

Prevalence of COPD and its risk factors in a rural area of Uganda: FRESH AIR Uganda

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Introduction

Chronic Obstructive Pulmonary Disease (COPD) is recognized as a common disease in low and middle income countries. While the main contributing factor in high income countries is tobacco smoke, biomass fuel use for cooking and domestic heating is a major cause of COPD in low and middle income countries (1,2). In sub-Saharan Africa people are unaware of the damage to respiratory health caused by biomass fuel use (3,4).



Image 1: Traditional open fires leading to high levels of pollution

Aims

Prevalence and burden of COPD in resource-poor settings of a rural area in Uganda.

Methods

The survey called for 300 men and 300 women aged 30 years and older, selected from 30 villages (probability proportionate to size) and subsequently 20 households (enumeration).

In spring & summer of 2012, the survey was performed in the villages by local nurses and health officers from the health centres in Masindi district after an intensive training to secure high-quality standards of spirometry.



Image 2: teaching in Masindi post-bronchodilator spirometry and completed the health-related quality of life Clinical COPD Questionnaire (CCQ).

Each participant was interviewed with a screening and air pollution questionnaire, and pre-bronchodilator spirometry was performed. Participants with an airflow limitation (FEV1/FVC ratio \leq 0.8 or FEV1 \leq 80% predicted as cut-off), underwent a

Results

Measurements were complete for 588 participants. 83% of participants lived in rural areas. 71% were between 30 and 50 years. 34% of males smoked; of these 52% were under the age of 40 years. 85% of females never smoked. 95% of households exposed to biomass smoke used wood as main solid fuel.

| | male | female |
|--------------------------|-----------------|-----------------|
| subject no. | 49.5% (n=291) | 50.5% (n=297) |
| age in years (\pm SD) | 45.0 \pm 12.8 | 45.4 \pm 14.5 |
| BMI (\pm SD) | 22.2 \pm 3.2 | 23.7 \pm 4.9 |
| smoking status | | |
| current smoker | 34% (100) | 7% (22) |
| former smoker | 22% (63) | 8% (24) |
| never smoker | 44% (128) | 85% (252) |
| biomass fuel | | |
| indoor exposure | 91% (265) | 95% (281) |
| time per day | 3.1 hours | 5.2 hours |
| years | 25.5 | 33.4 |
| outdoor exposure | 90% (262) | 95% (282) |
| time per day | 1.3 hours | 1.9 hours |
| years | 20.3 | 25.5 |
| Kerosene use | 95% (275) | 93% (277) |

Table 1: demographic data of participants

Fixed ratio

According to the Global Initiative for Chronic Obstructive Lung Disease (GOLD), presence of ratio FEV1/FVC $<$ 0.7 after administration of an inhaled bronchodilator, confirms the presence of COPD (5).

