

# Bad-breath: Perceptions and misconceptions of Nigerian adults

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## Abstract

**Objective:** To provide baseline data about bad-breath perception and misconceptions among Nigerian adults.

**Methods:** Multi-center cross-sectional study of individuals aged 18-64 years using examiner-administered questionnaires. Age comparisons were based on the model of emerging adults versus full adults. Data were recoded for statistical analyses and univariate and secondary log-linear statistics applied.

**Results:** Participants had lopsided perceptions about bad-breath. While 730 (90.8%) identified the dentist as the expert on halitosis and 719 (89.4%) knew that bad-breath is not contagious, only 4.4% and 2.5% associated bad-breath with tooth decay and gum disease respectively. There were no significant sex differences but the older adults showed better knowledge in a few instances. Most respondents (747, 92.9%) would tell a spouse about their bad-breath and 683 (85%) would tell a friend.

**Conclusions:** Participants had lop-sided knowledge and perceptions about bad-breath. Most Nigerian adults are their "brothers' keepers" who would tell a spouse or friend about their halitosis so they could seek treatment.

**Key words:** Bad-breath, emerging adults, misconceptions, Nigeria, perceptions

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## Introduction

Bad-breath is a universal social stigma<sup>[1-4]</sup> with cross-cultural differences in perceptions of its etiology and cure.<sup>[5,6]</sup> Oral causes account for 90% of bad-breath<sup>[7]</sup> with only a negligible minority being attributable to food and ill health. Many cases of bad-breath can be treated by simple oral hygiene measures except for pseudohalitosis, delusional halitosis and halitophobia.<sup>[8-10]</sup>

Poor knowledge of the real causes of bad-breath mystifies and stigmatizes bad-breath with the resultant reluctance to seek medical help. Those who should have sought help depend on self-perception. This is however, often unreliable because bad-breath sufferers are often unaware of their

condition.<sup>[11]</sup> Conversely, halitophobics are too conscious of a nonexistent bad-breath. While the former are do not to seek treatment,<sup>[12]</sup> the latter fail to respond to conventional treatment. They rather engage in a frenzy of oral hygiene practices,<sup>[13,14]</sup> and will usually need psychological support. In such instances, dentists become limited to a "stop-gap" role as stated in a recent study.<sup>[15]</sup>

The widespread ignorance about bad-breath encourages mis-information and misconceptions. These in turn breed stigmatization and the attendant psychological impact of social isolation.<sup>[16-18]</sup> In Nigeria, while dentists must take responsibility for the widespread ignorance (inadequate oral

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health education), the activities of unqualified persons in the health field add to the problem. Such unqualified persons offer advice on bad-breath beyond their qualifications and expertise.

The ignorance and “mystery” enshrouding bad-breath has resulted in misconceptions with far-reaching social implications. Such misconceptions include that the belief that bad-breath is hereditary and contagious.

Inadequate knowledge about a health problem often leads to serious misconceptions and breed stigmatization – a well-known deterrent to seeking medical attention.<sup>[12]</sup>

Arowojulo and Dosumu<sup>[19]</sup> put the prevalence of bad-breath at 14.5% (hospital based study). The paucity of Nigerian studies on bad-breath is further compounded by conclusions of available studies based on very limited data. The current paper attempted to offer baseline data on aspects of bad-breath never mentioned in an earlier Nigerian studies. It also identified and compared popular misconceptions about bad-breath among a cross-section of Nigerians based on age and sex.

## Methods

### Population and design

A cross-sectional survey of Nigerians from the Southwest, South South and North Central geopolitical zones to give the survey a national outlook.

### Study instrument

Authors obtained demographics (age and sex) with a self-administered questionnaire including closed “yes/no” questions, “yes/no/“don’t know” as well as “yes/no/not applicable” responses.

Closed questions assessed the association between bad-breath and heredity, food (garlic/onions) and systemic/diseases. Others included expert consultation/treatment and the likelihood of spread (contagious). A closed (yes/no) question assessed societal stigma through readiness/inhibition to discuss the condition with a friend/spouse. Two open-ended questions assessed specific bad-breath-associated diseases and how bad-breath could be avoided.

