Oral health and its impact on the life quality of homeless people in Hong Kong

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Objectives: To report on the oral health status and its impact on the life quality of homeless people in Hong Kong. *Design*: A cross sectional epidemiological survey involving clinical oral examinations and face-to-face interviews with 147 homeless participants. Clinical examinations were carried out following WHO criteria. The impact of oral health on quality of life was assessed with the short form of Oral Health Impact Profile, OHIP-14. *Results*: Over 90% had caries experience and most related to untreated decay. The mean DMFT score for dentate subjects was 8.1 (DT = 3.4, MT = 4.0, FT = 0.7). Periodontal disease was highly prevalent, 96% having periodontal pockets. The burden of oral health on their daily lives was common, 88% reporting an oral health impact within the past year. A multiple regression analysis indicated that the OHIP-14 score had significant associations with self-rated oral health, dental pain, employment status and length of time being homeless (p<0.05). Those who assessed rated oral health as 'poor/very poor', reported dental pain in the past year, were unemployed, and homeless for more than one year had poorer oral health related quality of life (significantly higher OHIP scores) than their counterparts. *Conclusion*: Among the homeless population studied, oral health status was poor and its impact on their life quality was substantial. The oral health impact was associated with socio-demographics and perceived dental problems.

Key words: Homeless, oral health, quality of life

Introduction

People who are homeless may be the most socially excluded group and have the least access to health services of all vulnerable populations (Allukian, 1995). Health is inextricably linked to homelessness since it is unsure whether health problems cause homelessness or homelessness cause ill health. Whatever the case, ill health is a major problem among homeless people (Burnette *et al*., 2005).

Information on the oral health of homeless people is sparse because this group is usually outside the sampling frames used for assessing the general population. Previous reports show high prevalence of untreated tooth decay, missing teeth, periodontal disease, poor masticatory function, and oral pathology among the homeless people (Blackmore *et al*., 1995; Gelberg *et al*., 1988; Gibson *et al*., 2003; Jago *et al*., 1984; Kaste and Bolden, 1995). Limited access to dental care, primarily due to financial barriers, an insufficient supply of dental providers willing to treat them and dental anxiety, increases homeless people's high risk for oral diseases (King and Gibson, 2003; Waplington *et al*., 2000).

The effects of dental caries and periodontal disease is not simply destruction of teeth and their supporting tissue but discomfort and pain as well as compromised social and psychological functioning, general health and well being. Many oral health related quality of life (OHRQoL) measures have been developed to assess the impact of oral disorders on daily living and psycho-social functioning (Allen, 2003; Slade, 1997a). This reflects a paradigm shift in assessing oral health and a move towards the use of patient-oriented measures to gain subjective and more meaningful information on the impact of disease on an individual's life.

Existing literature on the oral health of homeless people is limited to clinical oral health status information assessed with objective measures. To date, there is a dearth of information on how oral health impacts on the day-to-day living or life quality of homeless people. To help fill this gap in knowledge, we conducted a community study to investigate OHRQoL among homeless Chinese in Hong Kong.

In recent years there has been a dramatic increase in the number of homeless people in Hong Kong, owing to the downturn in the economic environment. The issue of homelessness has emerged as a social problem in Hong Kong. According to the territory-wide survey in January 2000, the number of homeless was 819 in Hong Kong (Social Welfare Department, 2000). The homeless population was dominated by male (96%) and single people (73%), and nine were not of Chinese ethnicity. This is different from the great diversity among homeless reported in some other countries (King and Gibson, 2003).

The purpose of this study was to determine the oral health status and its impact on the life quality of homeless people in Hong Kong SAR, China, and to identify factors associated with OHRQoL among this study group.

Materials and methods

The target population of this study was Chinese homeless people in Hong Kong. Given the transient nature of homelessness, it was not feasible to identify a complete

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list of homeless people to act as an appropriate sample frame, from which to select a random sample of subjects. Instead, a proportional sampling plan was used according to the data provided by the Hong Kong Social Welfare Department (2000). Analyzed by geographical location, the highest number was recorded in Kowloon area, especially in the districts of Yau Ma Tei and Shum Shui Po (50%). There was 30% found in the districts of Wanchai, Central&West and Eastern in Hong Kong Island. In this study around two thirds of the respondents were recruited from Kowloon area and mainly from districts of Yau Ma Tei and Shum Shui Po, while one third were from Hong Kong Island, mainly from Central & West and Eastern districts. In each district, a 'snow-ball' sampling technique was used to recruit subjects, i.e. subjects helped recruiting other subjects.

