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Halitosis in Hong Kong: A Community Based Study

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Halitosis in Hong Kong: A Community Based Study

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1.0 Abstract

Objectives: The aim of this study was to estimate the prevalence of self-reported halitosis (SRH) in the territory of Hong Kong SAR, China. In addition, to identify socio-demographic, oral health, and behavioural factors associated with SRH.

Methods: A quota sample of 450 Chinese adults in Hong Kong SAR, China was recruited from random digit telephone dialing. Through anonymous telephone interviews, subjects were interviewed about their self-reported prevalence of halitosis (duration and severity). In addition, information on socio-demographic factors (age, gender, formal education attainment, family income), oral health factors (global rating of oral health, perceived dental caries status, perceived periodontal health status) and behavioural factors (use of dental services, tooth brushing, use of additional oral hygiene aids, smoking and alcohol use).

Results: The prevalence of SRH was 40.7% (183/450); and most who reported experiencing halitosis claimed to experience it at least once a week (44.9%, 80/178). The mean severity score of SRH was 3.62 (SD=1.84). SRH was associated with socio-demographic factors: age ($p<0.05$), formal education attainment ($p<0.05$), oral health factors: global rating of oral health ($p<0.001$), perceived dental caries status ($p<0.05$), perceived periodontal health status ($p<0.05$), and behavioural factors: use of dental services ($p<0.05$) and use of additional oral hygiene aids ($p<0.05$).

Conclusion: Halitosis is relatively prevalent in Hong Kong SAR, China. Self-reported halitosis is associated with socio-demographic, oral health and behavioural factors. These findings highlight that halitosis as a public health issue that should be further investigated and managed.

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2.0 Introduction

Halitosis can be defined as “a disorder characterized by persistent bad or offensive breath coming from the oral cavity” (Gage, 1997). Colloquial terms for halitosis include ‘bad breath’, ‘offensive breath’ and ‘oral malodour’. Halitosis has long been reported in the literature; in 1821 the term was coined from the Latin term ‘Hali’ meaning breath and ‘-osis’ from Greek to describe a condition. Despite acknowledgement of this condition for many centuries, only recently has there been considerable interest in the condition amongst the dental profession. (Rosenburg, 1992; Bosy, 1997)

The aetiology of halitosis can be classified according to its origin (extrinsic and intrinsic). Extrinsic causes include the temporarily malodour from external substances such as tobacco, alcohol and certain food. Intrinsic causes include those of oral origin (i.e. tongue, periodontium) or systemic origin (i.e. respiratory, gastrointestinal and others) (Bosy, 1994). One of the major localized causes of halitosis from the oral cavity is the release of volatile sulphur compounds (VSCs) from bacteria originating from the mouth due to periodontal diseases and other oral infections (Al-Ansari et al., 2006). Species involved in the release of VSCs are mainly gram-negative bacteria such as *Porphyromonas gingivalis*, *Prevotella intermedia*, *Tannerella forsythensis*, *Fusobacterium nucleatum* (Awano et al., 2002). The mouth is a breeding ground for anaerobic bacteria in particular the distal third of the tongue (Tonzetich, 1977).

Systemic causes include respiratory tract infections: tonsillitis, sinusitis and post-nasal drip, diabetic ketoacidosis, renal failure, gastrointestinal disorders and the use of certain medications (Al-Ansari et al., 2006). The habit of eating spices and substances absorbed via the gastrointestinal system into the circulatory system may

be released in pulmonary expired air or via saliva as volatile odoriferous compounds derived from foods (Lee, 2007).

Many methods have been developed in recent decades to assess halitosis however their implementation in their clinical setting is limited, owing to the sensitivity and specificity concerns (Rosenburg, 1996). Hence, self-reported subjective assessment of halitosis remains important. Moreover, it is the key reason why people seek care for the management of halitosis.

Estimates of the prevalence of self-reported halitosis has for the most part, been obtained from clinical (patient) samples (Miyazaki et al., 1995; Ayo-Yusuf et al., 2005; Liu et al., 2006). Few studies have considered the prevalence of halitosis in a random community based population sample, particularly in Asia.

