HIV AND TB DRIVE NON-COMMUNICABLE LUNG DISEASE IN URBAN WEST AFRICA

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BACKGROUND

- In an urban Nigerian population, this study aimed to report the prevalence of airway obstruction and chronic lung disease (CLD), and quantify the contribution of recognised risk factors, including HIV, TB, smoke and biofuel exposure by comparing HIV negative and HIV positive groups.

In 2019 an estimated 3.28 million deaths and 74.4 million Disability Adjusted Life Years were attributable to COPD alone. Up to 84% of this mortality and morbidity occurred in low- and middle-income countries (LMICs). Despite these reports, high-quality data characterising the burden of disease and risk factors for CLD remain very limited across sub-Saharan Africa (SSA).

HIV exposure is recognised as a risk factor for CLD and accelerated decline in lung function although the mechanisms underlying this, and the long-term outcomes of this association, are not well understood. There are limited data reporting post-TB lung disease in SSA. Despite representing the epicentre of the HIV pandemic, there are no data comparing lung health and disease between people living with HIV (PLWH) and HIV negative populations in west or central Africa.

METHODS

- Between 2018 and 2019, we conducted a multi-centre cross-sectional observational study was conducted at three community clinics in Lagos Mainland, Lagos, Nigeria, including the Nigerian Institute of Medical Research (NIMR; the largest HIV clinic in Lagos). All eligible participants undertook:

1. Validated respiratory health questionnaires
2. Spirometry-based lung function testing using both Global Lung Initiative (GLI) and Nigerian Reference Study reference values to define lower limit of normal (LLN)

CLD was defined as any self-reported CLD, and/or questionnaire-defined bronchitis and/or airways obstruction FEV_1/FVC ratio <0.7 and/or FEV_1/FVC ratio <LLN) and/or PRISm (FEV1 <80% predicted and FEV_1/FVC ratio >0.7).

In urban Nigeria, HIV and TB are independent risk factors chronic lung disease in the absence of conventional environmental risk factors, such as tobacco and biofuel

RESULTS

148 HIV-negative individuals and 170 HIV-positive individuals completed the study. **Current cigarette (11/318, 3.5%) and lifetime domestic biofuel (6/318, 1.8%) exposures were low.** Airway obstruction (33/170, 19.4% vs 12/148, 8.1%, p=0.004) and CLD (73/170, 42.9% vs 34/148, 23%, p < 0.0001) were more prevalent in PLWH compared to the HIV-negative group (Figure 1). In adjusted analyses, **HIV infection and history of TB were independently associated with two and three-fold increased risk of CLD respectively (table).** No HIV-related variables in PLWH associated with outcomes.

		Total n (%)	Airways obstruction n (%)	Crude Odds Ratio (95% CI)	CLD n (%)	Crude Odds Ratio (95% CI)
HIV status	Negative	148 (46)	12 (8·1)	1	34 (23·0)	1
	Positive	**170 (54)**	**33 (19·4)**	**2·73 (1·34, 5·57)**	**73 (42·9)**	**2·52 (1·53, 4·16)**
Sex	Male	151 (47)	20 (13·2)	1	54 (35·7)	1
	Female	167 (53)	25 (14·9)	1·17 (0·62, 2·21)	53 (31·7)	0·85 (0·53, 1·36)
Age (years)	≤ 40	144 (45)	19 (13·2)	1	47 (32·6)	1
	41-50	120 (37)	16 (13·3)	1·03 (0·50, 2·11)	43 (35·8)	1·18 (0·71, 1·98)
	>50	56 (18)	10 (17·9)	0·43 (0·62, 3·31)	17 (30·4)	0·90 (0·46, 1·76)
Body Mass Index (kg/m²)	<18·5	12 (4)	6 (50·0)	4·40 (1·24, 15·67)	7 (58·3)	2·69 (0·78, 9·22)
	18·5-23·9	108 (34)	20 (18·5)	1	37 (34·3)	1
	24-29·9	127 (40)	13 (10.2)	0·50 (0·23, 1·07)	46 (36·2)	1·09 (0·64, 1·87)
	≥30	71 (22)	6 (8·5)	0·41 (0·15, 1·08)	17 (23·9)	0·60 (0·31, 1·19)
Smoking status	Never	257 (81)	35 (13·6)	1	87 (33·9)	1
	Ever	61 (19)	10 (16·4)	1·24 (0·57, 2·70)	20 (32·8)	0·95 (0·53, 1·73)
History of TB	No	268 (84)	30 (11·2)	1	79 (29·5)	1
	Yes	**50 (16)**	**15 (30·0)**	**3·40 (1·64, 7·05)**	**28 (56·0)**	**3·04 (1·62, 5·72)**

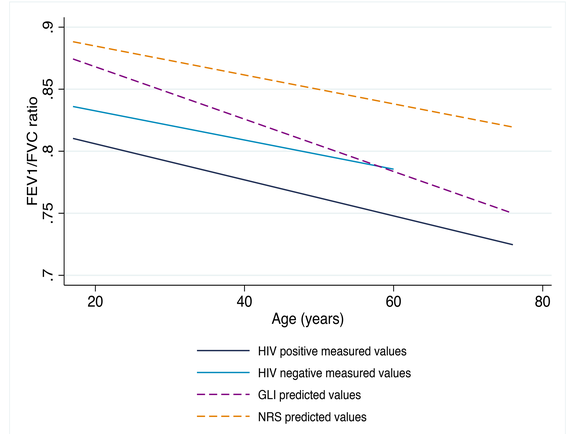

Figure 1. FEV_1/FVC ratio against age. Organised by HIV status with predicted values shown by dashed lines. Predicted values for the overall study population calculated using lung function reference equations from GLI (Global Lung Initiative) and NRS (Nigerian reference study)

CONCLUSIONS

Our study is the first to compare lung health in PLWH and HIV-negative populations in west Africa. We found that HIV infection and previous TB infection are associated with increased risk of airways obstruction and CLD, and that this risk far outweighs the usual risk factors of tobacco smoke exposure and indoor air pollution, the prevalence of which were low. Although HIV has been characterised as an independent risk factor for COPD and CLD in other regions, our study is the first to quantify this relationship in west Africa. These results align with estimates of COPD prevalence for the single BOLD study of a Nigerian HIV-negative population and for meta-analysis data of PLWH in SSA

In our population, representative of the largest metropolitan area in SSA, the low levels of tobacco use and biofuel exposure, suggest that the impact of WHO-advocated strategies such as smoking cessation and reducing household pollution may have minimal impact on mitigating the burden of CLD in some LMIC settings. Awareness of the life-long non-communicable morbidity of TB and other infectious diseases is increasing but these data are absent from current CLD policy which omission requires urgent focus.

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