

Epidemiology of tobacco use and dependence in Sub-Saharan Africa: A systematic review.

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Abstract

Background: Tobacco use is a major contributor of morbidity and mortality globally, and currently increasing in Africa. There is a paucity of data in Africa and the efforts gained by various interventional programs have not been well quantified in Africa.

Methods: WHO data repositories covering the period ranging from 1990 to 2016 together with other studies conducted in Africa on smoking and associated mortality were examined and analyzed both for comparison and for highlighting evidence necessary for guiding the on-going tobacco control efforts.

Results: The burden of tobacco-related deaths in Africa increased from 150,000 reported deaths in 1990 to over 215,000 in 2016, representing about 70% increase in mortality. The highest number of deaths was recorded in Eastern Africa and the lowest was recorded in Central Africa. The prevalence of tobacco smoking is equally increasing, with the prevalence increasing from 9.8% in 2015 to 13.9% in 2016.

Interpretation: Both the burden of tobacco-related deaths and smoking rates are increasing Africa. More investment is urgently needed to foster local preventive and therapeutic interventions with tailored and context-sensitive approaches.

Keywords: Tobacco, Smoking, Lung cancer.

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Introduction

Tobacco use is a major global health risk for developing a range of chronic diseases including lung cancer, chronic obstructive pulmonary disease (COPD) and coronary heart diseases (CHD). Recent World Health Organization (WHO) estimates indicate that about 1.1 billion people use tobacco worldwide. Tobacco use is responsible for over 7 million deaths annually, with over 80% of deaths occurring in low and mid-income countries (LMICs) [1]. There have been purposeful national and global efforts and strategies for control of tobacco consumption. In 2010, WHO, through Framework Convention of Tobacco Control (WHO FCTC), set a goal of 30% reduction of tobacco smoking from the prevalence of 22.1% to 15.4% by the year 2025 [2]. Despite efforts in tobacco control, the consumption of tobacco products remains substantially high worldwide. The trend in tobacco smoking and related deaths are declining worldwide except in the developing countries. Currently, Africa represents the least consuming region of tobacco product worldwide. However, the existing raising trend in tobacco use in the context of weak FCTC implementation strategy is likely to increase the public health impact in the next decades. It is imperative for African countries to explore the potential risk factors for continued tobacco for a successful implementation of the control strategies. Furthermore, a detailed discourse on the challenges on the implementation of WHO FCTC in Africa provides opportunities for accelerating the gains obtained elsewhere.

Epidemiology of tobacco use in Africa

Global Burden of Disease (GBD) 2017 report estimates the overall prevalence of smoking at 25% and 5.5% respectively among men and women in 2015 [1]. In the same year, smoking accounted for 11.5% of global deaths and ranked among the top five risk factors based on disability adjusted life years (DALYs) [1]. Estimates by WHO indicate that over 1.1 billion people smoked tobacco in 2016, with strong predominance among males [2]. Of these, the vast majority of smokers, up to 80%, live in LMICs [1]. While tobacco smoking is decreasing in other regions, there is increasing trend in Eastern Mediterranean and Africa regions. Tobacco smoking is reported to account for 6 million deaths every year globally, 600,000 of these deaths are due to secondary smoking [2].

In 2010, the global prevalence of tobacco smoking was estimated at 22.1% (36.9% male, 7.3% female) globally and 12.8% (23.2% male, 2.5% female) in Africa region [2]. In 2010 WHO projected the global prevalence of tobacco smoking to decrease from 22.1% to 18.1% and an increasing trend in Africa regional from 12.8% to 18.9% respectively by 2025 [2]. The recent estimates by WHO indicates the global and Africa regional prevalence of tobacco use to be 19.9% (17.5% male, 2.2% female) and 9.8% (33.7% male, 6.2% female) in 2015. It is clearly observed that in all countries, the rate of tobacco smoking is much more common among men than women. However, WHO data, based on a fifteen-year - 2000 to 2015 - monitoring, indicates a general decline in smoking rates in most

countries worldwide. Noteworthy, the rate of smoking increased in 27 countries; all of which are developing countries and 15 of which are in sub-Saharan Africa (SSA). This observation calls for improved strategies for tobacco control in these regions [2].

