data set of adults Finns. Since the weights were based on several variables, and not used to create comparable groups, but to form a nationally representative data set, using on of those as an independent variable did not harm our results but allowed us to see the differences according to the university hospital districts. The longitudinal study design is a strength, and the statistical approaches allow us to clearly point out the main findings and to draw conclusions on change in unmet treatment need and the determinants of it. Some differences in study methods and the health care systems make comparison with findings from other countries difficult, which is a limitation. The measurements used are well established and widely used in population studies, although most of those studies have been cross-sectional. The measurement of unmet treatment need may differ among studies and underestimate the need for services. While differences in defining unmet treatment need exist, the 12-month reference period seems to be widely used .[11,27] Unmet need, so defined, has been captured in international studies such as the Survey on Health, Ageing and Retirement, the European Union Survey of Income and Living Conditions, and the WHO Study on global ageing and adult health, SAGE[9,28] The equal timelines are a strength in our study. To further examine and understand the factors leading to unmet treatment need, the different time periods between check-ups and visits and reasons for unmet need could be examined especially in Finland, where the individual recall intervals have been recommended since 1990´s. Attention to co-occurring risk factors for poor access to needed care should be given in order to reduce disparities among populations.[28]

Our findings are important in understanding the interplay between service utilization and perceived oral health. The findings offer new information for planning the supply of services. Unmet treatment need is very common among certain groups of adult Finns. Subsidized care should be able to target resources at those who need and benefit the most. Using simple and easy questionnaires within other sections of social and healthcare, asking about the need for oral health services along with relevant background questions, might help in targeting resources to those at risk and reduce unmet oral health treatment need.

ACKNOWLEDGEMENTS

The Health 2000 and Health 2011 Surveys were organized by the Finnish National Institute for Health and Welfare (THL) and partly supported by the Finnish Dental Society Apollonia and the Finnish Dental Association. ET-S acknowledges a personal grant from the Finnish Dental Society Apollonia. The authors declare no potential conflict of interest with respect to the authorship or publication of this article.

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Table 1. Baseline sociodemographic characteristics of interviewed dentate participants who were born in 1970 and answered in questions on perceived oral health and service use in the Health 2000 Survey (n=5648) according to follow-up status in the Health 2011 Survey. Lost to follow-up: participated in 2000 but not in 2011. Followed up: participated in both surveys.

	Lost to follow-up n=1,810	Followed-up n=3,838	
	% (n)		p-value*
Women	45.2 (874)	52.9 (2,110)	<0.000
Born			
1956-70	33.4 (595)	40.6 (1,599)	
1946-55	24.2 (404)	30.4 (1,146)	
-1945	42.4 (811)	29.0 (1,093)	
Education (missing n=62)			<0.001
Basic	46.1 (835)	28.0 (1,056)	
Intermediate	32.7 (563)	35.9 (1,364)	
Higher	21.2 (376)	36.1 (1,392)	
Area of residence			0.021
Southern	35.4 (624)	34.0 (1,279)	
Western	13.5 (254)	14.2 (560)	
Central	24.5 (433)	21.9 (816)	
Eastern	15.8 (294)	16.7 (646)	
Northern	10.9 (204)	13.1 (537)	
Unmet treatment need *	30.9 (540)	25.3 (969)	< 0.001

Those who reported self-assessed treatment need but had not visited a dentist during the previous 12 months.

Table 2. Unmet treatment need (%) in 2000 or 2011 by sociodemographic characteristics determined at baseline.

		Unmet treatment need				
		%				
		In neither year	Only in 2000	Only in 2011	In both years	p
All		63	17	12	8	
Gender	Male	58	19	13	10	<0.001
	Female	66	16	11	7	
Born	1956-70	59	19	12	10	<0.001
	1946-55	60	19	11	10	
	-1945	69	13	11	7	
Education	Basic	62	17	11	9	<0.001
	Intermediate	59	19	13	9	
	Higher	67	16	12	5	
Area of residence in Finland	Southern	63	17	12	8	<0.001
	Western	68	16	10	6	
	Central	69	14	9	8	
	Eastern	58	20	12	10	
	Northern	54	18	17	11	

Prevalence of unmet treatment need in year x is the sum of 'only in x'+ 'in both years'.
p-value X^2-test

Table 3. Unmet treatment need (%) in 2000 and 2011 by background and health-related variables.

