



### Prevalence of Cough Among Adults in An Urban Community in Nigeria

*Prévalence de la toux chez les adultes dans une communauté urbaine au Nigeria*

O. O. Desalu\*, A. K. Salami, A. E. Fawibe

#### ABSTRACT

**BACKGROUND:** Cough is the commonest symptom for which patients seek medical attention and may be a warning sign of an impending disease.

**OBJECTIVE:** To determine the prevalence of cough among adults in an urban community in Nigeria.

**METHODS:** We conducted a cross sectional study among subjects aged  $\geq 18$  years from May 2009 to October 2009 in Ilorin, Nigeria. A semi-structured questionnaire was used to collect the data. The American College of Chest Physicians (ACCP) and the European Respiratory Society (ERS) cough guidelines were used to define acute, sub acute and chronic cough.

**RESULTS:** A total of 472 subjects participated in this study, 238(50.4%) were men and 234(49.6%) were women. Ninety-seven (20.6%) had cough in the preceding 12 months. Thirty-one (6.6%) had cough at the time of interview, of which 17(3.6%) were productive. The prevalence of acute cough was 3.8%, sub acute 1.7% and chronic cough was 1.1%. All types of cough were common in those aged  $<45$  years, unskilled workers, low educational attainment, while chronic cough was common in the women. The risk of coughing increased with tobacco smoking and the number of sticks smoked per day. Majority of subjects with acute cough [16(88.9%)], sub acute cough [8(100%)] and chronic cough [3(60 %)], were yet to consult a doctor.

**CONCLUSION:** Our study revealed a low prevalence of cough among adults in this urban community in Nigeria. It is imperative to enlighten the community on the importance of seeking early treatment for cough, which may be a warning sign of life threatening lung disease. *WAJM* 2011; 30(5): 337–341.

**Keywords:** Cough, Prevalence, Smoking, Respiratory symptoms, Nigeria.

#### RÉSUMÉ

**CONTEXTE:** La toux est le symptôme le plus courant pour lequel les patients consultent un médecin et peut-être un signe d'alerte d'une maladie imminente.

**OBJECTIF:** Déterminer la prévalence de la toux chez les adultes dans une communauté urbaine au Nigeria.

**MÉTHODES:** Nous avons mené une étude transversale chez les sujets âgés de plus de 18 ans de mai 2009 à Octobre 2009 à Ilorin, Nigeria. Un questionnaire semi-structuré a été utilisé pour collecter les données. L'American College of Chest Physicians (ACCP) et l'European Respiratory Society (ERS) des lignes directrices contre la toux ont été utilisés pour définir aiguë, la toux subaiguë et chronique.

**RÉSULTATS:** Un total de 472 sujets ont participé à cette étude, 238 (50,4%) étaient des hommes et 234 (49,6%) étaient des femmes. Quarante-huit (20,6%) présentaient une toux dans les 12 précédentes mois. Trente et un (6,6%) présentaient une toux au moment de l'entrevue, dont 17 (3,6%) ont été productives. La prévalence de la toux aiguë a été de 3,8%, sous aiguë de 1,7% et une toux chronique était de 1,1%. Tous les types de toux étaient courantes dans celles âgées de  $<45$  ans, les travailleurs non qualifiés et à faible niveau de scolarité, alors que la toux chronique était commune chez les femmes. Le risque de toux augmente avec le tabagisme et le nombre de bâtonnets fumés par jour. La majorité des sujets présentant une toux aiguë [16 (88,9%)], sous la toux aiguë [8 (100%)] et une toux chronique [3 (60%)], n'avaient pas encore été consulter un médecin.

**CONCLUSION:** Notre étude a révélé une faible prévalence de la toux chez les adultes de cette communauté urbaine au Nigeria. Il est impératif d'éclairer la communauté sur l'importance de rechercher un traitement précoce pour la toux, qui peut être un signe avant-coureur d'une maladie pulmonaire potentiellement mortelle. *WAJM* 2011; 30(5): 337–341.

