The health cost of tobacco use in Uganda

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Abstract

The economic cost of tobacco use is well documented in high-income countries. It has been measured in relatively fewer low-and middle-income countries, and much less in sub-Saharan Africa despite the longstanding recognition of significant current and future health risk to people attributed by tobacco use in this region. This article fills this gap by estimating the economic cost of tobacco use in Uganda, a low-income country in sub-Saharan Africa. This study estimates the economic cost of tobacco use in Uganda using the cost-of-illnesses approach based on data collected from a survey of patients and caregivers in four major service centers in Mulago National Referral Hospital, namely, Uganda Cancer Institute, Uganda Heart Institute, Chest Clinic and Diabetic Clinic, key informant interviews and secondary sources for the year 2014. The total direct health care and non-health care cost of tobacco-related illnesses in Uganda was USD 41.56 million. The total indirect morbidity and mortality costs from the loss of productivity due to tobacco-related illnesses were USD 11.91 million and USD 73.01 million, respectively. The direct and indirect costs of tobacco use added up to USD 126.48 million, which is equivalent to 0.5% of GDP, a proportion comparable to the estimated health cost of tobacco use in other countries. The total health care cost of tobacco-related illnesses constitutes 2.3% of the national health care account which is already over-burdened with the cost of infectious diseases, limited medical personnel and infrastructure. In addition, tobacco-related illnesses heavily reduce life expectancy of tobacco users and ultimately their economic productivity. The cost of tobacco-related illnesses in Uganda far outweighs the benefits of employment and tax revenue generated from the tobacco sector. Stronger tobacco control measures need to be undertaken to reduce the disease and economic burden of tobacco use in this country.

Keywords: Cost-of-illness, tobacco use, health care cost, morbidity, mortality

Key Messages

• Using the cost-of-illness approach to estimate the direct health care and indirect morbidity and mortality costs of tobacco use, we find that the health cost of tobacco use in Uganda far outweighs the benefits of tobacco production and consumption to the economy.
• As tobacco use causes net cost to the economy of Uganda, stronger policy measures need to be undertaken to reduce tobacco consumption and consequent disease burden in this country.
Introduction

The World Health Organization (WHO) identifies tobacco as the leading cause of preventable death in the world. Tobacco use killed 100 million people in the 20th century and will likely kill up to one billion people in the 21st century (Peto and Lopez 2001). Many of these deaths occur prematurely, and impact negatively on the socioeconomic development of any nation. Tobacco use and exposure to second-hand smoke in non-smokers cause death to almost 6 million people each year among adults including >600 000 non-smokers who die from exposure to second-hand smoke (Oberg et al. 2010; WHO 2011a). Tobacco kills one of every two users, a mortality rate higher than any other risk factor (Peto et al. 1992). Annual death toll from tobacco use is expected to rise to 8.3 million by the year 2030, with >80% of them projected to occur in low- and middle-income countries (LMICs) (WHO 2011a).

The economic cost of tobacco use is well documented in high-income countries (HICs). It has been measured in relatively fewer LMICs partly due to the reason that the tobacco epidemic is at an early stage in LMICs and hence the need for addressing the adverse health consequences of tobacco use are not felt as urgent as it is in HICs (WHO 2011b). It is also attributable to the lack of reliable data on patients’ health care expenditures and access to health care in LMICs. The evidence on the economic cost of tobacco use in sub-Saharan Africa is even more limited (see e.g. Kidane et al. 2015; for Tanzania; Yach 1982; McIntyre and Taylor 1989; Yach et al. 1992, Groenwald et al. 2007 for South Africa) despite the long-standing recognition of significant current and future health risk to people attributed by tobacco use in this region (Yach 1986; Saloojee 2000; Jamison et al. 2006; Pampel 2008).