In order to ensure participation, four major organizations which provide service to homeless people were contacted. While organizations from Hong Kong Island were St. James Settlement and St. Barnabas' Society, the organizations from Kowloon were Society for Community Organization and Salvation Army. All of these are non-profit-making and non-governmental community organizations. These organizations helped us to promote our survey and recruit homeless people in homeless centers, shelters and on the streets.

Data collection was conducted in March 2005 in the form of a clinical examination and a questionnaire interview. Oral examination was carried out by two trained and calibrated examiners using the examination procedures and diagnostic criteria recommended by World Health Organization (1997). Tooth status was assessed using the DMFT index with a mouth mirror, dental probe and a torch light. Community Periodontal Index (CPI) was used to assess the periodontal status. The presence of any oral mucosal lesions was recorded. Duplicate clinical examinations were performed on 10% of subjects who were randomly selected to monitor the inter-examiner agreement. Kappa statistics was employed to assess the level of agreement between examiners.

A structured questionnaire was designed to gather information on self perceived oral health status, impact of oral health on life quality, oral health behaviour and attitudes, and socio-demographic characteristics of the participants.

In assessing perceived health status, subjects were asked to rate their oral health on a single-item global scale. The impact of oral health on life quality was assessed with the short form of Oral Health Impact Profile, OHIP-14 (Slade, 1997b). This 14-item questionnaire covers seven domains of oral health impact: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap based on Locker's adaptation of the WHO's classification of disease-impairment-disability-handicap (Locker, 1988). The measure has been used in a number of oral health impact studies globally (Brennan and Spencer, 2005; Locker et al., 2002) and a Chinese version of the instrument demonstrated acceptable psychometric properties, in terms of validity and reliability (Wong et al., 2002).

Socio-demographics including age, gender, employment status and length of time they were homeless were

recorded. In relation to oral health attitude and behaviour, questions were asked about their oral hygiene practices, utilization of dental services, barriers to their use, and how they managed dental problems.

The questionnaire was designed in English which was then translated to Cantonese. A pilot testing for face and content validity was carried out before the questionnaire was finalized. According to the 2000 Survey (Social Welfare Department, 2000), most of the homeless have low educational background with only 4% having completed secondary education. Thus the questionnaire was administrated by face-to-face interview. Two interviewers were trained in the interviewing process among homeless people at a homeless center. Each questionnaire interview took approximately 15 minutes to complete.

Statistical analyses were made by SPSS 11.5. Overall response rate to the survey was calculated. Descriptive statistics were produced of their oral health status: level of edentualism, mean numbers of decayed, missing and filled teeth and the distribution of the highest CPI scores. Frequency distribution of responses to OHIP-14 questions was examined. Associations between oral health impacts (mean OHIP-14 scores) and potential factors (including socio-demographics, oral health behaviour, self-rated and clinical oral health status) were explored using parametric statistical tests on log transformed data (LN) in bivariate analysis. All factors were then subjected to multivariate testing for their effects on OHIP-14 score; a linear regression model with stepwise elimination was used, with OHIP-14 summary score (after logarithm conversion) as the dependent variable.

Results

With the help of the homelessness organizations, 191 homeless people were invited and 147 agreed to participate in this project, giving a response rate of 77%. The majority (65%) of the subjects were visited in the shelters for street sleepers, 16% at organization centers, and 19% were examined on the street.

One hundred and forty (95%) were men. The age of the participants ranged from 21 to 75 years with a mean age of 48. The majority of them (85%) were within the 35-64 year range. The period of homeless ranged from one month to 40 years, with a mean period of 53 months. Over half of them (52%) were homeless for less than one year. Three quarters of them were unemployed and 18% were currently working full time.