### Participating criteria

An exclusive survey of working age-adults (18-65 years). The age grouping adopted is a modification of the emerging concept of “emerging adults” and “full adults.”<sup>[20]</sup> The age of 18 on which adulthood was based is statutory.<sup>[21]</sup>

### Ethical considerations

The study met the requirements of the declaration of Helsinki. Participation was completely voluntary-based

on informed verbal consent. Participants were drawn from several social settings, including schools, hospitals, etc., Hence, clearance was based on approval from the committee of dental education and practice. No personal identifiable data were obtained and data were treated with standard data protection procedures.

### Data analysis

Secondary log-linear analyses of several categorical variables were performed after recoding into numeric variables where 1 replaced “yes,” 2 replaced “no” and 3 replaced “don’t know.”

The paradigm of the so-called “millennial age group” known to show distinct personalities and characteristics influenced age grouping in the current study.<sup>[22]</sup> Based on this classification, 18-29 years old participants formed a distinct group from the 30 to 64 years olds in all analyses as used in a recent dental study.<sup>[23]</sup>

Disease names stated by respondents recoded into eight categories included respiratory, intra-oral, microbial (excluding intra oral), gastrointestinal and ear nose and throat. Diseases mentioned outside these categories formed the “others” category. The two remaining categories were “not applicable” – for “no’s” and “don’t know” responses.

Responses to the question on the contagiousness recoded into three categories became re-designated as; contagious, not contagious and don’t know. Similarly, responses to how bad-breath can be avoided became re-designated as good oral hygiene, others (other methods excluding good oral hygiene) and don’t know. Univariate and bivariate analyses using the PASW (SPSS) statistical software version 18 (SPSS for Windows version 18.0, IBM, Chicago, IL, USA) and secondary log-linear statistics to confirm or refute associations formed the mainstay of data analyses. Analyses were at 95% confidence interval hence  $P \leq 0.05$  were considered as statistically significant.

## Results

### General responses

Eight hundred and four of nine hundred questionnaires remained after data cleaning. Participants consisted of 399 (48.6%) males and 405 (50.4%) females made up of 443 emerging millennial adults and 361 full adults.

About 55% of all respondents (440, 54.7%) admitted knowing someone suffering from bad-breath. The questionnaire did not seek to know if the person they knew happened to be themselves.

Over 90% of respondents (730, 90.8%) knew that bad-breath is treated by the dentist. Most respondents (487, 60.6%) knew that bad-breath is not hereditary; the rest

**Table 1: Relationship age and knowledge/opinion of bad breath (Chi-square statistics)**

Association between age and;	X <sup>2</sup>	df	Significance
Freedom to discuss bad breath with friend	8.858	1	0.354
Freedom to discuss bad breath with spouse	0.513	1	0.474
Association of bad breath with disease	6.183	2	0.045
Knowledge of bad breath- associated disease name	1.326	2	0.515
Opinion on contagiousness of bad breath	0.192	2	0.908
Knowledge of how bad breath is spread	0.408	2	0.815
Association of garlic with bad breath	4.569	2	0.102
Knowledge of how to avoid bad breath	4.467	2	0.107
Knowing someone suffering from bad breath	6.170	1	0.013

**Table 2: Relationship age and knowledge/opinion of bad breath (Logilinear statistics)**

Association between age and;	Partial X <sup>2</sup>	df	Significance
Freedom to discuss bad breath with friend	1.441	1	0.230
Freedom to discuss bad breath with spouse	1.103	1	0.294
Association of bad breath with disease	7.091	2	0.029
Knowledge of bad breath- associated disease name	2.221	2	0.329
Opinion on contagiousness of bad breath	0.190	2	0.909
Knowledge of how bad breath is spread	0.404	2	0.817
Association of garlic with bad breath	4.191	2	0.123
Knowledge of how to avoid bad breath	4.089	2	0.129