3.0 Aims and Objectives

1. To estimate the prevalence of self-reported halitosis in Hong Kong SAR, China.
2. To describe the frequency and severity of self-reported halitosis among those who claim to experience halitosis.
3. To identify associations between self-reported halitosis and socio-demographic, oral health, and behavioural factors.

4.0 Material and Methods

4.1 Sampling Frame

The sampling frame for this study was all adults over the age of 18 in Hong Kong SAR, China. According to the official statistics of Census and Statistic Department in Hong Kong, the population distribution in different age groups (20-39, 40-59, >59) are reported as 29.8%, 33.6% and 18.6% of the total population respectively, *Table 1* (Hong Kong 2009 Population Census; Census and Statistics Department 2011, <http://www.gov.hk/en/about/abouthk/factsheets/docs/population.pdf>). A proposed sample size of 400 was determined based on sample power calculation (80% statistical power, based on estimated prevalence of 20% in the community): given the potential of non-response, it was prudent to obtain a sample size of 450. A random sample of telephone numbers (1500) was obtained from the Telephone Survey Unit, Social Sciences Research Centre, The University of Hong Kong (www.ssrc.hku.hk).

Table 1 Population by age group in Hong Kong 2010

Age group	Population ('000)	Percentage of total population (%)
20-39	2113.5	29.8
40-59	2387.0	33.6
> 59	1317.4	18.6

4.2 Data Collection

Data was collected by means of a telephone interview which comprised of 28 specific questions. Firstly, subjects were asked if they thought they had halitosis, the frequency and the severity of their halitosis, how they recognized it, and at what period it was most offensive. In addition, subjects were asked to rate how it affected their social interaction and daily life; their knowledge of the causes of halitosis and how they managed it (including whether they sought professional help or not). All participants were asked if they recognized halitosis among their family members, colleagues and friends, whether they would inform them of such, and how it would affect their interpersonal relationship. The second part inquired about each individual's oral health behavioral practices, including oral hygiene practices, dental attendance, use of smoking and alcohol products. The third part collected information on socio-demographic data, including age, gender, formal educational attainment and income level.

4.3 Data Analysis:

Data was analyzed using the Statistical Package for Social Sciences (SPSS) software (Chicago, IL, USA), version 17. Frequency distributions were calculated for all study variables: prevalence (percentage, number), and mean (SD values) where applicable.

Associations between SRH and socio-demographic variables (age, gender, formal education attainment, income level), oral health status (self-perceived caries status, self-perceived periodontal status, global rating of oral health) and behavioral factors (dental attendance, toothbrushing frequency, use of additional oral hygiene aids, smoking and alcohol usage) were examined using chi-square tests and Student's t-tests as applicable.

5.0 Results

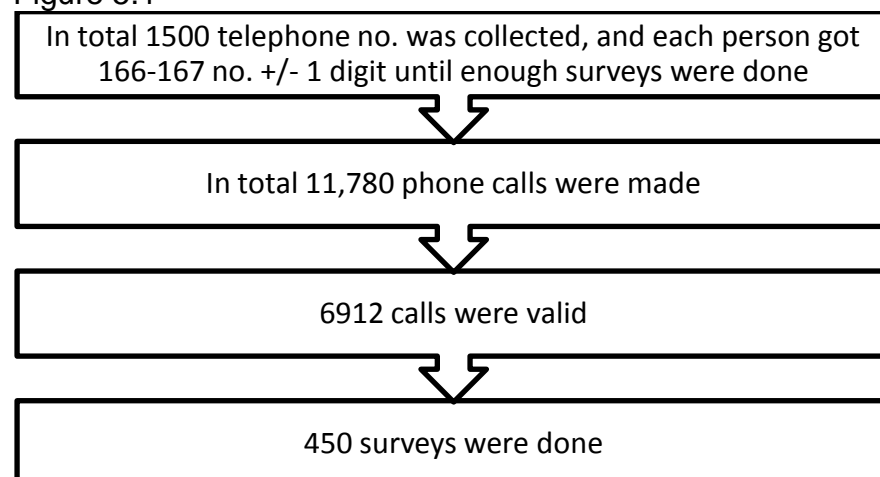
5.1 Response Rate and Profile of the Group