Of the total 147 participants, 85% of them claimed to own a toothbrush. Almost half of them (47%) claimed they brushed only once a day and 14% of them claimed they never brushed. Over half (51%) of the participants claimed they had dental pain in the past 12 months. More than 70% said that they needed to see a dentist. Approximately half (46%) reported their last dental visit was more than three years ago and 16% reported never attending a dentist. The key reason why they did not seek dental care was due to uncertainty of the cost (65%). When the participants were asked how they would manage dental decay with pain, 29% of them would seek dental care, 27% would request removal of the teeth, and 27% claimed they would manage the dental pain themselves. If they had a tooth broken, half of them would take no

action and only 23% of them would see a dentist about the trauma. For pain in general, 8% of the subjects reported that they would drink alcohol to relieve pain.

For clinically scored caries status DMFT and periodontal conditions CPI, Kappa statistics were 0.78 and 0.51, respectively, indicating a moderate to satisfactory examiner reliability.

Nine participants (6%) were edentulous and 41 (28%) had natural teeth less than 20. For dentate subjects, 127 (92%) had experience of dental caries in the form of missing, decayed or filled teeth with a mean DMFT of 8.07 (SD 7.43). The mean missing and decayed components dominated the DMFT, being M=4.04 (SD 5.78) and D=3.37 (SD 3.99), respectively. Approximately 79% had one or more decayed teeth. The mean number of filled teeth per person was only 0.66 (SD 1.58). Almost half of the dentate subjects (46%) had at least one anterior teeth missing and 13% had four or more upper anterior teeth missing.

Periodontal health was assessed among 132 individuals; 15 subjects were excluded because they were edentulous or refused the examination of their periodontium. None of the participants had a highest CPI score of zero (healthy gingivae) or one (bleeding on probing). Most of the subjects (96%) had periodontal pockets. The mean number of sextants with shallow and deep pockets was 2.51 and 1.18 respectively. Oral mucosal lesions were found among 18 people (12%), which were mainly mouth ulcers (13). Other features included white patches on buccal mucosa (1), oral candidiasis (1) and alveolar abscess (3).

With respect to oral health status, 90% of the participants rated their oral health as less than good and 52% considered their oral health to be poor or very poor. The prevalence of oral health impact on their daily life was 88% (i.e. the percentage who endorsed the frequency of impact on one or more of the OHIP-14 as occurring 'hardly ever' to 'very often') among the homeless participants within the past year (Table 1). Most commonly it was because of physical pain (70%). Fifty-eight percent reported experiencing pain which made it uncomfortable for them to eat. Social and psychological disturbances because of oral health were also common. For example, 49% claimed psychological disability and 44% claimed psychological discomfort because of their oral health status. Around 40% claimed they were handicapped because of their oral health problems with a quarter claiming they were totally unable to function at some point in the past year because of dental problem.

Socio-demographic disparities in the reported oral health burden were observed (Table 2). The correlation between age and OHIP-14 score was weak (r=0.189, p<0.05). Those who claimed to be homeless for one or more years had higher OHIP-14 score than those homeless for less than one year (p<0.05, t-test). In addition, those unemployed homeless reported more oral health burden than those who were working for pay (p<0.05).

Oral health impact was associated with oral hygiene practice. Those who reported not possessing a toothbrush had greater oral health burden than those who possess a toothbrush (p<0.01). There was a two-fold increase in oral health impacts among those who rated their oral health as poor or very poor compared to those who rated as

Table 1. Prevalence of oral health impact on quality of life

OHIP-14	% (n=147)
Functional limitation	49.7
Trouble pronouncing words	30.6
Taste worse	34.0
Physical pain	70.1
Painful aching	38.8
Uncomfortable to eat	58.5
Psychological discomfort	44.2
Self-conscious	41.5
Tense	25.2
Physical disability	55.7
Diet unsatisfactory	37.4
Interrupt meals	37.4
Psychological disability	49.0
Difficult to relax	27.2
Been embarrassed	39.5
Social disability	32.0
Irritable with others	18.4
Difficulty doing jobs	23.8
Handicap	39.5
Life unsatisfying	30.6
Unable to function	23.8
Total scale	87.8

good or excellent (p<0.001). Oral health burden was also associated with reported dental pain within the past year (p<0.01) and perceived need of dental care (p<0.05).