**Table 3: Relationships between sex and knowledge/opinion of bad breath (Chi-square)**

Association between sex and;	Partial X <sup>2</sup>	df	Significance
Freedom to discuss bad breath with friend	0.992	1	0.319
Freedom to discuss bad breath with spouse	0.222	1	0.638
Association of bad breath with disease	2.204	2	0.332
Knowledge of bad breath- associated disease name	3.351	2	0.187
Opinion on contagiousness of bad breath	4.384	2	0.111
Knowledge of how bad breath is spread	5.782	2	0.056
Association of garlic with bad breath	1.28	2	0.526
Knowledge of how to avoid bad breath	0.455	2	0.796

(317, 39.4) either considered bad-breath to be hereditary or were not sure.

About 6 of every 10 (477, 59.3%) respondents knew the association between garlic/onions with bad-breath. A similar number (483, 60.1%) associated bad-breath with oral and systemic diseases ranging from tonsillitis to cancer. Only a minute proportion (20, 2.5%) stated gum disease as a likely cause of bad-breath.

A minority of respondents (85, 10.6%) believed in bad-breath being contagious. The vast majority (719, 89.4%) either believed that bad-breath is not contagious or were

**Table 4: Relationships between sex and knowledge/opinion of bad breath (Logilinear)**

Association between sex and;	Partial X <sup>2</sup>	df	Significance
Freedom to discuss bad breath with friend	1.433	1	0.231
Freedom to discuss bad breath with spouse	0.662	1	0.416
Association of bad breath with disease	0.838	2	0.658
Knowledge of bad breath- associated disease name	1.731	2	0.421
Opinion on contagiousness of bad breath	0.500	2	0.779
Knowledge of how bad breath is spread	1.882	2	0.390
Association of garlic with bad breath	2.802	2	0.246
Knowledge of how to avoid bad breath	0.035	2	0.983

**Table 5: Response to questions assessing knowledge of bad breath**

Category	Correct response	Wrong response
Emerging Adults	37	406
Full Adults	52	309
Sig.=0.005 (fisher exact)		
Male	48	351
Female	41	364
Sig.=0.389		

not sure. Most respondents felt free to tell friends/spouses to seek medical help for bad-breath. Such advice would more likely come from spouses (747, 92.9%) than friends (683, 85%). About 80% of respondents stated maintaining good oral hygiene as a panacea for halitosis.

**Bad-breath and age: Comparisons between millennial and full adults**

Age differences between responses on heredity, knowledge of who treats bad-breath and freedom to discuss a friend/spouse's bad-breath did not attain statistical significance ( $P > 0.05$ ). Again, age differences in response to the association between bad-breath and garlic, its contagiousness, how contracted and Knowledge of how to avoid bad-breath did not attain statistical significance ( $P > 0.05$ ) [Table 1].

More full adults admitted to knowing someone suffering from bad-breath compared to millennial, emerging adults (215, 59.6% vs. 225, and 50.8%). A Chi-square test for association between age and knowing someone suffering from bad-breath showed a significant relationship  $\chi^2$  (1) =6.170,  $P = 0.013$  [Table 1].

More full adults linked bad-breath with other diseases than millennial adults (234, 64.8%) versus (249, 56.2%) respectively. Results of a Chi-square between age and awareness of the link between bad-breath and other diseases also showed a significant relationship ( $\chi^2$ [2] =6.183,  $P = 0.045$ ) [Table 1].

After log-linear analyses, the sole significant relationship existed between age and the awareness of the link between

bad-breath and other diseases, (partial  $\chi^2[1] = 7.091$ ,  $P = 0.029$ ), confirming the associations reported with Chi-square statistics [Table 2].

### Bad-breath and sex: Comparisons between males and females

Males and females were almost equal in number in this study (399 and 405 respectively).

There were negligible sex differences between responses on heredity. Knowledge of who treats bad-breath and freedom to discuss a friend/spouse's bad-breath did not attain statistical significance ( $P > 0.05$ ) [Table 3]. Sex differences in response to association between bad-breath and garlic, its contagiousness, how contracted and knowledge of how to avoid bad-breath also did not attain statistical significance ( $P > 0.05$ ) [Table 3].