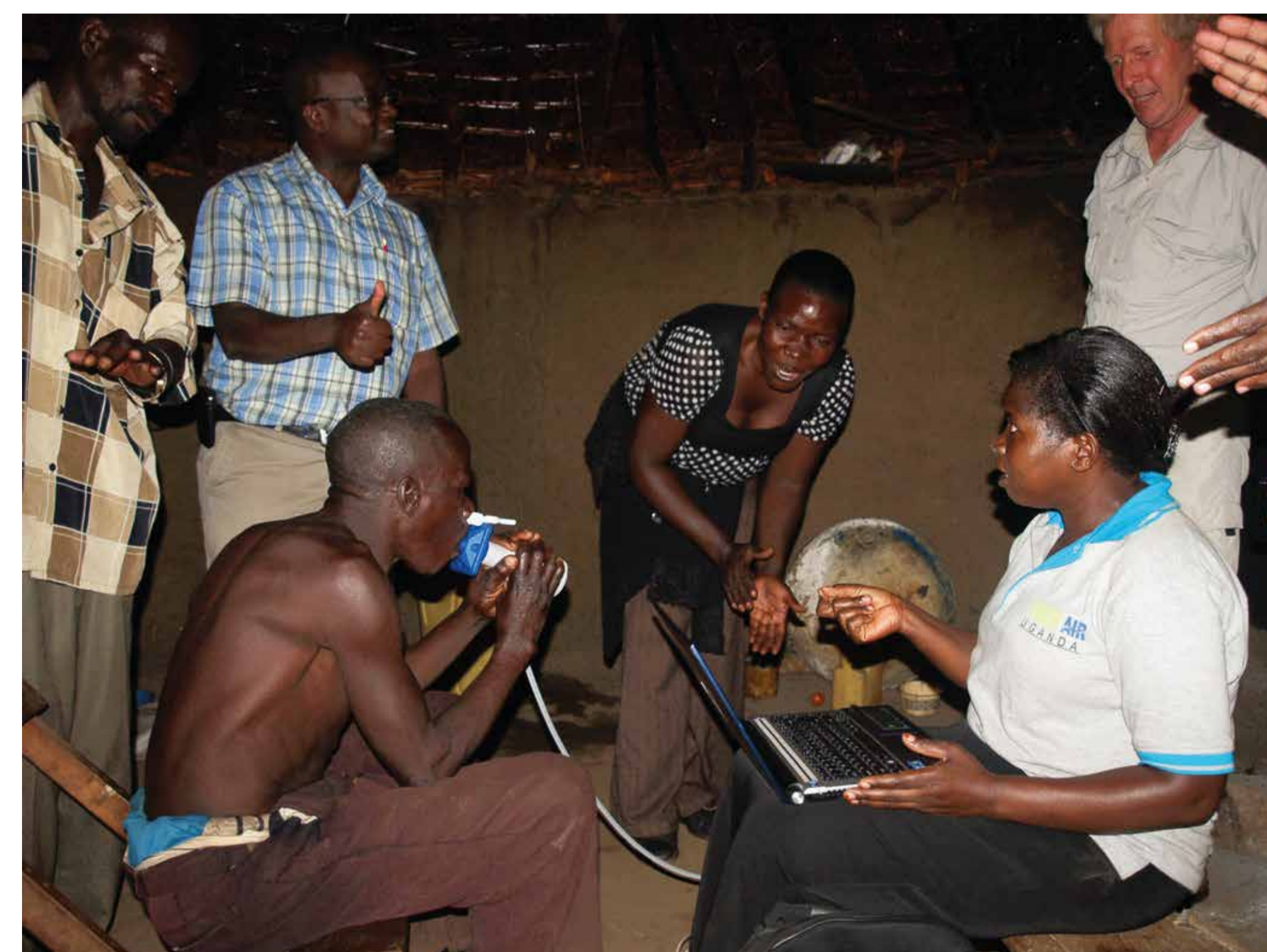


Image 3: spirometry performed by 2 research assistants

Fixed ratio resulted in prevalence COPD of 12.4% (n=73);

