

1 **Traditional oral health beliefs of Bulang people in Yunnan, China**

2 **Running title: Traditional oral health beliefs and practice of Bulang people**

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29

30 **Abstract**

31

32 **Objectives:** *To explore traditional oral health beliefs among the Bulang ethnic minority group*
33 *in China.*

34

35 **Methods:** *Eighteen village leaders, chiefs, elders, and seniors in Yunnan, China, were assigned*
36 *to three focus groups for discussion of traditional oral health beliefs. The discussions were led*
37 *by a facilitator. Transcripts were made and data were extracted.*

38

39 **Results:** *The focus-group discussions on the traditional oral health beliefs basically addressed*
40 *three themes. The first theme was the perception of oral health. The second theme was the*
41 *impact of healthy teeth (oral health). Healthy teeth essentially had impact on physical health,*
42 *emotions, and social status. The third theme was management of a toothache, which was regard*
43 *as tooth decay (dental caries). Blackening teeth was one of the pain relief methods. Blackened*
44 *teeth were reported as part of ethnic identity and not considered aesthetically unpleasing. It*
45 *also indicated the marital status of women.*

46

47 **Conclusion:** *Some Bulang people believed a healthy dentition has no spacing, pain, or*
48 *functioning problems. Well-aligned dentition qualified a person to have a higher social status.*
49 *Toothaches were considered caused by tooth-worms. Consulting a monk was another way to*
50 *manage a toothache. Tooth blackening was their tradition and was considered effective in*
51 *caries prevention.*

52 **Introduction**

53 China is a big country in the eastern part of Asia, with an estimated area of 10 million
54 square kilometres. It has the world's largest population of approximately 1.4 billion [1]. Its
55 populace comprises 56 ethnic groups, with Han as the main ethnic group, making up
56 approximately 93% of the population [1]. The populations of the other 55 ethnic minority
57 groups vary from a few thousand to more than 16 million. They are scattered across the country,
58 but the majority live in inland or border districts within the less-developed western region.
59 These ethnic minorities are culturally and linguistically diverse. In response, the central
60 government has established policies and allocated resources to promote social and economic
61 development. On the other hand, the policies were also intended to preserve the characteristic
62 culture of these ethnic minorities. Formicola et al. [2] reported that providing culturally
63 competent services has become a growing concern for the healthcare professionals. Such
64 services may facilitate rapport with the ethnic minorities because they have their own
65 knowledge, attitude and behaviour towards oral health and management of oral diseases. At
66 present, there is little information about the oral health beliefs and care-seeking behaviours of
67 the ethnic minorities in China.

68

69 Bulang is one of the 55 ethnic minority groups, with a population of approximately
70 120,000 [3]. The majority of the Bulang people (97%) live in the mountainous areas along the
71 Mekong River on the south-western frontier of Yunnan Province, which is 1,500 to 2,300
72 metres above sea level [3]. The social development of the Bulang people is below the national
73 average, and Bulang is one of seven poor ethnic minority groups that receive special economic
74 support from the central and local governments [4]. Apart from China, Bulang people can also
75 be found as an ethnic minority group in neighbouring Laos, Myanmar, and Thailand.

76

77 Bulang people speak a language that belongs to the South Asian language family. The
78 language does not have a written form. The Bulang people in China often live among other
79 ethnic groups and thus many can speak other languages. They favour sour and hot foods and
80 rice, maize, and beans are their staple foods. Drinking home-brewed wine and smoking tobacco
81 are their pastimes. A report states that Bulang women chew betel nuts and stain their teeth black
82 with betel-nut juice [4]. They judge black teeth as beautiful and believe the practice is good for
83 their teeth. It is essential to understand their traditional beliefs and oral health practices because

84 they are fundamental in framing culturally sensitive and appropriate oral health policies. In
85 addition, it is important to understand their peculiar traditional belief in oral health such as
86 blackening their teeth can prevent caries and is considered beauty. Furthermore, this
87 understanding enables the dentists to provide culturally competent care for these people. This
88 qualitative study was conducted to explore the traditional beliefs and oral health practices
89 among the Bulang ethnic minority group in China.