**Mots-clés:** Toux, Prévalence, fumeurs, les symptômes respiratoires, au Nigeria.

## INTRODUCTION

Cough is an important defence mechanism in the respiratory system that is responsible for clearing excessive secretions, foreign material and infectious organisms from the airway.<sup>1-3</sup> Despite its protective function, paradoxically it also assists in the spreading of infections.<sup>3</sup> Cough is the commonest symptom for which most patients seek medical attention, affecting a large proportion of the general population.<sup>1,2</sup> It may be benign and self limiting and also a warning sign of an impending disease.<sup>1,2</sup> Cough can be complicated by syncope, abdominal hernias, and incontinence and pneumomediastinum. In addition to these physical complications, coughing causes psych morbidity and significant impairment in the quality of life.<sup>3-6</sup> The socioeconomic effects of cough are absenteeism from work, absenteeism due to care giving for others, increased physician consultation cost, huge cost of prescription medication, and non-prescription medication.<sup>7</sup>

The classification of cough that is based on symptom duration is somewhat arbitrary and it can be divided into acute self-limiting cough, or chronic persistent cough, which usually lasts for more than eight weeks.<sup>6-7</sup> A cough lasting for a period of 3–8 weeks is called subacute cough.<sup>6</sup> The respiratory society guidelines in Europe and America have set a cut off of >8 weeks as a case definition for chronic cough.<sup>7-9</sup>

Acute cough is the commonest presentation in primary care and it is mostly associated with viral upper respiratory tract infection.<sup>6</sup> In the absence of significant co-morbidity, it is benign and self-limiting and one of the commonest symptoms associated with acute exacerbations and hospitalizations of asthma and chronic obstructive pulmonary disease (COPD).<sup>7</sup> Chronic cough is often the key symptom of many important chronic respiratory diseases and may also be the sole presenting feature of a number of extrapulmonary conditions, in particular upper airway and gastrointestinal disease.<sup>6-7</sup> Several studies on cough had been conducted in developed countries.<sup>2, 10-12</sup>

In Nigeria, one study reported on the prevalence of ACE induced cough

among Nigerian hypertensive patients.<sup>13</sup> Another study reported on the factors associated with nocturnal, productive and dry cough in a young adult population.<sup>14</sup> There is a dearth of epidemiological studies on cough in Sub-Saharan Africa. The aim of our study was to determine the prevalence of cough among adults in an urban community in Nigeria.

## SUBJECT, MATERIALS AND METHODS

### Study Design and Setting

We conducted a descriptive cross sectional study among subjects' aged  $\geq 18$  years from May 2009 to October 2009 in Ilorin, Kwara State, Nigeria. Ilorin is one of the largest cities in Nigeria and is the capital of Kwara State. It is located, on latitude 80 30"N and longitude 40 30" E; in West Africa. Ilorin city has five local administrative areas called local government areas.

The study was carried out in Ilorin West Local Government which has an area of 105 km<sup>2</sup> and a population of 364,666 at the 2006 census. The area is a confluence of cultures and is mainly populated by the Yoruba's in addition to the Fulani's and other tribes in Nigeria. This study setting was chosen because it is a true representation of an urban community. The study area met the United Nation's definition of urban settlements for Nigeria: which is defined as towns with 20,000 inhabitants or more whose occupations are not mainly agrarian.<sup>15</sup>

### Sample Size and Sampling

The minimum sample size of 384 was calculated using the Cochran's formula of  $N = Z^2pq/d^2$ ,<sup>16</sup> and using a prevalence of cough in Nigeria of 50%. The subjects were selected by multistage cluster sampling method. The electoral wards became the clusters and a sample frame containing the list of the six clusters was drawn, and three clusters were selected from the sampling frame by simple random sampling.

Within each selected cluster, a list of the household was also drawn and subsequently a random selection of household was made; the entire individual in a selected household who met the inclusion criteria were recruited.

The inclusion criteria were as follow: age  $\geq 18$  years, residing in Ilorin for at least a year, and subject willing to participate in the study.

### Data Collection

A semi-structured questionnaire was prepared by two pulmonary physicians and the questionnaire was piloted among 10 subjects in the community. Some questions were rephrased before the questionnaires were formally administered to ensure clarity. The questionnaires were administered directly face to face to the subjects by the trained interviewers. Interviews were conducted in English or Yoruba languages depending on the subject's choice. The preferred language which ensured a better understanding of the questions and enabled respondents to answer easily was adopted.

The differences between the interviewers abilities were not significant as inter-rater variability analysis yielded a [kappa] of 0.9. The study investigators paid several field visits to some of the study participants (randomly selected) to confirm that, they had been interviewed and also to the interviewers to ensure proper questionnaire administration.

