Prevalence of COPD in sub-Saharan Africa: *FRESH AIR Uganda survey*

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Background

Chronic Obstructive Pulmonary Disease (COPD) is recognised as a common disease in low and middle-income countries (LMIC).[1] In sub-Saharan Africa, people are unaware of the damage to respiratory health caused by biomass smoke,[2] a major cause of COPD in LMICs.[3] The aim of this survey, performed in 2012, was to collect data on the prevalence and burden of COPD and related risk factors in a rural area of Uganda.

Methods

Population-based cross-sectional survey of 620 randomly selected participants aged 30 or older. Newly trained local healthcare workers conducted interviews in the villages using validated questionnaires, and performed pre- and postbronchodilator spirometry. The lower limit of normal (LLN) threshold, i.e. the fifth percentile of the predicted FEV_1/FVC ratio, was used as defining criterion of COPD, avoiding over-diagnosis of elderly and under-diagnosis of young participants.[4]

Results

Table 1: Demographic data of study population

	male	female	total
Population	291 (49·5%)	297 (50·5%)	588 (100%)
Age in years	45·0 (12·8)	45·4 (14·5)	
Body mass index (kg/m²)	22·2 (3·2)	23·7 (4·9)	
Education level			
none	25 (9%)	93 (31%)	118 (20%)
primary	189 (65%)	169 (57%)	358 (61%)
secundary	63 (21%)	28 (9%)	91 (15%)
tertiary	14 (5%)	7 (2%)	21 (4%)
Smoking status			
current smoker	100 (34·4%)	22 (7·4%)	122 (20·7%)
former smoker	63 (21·6%)	24 (8·1%)	87 (14·8%)
never smoker	128 (44·0%)	251 (84·5%)	379 (64·5%)
Biomass fuel use			
indoor exposure	265 (91·1%)	281 (94·6%)	546 (92·9%)
hours exposed per day	3·1 (2·5)	5·2 (2·4)	
years exposed	25·5 (18·4)	33·3 (18·2)	
outdoor exposure	262 (90·0%)	282 (94·9%)	544 (92·5%)
hours exposed per day	1·3 (1·7)	1·9 (2·5)	
years exposed	20·3 (16·9)	25·5 (17·7)	

Data are number of patients (%) or mean ± standard deviation (SD)

Measurements were completed for 588 participants. Mean age was 45.2 years. Electricity was not available for 93% of households. Almost all the people of the community, both men and women, were exposed to biomass smoke. In almost all the exposed households, wood was the main solid fuel for cooking, used in an open fire with 3 rocks supporting the pot.

According to the FEV1/FVC ratio lower than the LLN, the prevalence of COPD in participants older than 30 years was 16.2% (52.6% women); the mean age was 46.7 years (SD 14.0). Among the participants with COPD, 38% of men and 40% of women were in the age group 30-39 years; 7% were older than 70.

Mild obstruction was found in 78%, moderate obstruction in 20%, and severe obtruction in 2%; no cases were found with very severe obstruction.

Figure 1: Distribution of COPD participants in age categories, using FEV₁/FVC ratio < lower limit of normal
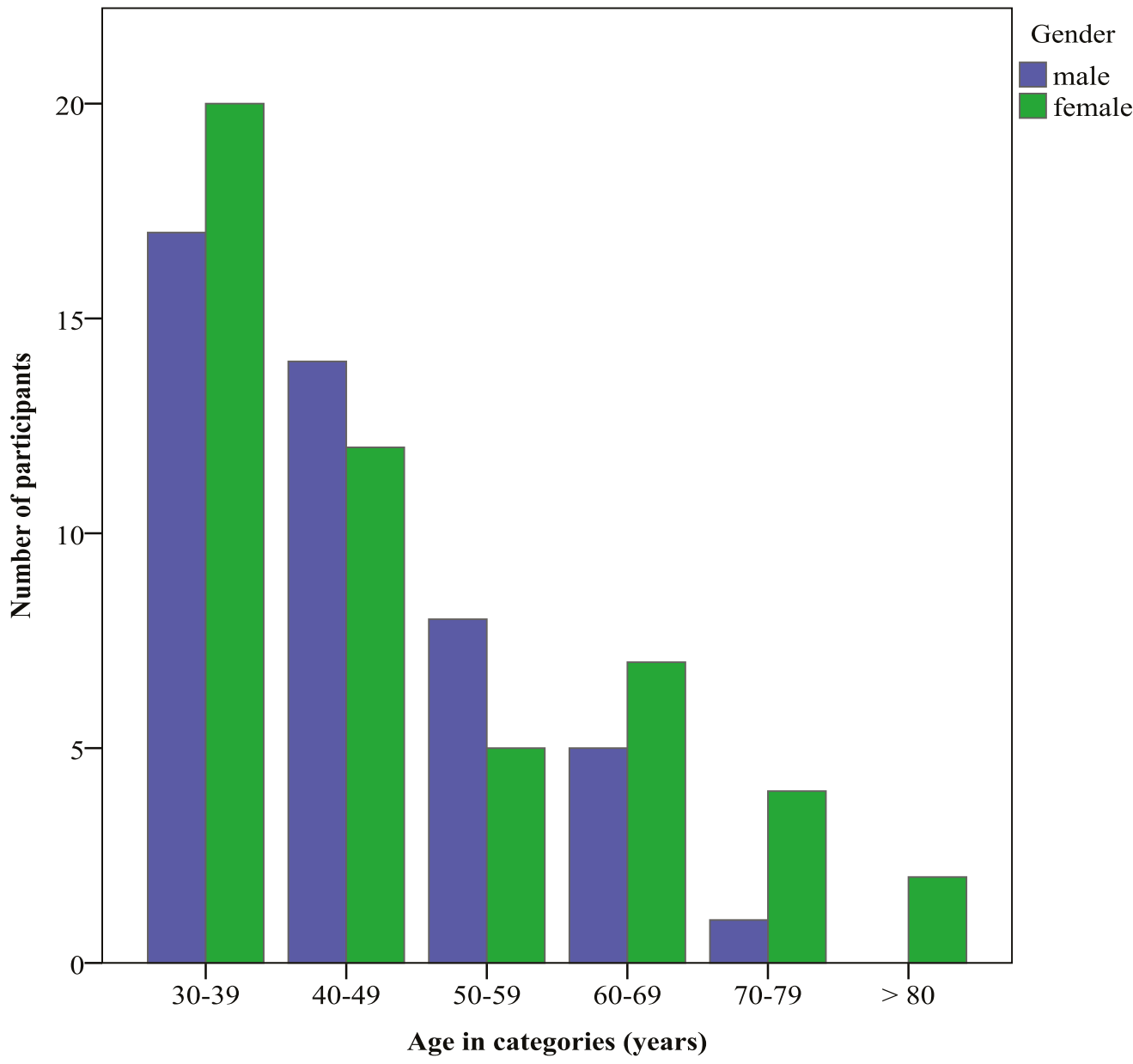
Using the GOLD fixed ratio criterion (FEV_1/FVC lower than 0.7) by way of comparison, a COPD prevalence of 12.4% (43.8% women) was found. The mean age of patients using this criterion was 55.5 years (SD 14.7); 15% were in the age group 30-39 years and 21% were above the age of 70 years.