90

91 **Method**

92 *Recruitment*

93 This qualitative study was conducted in 2013 using a purposive sampling method.
94 Ethics approval was sought from the University of Hong Kong/Hospital Authority Hong Kong
95 West Cluster Institutional Review Board (IRB UW01-0203). We selected the Bulang village
96 (布朗山鄉) in Xishuangbanna District (西雙版納), which has the largest concentration of
97 Bulang people in Yunnan, China. Bulang's traditions and culture are well preserved by the
98 people there. This offered an opportunity for exploring Bulang's traditional oral-health-related
99 beliefs and behaviours. Assistance from the Ethnic Minority Bureau of the local government
100 was sought to recruit village chiefs (or village headmen appointed by a government post to
101 administer his village), leaders, and elders. Furthermore, members of the Bulang communities
102 recommended by the local elders and leaders were also invited to participate. They were
103 regarded as knowledgeable about traditional cultural beliefs and practices. The purpose and
104 procedures of this study were explained to the participants by a local dialect research assistant
105 and written consent was sought.

106

107 *Focus groups*

108 Focus group discussions were used for generating information on collective views and
109 for understanding the meanings that lie behind those views [5]. Each focus group had five to
110 seven participants who lived in the same village. Focus group participants were asked questions
111 in an interactive setting and were encouraged to discuss thoughts freely with other
112 participants. The open and free discussions typically generate ideas that helped exploring and
113 understanding the traditional beliefs and oral health practices among the Bulang ethnic
114 minority group in China. The aim of gathering these participants is to get as many different
115 ideas and perspectives as possible, so having too many people can limit the ability to get ideas

116 from all participants. The study settings were the community centres of the three Bulang camps
117 in Yunnan, China. A native speaker of Bulang origin was trained as a facilitator for the
118 discussions in the focus groups. Questions asked of group participants were based on the
119 objectives of the project. The native-speakeing facilitator facilitated a focus group provided the
120 most objective results. The facilitator would also prompt a general discussion on oral health
121 without intruding into the personal oral health status and behaviour of the participants. A focus-
122 group discussion guide on traditional oral health beliefs included open questions on perceptions
123 of good oral health, impact of oral health on their lives, and management of dental problems.
124 Some sample questions for the discussion are shown in Table 1. The duration of each discussion
125 was approximately one hour, but this could be extended, if necessary.

126

127 ***Participants***

128 Eighteen Bulang people participated in the focus groups (Table 2). Eleven of them were
129 elders or formidable leaders (ages from 37 to 82). There were also five village chiefs (ages
130 from 28 to 59), one highly regarded 79-year-old monk, and one 70-year-old well-thought-of
131 barefoot doctor. Nine participants (50%) were female. The focus-group discussions on the
132 traditional oral health beliefs basically addressed three themes. The first theme was the
133 perception of oral health. They related healthy teeth to good oral health and had no idea about
134 periodontal (gum) disease. The second theme was the impact of healthy teeth (oral health).
135 Healthy teeth essentially had impact on physical health, emotions, and social status. The third
136 theme was management of a toothache, which is regard as tooth decay (dental caries).

137

138 ***Data collection method and analysis***

139 The discussions were videotaped, and a microphone was used for recording. The video
140 allowed researcher to identify the participant who made a suggestion or idea. The recorded
141 discussions were translated verbatim by the facilitator and a researcher (SZ) into Chinese line
142 by line. The transcript was analysed using thematic content analysis [6]. Firstly, the researcher
143 (SZ) read the transcript and generated a code to offer a summary statement or word for each
144 element. Secondly, the various codes were compared and, depending on their content,
145 categorised into sub-themes. Finial themes were developed using analytical and theoretical
146 ideas to combine and abstract the sub-themes. The transcripts were repeatedly read to ensure
147 no relevant data had been inadvertently or systematically excluded or any irrelevant data had
148 been included [7]. One of the authors (CC) read the transcripts while following the path of the

149 analysis. The purpose of which was not cross-validate data but rather to capture different
150 dimensions of the same phenomenon. In addition, repeated discussions took place with another
151 investigator (CC) and the authors about the level of abstraction and interpretation of the
152 findings until a consensus was reached.