This study fills this gap by using the cost-of-illness approach (WHO 2011b) to estimate the economic cost of tobacco use in Uganda, a low-income country in Africa with the prevalence of tobacco use among youth at 19.3% among boys and 15.8% among girls aged 13–15 years (GYTS 2011) and 11.6% among men and 4.6% among women aged 15+ years (GATS 2013). The much higher level of tobacco consumption among youth compared with adults portends increasing trend of tobacco use in the future generation, especially among girls, that would contribute to tremendous disease and death burden in Uganda. The results of this study are expected to serve as a benchmark that would make tobacco control communities, including professionals and policy makers, aware of the current state of harms caused by tobacco use to the economy and would lead them to take appropriate measures to prevent the epidemic. The specific objectives of the study are to provide (1) the estimate of the direct costs of health care of patients suffering from tobacco use related diseases, (2) the estimate of the indirect costs from lost productivity and income owing to tobacco-attributable morbidity and premature mortality and (3) the estimate the net cost of tobacco use measured by the difference between the total cost of tobacco use and the market value of tobacco products claimed to be the economic benefit of tobacco consumption yielded by the tobacco industry.

Materials and methods

Data sources

The primary data for the study were collected from the four major service centres in Mulago National Referral Hospital, namely, Uganda Cancer Institute, Uganda Heart Institute, Chest Clinic and Diabetic Clinic. Mulago National Referral Hospital is the national referral hospital in the capital city of Uganda and the only government facility which can diagnose illnesses such as cancer, cardiovascular diseases (CVDs), and chronic obstructive pulmonary disease (COPD). The hospital has good complete data in the study units, such as, the cancer and heart institutes, and the chest and diabetic clinics. The hospital receives patients referred from all the regions in Uganda and therefore would offer good national estimates.

The techniques used to collect the data included review of documents such as budget and expenditure reports, hospital reports, patient records, and health management information system (HMIS); survey of patients and caregivers; and key informant interviews. The survey(s) involved patients suffering from the six illnesses identified as attributable to tobacco use (e.g. lung cancer, stomach cancer, oral/pharyngeal cancer, diabetes, CVD and COPD) at the Mulago National Referral Hospital during the period 1 July 2013 to 30 June 2014. Both men and women who were 30 years or older and who suffered from one of the tobacco-induced diseases prevalent in Uganda were included in the survey. A sample of 353 patients was selected based on the availability of complete medical records. For each patient selected, one fulltime caretaker was selected and interviewed where available. The patients gave consent to participate willingly in the survey. Key informant interviews were conducted from the selected interviewees in the Ministry of Health and Mulago hospital administration. The secondary information on the total market value of cigarettes for 2014 was obtained from Euromonitor International Ltd database, the gross domestic product (GDP) for 2014 was obtained from the World Economic Outlook, International Monetary Fund database and the health expenditure as % of GDP was obtained from the World Development Indicators, The World Bank database.

Methods of estimation

Direct costs of tobacco-related illnesses

The direct costs of tobacco use, also called tobacco-attributable healthcare expenditures, are those healthcare expenditures resulting from the treatment of the tobacco-related illnesses, covering hospitalization, investigations and medications, and the non-health care expenditures such as transport and communication needed for the treatment. In Uganda, the provision of health care services is a mix of government, private and non-for-profit facilities. The Mulago National Referral Hospital under study operates both government subsidized services in general wards (with partial out-of-pocket contributions from patients) and purely private services in private wards (where patients pay 100% out-of-pocket). The patients covered in this study include both of these types. The costs incurred by government for providing health care facilities or the payments made by private insurance are not included in the direct cost component.

This exclusion is based on the assumption that the current public health expenditures on tobacco-induced diseases would have been used to treat other illnesses at the national level even if there were no illnesses caused by tobacco use and hence unavoidable from the society’s perspective. This assumption is particularly relevant for LMICs where public health expenditure is deficient in addressing the health care needs of the entire population.

Since the designated illnesses may be caused by risk factors other than tobacco use, we need to attribute the healthcare expenditures to tobacco use. For this measure, we calculate the Tobacco Attributable Fraction (TAF), which is the proportion of health services utilization, healthcare costs, deaths or other health outcome measures that is attributable to tobacco use. The TAF is also known as the population attributable risk (PAR).