Data on the prevalence of smoking is scarce in SSA due to limited studies. The available studies indicate the prevalence to vary considerably albeit with general increasing trend among youths and adults. South Africa is among the countries in SSA with a relatively improved tobacco control program both in terms of strategies and policies. A recent survey in South Africa revealed the overall prevalence of tobacco smoking of about 17.6%, with men affected four-fold compared to women [3]. Likewise, another study in Zambia based on demographic and health survey reported increased prevalence of tobacco smoking in rural population from 12% to 26% among men. However, generally, the survey the overall decline in the prevalence of tobacco smoking by 2% [4]. The major reported predictors of tobacco smoking include low socioeconomic status, low education and concomitant alcohol use [3-5]. In a recent rural population-based survey, among individual aged ≥ 35 years in Tanzania, the prevalence of current and ex-smokers were estimated at 5.4% and 19.8% respectively [6]. Similarly, a survey by van Gemert et al, conducted in Uganda reported the prevalence of smoking among current smokers was reported to be 34.4% and 7.4% in men and women respectively [7]. In Angola, the prevalence of current tobacco smoking was reported to be 6.1% (10% male, 2.6% female) [8].

The majority of studies conducted in Africa on tobacco smoking are on adult individuals. There are limited studies on the magnitude of tobacco smoking among children and adolescents in Africa. However, in the available few surveys, a substantial number of children and adolescents have been reported to smoke tobacco. A survey in Africa by Veeranki et al. revealed the age for initiation of tobacco smoking to be as low as 7 years. In this survey, the prevalence of tobacco smoking ranged from 0.7% in Ghana at 10 years of age to 9.6% in Cote d'Ivoire at 12 years of age [9]. Likewise, a survey in Angola showed that a third of all ever-smokers started smoking before 18 years of age [8]. Similarly, another recent survey in Madagascar reported the prevalence of cigarette smoking among adolescents to be 19% (30.7% male, 10.2 female) [10]. This population of children and youth are prone to lifetime dependence and thus, represents an important at-risk population who urgently need targeted interventions.

Data from the Global Youth Tobacco Survey (GYTS) indicate that about 12.5% of youth are exposed to secondhand smoking (SHS) globally [11]. Further, stratification of data revealed that the great exposure to SHS are acquired inside home, outside home or both settings which accounted for 30.4%, 44% and 23.2% respectively [12,13]. These youths constitutes bystander at-risk population for developing smoking-related health consequences. In developed countries, there are better strategies for implementation of smoke-free laws and policies. However, the majority of low and mid-income countries (LMICs) particularly in SSA either does not have or have weak legal framework and policies for smoke-free environment

[8,14,15]. Thus, due to lack of smoking designated places in public arena and intentional smoking in the poorly ventilated confined places exposes non-smokers, particularly children and adolescents to SHS. A survey in 25 countries in Africa revealed the overall prevalence of SHS of 45% [16]. The major sources of SHS exposure are typically parental and peer smoking [13]. Thus, if left unchecked, the exposure to SHS is likely to contribute to the silent epidemic of tobacco-related risk in the coming decades.

Epidemiology of tobacco dependence and addiction in Africa

Of the 4000+ chemicals and over 250 harmful chemicals, contained in tobacco smoke, nicotine is considered as the major component that is responsible for dependence and addiction [17-19]. The proposed mechanism for dependence involves the development of neuroadaptation resulting from chronic exposure to nicotinic stimulation of the neuronal nicotinic acetylcholinergic receptors (nAChRs) which are expressed in the brain's reward system i.e. the mesolimbic system [20]. Nicotine exerts its psychopharmacological effects through the release of dopamine either directly through agonistic stimulation of nAChR or indirectly by binding glutaminergic and GABAergic neurons [21]. The dopaminergic neurons which originate in the ventral tegmental area (VTA) project to the nucleus accumbens (NAc), hippocampus, amygdala, and prefrontal cortex (PFC) [22]. These neuronal projections collectively modulate the pathways involved in the information processing, memory, and emotions.

Development and progression of nicotine dependence is determined in part, by inherent sensitivity to nicotine coupled with the extent and duration of smoking [23,24]. Individuals with nicotine dependence represent a proportion of population at a higher risk for developing tobacco-related health problem [22,23]. A survey in the United States on nicotine dependence revealed the prevalence of 21.7% among individuals who were ever smokers and a significantly higher rate, of over 53% among those who were smoking daily [23]. Thus, dependence is an important public health challenge as at this stage it becomes difficult for the individuals to quit tobacco use and thus leading to increased risk of developing health consequences. For instance, it was reported that over a third of individuals who met a criteria for lifetime nicotine dependence were found to be dependent during the survey [23]. It is thus important to identify individuals prior to developing dependence so that appropriate and timely interventions can be initiated.