153

154 **Results**

155 *Perception of oral health*

156 Healthy teeth implied good oral health. Teeth were considered as healthy if there was
157 no pain (toothache) and no functioning problem. For example, “Unhealthy teeth can cause a
158 toothache. If you have a toothache, you don’t even want to eat rice which is the essential food”
159 (G2-5). Another participant mentioned that healthy teeth had no spacing, which caused food
160 impaction that affected eating and chewing functions. For example, “My teeth are generally
161 good till now, except there are some spacings. I feel uncomfortable [about the spacings] after
162 eating and it takes time to clean the teeth. If there were no food impaction, my teeth would be
163 as good as the teeth of my sons and daughters” (G1-1). Aging was one of the considered factors
164 that could affect health of their teeth. Teeth would fall out when people got old and that the loss
165 of teeth was an inevitable natural process of life. For example, “When my mom was old, her
166 teeth exfoliated naturally when she had a meal. I asked her whether the tooth exfoliation was
167 painful or not. She told me that she had no pain” (G2-4). However, there were participants who
168 held a different view. One participant expressed that there was no direct relationship between
169 aging and tooth loss and that teeth could be kept healthy by blackening them. For example,
170 “My sister in law started blackening her teeth around 17 years old. She is now 82 years old and
171 can still chew bones” (G1-2).

172

173 Participants believed tooth-worms were the cause of a toothache, which implied tooth
174 decay or dental caries. One participant said, “When the worms were taken out from the cavity
175 (tooth), the toothache would be cured” (G2-5). They were not aware of gum (periodontal)
176 disease. One village chief said, “Gum bleeding? I have no idea about gum disease or bleeding
177 gums. Since the establishment of the village, I have not heard of bleeding gums from the
178 villagers” (G3-1).

179

180 For having good teeth, the Bulang people applied black soot from the burning of twigs

181 of a local tree. Tooth blackening was believed could prevent toothache or dental caries.
182 Blackened substances were used into tooth cavities to relieve pain, and this is reported in the
183 subsequent paragraph—management of a toothache (third theme). Moreover, blackened teeth
184 were their tradition and it revealed a woman’s marital status, and this is reported in the impact
185 of healthy teeth on social status (second theme).

186

187 Apart from using soot to blacken their teeth, the participants also reported other
188 traditional methods to prevent their teeth from having a toothache, such as chewing betel nuts
189 and using bamboo slices for brushing. These methods were passed down from their parents,
190 relatives, or friends. For example, “My parents taught me to chew betel nuts. I usually chew
191 betel nuts first and then apply the black soot on the teeth. I have never had a toothache. It is
192 desirable for you to put soot on your teeth when you are young” (G1-1). (Note: They chewed
193 a mixture containing betel nuts and not betel nuts alone. The main ingredients for the ‘betel
194 nuts’ included lime, tobacco, two kinds of leaves (Gagai and Galun), and three kinds of barks
195 (Gaiyang, Maigi, and Bou).

196

197 The participants learnt to clean their teeth by rubbing them with roughened bamboo
198 slices. This tooth cleaning method originated from the monks living in the temple. In the
199 Bulang community, the monks were knowledgeable, intellectual, and well-respected people.
200 The roughened bamboo slices made at the temple were believed more effective in tooth
201 cleaning and that the bamboo slices blessed by a monk were more effective for cleaning teeth.
202 One participant said, “The monks use the bamboo slices to brush their teeth. We learnt this
203 [tooth cleaning] method from them in the temple.... This method originated from the Buddha.
204 Therefore, we offer a lot of bamboo slices as part of our sacrifice to them every year, then we
205 can use the slices afterwards. We believe that the slices are more effective for teeth cleaning
206 because the slices have received a blessing from the Buddha” (G3-3). Meanwhile, not all of the
207 people knew about using bamboo slices for cleaning teeth. Instead, they cleaned their teeth by
208 rinsing them with water. A participant reported, “Some elderly do not know how to look after
209 their teeth. They clean their teeth by rinsing with water” (G1-6).