In this study, TAF was calculated using the epidemiological approach that compares the annual treatment cost per person stratified
by tobacco use. Specifically, the medical cost ratio approach was used to calculate the relative risk (RR) given by:

\[
RR \text{ of medical cost} = \frac{\text{Average medical cost per ever tobacco user}}{\text{Average medical cost per never tobacco user}}
\]  
(1)

Ideally, both the numerator and the denominator should be based on per person cost for all people (including healthy and ill persons among ever tobacco users and never tobacco users) rather than just those who have the disease of interest. However, due to lack of data on the total medical cost of all ever tobacco users and all never tobacco users, we have used the medical cost per person who has the disease of interest only. In case it causes disproportionally larger upward bias in the estimate of average medical cost per ever tobacco users relative to the average medical cost per never tobacco users, it can lead to an overestimation of the RR and tobacco-attributable costs.

Data needed for TAF calculation in Equation (2) include tobacco use prevalence (smoking and smokeless tobacco use) and RR from Equation (1):

\[
TAF = \frac{P_e \times (\text{RR} - 1)}{P_r \times X (\text{RR} - 1) + 1} \times 100\% 
\]  
(2)

where \(P_e\) is the percentage of ever tobacco users (current plus former tobacco users), \(P_r\) is the relative risk of incurring expenditures for treating tobacco-related disease for ever tobacco users compared with never tobacco users.

The percentage of ever tobacco users is 11.76%, obtained from 8.84% daily smoking prevalence and 2.92% daily smokeless tobacco use prevalence based on the nationally representative Global Adult Tobacco Survey Uganda, 2013.

**Total direct costs of tobacco-related illnesses**

Let the average annual health care expenditure per patient in the health care facilities under study be \(\text{UCOST1}\) and the average annual health care expenditure per patient outside those facilities be \(\text{UCOST2}\). These two cost components are estimated from the costs incurred by the sample of inpatients in the study facilities and in other settings, respectively. The sum of these two average costs gives the average annual health care expenditure per patient:

\[
\text{UCOSTH} = \text{UCOST1} + \text{UCOST2}
\]  
(3)

Let the average annual transport and communication cost per patient be \(\text{UCOST3}\) and the average annual transport and communication cost per caregiver for each patient be \(\text{UCOST4}\). The sum of these two average costs gives the average annual non-health care expenditure per patient:

\[
\text{UCOSTNH} = \text{UCOST3} + \text{UCOST4}
\]  
(4)

The sum of the average costs of health care and non-health care services provides the average direct cost per patient:

\[
\text{UCOST} = \text{UCOSTH} + \text{UCOSTNH}
\]  
(5)

The total direct cost is given by the product of the total number of patients who suffered from the tobacco-attributable diseases and accessed health care services in a given year and the average direct cost per patient:

\[
\text{TDC} = \text{TOTP} \times \text{UCOST}
\]  
(6)

In the absence of any direct information on the number of patients suffering from tobacco-related illnesses and accessing health care facilities, we have used findings from two studies on Uganda that estimated the prevalence of self-reported non-communicable diseases (NCDs) at 23% (Wandera et al. 2015a) and the percentage with access to health care at 76% (Wandera et al. 2015b). The total number of patients with NCDs accessing health care in a given year has been estimated by:

\[
\text{TOTP} = \text{POP}(30+) \times 23\% \times 76\%
\]  
(7)

where \(\text{POP}(30+)\) is the total population who are 30 years or older.

The tobacco-attributable direct cost (\(\text{TATDC}\)) is estimated by the product of the total direct cost and the TAF:

\[
\text{TATDC} = \text{TDC} \times \text{TAF}
\]  
(8)

**Indirect morbidity costs of tobacco-related illnesses**

The indirect morbidity cost of tobacco use was estimated using the human capital approach, which values lost productivity using predetermined market earnings. The formula for calculating tobacco-attributable indirect morbidity costs based on the human capital approach is expressed as:

\[
\text{TAIMBC} = \text{TAF} \times \text{TWLDP} \times \text{DINCP} + \text{TAF} \times \text{TWLDC} \times \text{DINCC}
\]  
(9)

where \(\text{TAIMBC}\), total indirect morbidity cost; \(\text{TWLDP}\), total yearly work-loss days of patients; \(\text{TWLDC}\), total yearly work-loss days of caregivers; \(\text{DINCP}\), daily income per patient; \(\text{DINCC}\), daily income per caregiver.