The questionnaire was used to obtain socio-demographic information, cough and its duration, other respiratory symptoms, tobacco smoking status, medication and previously diagnosed respiratory diseases. The study outcomes were measured as periodic and point prevalence of cough. The point prevalence of cough was defined as the duration of cough to the time of questionnaire administration and periodic prevalence was based on cough in previous 12 months.<sup>10</sup> The periodic prevalence of cough over 12 months was included to address the impact of seasonal variation and climatic changes which can be a covariate of self reported respiratory symptoms.

The questions on self reported respiratory symptoms in the previous 12 months had been used in study of other respiratory condition.<sup>17</sup> The ACCP and ERS guidelines<sup>8-9</sup> jointly defined and categorised cough on the basis of duration into: acute < 3 weeks, sub acute 3–8 weeks and chronic cough > 8 week's duration.

### Statistical Analysis

The data obtained were analysed using SPSS Version 15. Descriptive and frequency statistics were generated to describe the characteristics of the study population. Chi-square test ( $\chi^2$ ) was used to test the significance of association of the variables. A p-value of < 0.05 was accepted as statistically significant. Multivariate analysis was used to determine the association between tobacco smoking and the types of cough.

### RESULTS

A total of 472 subjects participated in the study; their mean age was 33.9+12.3 years. Of the 472 subjects, 239(50.6%) were men and 233(49.4%) were women. The other characteristics of the study population are shown Table 1.

**Table 1: Distribution of Study Subjects by Socio-demographic Characteristics**

Characteristic	N (%)
<b>Gender</b>	
Male	238(50.4)
Female	234(49.6)
<b>Education attainment</b>	
Primary/none	184(39.0)
Secondary	170(36.0)
Tertiary	118(25.0)
<b>Occupational status</b>	
Unskilled	302(64.0)
Home maker/student/ unemployed	69(14.6)
Intermediate	22(4.7)
Professional	20(4.2)
Skilled manual	53(11.2)
Skilled non manual	6(1.3)
<b>Smoking status</b>	
Current	38(8.1)
Former	21(4.4)
Never	413(87.5)

**Table 2: Prevalence of Cough Features in the Study**

Cough Feature	N(%)
Acute cough	18(3.8)
Sub acute	8(1.7)
Chronic	5(1.1)
Cough in last 12months	97(20.6)

Ninety-seven (20.6%) subjects reported that they had coughed in the last 12 months and 31(6.6%) reported that they were coughing as the time of their interview. Of these 31 subjects, fifteen (3.8%) had acute cough, eight (1.7%) had a subacute cough while five (1.1%) had chronic cough (>8 weeks duration) (Table 2). Seventeen(3.6%) of the participating subjects had productive cough and five (1.1%) had haemoptysis at the time of interview.

Our results also show that all the types of cough were common in subjects <45 years of age. With respect to gender, there were no significant differences in acute, subacute, and cough in the past one year. However chronic cough was significantly common in the women. All cough types were also more common in the unskilled workers and those with low educational attainment which was defined as lack of tertiary educational attainment. (Table 3).

Upper respiratory tract infection (URTI) symptoms like sore throat, runny nose, nasal congestion/blockage, sneezing and conjunctivitis preceded the onset of acute cough in 10(55.6%) and subacute cough in six (75.0%) while none of the subjects with chronic cough had a preceding symptoms of URTI. Majority of subjects with acute cough [16 (88.9%)], sub acute cough [8 (100%)], and chronic cough [3 (60%)], were yet to visit a doctor at the time of the interview of the subjects. All (100%) the subjects who had acute and sub acute cough never visited a respiratory physician while only one subject visited a respiratory physician and was a prescribed antituberculous therapy.

### DISCUSSION

This is a pioneer study among adults in Nigeria to determine the prevalence of cough according to its duration and over a period of 12 months. There are several epidemiological studies of cough world wide.<sup>10-12, 15-16</sup> Many of these studies adopted different case definitions of cough, thereby making it difficult to compare the burden of cough. There are geographical variations in the definitions that are used in reporting cough in different studies as well as the age range of the studied population.