210

211 ***Impact of healthy teeth***

212 Healthy teeth were considered essential to good general health. Participants expressed
213 their daily activities and mood could be adversely affected by a toothache. In addition, the

214 alignment of a person's teeth would affect his/her social status. In this study, the impact of
215 healthy teeth was therefore essentially reported as the impact on physical health, the impact on
216 emotions, and the impact on social status.

217

218 ***Impact of healthy teeth on physical health***

219 Physical health was defined as the body status to perform daily activities. Toothache
220 was reported adversely affected the body's sensory functions and weakened their body's
221 defence system. For example, "If your teeth are good and have no toothache, you will feel good.
222 I heard from my friend that when he had a toothache, he could not hear clearly and his vision
223 was blurred.... He also easily got sick because of his toothache" (G2-1). "My head is very
224 painful if I get a toothache, and I will feel dizzy and disoriented..." (G3-3). A toothache equated
225 to tooth decay or unhealthy teeth, and it affected not only the person who had a toothache but
226 also the other people around that person. A participant reported the parents' daily work would
227 be significantly affected if the children had toothaches. "When a child has a toothache, he/she
228 will keep crying. The parents need to calm the crying child by carrying it on his/her back all
229 day long" (G2-5).

230

231 ***Impact of healthy teeth on emotion***

232 Participants reported that a toothache could adversely affect their mood. People would
233 be depressed and disturbed when they had a toothache. "When I had a painful tooth, I felt like
234 something was biting me. I could not enjoy my food and felt pain when eating.... Thus, I easily
235 got irritated and became angry" (G2-5). Another participant even expressed his suicidal
236 feelings because of the severity of his tooth pain and its persistent nature. For example, "My
237 head was also painful when I got a toothache. I even want to die when I got a severe toothache"
238 (G2-1). One participant said, "A toothache can be the reason for tooth loss. You have difficulty
239 eating without teeth, and missing teeth also affected the appearance of a person" (G3-1).

240

241 ***Impact of healthy teeth on social status***

242 Teeth alignment had an impact on social status. People with well-aligned teeth were
243 considered having a higher social status. A participant said, "Teeth, eyes, and hair were
244 important features that affect the first impression of a Bulang person. If a person has well-
245 aligned teeth, he or she is supposed to come from a high social class" (G3-3). The colour of the
246 teeth also had an impact-on the marital status of a woman. "A girl should blacken her teeth

247 when she gets married to show she is someone's wife. Then men will not chase after her
248 because of her blackened teeth" (G1-3). Another participant said, "Having teeth blackened is a
249 Bulang's tradition. Blackened teeth also represent identity of Bulang people and all Bulang
250 people should oblige to follow this tradition"(G3-3). One participant said, "If you do not
251 blacken your teeth, you are not a member in the Bulang community. This is our tradition and
252 every Bulang person should follow it. If you do not stain your teeth, the villagers will treat you
253 as Han people or other ethnic groups" (G1-3).

254

255 *Management of a toothache*

256 The third theme was management of a toothache or dental caries. There was no
257 discussion in the focus groups on periodontal disease because the participants did not know
258 about gum disease. Toothache was the main problem in the oral cavity, and its treatment
259 included drinking herbal tea, applying tobacco on the painful tooth, and consultation with
260 monks for care.