The participants with COPD had a total mean health-related quality of life Clinical COPD Questionnaire (CCQ) score of 0.81 (*symptoms* 1.09, *mental state* 0.60 and *functional state* 0.64). The mean MRC dyspnoea score was 1.33. One or more exacerbations within the last 12 months were reported by 30%, increasing with age (20% in group 30-39 years and 67% in group 60-69 years).

Table 2: Comparison of risk factors between non-COPD and COPD participants

	non COPD men	women	total	COPD men	women	total	p-value
Population			493 (83.8%)			95 (16.2%)	
Smoking status							0.071
current smoker	80 (33%)	18 (7%)		20 (44%)	4 (8%)		
former smoker	52 (21%)	15 (6%)		11 (24%)	9 (18%)		
never smoker	14 (46%)	214 (87%)		14 (32%)	37 (74%)		
Indoor biomass fuel							
participants exposed			460 (93.3%)			86 (90.5%)	0.335
years exposed	26.1 (18.3)	32.9 (17.9)		22.0 (18.2)	36.2 (19.5)		
cooking (hours/day)	3.1 (2.6)	5.1 (2.6)		3.4 (2.1)	5.6 (2.6)		
Outdoor biomass fuel							
participants exposed			457 (92.7%)			87 (91.6%)	0.704
years exposed	20.3 (17.0)	24.7 (17.5)		20.4 (16.1)	26.7 (18.6)		
cooking (hours/day)	1.2 (1.7)	1.9 (2.5)		1.6 (1.7)	2.0 (2.5)		
Cooking area							0.711
same building			80 (16.2%)			18 (18.9%)	
separate building			413 (83.8%)			77 (81.1%)	
Village in tobacco-growing area	106 (43%)	91 (37%)		26 (58%)	18 (36%)		0.249
Chest infections							0.266
none	30 (12%)	20 (8%)		4 (9%)	5 (10%)		
1 or 2 per year	134 (55%)	138 (56%)		15 (33%)	31 (62%)		
> 2 per year	82 (33%)	89 (36%)		26 (58%)	14 (28%)		

Data are number of patients (%) or mean ± standard deviation (SD)

The exposure to biomass smoke did not differ significantly between COPD and non-COPD participants. Univariate analyses demonstrated no significant differences between COPD and non-COPD for age, gender, tribal origin, education, chest infections, living in tobacco-growing areas, type of cooking areas, hospital admissions or health centre visits in the last 2 years; tobacco smoking showed a trend. Especially young men smoked (mean age 41); young women hardly smoked at all (mean age 53).

The logistic regression analyses confirmed the association of wheeze and former smoker with the presence of COPD; cough, current smoker and heart failure showed trends for association with COPD.

Table 3: Multivariate analysis for COPD

variables		OR	95% CI	p value
wheeze	no	1		
	yes	2·171	1·087-4·337	0·028
cough	no	1		
	yes	1·622	0·955-2·757	0·074
heart failure	no	1		
	yes	2·509	0·977-6·445	0·056
smoking	never	1		0·052
	current	1·665	0·953-2·907	0·073
	former	1·955	1·068-3·580	0·030

OD: odds ratio; CI: confidence interval

Conclusions

- Using lower limit of normal as criterion, prevalence of COPD was 16.2%; 39% (both men and women) were between 30-39 years of age
- In addition to a high smoking prevalence in young men, biomass smoke exposure was almost uniform in this population
- Where airflow obstruction was present, it was not generally severe; the same went for symptoms, health-related quality of life and MRC dyspnoea score
- 30% of participants with COPD had one or more exacerbations in the last 12 months

With life expectancy of 52 years, COPD represents a major threat for men and women of all ages in rural areas of Uganda.

References

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