Some investigators used point prevalence while others used periodic prevalence of cough, moreover the age range of the studied population also differs. One example is the European community respiratory health survey (ECRHS) which was restricted to young adults [age 20-44] and the periodic prevalence of cough in the pervious 12 month was adopted thereby missing a large number of the elderly population and total burden of cough.

The prevalence of acute cough in our study was 3.8%; this finding is lower than 25% in Trabzon, Turkey.<sup>12</sup> This difference might be due to high burden of tobacco smoking,<sup>20</sup> climatic conditions and viral upper respiratory tract infection in Turkey as compared to our environment. The prevalence of sub acute cough was 1.7%. There is a paucity of data on this entity called sub acute cough to compare with our results. This type of cough in clinical practice is often due to post-infective cough which may persist for more than three weeks and they are usually termed "post-viral cough".<sup>6-9</sup> The intermediate period between three and four weeks of cough is difficult to define aetiologically since all chronic cough would have started as an acute cough, but the clear diagnostic groups of chronic cough are diluted by those patients with these post-viral cough.<sup>6-9</sup> In this study, the prevalence of chronic cough using the definition of ACCP and ERS was 1.1%; this prevalence was low when compared with 3-40 % reported in many countries in Europe and the USA.<sup>2,6,10-12,18,19,21</sup> Cough in the previous 12 months was 20.6% and this result is slightly closer to what was reported in the study in young adults.<sup>14</sup> The wide variation between our results and others study may be due to the study methodology, age of population studied, urbanisation, presence of chronic obstructive airway diseases and the high prevalence of smoking.<sup>20,22</sup>

The prevalence of current smoking in this study was 8.4%, which is lower than what obtains in most European, Asian and Mediterranean countries. Subjects who were smoking were found to be at increased risk of reporting cough and this risk increased with number of cigarettes smoked per day. In resource



**Table 3: Sociodemographic Distribution of Subjects according to the Cough Types**

Variable	Cough Feature, N(%)			
	Acute	Sub-Acute	Chronic	Cough in 1year
<b>Age range (yrs)</b>				
18–44	83.3	62.5	100	84.5
>45	16.7	37.5	–	15.5
<b>Gender</b>				
Male	50.0	50.0	–	54.6
Female	50.0	50.0	100*	45.4
<b>Occupational status</b>				
Unskilled	38.9*	87.5	100	53.6
Home maker/student/unemployed	38.9*	12.5	–	23.7*
Intermediate	–	–	–	5.2
Professional	–	–	–	4.1
Skilled manual	22.2	–	–	12.4
Skilled non manual	–	–	–	1.0
<b>Educational attainment</b>				
None/primary	44.4	25.0	80.0	43.3
Secondary	27.8	62.5	20.0	32.0
Tertiary	27.8	12.5	–	24.7

\*P value &lt;0.05

**Tables 4: The Association between Tobacco Smoking Habits and Types of Cough**

Smoking Feature	Cough Feature		
	Acute /Sub-Acute	Chronic	Cough in 12 Months
<b>Smoking Status</b>			
Non-Smokers	1.00	1.00	1.00
Smokers <sup>†</sup>	1.29(0.43–3.81)	1.57(0.45–14.3)	2.11(1.16–3.86)*
<b>No of Sticks (per day)</b>			
0	1.00	–	1.00
1–5	1.77(0.49–6.45)	–	2.44(1.13–5.35)*
6–10	1.99(0.23–15.9)	–	3.39(0.92–12.5)
>10	–	–	0.89(0.11–7.42)

Values are in odd ratios (OR) with 95% C:I

\*p value <0.05; <sup>†</sup>, Smoker – a subject who had smoked 100 sticks in lifetime

poor countries, the scourge of HIV infection and use of biomass fuel and poverty are significant risk factors for chronic respiratory diseases.<sup>22–23</sup> However the effect of these latter risk factors in development of chronic cough cannot be equated to tobacco smoking. This explanation is corroborated by a study in Brazil which revealed that those exposed to wood smoke presented less impairment of pulmonary function and severe disease when compared with those exposed to both wood smoke and tobacco smoke or to tobacco smoke alone.<sup>24</sup>

We also discovered that acute sub acute and chronic coughs were more common in those subjects aged <45 years. In this study, the women were more predisposed to having chronic cough while the other types of cough had no gender predisposition. The cause of this female predisposition is unknown. Most studies have attributed this to females having more sensitive cough receptors than males.<sup>25–27</sup> Other researchers have attributed it to the modulator effect of oestrogen and progesterone on the cough reflex.<sup>28</sup>