The daily income has been calculated from reported monthly income under the assumption that there are 22 working days in a month. The total yearly work-loss days of patients (caregivers) is calculated by the average monthly work-loss days times 12 multiplied by the total number of patients (caregivers) and the employment rate of patients (caregivers):

\[
\text{TWLDP} = \text{TOTP} \times \text{EMPLOYP} \times \text{WLMP} \times 12 \\
\text{TWLDC} = \text{TOTC} \times \text{EMPLOYC} \times \text{WLMC} \times 12
\]  
(10)\(\text{11}\)

where \(\text{TOTP}\), total number of patients; \(\text{TOTC}\), total number of caregivers (for simplicity, it is assumed that each patient has one caregiver); \(\text{EMPLOYP}\), employment rate of patients; \(\text{EMPLOYC}\), employment rate of caregivers; \(\text{WLMP}\), average monthly work-loss days per patient; \(\text{WLMC}\), average monthly work-loss days per caregiver.

**Indirect mortality costs of tobacco-related illnesses**

Based on the human capital approach, the tobacco-attributable indirect mortality cost has been estimated according to the formula:

\[
\text{TAIMTC} = \text{TAF} \times \sum_{a=\text{Min}\ a}^{\text{Max}\ a} \left( \text{TDEATH}_{a} \times \text{PVLE}_{a} \right)
\]  
(12)

where \(\text{TAIMTC}\), tobacco-attributable indirect mortality cost; \(\text{TDEATH}_{a}\), total number of deaths from tobacco-attributable diseases for population subgroup \(j\) (male and female) whose age at death is within the age group \(a^*\) (30–44, 45–59, 60–69, 70–79, 80+); \(\text{PVLE}_{a}\), total discounted present value of lifetime earnings for population subgroup \(j\) whose age is within the age group \(a^*\); \(\text{Min}\ a\), minimum age group; \(\text{Max}\ a\), maximum age group.

The formula to calculate the PVLE is specified as follows:

\[
\text{PVLE}_{a} = \sum_{n=0}^{\text{Max}\ a} \left( \text{SURV}_{a}(n) \right) \times Y \times xE_{x} \frac{(1 + r)^{y-a}}{(1 + r)^{y}}
\]  
(13)
where SURV\(_j\) (\(n\)), the probability that a person of age \(a\) and gender \(j\) will survive to age \(n\); \(a\), the age of the person at death; \(\text{Max}\), maximum age group (e.g. age 80+); \(Y\), the mean annual earnings of an employed person; \(E_j\), the proportion of the population of gender \(j\) that are employed in the labour market; \(V\), the growth rate of labour productivity; \(r\), the discount rate.

The survival probabilities by age group and gender were obtained from the WHO life table for Uganda (WHO 2015a). The mortality rates from tobacco-attributable diseases by gender and age group for 2004 were drawn from the WHO Global Report: Mortality Attributable to Tobacco (WHO 2012). These mortality rates were used to estimate the total number of deaths based on the gender and age-specific population size of Uganda for 2014. The future pattern of earnings and labour force participation rates were predicted by assuming that people will be working and productive during their lifetimes in accordance with the current pattern of earnings and work experience for their cohorts. In the absence of gender-specific average earning, we assumed the same average annual earning for men and women, which is 4.56 million UGX per person (obtained from the patient survey). This annual income was assumed to grow at an annual average growth rate of 6% (based on projection from 2015 to 2020 in IMF 2015). The rate of discount was assumed to be 3% per annum following Sung et al. (2006).