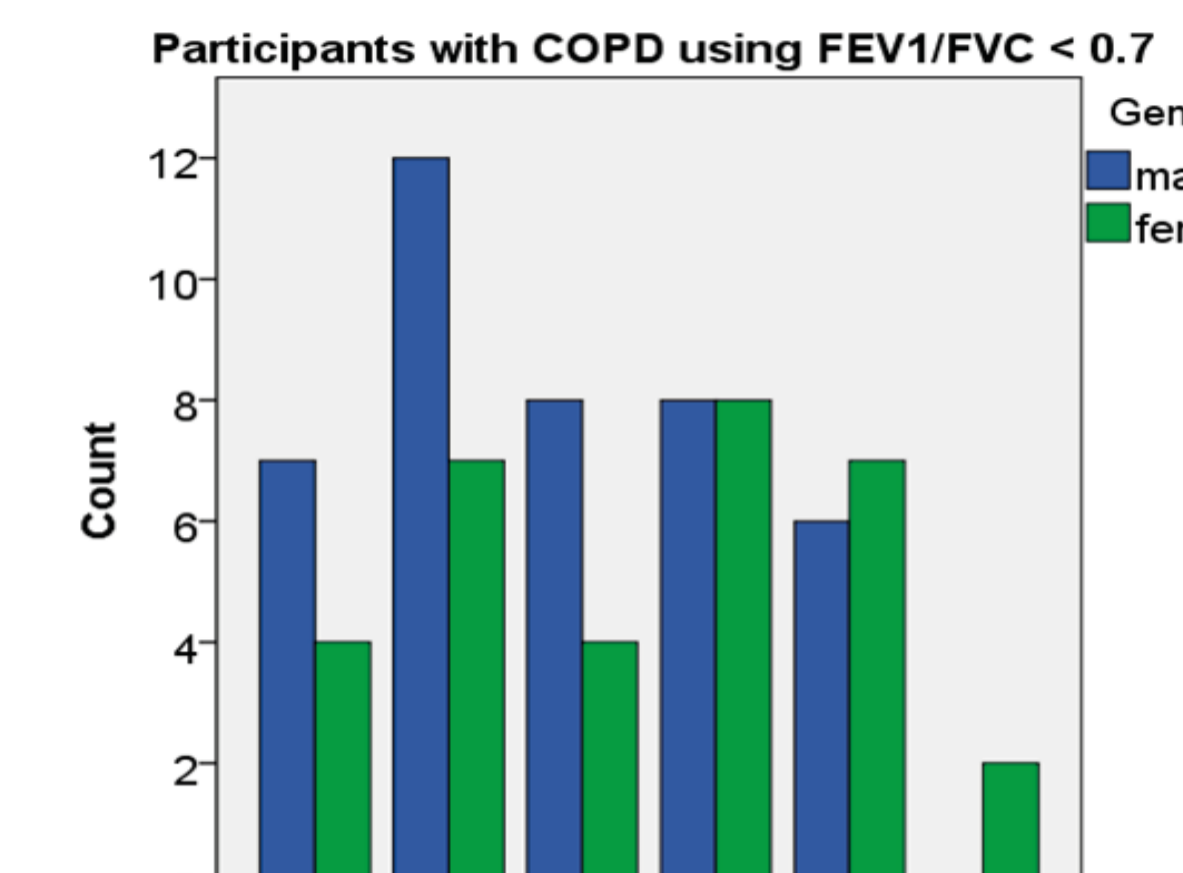


Figure 1: age in categories, ratio $<$ 0.7

of these 44% were females. The mean age of males was 53 \pm 14 years and of females 58 \pm 15 years. 15% of participants with COPD were 30-39 years (17% males and 12% females). 21% were above the age of 70.

| | male | female | total |
|-------------|------|--------|-------|
| 30-39 years | 17% | 12% | 15% |
| 40-49 years | 29% | 22% | 26% |
| 50-59 years | 20% | 13% | 16% |
| 60-69 years | 20% | 25% | 22% |
| 70-79 years | 14% | 22% | 18% |
| > 80 years | 0% | 6% | 3% |
| total | 100% | 100% | 100% |

Table 2: % within gender using ratio $<$ 0.7



Image 4: open fire where pot or griddle is supported by 3 rocks

Lower limit of normal

In healthy subjects FEV1/FVC ratio declines with increasing age and height. The use of lower limit of normal (LLN) has been recommended by ATS/ERS as defining criterion to confirm the presence of COPD (6).

Using LLN resulted in prevalence COPD of 16.2% (n=90);