261

262 Drinking herbal tea was the commonest method for managing a toothache. This method
263 was learnt from their parents, relatives, or friends. However, a participant felt that drinking
264 herbal tea was just a supportive and not a curative treatment effect. For example, "I knew a
265 kind of herb and boiled it in water with ginger and salt. Drinking the herbal tea can relieve the
266 pain but cannot cure the disease. The pain will be cured after the tooth falls out" (G2-4).
267 Substances such as tobacco debris and firewood ashes with salt and crumbled ginger were
268 applied on tooth cavities for pain relief and control of infection. For example, "Some friends
269 learnt that I used soot to blacken teeth for the treatment of a toothache, so they asked me to
270 apply black soot on their teeth. Their toothache was relieved after the soot application" (G1-1).

271

272 Another way to relieve pain was to consult a monk. The monk would apply beeswax
273 on the cheek, recite Buddhist scriptures, and pray for them. They said many Bulang people
274 went to the Buddhist temple for care and learnt this treatment method. Some of them practiced
275 this treatment method on other people, but only a few of them had learnt the skill. For example,
276 "People can remember and recite the specific Buddhist scripture. But only a few of them can
277 relieve the pain.... So we have to find beeswax and learn how to recite the scripture...but only
278 a few people can pray effectively and this method is not very popular" (G3-6).

279

280 **Discussion**

281 There are only a few studies on the oral health beliefs and practices of the Bulang ethnic
282 minority in China. A qualitative study using focus-group discussions explored essential
283 information and their opinions on the traditional beliefs and experiences. The interactive
284 discussions and probing may circumvent the inherent weakness of a questionnaire in collecting
285 information. Even though the Bulang participants can understand and speak the official
286 language, Mandarin, the discussions were conducted in the Bulang language to foster an
287 effective dialogue and to minimize misunderstanding. To enhance better communication, a
288 local person was trained to facilitate the focus group discussions.

289

290 The assistance from the Ethnic Minority Bureau of the local government is crucial for
291 the success in recruiting village chiefs, leaders, elders, and senior people who had some
292 privileged access to information and understanding of the tradition oral-health beliefs and
293 practices. A pre-visit was conducted to inform the participants of the details of the protocol,
294 and sufficient time was given to the participants to recall their oral-health-related beliefs and
295 traditions. Each group discussion meeting with an optimum group size was held in a
296 community setting, and the participants were from the same village. This allowed the
297 participants to participate actively and positively in the discussions in the presence of a local
298 and trained facilitator. The discussions were videotaped with the consent of the participants.
299 This enabled the translators to identify and follow the contributions of each participant. As the
300 study was conducted at the selected sites where the Bulang people live, the collected
301 information or results may not be valid for Bulang people who live in other parts of China or
302 its neighbouring countries.

303

304 In this study, oral health status is basically described by the participants in the context
305 of eating function and comfort. They showed their concern about the health and diseases of
306 their teeth and they believe teeth were believed to have a significant impact on general health.
307 The findings of this positive attitude are in agreement with the results of a study conducted in
308 Guangzhou [8]. Bulang people value the importance of their teeth, and therefore they pay
309 considerable attention to the prevention of dental diseases. This attitude may relate to their
310 observations and past dental experiences as well as culture and traditions. Apart from using
311 rough bamboo slices, which function like toothbrushes, to clean their teeth, they rinse their

312 teeth with water. They also chew a mixture of bark, tobacco leaves, and lime. The chewing not
313 only has a mechanical cleaning effect, but also stimulates saliva secretion and flow, which
314 promotes remineralisation of teeth and buffers the acids of their food. Although some suggest
315 old people can have healthy teeth, they believe aging can be a reason for the loosening and
316 missing of teeth. This loss of teeth through aging is regarded as a normal phenomenon and not
317 a disease. This belief has been widely reported among the Chinese worldwide over the last two
318 decades [9]. Pessimism over keeping teeth for life was not found among the Bulang people,
319 but appropriate intervention was considered effective for retaining teeth into old age. This
320 belief may be helpful in the promotion of oral-health education among the Bulang people.