Total health cost of tobacco-related illnesses
The total health cost of tobacco use is given by the following sum of the direct and the indirect costs that are attributable to tobacco use:

\[
\text{THC} = \text{TATDC} + \text{TAIMBC} + \text{TAIMTC}
\] (14)

Study limitations
The major study limitation was incomplete data in the patient records on various aspects, such as, history of tobacco use, outpatient data in diabetic clinic, socio-demographic characteristics of patients like education, missing diagnostic and therapeutic information. Additionally, the number of patients who died during the study made it difficult to follow-up the patients to establish the costs on transport and communication. Recall bias by patients and caregivers is a possibility, given that some clients were approached longer than 6 months after their last hospital visit.

There are two sources of downward bias in the estimate of the health cost of tobacco use. First, the study could not get data on the number and treatment costs of patients treated abroad. Second, we lack data on the impact of secondhand smoking on non-smokers, such as, children and women in the smokers’ households.

Finally, in estimating the indirect morbidity and mortality costs using the human capital approach, we have considered only the forgone productivity and income of the people who would have been economically active in the market. The lost productivity of the unpaid family members or housekeepers, who were either patients or caregivers are not included in the estimation. It would require imputation of reservation wage of these non-employed people conditional on their demographic and labour market characteristics which are not completely available in our survey. This exclusion would, however, create downward bias in the estimates of indirect morbidity and mortality costs and the total health cost of tobacco use.

Results
Description of patient and caregiver characteristics
Data were extracted from the medical records of 353 patients, of which 189 (54%) were male and 164 (46%) were female. Of the 353 patients, 103 (55% males, 45% females) were followed-up with a phone interview to obtain information pertaining to their tobacco use history, and the health care costs on medication. The mean age of the patients was 58 years and there was no significant variation in mean age by gender. In terms of regional distribution, about 63% of the study patients were from the districts of the central region, 13% were from the western and eastern regions each, about 6% were from the northern region; and 5% were from outside Uganda.

The survey interviewed a total of 173 caregivers, of which 49% were primary care givers to the patients. The majority of the caregivers (61%) were females. The mean age of the caregivers was 39 years (minimum = 16, maximum = 72). In terms of relationship to the patients, the first generation family contributed the largest number of caregivers (parents 30%, siblings 19%, other relatives 10% and guardians 1%) compared with the second generation family (spouse 16% and child 21%). Overall about 3% of the caregivers were not related to the patients but friends.

Majority of the caregivers had tertiary education (44%), with secondary education constituting about 43%, primary education about 11% and formal education only 2%. Despite the fact that this educational profile represents a relatively highly educated group of caregivers in relation to the national level educational attainment, it is a reasonable representation of the self-selected group of population who seek hospital care. Most of the caregivers were married (65%) while about a quarter (25%) had never been married. The separated/divorced and widowed combined constituted about 10%. This has implications on the availability of care givers and the time lost in more productive time while caring for the patients.

The history of tobacco use was captured on 103 patients (57 males and 46 females) who were followed-up. About 21% of the followed up subjects had a history of tobacco use (8% were currently using tobacco products and 14% had ever used but had stopped at the time of the survey). The proportion of current or ever user patients was relatively higher among men than women (male = 32%, female = 9%).

The common tobacco products used included cigarettes (75%), roll your known (10%), pipe (10%) and chewing tobacco (5%) and the users had used them on average for 12 months. On average, 13 cigarettes were smoked per day by users. A pack of cigarettes (with 20 sticks) cost the users on average UGX 2000 (USD 0.80) with a stick costing UGX 100 on average. This implies that patients who were smoking spent on average UGX 1300 daily on purchasing tobacco/cigarettes. A sizeable number (38%) of household members of the patients smoked and used tobacco. Of the 173 caregivers reached, 6% had a history of using tobacco products (4% currently using tobacco products, 2% ever using tobacco products). This proportion was significantly higher among males than females. All the caregivers using tobacco products used cigarettes. On average, they had used these for 12 months taking 3 cigarettes per day. 37% of the caregivers reported to be living with a family member who currently uses tobacco products.