The data on the magnitude of tobacco dependence are scarce in SSA as dependence is rarely assessed in the few available surveys. A recent population-based survey on the burden of COPD conducted in Tanzania revealed the prevalence of significant nicotine dependency to be 42%, based on Fagerström scale [6]. In Angola, Pedro et al. reported about 18.4% male, and 9.1% female to have nicotine dependence of medium or above, based on modified Fagerström scale [8]. This proportion is important as it constitutes an at-risk population who are not likely to quit smoking without any intervention from skilled healthcare provider. Thus, these patients are at higher risk of developing tobacco-related health problems.

Global and regional tobacco control programs and strategies

There have been several global and country-specific strategies for tobacco control for decades worldwide. Currently, WHO FCTC represents the global a set of strategies which aims to reduce global demand and supply of tobacco products. In 2008, UN during World Health Assembly (WHA) through WHO, introduced 6-tool evidence-based package - MPOWER for monitoring the progress, protection against tobacco exposure, offering help to affected, warning of the harmful use of tobacco, enforcement of legal bans and raising taxes on tobacco products. This initiative aims to accelerate tobacco control reduction measures. Through this initiative, it was projected that a purposeful and collective engagement of all member states could provide a 30% - reduction of tobacco smoking from 2010 prevalence of 22.1% to a target of 15.4% by 2025 [2].

The implementation of WHO FCTC has been reported to be uneven and without tailored-made, country-specific and sensitivity to the local context [25]. For instance, recent evaluation of FCTC reveals that only 16% of the world's population is protected by comprehensive national smoke-free program [26]. However, the monitoring of these programs through regular surveys is only available in about a third of countries, representing 39% of the global population [26]. The legal framework for ensuring smoke-free environment is an important component in achieving tobacco-free initiative. However, the current evidence indicates that the smoke-free laws are only available in about 20% of the world population, leaving nearly 80% unprotected [26]. Strategies for deterring initiation of smoking particularly among youths and for prompting quit attempt for smokers include pictorial warning and mass media campaigns. However, despite the potential of these strategies over a half the world population has not been reached. In parallel, initiatives for discouragement of smoking through bans on tobacco-related adverts and increased taxation on tobacco products are only available in a third of countries [26].

In parallel to the direct tobacco control through WHO FCTC program, the UN resolution of the action plan for control of NCD provides another platform [27]. Contrary to the situation in developed countries, LMICs particularly Africa, have very limited services for smoking cessations do not have services for The currently available therapeutic interventions for smoking-cessation include psychotherapy together with direct nicotine replacement therapy (NRT) and use of limited specific drugs [28]. In order to improve the outcome of smoking cessation programs, the role of skilled healthcare providers is paramount. It is well settled that individual who obtain advice from physician have 84% chance of having a successful quitting [26]. However, most of the tobacco smoking cessation services are unavailable in the majority of countries in SSA. For instance, over 60% of all quit lines services are in developed countries [26].

Tobacco control programs are particularly struggling in sub-Saharan Africa. For instance, a recent survey in South Africa revealed only 29% of adult smokers reported to have been received healthcare advice on quitting smoking in the preceding year. It is particularly important to learn that over 81% of adult smokers reported to have noted health warning labels on the

tobacco package, and nearly 50% were considered quitting smoking after reading the labels [3]. This finding suggests that increased investment in tobacco control could accelerate gains and making tobacco-free a reality in Africa.

Methods

This was a cross-sectional descriptive study conducted based on WHO online repository on tobacco use. Specifically, data were extracted from Global Health Observatory (GHO) and Institute of Health Metrics and Evaluation (IHME) repositories. In order to assess the burden and impact of various interventional programs, both global and regional summaries on tobacco use and tobacco-related deaths, over a period ranging from 1990 to 2016, were extracted and subsequently included in the analysis. Likewise, data on specific geographical division of Africa, excluding North Africa, were collected for independent analysis and comparison. The sub-Saharan Africa sub-regions included Eastern, Western, Central and Southern Africa. Data was entered on and analyzed using Excel spreadsheet software using percentages for reporting and comparison of regional and sub-regional data summaries.