321

322 Blackening the teeth is considered as one of the effective methods to prevent tooth
323 decay. This practice is also found among the Dai people in Yunnan, China [10] and among
324 some ethnic minority groups living in neighbouring Vietnam, Laos, and Thailand [11]. A
325 laboratory study reported that the tooth-staining substance used by the Kammu people in Laos
326 has an antimicrobial effect [11]. However, to date, there is no scientific evidence to support the
327 use of tooth-blackening substances by the Bulang people in China, and more studies are
328 necessary to confirm its effects in the prevention of tooth decay.

329

330 Most Bulang people live in remote mountainous areas of China where dental service is
331 scarce. Traditional Chinese medicine is common for them to use to manage dental diseases.
332 They take herbal medicines internally and apply herbs and tobacco to relieve symptoms such
333 as pain and swelling. These practices are adopted through the teachings of their ancestors,
334 observations, personal experiences, and religious beliefs. These treatments are supported by
335 little scientific evidence. Although the effectiveness of the treatments is unknown, they are
336 widely used probably because of the users' traditional beliefs. The traditional Chinese health
337 belief that a holistic or macrocosmic view emphasising the importance of environmental factors,
338 such as the Chinese philosophy of 'Yin and Yang' (陰陽) [9], has not been reported by the
339 Bulang people. The isolation of the Bulang villages, the inconvenient transportation, and the
340 language barrier between the Bulang people and the other ethnic groups of Chinese people may
341 be the reasons. Like the Han people, most Bulang people are Buddhist. However, their religious
342 practice is very different from the Han people and this could be another reason for their beliefs
343 that differ from those of the Han people. Bulang people believe that dental caries are caused by

344 tooth worms, and this belief is also found in people in some other Asian countries such as India,
345 Japan, and Singapore [12]. This belief is considered helpful for oral-health education in cultures
346 where the ‘tooth worm’ concept is part of people’s belief system [13].

347

348 Betel quid contains Areca catechu, betel leaf (Piper betel), and lime. Chewing betel quid
349 is associated with oral cancer, oral leukoplakia, and oral submucous fibrosis [14]. The habit
350 can be found in people living in the southern provinces of China, including the provinces of
351 Hunan, Hainan, and Yunnan [15]. However, Bulang people do not chew betel nuts; rather, they
352 chew mixtures that contain bark, leaves, tobacco, and lime. It is unknown if this chewing habit
353 is hazardous in causing oral cancer, and so further studies are needed to make a conclusion.

354

355 **Conclusion**

356 Some Bulang people in Yunnan, China, value the importance of healthy teeth as very
357 important and essential to general health. Healthy dentition is believed has no spacing, pain, or
358 functioning problems. Well-aligned dentition can promote the social status of a person. Gum
359 disease is not considered a part of oral health. Bulang people relate toothache to tooth decay,
360 which is believed to be caused by tooth worms. Blackening their teeth is a method to prevent
361 tooth decay and is not considered aesthetically displeasing. Blackening their teeth is also their
362 tradition to show their ethnic identity and the marital status of women.

363

364 **Competing interests**

365 The authors declare that they have no competing interests.

366

367

368 **Authors’ contributions**

369 Dr Shinan Zhang is the main person who planned and performed the study and prepared
370 the manuscript. The other two authors Profs Edward CM Lo and CH Chu contributed equally
371 to the supervision of this work and read and approved the final manuscript.