A quota sample of 450 telephone interviews was obtained, *Figure 5.1*. The socio-demographic profile of the survey population is presented in *Table 5.1*. More than half of the subjects were aged under 40 (58.4%, 263), 52.9% (238) were female, and 54% (243) had obtained post-secondary education. More than one third (33.8%, 152) of them had a family income of 30,000 or above.

Table 5.1 Socio-demographic profile of the study group

		%	(n)
Age	18-40	58.4	(263)
	41-59	29.3	(132)
	60 or above	12.2	(55)
Gender	Male	47.1	(212)
	Female	52.9	(238)
Formal educational attainment	Primary or below	11.1	(50)
	Secondary	34.9	(157)
	Post-secondary	54	(243)
Monthly family income (HKD)	Below 10,000	14.2	(64)
	10,000-19,999	29.1	(131)
	20,000-29,999	18.4	(83)
	30,000 or above	33.8	(152)

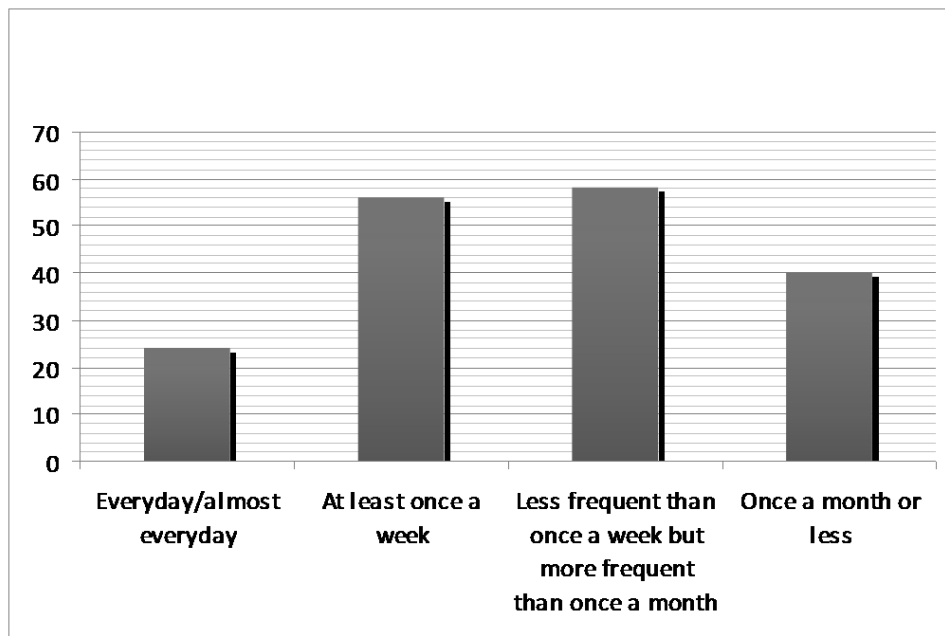
Figure 5.1



5.2 Self-Reported Halitosis

Four in ten (40.7%, 183/450) of the respondents reported experiencing halitosis ('bad breath') in the past month. Among them, 44.9% (80/178) claimed to experience halitosis at least once a week, *Figure 5.2*. Participants rated the severity of their halitosis on a 1 to 10 scale; their scores ranged from 1-10 with a mean score of 3.62 (SD=1.837), and a median of 3.00 (Interquartile range=3.00).

Fig. 5.2 Frequency of self-reported halitosis



Among those who claimed to experience halitosis, 1 in 5 (19.3%, 35/181) claimed that their halitosis affects their daily life to a moderate-to-great extent, *Table 5.2*. Among those who reported halitosis, relatively few sought professional advice (16.6%, 30/181), *Table 5.3*.