Out of the 353 patients, 30% had CVD, 27% had oral pharyngeal cancer, 14% had COPD, and 13% had diabetes. Lung and stomach cancers each constituted about 8%. Furthermore, out of the 235 patients (67% of 353) who were successfully traced, 64% were alive while 36% had died. Lung, oral pharyngeal and stomach cancers had the highest number of patients who had died, with the proportion constituting over 50%.

On average, most patients made three to four visits to the unit in the year of study, but with variations by condition. Oral pharyngeal, stomach, lung cancer and CVD patients made on average four visits, diabetic patients made three visits and COPD patients made two
visits a year. About 36 and 14% of the oral pharyngeal and lung cancer patients respectively made >10 visits in a year. On average, most patients (34%) spent 7 days in admission into hospital facility. Average direct healthcare cost

The total average direct healthcare cost to patients admitted during the study period was about 2 680 000 UGX (US$1073), with this average cost highest among stomach cancer patients (UGX 4 267 067 or US$1700) and lowest among COPD patients (UGX 722 137 or US$290). On average a patient incurred UGX 350 000 (US$140) as the cost of admission, UGX 140 000 (US$58) on consultations, UGX 390 000 (US$156) on investigations/laboratory services, UGX 300 000 (US$116) on medicines and UGX 592 500 (US$237) on nursing care during the study year, as indicated in Table 1.

Average direct non-health care costs

On average, patients incurred about UGX 160 000 (US$63) and UGX 230 000 (US$94) on communication and transport respectively during the study period. On the other hand, the caregivers recorded an average total expenditure of UGX 300 000 (US$120) and UGX 410 000 (US$163) on communication and transport, respectively during the study period.

Total direct costs

The annual average medical cost of a current or former smoker suffering from a tobacco-attributable disease is UGX 3 697 255, which is 2.28 times the annual average medical cost of a never smoker that is UGX 1 619 309. The RR ratio is thus 2.28. With a population level tobacco use prevalence of 11.76% (GATS 2013) and RR of 2.28, the PAR is 0.94%. With the total cost of health care services for NCDs estimated at UGX 11 520.72 billion, it implies that the direct cost of tobacco-attributable illnesses in Uganda is UGX 108.05 billion (Table 2).

Indirect costs of morbidity and mortality

The key factors to explain the indirect healthcare costs for both patients and caregivers are employment and income. Results suggest that at the time when the illness started, majority (40%) of the patients were either self-employed or engaged in various business...
activities. Other patients were employed by either government (17%) or non-governmental agencies (15%). The patients had a mean monthly income of about UGX 380,000 (US$153) and on average, patients lost 6 work-days in a month due to illness. The average retirement age among the patients who retired before the official retirement age of 65 years due to illness was 51 years (min = 35 years). Computation of the total annual work loss due to disability, factored in the average number of days lost and the average monthly income. The findings showed that patients on average lost UGX 930,000 (US$374) annually due to illness. The indirect morbidity cost of tobacco-attributable illnesses is estimated to be UGX 30.96 billion (Table 3).

Total and net costs of tobacco use
The indirect mortality cost due to loss of productivity and income from premature deaths of patients suffering from tobacco-induced diseases amounted to UGX 189.80 billion (Table 4). The indirect mortality costs added to the direct health care cost and the indirect morbidity costs make the total health cost of tobacco use in Uganda amount to UGX 328.82 billion, which is equivalent to USD 126.48 million (Table 4). The total health cost outweighs the market value of tobacco products or the so-called benefits of tobacco use in Uganda given by UGX 143.51 billion (USD 55.2 million) which is the net cost of tobacco use. These benefits accrue to the wages and salaries of the farmers and employees employed in the tobacco sector, profit of the tobacco growers and manufacturers, and government revenue generated from tobacco taxes.

It needs to be emphasized that the health cost of tobacco use estimated in this study reflects the private costs and would be a close approximation to the social costs in the absence of a well-developed public health care system which is generally the case in many LMICs countries. In principle, the health care costs in the government managed facilities in Uganda are paid for by the government; in reality, cost sharing or even full payment by the patients is a common practice in order to ensure proper diagnosis and treatment. However insignificant the contribution of government provided health care may be, we have assumed in the analysis that this cost is unavoidable.