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380

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385

386 **References**

- 387 1. National Bureau of Statistics of China. *The 2010 statistical report on the national*
388 *population*. March 12, 2013]; Available from:
389 http://www.stats.gov.cn/tjfx/jdfx/t20110428_402722253.htm.
- 390 2. Formicola AJ, Stavisky J, Lewy R. Cultural competency: dentistry and medicine learning
391 from one another. *J Dent Educ* 2003;67(8):869-75.
- 392 3. Zhang S, Lo EC, Liu J, Chu CH: A review of the dental caries status of ethnic minority
393 children in China. *J Immigr Minor Health* 2013. [Epub ahead of print]
- 394 4. Compile group of Brief history of Bulang minority group: Brief history of Bulang minority
395 group. Beijing: Nationalities Publishing House; 2007.
- 396 5. Burnard P, Gill P, Stewart K, Treasure E, Chadwick B: Analysing and presenting
397 qualitative data. *Br Dent J* 2008, 204(8):429-32.
- 398 6. Guest GM, MacQueen KM, Namey EE: Applied thematic analysis. United States of
399 American: SAGE publications; 2011.
- 400 7. Kristiansen L1, Hellzén O, Asplund K: Left alone--Swedish nurses' and mental health
401 workers' experiences of being care providers in a social psychiatric dwelling context in the
402 post-health-care-restructuring era. A focus-group interview study. *Scand J Caring Sci* 2010,
403 24(3):427-35.
- 404 8. Lin HC, Wong MC, Wang ZJ, Lo EC: Oral health knowledge, attitudes, and practices of
405 Chinese adults. *J Dent Res* 2001, 80(5):1466-1470.
- 406 9. Kwan SY, Holmes MA: An exploration of oral health beliefs and attitudes of Chinese in
407 West Yorkshire: a qualitative investigation. *Health Educ Res* 1999, 14(4):453-460.

- 408 10. Chen YH, Hu DY, Shi ZD, Yin W, Ge YP, Li JY, Rao NQ, Zhang WL, Jing D, Ma LB:
409 Correlation between teeth staining and dental caries of the female Huayaodais in Yunnan
410 Province. *Journal of Dental Prevention & Treatment* 2012, 20(11):587-590.
- 411 11. Tayanin GL, Bratthall D: Black teeth: beauty or caries prevention? Practice and beliefs of
412 the Kammu people. *Community Dent Oral Epidemiol* 2006, 34(2):81-86.
- 413 12. Suddick RP, Harris NO: Historical perspectives of oral biology: a series. *Crit Rev Oral*
414 *Biol Med* 1990, 1(2):135-151.
- 415 13. Gao XL, Hsu CY, Xu YC, Loh T, Koh D, Hwarng HB: Promoting positive health
416 behaviours--'tooth worm' phenomenon and its implications. *Community Dent Oral*
417 *Epidemiol* 2012, 29(1):55-61.
- 418 14. World Health Organization: International agency for research on cancer IARC monograph
419 on the evaluation of carcinogenic risks to humans. Betel-quid and areca-nut chewing and
420 some areca-nut-derived nitrosamines. Lyon, France: IARC; 2004.
- 421 15. Zhang X, Reichart PA: A review of betel quid chewing, oral cancer and precancer in
422 Mainland China. *Oral Oncol* 2007, 43(5):424-430.
- 423

424 **Table 1 Focus-group discussion guide**

1. How would you or your people describe a healthy mouth?
2. How would you or your people describe good general health?
3. What is the relationship between oral health and general health?
4. What is the relationship between oral health and age?
5. How do you improve or to maintain oral health?
6. How do you judge a person has a good oral health?
7. How important is keeping healthy primary teeth in children?
8. What are the treatments for tooth decay and gum disease?
9. How do you or your people manage toothache when there is no dentist?
10. What are the treatments for gum disease?
11. How do you or your people manage swollen gum when there is no dentist?
12. What do you or your people do and what materials used to prevent dental problems?

425

426 **Table 2 Demographic of the participants**

Group	Participant	Position	Gender	Age
1	G1-1	Leader	Male	28
1	G1-2	Leader	Male	37
1	G1-3	Leader	Male	61
1	G1-4	Elder	Female	82
1	G1-5	Elder	Female	58
2	G2-1	Leader	Male	59
2	G2-2	Monk	Male	79
2	G2-3	Elder	Male	74
2	G2-4	Elder	Female	79
2	G2-5	Elder	Female	69
2	G2-6	Elder	Female	67
3	G3-1	Leader	Male	59
3	G3-2	Doctor	Male	70
3	G3-3	Elder	Male	73
3	G3-4	Elder	Female	63
3	G3-5	Elder	Female	82
3	G3-6	Elder	Female	68
3	G3-7	Elder	Female	45

427