Table 5.2 ‘To what extent does it affects your daily life?’*

Extent of effect	%	(n)
No effect	38.7	(70)
To little extent	42.0	(76)
To moderate extent	11.6	(21)
To a great extent	7.7	(14)
*total=181		

Table 5.3 ‘Have you sought professional advice, and if so from whom?’*

Professional advice sought	%	(n)
Dentist	12.7	(23)
Physician	1.7	(3)
Chinese Medical Doctor	5.0	(9)
Reference book	0.6	(1)
*total=181		

Almost half of the subjects who claimed to have experienced halitosis (44.3%, 77/174) regarded diet as the major cause of halitosis. Systemic diseases (33.3%, 58/174) and insufficient oral hygiene (32.8%, 57/174) were both believed to cause halitosis by approximately one third of the subjects. More than a quarter subjects considered insufficient sleep (26.4%, 46/174) and ‘hot air’ (熱氣) (25.9%, 45/174) as causative factors of halitosis while one fifth of the subjects (21.8%, 38/174) also reported oral diseases as a major cause of halitosis. Other causes suggested by a minority include dehydration and smoking, etc, *Table 5.4*.

Table 5.4 Major causes of bad breath*

What do you think are the major causes of bad odour?	%	(n)
Diet	44.3	(77)
Systemic diseases	33.8	(58)
Insufficient oral hygiene	32.8	(57)
Insufficient sleep	26.4	(46)
Hot air	25.9	(45)
Oral diseases	21.8	(38)
Dehydration	9.2	(16)
Smoking	6.3	(11)
Others	9.2	(16)

*Up to 3 main causes cited

More than half of subjects (53.7%, 95/177) who claimed to have experienced halitosis managed it through tooth brushing or flossing. Four in ten (40.7%, 72/177) of subjects used chewing gum or mints while 32.8% (58/177) found drinking water helpful. Mouth rinsing was carried out by approximately one third of subjects (31.6%, 56/177). Other management methods reported included use of herbal tea or Chinese medicine, diet control, professional help and sufficient sleep, *Table 5.5*.

Table 5.5 Management of bad odor*

How did you manage your bad odour?	%	(n)
Tooth brushing/ flossing	53.7	(95)
Chewing gum/mints	40.7	(72)
Drinking water	32.8	(58)
Mouth rinsing	31.6	(56)
Herbal tea/ Chinese medicine	19.2	(34)
Diet control	18.6	(33)
Professional help	8.5	(15)
Sufficient sleep	6.2	(12)
Others	6.8	(11)

*Up to 3 main methods of management were cited

Of those who self-reported halitosis, 4 in 5 (82.5%, 151/183) felt that their halitosis became more offensive at a particular time of the day. Most of these respondents reported that their halitosis was the most severe when they just wake-up (73.5%, 111/151). Of those who experienced self-reported halitosis, 3 in 4 (78.1%, 143/183) first recognized their halitosis themselves (through self-alert). In a minority of cases, they became aware of their halitosis problem by a family member (9.3%, 17/183), spouse (7.1%, 13/183) or friend (4.9%, 9/183).

5.3 Effect of halitosis on social interaction

Most (72.9%, 328/450) claimed they would inform their spouse/girlfriend/boyfriend if they had bad breath and likewise their family members (78.9%, 355/450). Approximately one third (35.1%, 158/450) of respondents would inform a friend if their friends have halitosis and one in five (21.6%, 97/450) would inform their colleagues, Table 5.6.

Table 5.6 'If the following people have halitosis, will you inform them?'

	Yes % (n)	Perhaps % (n)	No % (n)
Spouse/Girlfriend/Boyfriend	72.9 (328)	10.7 (48)	11.1 (50)
Family member	78.9 (355)	5.3 (24)	13.8 (62)
Colleague	21.6 (97)	20.9 (94)	49.8 (224)
Friend	35.1 (158)	28.9 (130)	34.7 (156)

Most of respondents reported that halitosis would affect their relationship with spouses/boyfriends/girlfriends (59.1%, 266/450), colleagues (60.9%, 274/450) and friends (64.2%, 289/450) respectively. In addition, approximately half (46.9%, 211/450) of the respondents felt that halitosis will affect the relationship with their family members, Table 5.7.