Table 4. Total and net cost of tobacco use in Uganda, 2014

| Amount/Amount (%) |
|-------------------|
| Billion UGX       | Million USD |
|--------------------|-------------|
| A. Direct cost     | 108.05      | 41.56        |
| B. Indirect morbidity cost | 30.96      | 11.91        |
| C. Indirect mortality cost | 189.80     | 73.01        |
| D. Total health cost of tobacco use (A + B + C) | 328.82     | 126.48       |
| E. Total market value of cigarettes | 143.51     | 55.20        |
| F. Net cost of tobacco use (D – E) | 185.31     | 71.28        |
| G. GDP, 2014       | 66 155.63   | 25 573       |
| H. Health cost of tobacco use as % of GDP (D/G) | 0.5%       | 0.5%         |
| I. Health expenditure as % of GDP, 2014 | 7.2%       | 7.2%         |
| J. Health expenditure, 2014 (H × I) | 4777.85    | 1846.92      |
| K. Health expenditure on tobacco-induced diseases as % of total health expenditure (AVJ) | 2.3%       | 2.3%         |

Note: The direct cost (A) and indirect morbidity cost (B) were taken from Tables 2 and 3 respectively. The market value of cigarettes (E) was sourced from Euromonitor International Ltd. database. The GDP (G) was obtained from the World Economic Outlook, International Monetary Fund database, and health expenditure as % of GDP (I) was obtained from the World Development Indicators, The World Bank database.
even if tobacco-related illnesses are eliminated (See the section on Methods of Estimation of Direct cost of tobacco-related illnesses). If we drop this assumption, the social cost would be higher than the private cost and the net cost to society would be larger than what we estimate in this study. The decisive factor is that the cost of tobacco use in Uganda exceeds the benefits which justify government intervention in tobacco control to combat tobacco use in the country.

Discussion and conclusion

The direct cost of treating tobacco-induced diseases constitutes 2.3% of the national health expenditure of Uganda in 2014. This share is comparable to the percentages of total health care cost devoted to treating smoking-attributable illnesses in other LMICs, such as, 1.4% in Mexico (Reynales-Shigematsu et al. 2006), 2.7% in Czech Republic (Sovinová et al. 2007), 2.7% in Uzbekistan (Usmanova et al. 2007), 3% in China (Yang et al. 2011), 0.2% in Laos People’s Democratic Republic (Chu et al. 2009), 2.4% in Vietnam (Ross et al. 2007), as well as HICs, such as, 1.2% in Sweden (Bolin et al. 2011), 2.4% in UK (Callum et al. 2011), 2.2% in Australia (Collins and Lapley, 2008), 1.4% in Republic of Korea (Oh et al. 2012) and 1.8% in Singapore (Quah et al. 2002). In making comparison with other studies, we should make the distinction clear that our study estimates the health cost of both smoking and smokeless tobacco use while most of the previous studies cited here are limited to the health cost of smoking only.

The total cost of tobacco use in Uganda is estimated to be 0.5% of the GDP in 2014. It indicates that the relative economic burden of tobacco use in Uganda can be as high as or even larger than those in other LMICs, such as, 0.1% in Mexico (Reynales-Shigematsu et al. 2006), 0.2% in Czech Republic (Sovinová et al. 2007), 0.6% in Uzbekistan (Usmanova et al. 2007), 0.2% in Myanmar (Kyaing 2003), 0.1% in Thailand (Leartsakulpanitch et al. 2007), 0.6% in China (Yang et al. 2011), 0.1% in Laos People’s Democratic Republic (Chu et al. 2009), 0.6% in Malaysia (Al-Junid 2007), 0.1% in Vietnam (Ross et al. 2007), as well as HICs, such as, 0.7% in Netherlands (van Genugten et al. 2003), 0.3% in Sweden (Bolin et al. 2011), 0.2% in UK (Callum et al. 2011), 0.9% in Australia (Collins and Lapley 2008), 0.3% in Republic of Korea (Oh et al. 2012), 0.4–0.5% in Singapore (Quah et al. 2002). The opportunity cost of these resources is very high as these resources could have been diverted to competing and more productive uses benefiting public health as well as the economy.