Our study results also reveal that

most patients with acute and sub acute cough had preceding symptoms of upper respiratory tract infection and never visited a doctor. This finding is in agreement with other reports that associated upper respiratory tract infection with acute cough.<sup>7–9</sup> Furthermore, majority of the subjects with the three types of cough were yet to visit a doctor for medical treatment and often resorted to self medication and only 20% of those with chronic cough had visited a respiratory physician. Although acute cough is normally benign and self-limiting in the absence of significant co-morbidity,<sup>7,9</sup> subacute and chronic cough might be a warning sign of serious lung diseases that requires immediate medical evaluation and treatment. Delayed presentation and diagnosis were identified as factors commonly associated with death in tuberculosis and asthma,<sup>29–31</sup> which are common adult respiratory diseases.<sup>32</sup>

The limitations of our study were the seasonal variation in the reporting of respiratory symptoms as this study was conducted in the rainy season. Although the reported cough in last 12 months might have captured the increase in cough episodes in the dusty harmattan period and give us some quantitative insight into the burden of cough, the cough in the last 12 months may also be associated with poor recall of symptoms by the subjects. Other limitations were the non validation of the survey instrument and the sample size.

The prevalence of acute and chronic cough among adults was low in this urban Nigeria community. Despite the low prevalence, there is a need to enlighten the populace on the importance of seeking early medical treatment, as it may be warning sign of life threatening or irreversible lung disease.

#### ACKNOWLEDGEMENT

We the authors thank the interviewers who are members of The Action Health (TAH) Club, University of Ilorin for their assistance in the data collection.

#### DUALITY OF INTEREST

We the authors hereby declare no conflict of interest.