Table 5.7 Effect of halitosis on social interaction

	No effect % (n)	To little extent % (n)	To some extent % (n)	To a great extent % (n)	To very great extent % (n)
Spouse/Girlfriend/ Boyfriend	36.7 (165)	23.8 (107)	19.6 (88)	10.7 (48)	5.1 (23)
Family member	51.6 (232)	26.0 (117)	12.7 (57)	4.9 (22)	3.3 (15)
Colleague	30.4 (137)	22.9 (103)	26 (117)	8.7 (39)	3.3 (15)
Friend	32.7 (147)	28.8 (121)	28.2 (127)	6.9 (31)	2.2 (10)

5.4 Variation in Self-reported Halitosis

Self-reported halitosis in the past month was associated with socio-demographic factors: age ($p < 0.05$) and formal educational attainment ($p = 0.01$), *Table 5.8*. Subjects aged 41-59 years and those without tertiary education attainment more frequently reported experiencing halitosis.

Table 5.8 Various socio-demographic factors associated with self-report halitosis

Socio-demographic factors	Yes %	(n)	No %	(n)	P-value*
Age					
18-40	36.1	(95)	63.9	(168)	0.03
41-59	50.0	(66)	50.0	(66)	
≥ 60	40.0	(22)	60.0	(33)	
Gender					
Male	45.3	(96)	54.7	(116)	0.06
Female	36.6	(87)	63.4	(151)	
Formal educational attainment					
Secondary or below	46.9	(97)	53.1	(110)	0.01
Post-secondary	35.4	(86)	64.6	(157)	
Monthly family income					
Below HKD 10,000	42.4	(27)	57.8	(37)	0.79
Above or equal to HKD 10,000	40.7	(148)	59.3	(218)	

*P-value obtained from Chi-square statistics

Oral health factors were also associated with SRH: global rating of oral health ($p<0.001$), self-reported dental decay ($p=0.04$) and self-reported periodontal disease ($p=0.01$), *Table 5.9*. Those who rated themselves with a lower global rating of oral health, with self perceived dental decay and gum disease more frequently reported experiencing halitosis.

Table 5.9 Various oral health factors associated with self-report halitosis

Oral Health Factors	Yes		No		P-value*
	%	(n)	%	(n)	
Self rating of Oral health					
Average or below	46.3	(142)	53.7	(165)	<0.01
Good to very good	28.7	(41)	71.3	(102)	
Self-reported Tooth decay					
Yes	47.6	(69)	52.4	(76)	0.04
No	37.4	(114)	62.6	(191)	
Self-reported Gum disease					
Yes	49.6	(69)	50.4	(70)	0.01
No	36.7	(114)	63.3	(197)	
Wearing of Partial Denture					
Yes	41.4	(166)	58.6	(235)	0.37
No	34.7	(17)	65.3	(32)	
Number of natural teeth					
20 or more	40.3	(162)	59.7	(240)	0.65
Less than 20	43.8	(21)	56.3	(27)	

*P-value obtained from Chi-square statistics

In addition, SRH was associated with behavioral factors: dental attendance patterns ($p=0.03$) and use of additional interdental hygiene aids ($p=0.04$), *Table 5.10*. Those who had a habit of using interdental aids or visiting the dentist regularly less frequently reported experiencing halitosis.