Results

The steady increase in smoking-related deaths in SSA is clearly highlighted in Figure 1. The number of deaths increased from about 150,000 in 1990 to over 215,000 deaths in 2016. Further, it is noteworthy that such steady increase is observed in all SSA sub-regions, with the highest number of deaths occurring in Eastern Africa. The number of deaths in Central Africa region is the lowest while the number of deaths in Southern Africa region is demonstrating a subtle decline over the last 15 years.

The overall global prevalence of tobacco smoking is estimated to increase from 19.9% in 2015 to 21.9% in 2016. Similarly, in Africa region, the overall prevalence of tobacco smoking increased from 9.8% in 2015 to 13.9% in 2016. The overall prevalence of tobacco smoking is increasing in Africa, Eastern Mediterranean and Western Pacific while there is a notable decrease in Americas and Europe. Throughout all WHO regions, the result indicates that tobacco smoking is more-or-less a male problem. A notable proportion of female in Americas and Europe regions smoke cigarettes and very few in the rest of the world. The highest prevalence, about 46%, of male tobacco smokers is in the Western Pacific followed by over 38% in Europe (Figure 2).

Figure 3 below demonstrates that tobacco smoking is a predominantly a male problem across all socio-economic strata. The level of smoking is not shown to be influenced by the income status. Nearly 43% of the men in upper-middle income countries smoke tobacco, representing the highest number in all World Bank (WB) income groups. In all other WB income groups, the level of tobacco smoking is comparable among men, ranging from 30-33%. The prevalence of smoking among female is highest in the high-income countries, about 17.8%, while it ranges from 2.9% to 5.2% in all other income groups.

Discussion

The prevalence and burden of tobacco smoking are generally increasing both globally and in Africa. In Africa, the prevalence

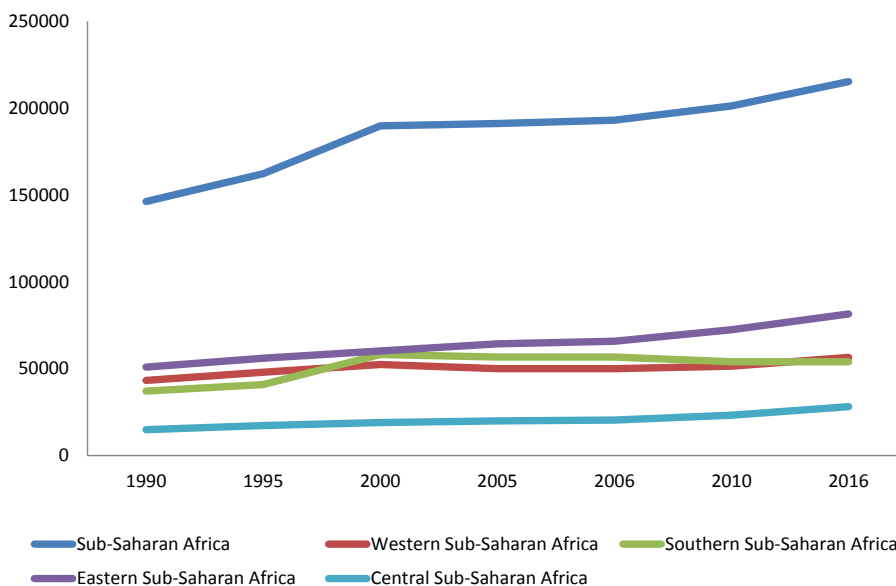


Figure 1. Trend in tobacco smoking-related deaths in sub-Saharan Africa and its sub-regions over the period of 25 years: 1990-2016. (Source: Institute of Health Metrics and Evaluation).