## REFERENCES

- Schappert SM, Burt CW. Ambulatory care visits to physician offices, hospital outpatient departments, and emergency departments: United States, 2001–02. *Vital Health Stat* 2006; **159**: 1–66.
- Barbee RA, Halonen M, Kaltenborn WT, Burrows B. A longitudinal study of respiratory symptoms in a community population sample. Correlations with smoking, allergen skin-test reactivity, and serum IgE. *Chest* 1991; **99**: 20–6.
- Ing A. Chronic cough. *Respirology* 1997; **23**: 9–16.
- McGarvey LP, Carton C, Gamble LA, Heaney LG, Shepherd R, Ennis M, *et al.* Prevalence of psych morbidity among patients with chronic cough. *Cough* 2006; **2**: 4. Available at <http://www.coughjournal.com/content/2/1/4>
- French CL, Irwin RS, Curley FJ, Krikorian CJ. Impact of chronic cough on quality of life. *Arch Intern Med* 1998; **158**: 1657–61.
- Chung FI, Pavord ID. Prevalence, pathogenesis, and causes of chronic cough. *The Lancet* 2008; **391**: 1364–74.
- Morice AH, McGarvey L, Pavord I. Recommendations for the management of cough in adults. *Thorax*. 2006; **61**: 1–24.
- Morice AH, Fontana GA, Sovijarvi AR, Pistolesi M, Chung KF, Widdicombe J, *et al.* The diagnosis and management of chronic cough. *Eur Respir J*. 2004; **24**: 481–92.
- Irwin RS, Baumann MH, Bolser DC, Boulet LP, Braman SS, Brightling CE, *et al.* Diagnosis and management of cough executive summary: ACCP evidence-based clinical practice guidelines. *Chest*. 2006; **129**: 1S–23S.
- Janson C, Chinn S, Jarvis D, Burney P. Determinants of cough in young adults participating in the European Community Respiratory Health Survey. *Eur Respir J* 2001; **18**: 647–54.
- Ford AC, Forman D, Moayyedi P, Morice AH. Cough in the community: a cross sectional survey and the relationship to gastrointestinal symptoms. *Thorax*. 2006; **61**: 975–9.
- Ozlu T, Can G, Oztuna F, Bulbul Y. Coughing symptoms prevalence in adult population in Trabzon Turkey. *Turkish Respiratory Journal* 2001; **1**: 12–4.
- Salami AK, Katibi IA. Angiotensin converting enzyme- inhibitors associated cough: a prospective evaluation in hypertensives. *Annals of African Medicine* 2005; **4**: 118–12.
- Desalu OO, Salami AK, Seidu OA, Olokoba, AB, Fadeyi A. Factors associated with nocturnal, productive and non-productive cough among young adults in Ilorin, Nigeria. *J Bras Pneumol*. 2010; **36**: 325–331.
- Socioeconomic data and application centre (SEDAC). Gridded population of the world and the rural-urban mapping project (GRUMP). (Cited on 04/10/2010). Available at <http://sedac.ciesin.columbia.edu/gpw/country.jsp?iso=NGA#>
- Bartlett JE, Kortrijk JW, Higgins C. Organizational research: Determining appropriate sample size for survey research. *Information Technology, Learning, and Performance Journal* 2001; **19**: 43–50.
- Burney PGJ, Luczynska C, Chinn S, Jarvis D. The European Community Respiratory Health Survey. *Eur Respir J* 1994; **7**: 954–960.
- Coultas DB, Mapel D, Gagnon R, Lydick E. The health impact of undiagnosed airflow obstruction in a national sample of United States adults. *Am J Respir Crit Care Med* 2001; **164**: 372–7.
- Cullinan P. Aetiological factors in persistent sputum production: a case-control study. *J Epidemiol Community Health* 1993; **47**: 27–31.
- World Health Organization. Tobacco or health: a global status report. Geneva, Switzerland, 1997. Global Trends in Tobacco Use. Available from <http://www1.worldbank.org/tobacco/book/pdf/02-Tobacco-Chap1.pdf>
- Lundback B, Nystrom L, Rosenhall L, Stjernberg N. Obstructive lung disease in northern Sweden: respiratory symptoms assessed in a postal survey. *Eur Respir J* 1991; **4**: 257–66.
- Global surveillance, prevention and control of chronic respiratory diseases: a comprehensive approach. Geneva, World Health Organisation, 2007. Available from [http://www.who.int/gard/publications/GARD\\_Manual](http://www.who.int/gard/publications/GARD_Manual).
- Desalu OO, Adekoya AO, Ampitan BA. Increased risk of respiratory symptoms and chronic bronchitis in women using biomass fuels in Nigeria. *J Bras Pneumol*. 2010; **36**: 441–446.
- Moreira MA, Moraes MR, Silva DG, Pinheiro TF, Vasconcelos Jr HM, Maia LF, *et al.* Comparative study of respiratory symptoms and lung function alterations in patients with chronic obstructive pulmonary disease related to the exposure to wood and tobacco smoke. *J Bras Pneumol*. 2008; **34**: 667–74.
- Os I, Bratland B, Dahlo FB, Gisholt K, Syvertsen JO, Tretli S. Female preponderance for lisinopril-induced cough in hypertension. *Am J Hypertens* 1994; **7**: 1012–15.
- Dicpinigaitis PV, Rauf K. The influence of gender on cough reflex sensitivity. *Chest* 1998; **113**: 1319–21.
- Kastelik JA, Thompson RH, Aziz I, Ojoo JC, Redington EA, Morice AH. Sex-related Differences in Cough Reflex Sensitivity in Patients with Chronic Cough. *Am J Respir Crit Care Med* 2002; **166**: 961–4.
- Tan KS, McFarlane LC, Lipworth BJ. Modulation of airway reactivity and peak flow variability in asthmatics receiving the oral contraceptive pill. *Am J Respir Crit Care Med* 1997; **155**: 1273–7.
- Erhabor GE, Adewole OO, Ogunlade O. A Five-Year Review of Tuberculosis Mortality amongst Hospitalized Patients in Alewife. *Indian J Chest Dis Allied Sci* 2006; **48**: 253–6.
- Bandeled EO, Olude IO. Analysis of deaths due to Tuberculosis at the Lagos University Teaching Hospital. *Journal of the National Medical Association*. 1985; **77**: 643–6.
- Bandeled EO. A ten-year review of asthma deaths at the Lagos University Teaching Hospital. *Afr J Med Med Sci*. 1996; **25**: 389–9.
- Desalu OO, Oluwafemi JA, Ojo O. Respiratory diseases morbidity and mortality among adults attending a tertiary hospital in Nigeria. *J Bras Pneumol*. 2009; **35**: 745–52.