Tobacco use has enormous negative consequences to the economy and therefore requires proactive control measures. This article is an output of one of the forerunner studies on economic cost of tobacco use in Africa, using fairly complete data from patient records on the medical costs incurred. This study also shows that the cost of managing tobacco-related illnesses is greater than the benefits of tobacco to government and individuals and their families in Uganda. Based on the finding of the positive net cost of tobacco use to society and the economy, this study recommends that government of Uganda urgently implement the Tobacco Control Act 2015 which was passed on 19 May 2015, specifically revising the tax regime from tiered specific to uniform specific tax system and raising the tax. Tax increases should reduce the affordability of tobacco products in Uganda. In addition, a strong tax administration is critical to minimize tax avoidance and tax evasion, to ensure that tobacco tax increases lead to higher tobacco product prices and tax revenues, as well as reductions in tobacco use and its negative health consequences. This is in tandem with the recommendations of the Addis Ababa Third International Conference on Financing for Development on how to finance the 17 sustainable development goals of which targets 3.4 and 3a are directly related to controlling NCDs through tobacco control (UN 2015b;c; WHO 2015b).

The second recommendation is to strengthen the NCD programme at the Ministry of Health, following the Global NCD Action Plan that includes voluntary targets focusing on the NCD risk factors.

Managing tobacco-related illnesses is a collective effort of the patients and their families. In the absence of a well-developed health insurance mechanism, the biggest share of the medical costs is bound to be borne by the out-of-pocket health expenditures of households. However, the excessive cost of treating diseases such as cancer or CVD can only be borne by the few Ugandans in the wealthy quintile. Moreover, expenditures on tobacco consumption deprive the poor households of basic necessities including food, education and health care with greater impoverishing effect. Based on these costs, we recommend that Civil Society Organizations should work with the patients and their families who have incurred these costs to trigger advocacy for strengthening tobacco control regulation including establishing smoke free environments, education on the health consequences of tobacco use and litigation against the tobacco industry for compensation. These activities will highlight the health hazards of tobacco use hence propelling government to strengthen the tobacco control programme.

The health care cost of treating tobacco-related illnesses impacts heavily on the much needed resources to run the country’s health system which is already over-burdened with the cost of infectious diseases, limited medical personnel and infrastructure. Tobacco-related illnesses heavily reduce life expectancy of the individuals and ultimately their economic productivity, thus depleting the quality and quantity of countries’ labour force. The estimates in this study, based on lost earnings, underestimate the costs to households since they ignore the value of lost household production, adverse impacts on the health and education of family members, costs of sub-optimal land use, the value of lost leisure, and the pain and suffering associated with tobacco-related illnesses. In the Ugandan setting if an individual suffers from a chronic health condition, care giving, medical expenses, the physical and emotional drain are borne by the whole family who actively participate in the health care process. Most times the ill person is the bread winner of the family; therefore, the lost income due to illness adversely affects the family wellbeing since the family has to generate money for treatment through sale of property like land to meet the costs. The impacts of chronic diseases such as those related to tobacco use are not confined to the infected person only. The illness or death of an adult can increase the morbidity or mortality of their spouse; the illness or death of a mother or father can result in excess mortality among bereaved persons including their children.

In conclusion, our study indicates that tobacco use causes substantial economic and health burden on Uganda. Timely measures are necessary to control tobacco use when it is still at an early stage of the epidemic and not beyond control.

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Note

1. According to the World Development Indicators Database, the percentage of population aged 25 who completed at least primary education was 32.5%, the percentage of the same age group who completed at least lower secondary education was 24%, and the percentage who completed at least short-cycle tertiary education was 8.1% in 2012.