Furthermore, clinical oral health status was associated with oral health related quality of life. Those who were in need of prosthetic care, i.e. missing anterior teeth especially missing upper anterior teeth, more frequently claimed problems with their oral health (p<0.05). In addition, those who had higher DMFT scores experienced more oral health burden on life quality (p<0.05).

In regression analysis, the OHIP-14 scores was the dependent variable and the independent factors entered into the model were socio-demographics, oral health behaviour, self-rated and clinical oral health status (as categorized in Table 2; age entered as a continuous variable). The final linear regression model as a result of stepwise selection process is presented in Table 3. The variables significantly associated with OHIP-14 score were self-rated oral health, past dental pain, year of homeless and employment status (p<0.05). The model explained 29% (R² value 0.29) of the variance of OHIP-14 score.

Discussion

A key purpose of this paper was to draw attention to the burden of oral health on the life quality of a socially excluded population, homeless people. This study is among the first that reports data on OHRQoL of homeless persons. The participation of those organizations which provide

Table 2. Variations in oral health impact on quality of life

Variable	n	OHIP-14 score*	
		Mean (SD)	p value
Gender			
Male	140	2.01 (1.09)	0.807
Female	7	1.90 (0.81)	
Age group			
< 35 yrs	15	1.58 (1.34)	0.076
35-44 yrs	38	1.73 (1.11)	
45-54 yrs	56	2.27 (0.97)	
55-64 yrs	32	2.07 (0.97)	
> 64 yrs	6	1.87 (1.14)	
Year of homeless			
< 1 year	77	1.79 (1.18)	0.013
≥ 1 year	70	2.23 (0.90)	
Employment			
Yes	26	1.51 (1.06)	0.010
No	121	2.11 (1.05)	
Own a toothbrush			
No	22	2.44 (0.68)	0.002
Yes	125	1.92 (1.11)	
Self-rated oral health			
Good or excellent	15	0.9 (0.89)	0.000
Moderate	55	1.84 (1.10)	
Poor or very poor	77	2.33 (0.92)	
Dental pain			
No	72	1.68 (1.16)	0.001
Yes	75	2.31 (0.89)	
Need to seek dental care			
No	42	1.63 (1.17)	0.040
Yes	105	2.15 (1.00)	
Number of natural teeth[#]			
≥ 20	106	1.89 (1.09)	0.102
< 20	32	2.25 (1.06)	
Missing anterior teeth[#]			
Yes	63	2.18 (1.09)	0.041
No	75	1.80 (1.07)	
Missing upper anterior teeth[#]			
Yes	57	2.24 (1.06)	0.016
No	81	1.79 (1.08)	
DMFT[#]			
≥ 10	45	2.25 (0.93)	0.026
< 10	93	1.84 (1.14)	

* OHIP-14 scores were processed with logarithm conversion, i.e. LN [OHIP-14+1], before implementing parametric statistical analysis, t-test or ANOVA.
[#] Dentate only

services to the homeless facilitated us in accessing this group and encouraged participation such that the response rate was good, at over 75%.

The limitations of this study need to be addressed. Rather than a prospective design using a random sampling technique, a convenience sample was used due to the transient nature of the population and the difficulty in gaining access to their specific locations. The sampling technique and sample size may compromise the representativeness of this hard-to-reach population and restrict the generalization of findings.

In agreement with previous studies, the oral health status of the homeless group was poor with a high proportion of untreated decay and periodontal pockets (Blackmore *et al*., 1995; Gelberg *et al*., 1988; Gibson *et al*., 2003; Jago *et al*., 1984; Kaste and Bolden, 1995). The low utilization of

dental service among homeless people has been documented in previous research (Allukian, 1995; King and Gibson, 2003) and was reaffirmed in the present study. Uncertainty of cost or financial barrier was cited by homeless people as the key reason of not seeking dental care. Programmes of oral health promotion and education need to be designed for the increasing numbers of the homeless in Hong Kong. Homeless people need to be aware of the existing facilities for pain relief in government clinics as well as voluntary organizations without cost. Moreover it is important to inform them that lower cost dental services are provided by voluntary organizations, and to encourage them to seek social services assistance when in need of dental care.