Table 5.10 Various behavioral factors associated with self-report halitosis

Behavioral Factors	Yes %	(n)	No %	(n)	P-value*
Smoking					
Yes	52.7	(27)	47.1	(24)	0.06
No	38.9	(155)	61.1	(243)	
Drinking alcohol					
Yes	42.1	(53)	57.9	(73)	0.71
No	40.1	(130)	59.9	(194)	
Pattern of dental visit					
Regular	35.3	(76)	64.7	(139)	0.03
Irregular	45.5	(107)	54.5	(128)	
Toothbrushing habit					
twice a day or more	40.4	(166)	59.6	(245)	0.60
once or less a day	44.7	(17)	55.3	(21)	
Use of Mouthrinse					
Yes	40.0	(62)	60.0	(93)	0.84
No	41.0	(121)	59.0	(174)	
Use of Chewing gum					
Yes	40.4	(88)	59.6	(130)	0.90
No	40.9	(95)	59.1	(137)	
Use of interdental aids					
Yes	35.4	(73)	64.6	(133)	0.04
No	45.1	(110)	54.9	(134)	

*P-value obtained from Chi-square statistics

6.0 Discussion

It was feasible to obtain 450 interviews from the Hong Kong SAR, China community to participate in this study. This reflects the efficiency and effectiveness of random digit telephone method in epidemiological surveys as has been reported by others (Spencer et al., 1997). In order to obtain the required quota sample, more than 1500 numbers were dialed. Recent change in telecommunication regulations that allow 'cold call' to be blocked is an issue for researchers using random digit telephone method to consider. Nevertheless, the socio-demographic profile of survey participants approximated to that of the Hong Kong Census data in terms of gender and age group, and thus can be considered relatively representative of the HKSAR, China community (<http://idds.censtatd.gov.hk/Default.aspx>).

SRH was relatively common in HKSAR, China (approximately 40% reported experiencing self-perceived halitosis in the past month). This prevalence is comparable to the estimate suggested by the American Dental Association, 2003 (50%). Other reports of halitosis suggested the frequency ranges from 22% to 50% (Tonzetich et al., 1976; Bosy, 1997), study in Japan: 23% (Ueno et al., 2007); France: 22% (Frexinos et al., 1998); Mainland China: 28% (Liu et al., 2006); Italy: 19% (Settineri et al., 2010); Canada 23% (Bosy et al., 1994). This variation in prevalence of SRH may relate to many factors such as sampling frame (community vs. population), sampling method (telephone survey vs. other methods) and method of data collection or indeed true sample variations.

In this study, the mean severity score of SRH was 3.62 ± 1.84 (on 1-10 scale). One in five who experienced halitosis claimed that it had a 'moderate to great' effect on their daily life. Other studies have reported varying severity of halitosis which in part

may relate to method of assessment and/or study sample variations (Ueno et al., 2007). Approximately half (45%) of those who reported experiencing halitosis claimed they experienced halitosis at least once a week. However, lack of comparable data obtained from other studies precludes comparisons to be made.

The major cause of halitosis was perceived to be largely diet related. Strong flavored food such as raw onion, garlic, spices and dairy products containing protein have been related to cause halitosis (Lee et al., 2004). An interesting finding of this community health project was one in four subjects believed insufficient sleep and 'hot air' (熱氣) were the major causes of halitosis. This may relate to a widely-held belief in traditional Chinese medicine in the aspect of imbalance between 'yin' and 'yang' which is thought to cause 'hot air' (Lim et al., 1994).

Most subjects realized that adequate oral hygiene was necessary to prevent halitosis, hence implementing tooth brushing and flossing for its management; this concurs with other findings (Bosy, 1997). Maintaining good oral hygiene can help to prevent oral diseases including dental caries, periodontal diseases or dental infection which are the key causes of halitosis. In respect to people's belief in Chinese medicine, it is noted that one in five subjects who claimed to have experienced halitosis would drink herbal tea or use Chinese medicine to tackle the problem as this is thought to exist to re-establish an equilibrium status in the body, i.e. balance between 'yin' and 'yang' (McGrath, 2005).

It is interesting that if their partner or family members had halitosis, most subjects were more likely to tell them of it than if a colleague or friend had halitosis. This suggests that people are hesitant to talk about halitosis, unless it's with those whom they are intimate with (Eli et al, 2001). Another interesting finding was that the

majority of participants felt that if a friend, colleague, or partner had halitosis, it would affect their relationship more so than if it was with their family members. This suggests that subjects may-be more willing to forgive or tolerate aspects of family members than friends, colleagues or partners - after all, 'blood is thicker than water'!