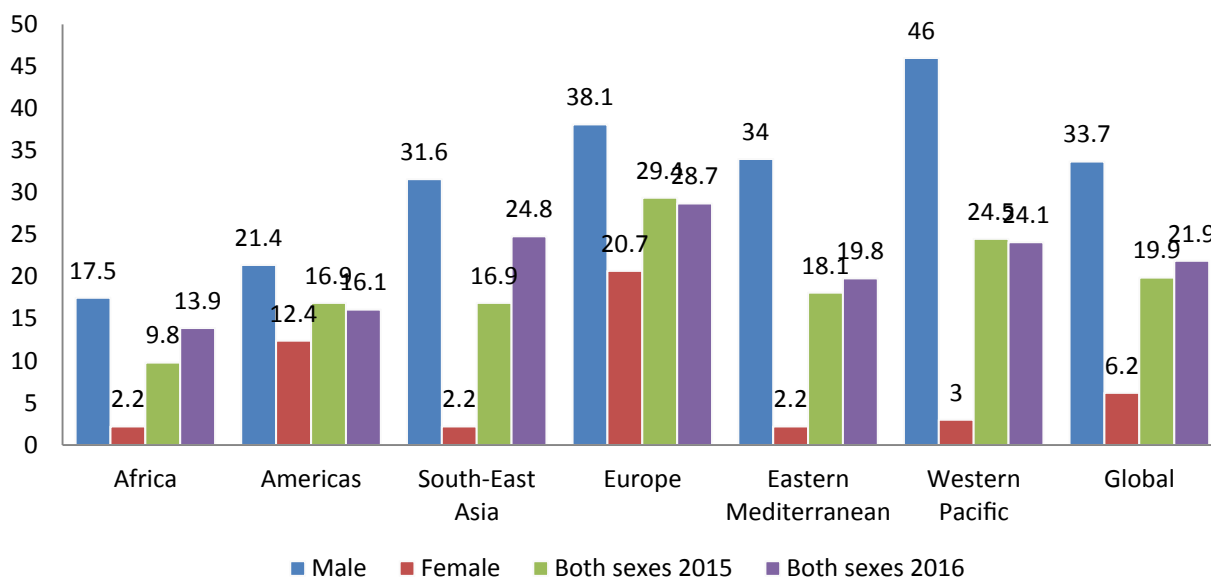


Figure 2. Global and regional estimates of prevalence of tobacco use by sex (Source: WHO regional data, 2016).

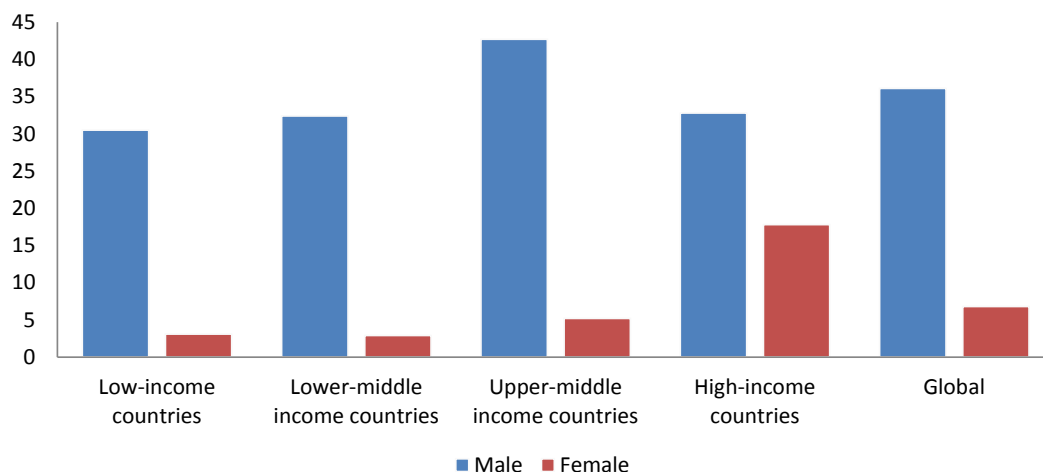


Figure 3. Prevalence of tobacco use according to World Bank income groups (Source: WHO data, 2012).

of smoking is estimated to increase by over 70%, with strong male preponderance, based on 2015 and 2016 data. In parallel, the data highlights that both prevalence and the number of tobacco-associated deaths are increasing in Africa. It is likely that the available mortality data could represent only a proportion of reported cases, as many deaths could be occurring at homes. Thus the level of burden of tobacco-related death could be grossly underreported due to poor data capture and lack of adequate diagnostic facilities.

Eastern Africa represents the sub-region with highest and increasing number of tobacco-associated deaths. Central Africa has the lowest number of tobacco-associated deaths. The observed variability in the number of the deaths occurring in SSA sub-regions remains to be explored. The current data highlights that in the absence of tailored efforts in tobacco control, Africa is unlikely to meet the 2025 target according to 2010 projection. The achievement of the 30%-reduction target set by WHO through FCTC in Africa may require additional efforts to explore drivers and challenges operative in the local context.