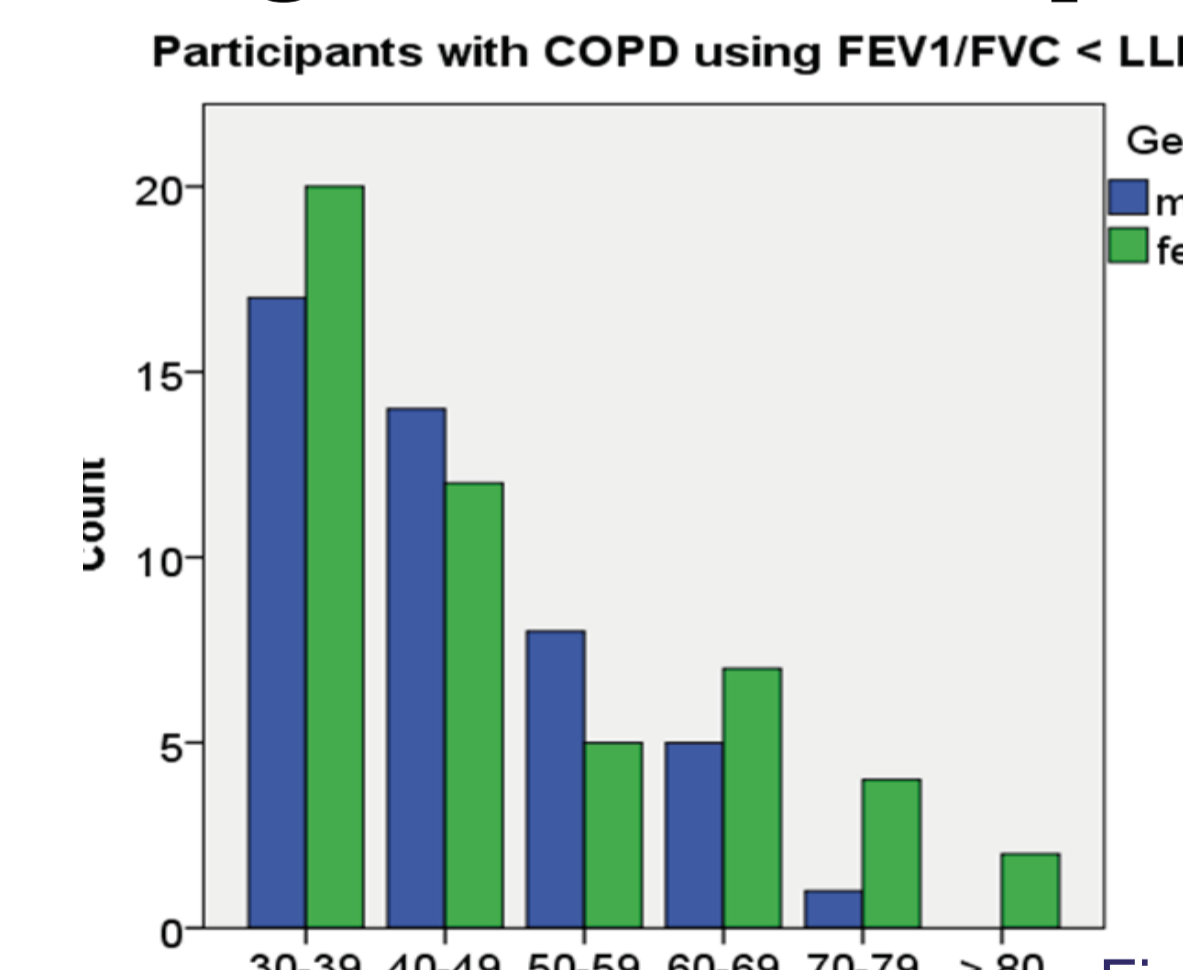


Figure 2: age in categories, ratio $<$ LLN

of these 53% were females. Mean age was lower: 46 \pm 11 years for males and 48 \pm 16 years for females. Number of participants with COPD in age 30-39 years increased to 39% (37% males and 40% females). Only 7% were above the age of 70.

| | male | female | total |
|-------------|------|--------|-------|
| 30-39 years | 37% | 40% | 39% |
| 40-49 years | 33% | 24% | 27% |
| 50-59 years | 17% | 10% | 14% |
| 60-69 years | 11% | 14% | 13% |
| 70-79 years | 2% | 8% | 5% |
| > 80 years | 0% | 4% | 2% |
| total | 100% | 100% | 100% |

Table 3: % within gender using ratio $<$ LLN

Using the LLN, more younger adults were diagnosed with COPD; the fixed ratio would have missed many of these participants and falsely identify elderly having COPD.

Tobacco smoking

Among participants with COPD diagnosed with LLN, 45% of males were current-smokers (mean age 40, median age 38). In age 30-39 years, 65% of males were current smokers (5.1 \pm 2.8 packyears) and 18% were former-smokers. Only 8% of females were current-smokers (mean age 52, median age 54). In age 30-39 years, 90% of females were never-smokers. Above the age of 60 nobody smoked at all, except for 2 women.