Homeless people are more likely to report oral pain, to perceive a need for dental care, and to view their oral health as poor when compared to general population (Gelberg et al., 1988; Gibson et al., 2003; Jago et al., 1984). The present study supported these findings and provided data when comparing the study group to the general population in Hong Kong (Department of Health, 2001).

The burden of oral health on day to day living of homeless group was immense with almost 90% reporting an oral health impact in the past year. Although no information is available on the impact of oral disease on the daily life of homeless people, it is apparent that many socially deprived and excluded groups do suffer a significant oral health burden (Locker et al., 2002; McGrath, 2002).

Physical pain was common with many reporting it uncomfortable to eat because of dental problems. Likewise many suffered physical disabilities as a result of their oral health, finding that their diets were unsatisfactory and had to interrupt meals. The importance of oral health and nutrition and diet had long been suggested, as good oral health, particularly retention of teeth or adequate dentures are important for nutritional status (Steele et al., 2004; Walls et al., 2000). It is plausible that physical pain and disabilities which homeless people experience is compromising their nutritional health with impact on their general health status. Furthermore, almost 40% homeless people felt embarrassed or even unable to carry usual activities due to their oral health problems, exacerbating the isolation of homelessness. These findings provide insight into the significances of oral health to the lives of homeless people and how oral health burdens their daily lives. The substantive oral diseases found in homeless persons may not only result in loss of function, but also affect their self-esteem, well-being and ability to escape from homelessness.

Population norm data is available in Hong Kong with respect to oral health impact on life quality (as assessed by OHIP-14) for adults aged 35-44 and those aged 65-74 (Department of Health, 2001). On comparing the prevalence of impact at a domain level of those aged 35-44 among the homeless population studied with that of the general population aged 35-44, it is apparent that across all domains

Table 3. Multivariate linear regression analysis for OHIP-14 score

Variable	B	SE	Significance	95% CI for B	
				Lower bound	Upper bound
Self-rated oral health (excellent/good/fair vs very poor/poor)	0.576	0.158	<0.001	0.263	0.890
Dental pain (No vs Yes)	0.598	0.159	<0.001	0.284	0.912
Year of homeless (<1 year vs ≥1 year)	0.473	0.157	0.003	0.163	0.784
Employment (Yes vs No)	0.524	0.205	0.012	0.118	0.930

$R^2 = 0.29$

Table 4. Comparison of oral health impact on life quality between homeless people and general population in Hong Kong (Department of Health, 2001)

OHIP-14	Homeless, 35-44 yrs % (n=38)	General Population, 35-44 yrs % (n=375)
Functional limitation	36.8	35.2
Physical pain	63.2	49.6
Psychological discomfort	42.1	22.7
Physical disability	55.3	30.4
Psychological disability	50.0	20.6
Social disability	26.3	13.1
Handicap	36.8	10.9

the prevalence of impact among the homeless population was higher (Table 4). Of note, experience of a psychological disability and social disability among the homeless group was more than twice as prevalent compared to the general population findings. Experience of handicap as a result of oral health was three times more common among the homeless compared to the general population.

Socio-demographic disparities in the oral health impact on life quality existed among the study population. The length of time being homeless was shown to be associated with the burden of oral health on daily life of the homeless group. This indicates that homelessness is a threat to oral health and how it impacts on quality of life. Results from the multiple regression analysis reaffirmed that sociodemographic variables, i.e. employment status and length of time being homeless were significantly related to oral health impacts. Of the clinical oral health status factors, number of missing teeth, especially missing upper anterior teeth was associated with oral health impact. Those deemed to have prosthetic need (having tooth space anterior to the premolars) experienced more oral health burden on daily life than those without prosthetic treatment need. This supports previous reports that providing dentures for a homeless adult having missing teeth, especially missing front teeth, may dramatically improve his/her self confidence and attitude toward health and enhance self-esteem (US Department of Health and Human Services, 2001).