A very similar number of males admitted to knowing someone suffering from bad-breath compared with females (209, 52.4% vs. 231, 57.0%), respectively. Furthermore, a similar number of males and females reported being aware of the link between bad-breath and other diseases (250, 62.7%) versus (233, 57.5%), respectively.

Results of a Chi-square test between gender and descriptive variables no significant associations ( $P > 0.05$ ) except a slight likelihood that males considered bad-breath to be contagious. Interestingly, 42 respondents-mostly males (28, 67.0%) feared that bad-breath could be passed on through kissing (likelihood ratio<sup>[2]</sup> = 5.844,  $P = 0.054$ ,  $\chi^2[2] = 5.782$ ,  $P = 0.056$ ) [Table 3].

On subjection to log-linear analyses to further confirm the strength of the associations, none of the differences in responses were significantly associated with the sex of the respondents ( $P > 0.05$ ) [Table 4]. A weak association also existed between the knowledge about contagiousness and knowledge of how to avoid bad-breath.

Overall, (89, 11.1%) stated a correct bad-breath-associated disease name with no sex differences ( $P > 0.05$ ), but with strong age-differences ( $P = 0.005$  [Fisher's exact]) [Table 5].

## Discussion

This study achieved its primary aim-provision of baseline data in neglected areas that could help clinicians and public health experts understand Nigerians' perceptions/misconceptions about bad-breath. It also achieved its secondary aim-age and sex comparisons in perceptions/misconceptions of bad-breath. The fact that over ninety per cent of respondents knew that the dentist is the primary professional to consult for the treatment of halitosis is expected. It tallies with the percentage who stated maintaining good oral hygiene as the way of avoiding halitosis.

What is worrisome is continued ignorance about foods/spices and halitosis. Sixty percent of the respondents in the current study identified garlic as a potential influencer of bad-breath. This finding further demonstrated the lopsided/limited knowledge of the participants in the current study. While claiming to understand the importance of oral hygiene in avoiding bad-breath, they were unaware of the role of foods like garlic in causing bad-breath. This is important for bad-breath – at least of a temporary nature. The finding corroborates the level of ignorance demonstrated by Nigerian University undergraduates over 70% of whom identified viruses as the cause of bad-breath.<sup>[24]</sup>

This limited/lopsided knowledge again underpins the fact that only a disappointing 2.5% stated gum disease as possible cause of bad-breath. Also, just 4.4% stated tooth decay and an even lower (1.2%) stated otolaryngology related conditions including (sore throat, tonsillitis and sinusitis).

The knowledge of respondents in the Nigerian environment is peculiar and probably strongly influenced by two major factors viz., lack of information and misinformation – with the latter probably playing the most prominent role.

Authors of the current study also believe that the source of information/misinformation is also two-fold – family/friends/colleagues on one hand and the internet on the other. While the older adults tended to depend on the former, the emerging/millennial generation depend more on the latter. This position is supported by research as attachment of millennial adult age-group to the internet is well-documented.<sup>[23]</sup>

Unfortunately, information from these two sources often range from useless/untrue to dangerous. Such useless information is exemplified by a piece available on a popular site providing answers from users, which reads “halitosis is inflammation of the lining of the mouth, and generally causes bad-breath.” Then the advice goes “clinical” “you could kiss someone with halitosis all day, but then brush your teeth once, and whatever bacteria came over would be gone. They don't set up shop if there's nothing in there to house them, like plaque.”<sup>[25]</sup> The internet forum chose this as the best answer despite having been posted by a manager at a beer store!

The advice could also be dangerous. This applies to advice often given by persons with some level of respect in the public being “medics.” Some of such self-acclaimed experts are often not responsible enough to limit their advice to areas covered by their training and expertise. A patient attending for the glossodynia with a heavily-plaque-coated tongue exemplifies the scenario. She had stopped brushing her tongue for months based on “medical advice” to alleviate glossodynia. Sadly, the “medical advice” had been given by a medical laboratory scientist oblivious of the fact that the patient had undergone a hysterectomy 10 years earlier!