Several socio-demographical factors were associated with SRH. Younger adults (aged 18-40) were the least likely to report halitosis and those aged 41-59 were most likely to report halitosis. Interestingly, those aged 60 or older were less likely to report halitosis than those aged 41-59. A national survey in Japan also identified those aged 41-59 as most frequently reported halitosis (The National Survey on Health and Wealth, Japan, 1999). Older people, given issues of xerostomia and other factors, are potentially more likely to experience halitosis, but perhaps do not self perceive it as a health concern, given that they have numerous other health problems.

Level of formal educational attainment was also associated with SRH. Those with higher formal educational attainment less frequently reported halitosis than those with lower formal educational attainment. The issue of poor oral health among people with lower level of formal educational attainment has long been recognised, and the findings of this community health project would suggest that halitosis is also a concern for them (Watt et al., 1999).

Oral health factor (self-reported) were associated with reports of halitosis. Of note, there was a strong association between self-reported oral health (global rating) and prevalence of SRH. This suggested that halitosis is indeed considered by the public in their conceptualization of oral health. SRH was also associated with self-perceived dental caries status and self-perceived periodontal status. It has long been recognized that untreated dental caries and periodontal diseases are related to halitosis (Liu et al., 2006).

A number of behavioral factors were associated with SRH: dental attendance and use of additional oral hygiene aids. 'Regular' dental attendees less frequently reported halitosis than 'irregular' dental attendees. This may relate to differences in oral health knowledge, attitude and behavioral of regular dental attendees than irregular dental attendees, and/or the benefit of a regular dental visit. The use of additional oral hygiene aids (such as interdental cleansing agents) were associated with SRH, suggesting that in addition to tooth brushing (twice a day), other oral hygiene aids are useful in combating halitosis (Lee et al., 2004).

7.0 Conclusions

In Hong Kong SAR, China, halitosis (self-reported) is relatively common (a population estimate of approximately 40%). Among those who reported experiencing halitosis, one in five claimed that it affected their daily life to a 'moderate/ great' extent.

There was some confusion among the public about the causes of halitosis and how to prevent or manage halitosis. The Chinese health belief that 'hot air' (熱氣) causes halitosis was a commonly held belief and the use of traditional Chinese medicine to manage halitosis was also common. Less than 10% of those who reported experiencing halitosis sought professional help.

In general the public claimed that if their spouses/partners; family members, colleagues, or friends had halitosis it would affect their social interactions with them. They would be less likely to alert a colleague or friend of halitosis than they would a family member or spouse/partner.

Socio-demographic factors, oral health factors and behavioral factors were associated with SRH. Age and level of formal educational attainment was associated with reports of halitosis. In addition, global ratings of oral health, perceived experience of tooth decay and perceived experience of periodontal disease were associated with reports of halitosis. Dental attendance patterns and use of interdental cleaning aids were associated with reports of halitosis.

8.0 Recommendations

In this community health project we estimated that halitosis (self-reported) in Hong Kong was relatively common (~40% of the public reported experiencing it). It would be useful to investigate the association between self-reported halitosis and clinical 'objective' assessments of halitosis (i.e with the use of Halimeter, OralChroma, and/or organoleptic assessments) to support or refute the claim that halitosis is a prevalent condition in Hong Kong SAR, China.

Despite the fact that halitosis was relatively common and in some cases impacting daily life to a moderate-great extent; relatively few sought professional advice for its management. There is a great need to enhance public awareness about the role of health care providers, particularly dentist in the management of halitosis.

There appears to be misconceptions with regards to the causes of halitosis and how to manage it among the Hong Kong population. It is important to identify good and bad practices in preventing and managing halitosis in the community (including adopting traditional health beliefs and practices where appropriate).