SSA is the known least consumer of tobacco, but the increasing trend in both the prevalence and smoking-related mortality is alarming. Studies conducted worldwide shows that over 90% of tobacco smoking is started during adolescence. This is in agreement with the situation in Africa where the majority of new cases of smokers are typically adolescents indicating inadequate efforts towards youth-related preventive strategies [10]. This observation highlights the urgent need for African countries to design mechanisms for participatory inclusion of youths in tobacco control program. This could be achieved through effective school-based preventive and cessation programs together with community-based intervention programs. In parallel, most of the data regarding tobacco use relies on cigarette smoking. However, in Africa and other developing countries, there is a range of alternative means of tobacco consumption including chewing, snuffing and piping. Recently, the use of wet piping has become fashionable among youths and young adults in urban settings in Africa. For instance, a survey in Madagascar, reported the prevalence of non-cigarette tobacco use to be as high as 7% (8.5% males, 5.8% females) among adolescents aged 13-15 years [10]. These 'newer and imported' tobacco smoking practices are usually promoted as tobacco-free and the widespread misconception is increasingly becoming rampant. Thus the existing misconception may translate into underreporting of tobacco use and associated health consequences. Besides, the existing underreporting together with lack of adequate diagnostic facilities, could lead to underestimation of tobacco-related deaths.

The existing social transition in Africa, characterized by increased urbanization – drawing the majority of youths to cities – exposes them to increased risk of tobacco smoking and other risk behavior. The existing poor tobacco control measures in Africa allow exponential growth of the incident cases in Africa. The lack of effective legal framework exposes children to tobacco experience while they are still young and thus finds it easy to practice smoking at adolescence. For instance, it is dismal to note that in Africa, it is very common and considered normal for the smoking parent or even school teachers to send a

child of the any age to nearby kiosk for buying him cigarettes. These adult people would typically smoke while within the same confinement - dwelling house or even classrooms - without any deterring legal or social or moral principles. In addition to the legal measures and appropriation of social norms, there is a need for engaging parents/guardians and teachers in the control of adolescent tobacco use through education. There are must be purposeful efforts to enforce the legal framework for tobacco control in terms of effective smoke-free laws and policies and limiting tobacco access to minors [29].

Tobacco control in Africa should be tackled by involvement of diverse stakeholders and through multiple facets. In particular, smoking cessation programs including NRT are not readily available in many African countries. Lack of skilled healthcare providers partly hinders the efforts for therapeutic intervention for tobacco control. For instance, smokers with nicotine dependence are commonly blamed for their smoking habits without consideration of their irresistible addiction that requires medical help. Studies conducted elsewhere have demonstrated improved quitting when NRT is added to encouragement to practice quitting among unmotivated smokers [30]. Typically, where NRT services are available, the products are only provided in hospital settings. It is imperative that efforts should be made to bring NRT products to the users as over-the-counter products, for improved access [31,32].

In order to improve gains on tobacco control, African governments are advised to re-look on the behavioral intervention which are sensitive to the local context by specifically addressing the social norms, default options and non-promotion or discouraging packaging of tobacco products [33]. One possibility for accelerated behavioral intervention lies on the current wide coverage of mobile phone in Africa, which provides an opportunity for raising awareness on health impact of smoking particularly among the youths. However, despite this noble platform, little has been attempted in Africa contrary to the gains in the developed countries [34].

Conclusion

Tobacco use is increasingly becoming an important cause of disease in Africa. The available evidence indicates that both the burden of disease and smoking prevalence are on the rise. The global efforts on tobacco control have demonstrated gains elsewhere but with limited achievement in Africa. There is urgent need to explore further potential drivers of continued tobacco use and devise solutions which are tailored to the local context and sensitive to the culture and community norms in Africa. The current shift of focus of major tobacco companies to Africa requires concerted international efforts towards protection against scrupulous industrial investment, promotion, and trading of tobacco products. Part of the international focus should be directed to the innovation and provision of alternative sources of livelihood for the local and poor farming communities in Africa who have complete reliance on tobacco. Increased investment in tobacco control programs is greatly needed in terms of human capacity, financing for healthcare services, legal framework and enabling infrastructure. Collectively, these investments will provide opportunity and platform for preventive and therapeutic interventions in order to accelerate the achievement of tobacco-free Africa.

Disclosure of Conflict of Interest

The author declares no any conflict of interest.

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