		Unmet treatment need				
		%				
		In neither year	Only in 2000	Only in 2011	In both years	p
Gender	Male	43	50	50	56	<0.001
Self-perceived health in 2000	Poor	28	32	28	34	0.123
Pain or discomfort related to teeth or dentures	In 2000	37	23	40	31	<0.001
	In 2011	36	38	27	27	0.001
Poor subjective oral health	In 2000	22	52	26	68	<0.001
	In 2011	20	23	39	54	<0.001
Perceived economic situation in 2000	Very good	19	18	15	15	0.001
	Good	45	41	44	36	
	Poor	36	41	42	50	
Perceived economic situation in 2011	Very good	25	23	21	12	<0.001
	Good	45	48	42	51	
	Poor	30	30	37	37	
Dental fear in 2000	No	64	50	62	49	<0.001
	Somewhat	29	34	31	34	
	Very	7	17	7	17	
Dental fear in 2011	No	69	64	62	57	<0.001
	Somewhat	27	29	30	30	
	Very	4	7	8	14	

p-value X^2-test

Table 4. Unmet treatment need by subjective oral health between 2000 and 2011. P-values <0.001

Subjective oral health	Unmet treatment need %			
	In neither years	Only in 2000	Only in 2011	In both years
ALL				
Good in both years	69	47	55	29
Poor only in 2000	12	31	9	20
Poor only in 2011	10	6	23	11
Poor in both years	9	16	13	40
MALES				
Good in both years	66	42	49	25
Poor only in 2000	12	31	9	17
Poor only in 2011	12	7	25	11
Poor in both years	10	20	17	47
FEMALES				
Good in both years	70	53	60	34
Poor only in 2000	13	31	9	23
Poor only in 2011	9	5	21	12
Poor in both years	8	11	10	31

Table 5. Logistic regression model for change in unmet treatment need according to enabling, predisposing and need variables at baseline.

	Model 1[a]			Model 2[b]		
	OR	95% CI	p	OR	95% CI	p
Male gender	0.88	0.64–1.19	0.40	1.32	1.07–1.64	0.01
Poor subjective oral health (ref=Good)	0.53	0.39–0.73	<0.01	1.05	0.81–1.36	0.74
Pain or discomfort related to teeth or dentures (ref=No)	0.91	0.65–1.26	0.56	1.01	0.81–1.25	0.96
Area of residence (ref=Southern Finland)						
Western	1.13	0.69–1.85	0.63	0.82	0.58–1.15	0.25
Central	0.90	0.60–1.36	0.62	0.72	0.53–0.98	0.04
Eastern	0.96	0.64–1.45	0.85	1.19	0.88–1.62	0.26
Northern	0.83	0.54–1.30	0.42	1.54	1.13–2.09	0.01
Age cohort (ref=1956-1970)						
1946-1955	0.86	0.58–1.29	0.47	0.71	0.54–0.92	0.01
-1945	0.70	0.46–1.04	0.08	0.66	0.50–0.87	<0.01
Education (ref=Higher)						
Intermediate	0.71	0.49–1.02	0.06	0.92	0.71–1.19	0.54
Basic	0.61	0.41–0.93	0.02	1.28	0.97–1.70	0.09
Dental fear (ref=No)						
Somewhat	1.07	0.77–1.49	0.67	1.17	0.92–1.47	0.20
Very	1.29	0.84–2.00	0.25	1.02	0.66–1.57	0.93
Perceived economic situation (ref=Good)						
Poor	0.71	0.51–0.98	0.04	1.14	0.91–1.44	0.27
Very good	0.82	0.53–1.27	0.38	0.83	0.61–1.13	0.23

[a] Model 1: improvement=having unmet treatment need in 2000 but not in 2011.

[b] Model 2: worsening= no unmet treatment need in 2000 but having it in 2011.