Interestingly many perceived that if others had halitosis (their spouse/partner, family members, colleagues or friends), then it would affect how they socially interacted with that person. Few would inform colleagues or friends of the problem. This highlights the need for further investigation and openness surrounding issues of halitosis.

Age and lower educational status were associated with self reported halitosis. This is likely to have implications in planning oral health promotion activities and/or other services for the Hong Kong community.

The observed association between self-perceived dental caries and periodontal, and halitosis suggests that the issue of halitosis could be considered in oral health promotion campaigns to encourage early management of these oral health problems. Moreover, the observed association between dental attendance and halitosis suggests that regular dental attendance may be useful in managing halitosis and ought to be recommended.

Of note the use of additional oral hygiene aids was associated with reported halitosis. It would be useful to investigate further in the clinical setting through means of clinical trials the effectiveness of different oral hygiene regimes in the management of halitosis.

9.0 Acknowledgements

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11.0 Appendices

Appendix 1 Questionnaire

Faculty of Dentistry

The University of Hong Kong

Prince Philip Dental Hospital
34 Hospital Road
Hong Kong



香港大學牙醫學院

香港西營盤醫院道 34 號

Case Number: _____ Interviewer: _____

1. Do you think you have bad breath in the past months? Yes (to Q5-28) No (to Q2-4, 14-28)

2. What do you do to prevent/avoid getting bad breath? (3 answers required)

3. If any of the following had bad breath, how would it affect your relationship with them?

	Yes	No	Perhaps	N/A
Spouse or Boyfriend/Girlfriend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Family members	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Colleague	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. How does it affect your relationship with the following people?

	No effect	To little extend	To some extend	To a great extend	To a very great extend
Spouse or Boyfriend/Girlfriend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Family members	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Colleague	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(skip to Q14)

5. How often do you have bad breath?

Everyday
 Almost everyday
 At least once a month
 Less frequent than once a week but more frequent than once a month
 Once a month

6. How would you grade your severity of bad breath?

The best possible odour The worst possible odour

|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

1 2 3 4 5 6 7 8 9 10

7. Do you feel your breath become particularly offensive at some time of each day? Yes No
 If yes, when is it?
 Just wake up Before meals After meals Others (Please specify): _____
8. How did you first recognise it?
 Self-alert Spouse Family members Friends
9. What do you think are the major causes of it?(3 key causes, if <3 put down "nothing else")

10. How did you manage it? (3 major ways)

11. Have you sought professional advice? Yes No
 If yes, from whom?
 Dentist Physician Chinese Medical Doctor Others (Please specify) : _____
 Do you find it effective? Yes No
12. To what extend it affects your life?
 No effect To little extend To some extend To a great extend To a very great extend
13. What are the major ways it affects your life?

14. What is your age? _____
15. What is your gender? Male Female
16. Did you visit dentist regularly? Yes No
17. When was the last time of your visit? Within one year More than one year
18. Reason for attendance? Pain motivated Not pain motivated
19. How often do you brush your teeth a day? Less than once a day Once a day Twice or more
20. Do you use other additional oral hygiene aids?
 Mouthrinse Chewing Gums Interdental cleaning aids Others (Please specify): _____
21. How would you rate your oral health?
 Very poor Poor OK Good Very good

22. Do you think you have dental decay? Yes No
 Do you think you have gum disease? Yes No
23. How many natural teeth do you have? More than 20 10-20 Less than 10
24. Do you wear denture?
 Complete denture Partial denture No
 Upper
 Lower
25. Are you a smoker? Current Previous Never
 If yes, how many cigarettes per day? _____
26. Do you drink alcohol? Daily Weekly More than weekly No
 If yes, how many units? (1 unit = 1/2 a pint of beer or 1 glass of wine) _____
27. Please indicate your highest formal education attainment.
 Primary or below Secondary Post-secondary Degree
28. What is your monthly family income?
 Below \$10,000 \$10,000-19,999 \$20,000-29,999 \$30,000 or above

That's the end of the interview. Thank you for your time.