Overall, while respondents in the current study demonstrated excellent knowledge and correct perceptions in many respects, unacceptably low figures attended others – reflecting serious lopsidedness which cuts across age and sex divides. Aside this, the knowledge among 85% of respondents that halitosis is not contagious is consistent with the 82% reported in an earlier Nigerian study.<sup>[24]</sup>

One interesting finding of the current study is the fact that 93% of respondents would tell a friend to seek medical attention for their halitosis. Furthermore, 85% would offer a friend the same piece of advice. The slight difference in spouses being more likely to benefit from this advice is expected as most people feel less-inhibited to discuss personal issues with their spouses. This social support among families and friends is a well-recognized psychological buffer among Americans of African descent.<sup>[26]</sup> This also justifies the lower suicide rate reported among Africans.<sup>[27,28]</sup>

In addition to providing baseline data in previously neglected aspects of bad-breath, this study attempted to make age and sex comparisons. While sex comparisons were standard, the choice of age grouping in the current study differed from earlier bad-breath studies. The authors' hinged their choice on two main reasons – the concept of emerging adulthood<sup>[20]</sup> and the millennial age group concept of the USA.<sup>[23]</sup>

It is instructive to note that the most common age group complaining of bad-breath in an earlier Nigerian study<sup>[9]</sup> were 20-29 years olds. This falls within the millennial/emerging adults as used in the current study. Also, according to the American Psychological Association, this age-group is the most “stressed-out” age group in the USA. They had a reported average stress level of 5.4 compared with the 4.9 national averages on a 10-point scale.<sup>[29]</sup> The stress levels might explain the increased prevalence of halitosis in this age group.

This study shatters the myth about the link between the stigmatization and readiness to discuss health problems or seek treatments. With 93% of respondents willing to discuss a bad-breath concern with their friends and 92% with their spouses, the caring, “brothers’ keeper” spirit of Nigerians shines through.

The current study also set out to describe age and sex differences in the opinions of the respondents on bad-breath.

Though many people felt that bad-breath could be linked to other diseases, only an insignificant handful (89, 11.1%) stated diseases linkable with bad-breath. There were no sex differences in this number but the significant age differences observed deserve a special mention because they were somewhat paradoxical.

Full adults fared significantly better in the knowledge of association of bad-breath with other diseases as well as in

their ability to state the actual possible diseases. Emerging/millennial adults’ are considered more internet savvy but were less informed about bad-breath – an unexpected paradox.

In the opinion of the authors, two possible scenarios explain these paradoxical observations. First, it is possible that the younger emerging/millennial adults accessed the internet more than the full adults but for other purposes other than health – most likely, social networking. The second reason is a consequence of the second – the relative paucity of health-related information on social networking media. Many social networking messengers are also not enabled for such content hence explaining the observations.

## Conclusions

The knowledge of these Nigerian respondents about the etiopathogenesis of bad-breath is lopsided/limited. While their knowledge about its contagiousness, heredity, and method of avoidance is high, their knowledge of the role of certain foods and periodontal diseases is very low. These observations cut across divides of age and sex except for the knowledge of association of halitosis with other diseases as well as being able to name such diseases. Full adults fared better in both respects. Nigerians’ are their “brothers’ keepers” and halitosis sufferers should expect to receive advice to seek help from friends and spouses - the latter being more likely.

## Recommendations

Based on the results and conclusions of this study, it is recommended that;

1. The role of foods like onions and garlic and those of chronic periodontitis and gingivitis should be incorporated into on-going oral health education campaigns  
There should be a deliberate engagement of the emerging/millennial adults through social media and networking sites that they often access
2. Social networking messengers should be enabled to offer factual oral health education as this is more likely to catch the attention of the emerging/millennial adults.
3. Oral health studies of the current nature should be accessible in the public domain through the use of terms commonly searched by the public. For instance, the term “bad-breath” as used in the current study is more likely to enjoy a higher readership than the more academic term “halitosis.”

## Limitation

Socioeconomic status and educational level are known modifiers of oral health education. The fact that these were not considered in the current study is an obvious limitation.

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