In conclusion, the results of this study provide baseline information on the oral health and its impact on life quality of Chinese homeless people in Hong Kong. The prevalence of oral diseases among homeless was high and has a substantial impact on their life quality. Furthermore, the oral health impact experienced was associated with socio-demographic factors, oral hygiene practice, perceived dental problems and needs, and clinical oral health status.

Acknowledgement

References

Allen, P.F. (2003): Assessment of oral health related quality of life. *Health and Quality of Life Outcomes* **1**:40-47.

Allukian, M. Jr. (1995): Oral health: an essential service for the homeless. *Journal of Public Health Dentistry* **55**, 8-9.

Blackmore, T., Williams, S.A., Prendergast, M.J., Pope, J.E. (1995): The dental health of single male hostel dwellers in Leeds. *Community Dental Health* **12**, 104-109.

Brennan, D.S. and Spencer, A.J. (2005): Comparison of a generic and a specific measure of oral health related quality of life. *Community Dental Health* **22**:11-18.

Burnette, C.W., Nakashima, J., MacGuire, J. (2005): Community Homelessness Assessment, Local Education and Networking Groups (CHALENG) Report. http://www1.va.gov/homeless/docs/CHALENG_2004_Report.pdf

Department of Health. (2001): *Oral health survey 2001*. Hong Kong.

Gelberg, L., Linn, L.S., Rosenberg, D.J. (1988): Dental health of homeless adults. *Special Care in Dentist* **8**, 167-172.

Gibson, G., Rosenheck, R., Tullner, J.B., Grimes, R.M., Seibyl, C.L., Rivera-Torres, A., Goodman, H.S., Nunn, M.E. (2003): A national survey of the oral health status of homeless veterans. *Journal of Public Health Dentistry* **63**:30-37.

Jago, J.D., Sternberg, G.S., Westerman, B. (1984): Oral health status of homeless men in Brisbane. *Australian Dental Journal* **29**:184-188.

Kaste, L.M. and Bolden, A.J. (1995): Dental caries in homeless adults in Boston. *Journal of Public Health Dentistry* **55**:34-36.

King, T.B. and Gibson, G. (2003): Oral health needs and access to dental care of homeless adults in the United States: a review. *Special Care in Dentist* **23**: 143-147.

Locker, D. (1988): Measuring oral health: a conceptual framework. *Community Dental Health* **5**:3-18.

Locker, D., Matear, D., Stephens, M., Jokovic, A. (2002): Oral health-related quality of life of a population of medically compromised elderly people. *Community Dental Health* **19**:90-97.

McGrath, C. (2002): Oral health behind bars: a study of oral disease and its impact on the life quality of an older prison population. *Gerodontology* **19**:109-114.

Slade G.D. (1997a): *Measuring oral health and quality of life*. Chapel Hill: University of North Carolina.

Slade, G.D. (1997b): Derivation and validation of a short-form oral health impact profiles. *Community Dentistry and Oral Epidemiology* **25**: 284-290.

Social Welfare Department. (2000): *Survey of Street Sleeper 2000*. Hong Kong.

Steele, J.G., Sanders, A.E., Slade, G.D., Allen, P.F., Lahti, S.N., Nuttall, N., Spencer, A.J. (2004): How do age and tooth loss affect oral health impacts and quality of life? A study comparing two national samples. *Community Dentistry and Oral Epidemiology* **32**:107-114.

US Department of Health and Human Services (2001): Homelessness and oral health. http://bphc.hrsa.gov/hchirc/pdfs/newsletter/winter_2001.pdf

Walls, A.W.G., Steele, J.G., Sheiham, A., Marcenes, W., Moynihan, P.J. (2000): Oral health and nutrition in older people. *Journal of Public Health Dentistry* **60**:304-307.

Waplington, J., Morris, J., Bradnock, G. (2000): The dental needs, demands and attitudes of a group of homeless people with mental health problems. *Community Dental Health* **17**:134-137.

Wong, M.C., Lo, E.C., McMillan, A.S. (2002): Validation of a Chinese version of the Oral Health Impact Profile (OHIP). *Community Dentistry and Oral Epidemiology* **30**:423-430.

World Health Organization. (1997): *Oral health surveys: basic methods*, 2nd edn, Geneva.