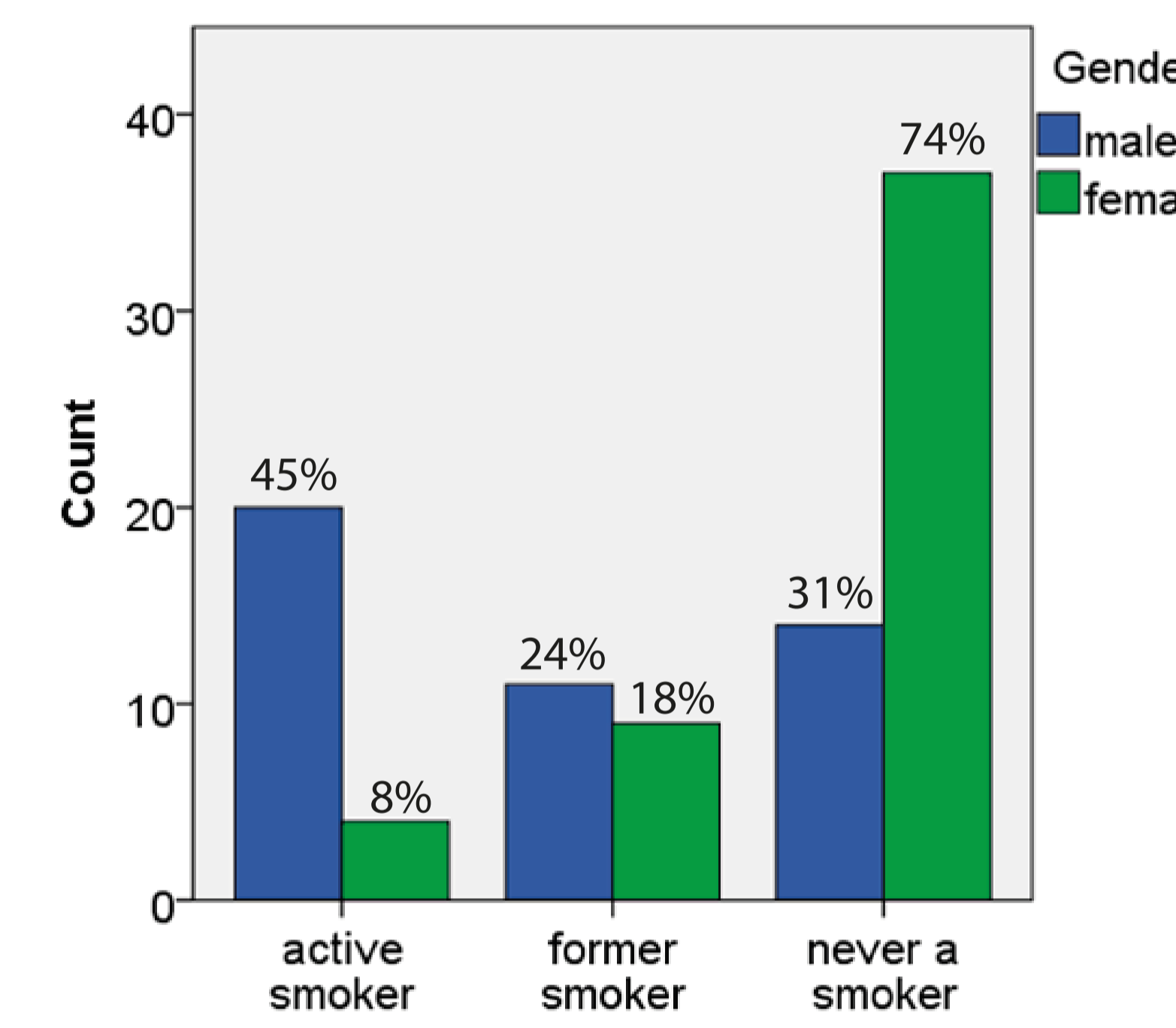


Figure 3: smoking status and % within gender of participants with COPD using ratio $<$ LLN



Image 5: Biomass smoke escaping through thatched roofs

Conclusions

- The prevalence of COPD in Masindi district of Uganda was 12.4% using the fixed ratio and 16.2% using the lower limit of normal, especially among younger adults
- Most people of all ages are exposed to biomass fuel smoke
- The rate of tobacco smoking is high, particularly among young men

COPD represents a major threat for people of all ages in rural Uganda. Further analysis will examine the interaction of tobacco smoke, biomass fuel use and other factors in the development of COPD. A major priority is to increase the knowledge of harmful effects of biomass fuel use and tobacco smoke in the various communities and promoting awareness among healthcare workers and policy makers.

References

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