Economic cost of tobacco-related cancers in Sri Lanka

Hemantha Amarasinghe,1,2 Sajeeva Ranaweera,2 Thushara Ranasinghe,3 Nadeeka Chandraratne,2 Dinesh Ruwan Kumara,4 Montarat Thavorncharoensap,5 Palitha Abeykoon,4 Amala de Silva6

ABSTRACT

Introduction  Cancer has a high mortality rate and morbidity burden in Sri Lanka. This study estimated the economic cost of smoking and smokeless tobacco (ST) related to cancers in Sri Lanka in 2015.

Methods  Prevalence-based cost of illness is calculated according to the guidelines of the WHO (2011). The direct costs are costs of curative care (costs of inward patients and outpatient care borne by the state and out of pocket expenditure by households) for tobacco-related cancers, weighted by the attributable fractions for these cancers. Indirect costs are lost earnings due to mortality and morbidity (absenteeism of both patient and carers resulting from seeking care and recuperation).

Results  The total economic cost of tobacco-related cancers for Sri Lanka in 2015 was estimated to be US$121.2 million. The direct cost of smoking and ST-related cancers was US$42.1 million, which was 35% of the total cost, while the indirect cost was US$79.1 million, which was 65% of the total cost.

Conclusion  Burden of tobacco smoking and ST-related cancers as reflected in these economic costs is enormous: affecting the healthcare system and country’s economy. Policymakers should take note of this burden and address tobacco consumption control as a priority.

INTRODUCTION

Tobacco is identified as the leading preventable cause of premature death worldwide. It was estimated that 6 million people died from tobacco-related illness in 2014, of which 70% occur from non-communicable diseases related to tobacco such as heart disease, cerebrovascular diseases and lung diseases or communicable diseases which contribute significantly to the burden of tobacco-related diseases.

According to the National Cancer Registry of Sri Lanka, in 2014, 86.4 and 89.1 per 100,000 populations in males and females, respectively,1 were ever smokers. This study estimates economic costs of tobacco-related cancers in Sri Lanka and does not estimate the economic costs of other non-communicable diseases related to tobacco such as heart disease, cerebrovascular diseases and lung diseases or communicable diseases which contribute significantly to the burden of tobacco-related diseases.

The economic costs of smoking-related cancers were calculated as direct costs for treating tobacco-related cancers and indirect cost due to productivity loss due to premature mortality and morbidity. The costs of smoking and smokeless tobacco were determined separately and combined to estimate the total cost due to tobacco and ST-related cancers.

Types of cancer selected for the study

The costs of lung, lip, oral cavity and pharynx (3rd revision of the International Classification of Diseases for Oncology (ICDO-3): C00–C14 except C07-C08 salivary gland neoplasm) and oesophagus, larynx, stomach, kidney, pancreas, colorectal, liver and bladder cancer were calculated for smoking-associated cancers. Costs of cancer of the lip, oral cavity and pharynx (ICDO-3: C00–C14 except C07-C08) and oesophagus were calculated for ST.

Calculation of smoking/ST attributable fractions (AF)

The following formula is used for calculating smoking/ST AF:

\[ AF = \frac{\sum_{j=1}^{n} P_j (RR_j - 1)}{\sum_{j=1}^{n} P_j (RR_j - 1) + 1} \]

where \( j \) is the exposure category with baseline exposure or no exposure \((j=0)\), \( RR(j) \) is the relative risk at exposure level \( j \) compared with no consumption and \( P(j) \) is the prevalence of the \( j \)th category of exposure.

AFs were calculated for each type of cancer. The AFs derived from the formula, together with the number of deaths and healthcare episodes, were used to estimate the number of healthcare episodes attributable to smoking in this study.

Calculation of direct cost

Direct healthcare cost included both government and out of pocket (OOPE) expenditures for outpatient and inpatient visits as well as clinic visits. Direct costs for outpatient care took into account frequency of clinic visits for the year and cost to the government of providing such a service per person. An expert panel consisting of eight senior oncologists, two oncosurgeons, five public health consultants, a surgeon and three consultant physicians was consulted to estimate these costs. When calculating the inpatient care cost, the costs of surgery and pharmaceuticals, survival rates for certain cancers, the average intensive care unit (ICU) treatment days required for specific cancers, the average number of days in hospital was expert views of this panel. These costs reflected the experience of the clinicians in both the government and private sectors as all of them worked in both sectors.

Costs incurred by family members in accompanying the patient on different OPD visits and on entering hospital are included under OOPE by family.

Calculation of indirect cost

Loss of life or withdrawal from the workforce was calculated, considering the earnings for the period up to retirement based on average earnings adjusted for economic growth, the probabilities of survival and employment. The average earnings were taken from the Household Income and Expenditure Survey (HIES) data of the Department of Census and Statistics. Indirect costs in the form of lost earnings due to premature mortality was calculated using the ‘scenario building method’ based on mean income, incorporating annual growth, weights for probability of survival and employment with the lost earnings gap depending on age of death and assumed age of retirement. A discount rate of 4.5% was used. Lost daily earnings due to absenteeism was calculated based on average monthly earnings as reported in the HIES.

Data sources

Published reports of surveys conducted by government which are nationally representative such as the National Cancer Registry, reports from Registrar General’s Department and Medical Statistics Unit of the Ministry of Health were used. Studies carried out by postgraduate students in the areas of community medicine and health economics were utilised in developing the best possible estimates when there was a paucity of data.

The extracted data were further validated through expert group meetings with the agreement of all experts. When the data were unavailable (eg, survival rates for certain cancers, the average number of ICU treatment days for specific cancers), the best estimates were made through the consensus of the experts. Incidence of cancers among males and females were projected for 2015 based on data from the National Cancer Registry 2009 and cross-checked against Globocan 2012 IARC data base for Sri Lanka which was used to estimate the number of patients with cancer in the year 2015.

The number of deaths from each type of cancer were obtained from the 2010 Indoor Mortality and Morbidity Report, Ministry of Health, Sri Lanka. Income data were obtained from Household Income and Expenditure Survey year 2012–2013, of the Department of Census and Statistics, Sri Lanka.

The OOPE of inpatients and outpatient department, clinic visits, hospital costs, ward management costs including hospital indoor cost per patient and human resource costs were obtained from a comprehensive study conducted in 2014.

Length of stay in the hospital ward and number of clinic visits per year were obtained from the Statistical Cancer Review 2011 of the Medical Statistics Unit, National Cancer Institute, Sri Lanka.

To calculate the AF for smoking, the prevalence of smoking and ST use were obtained from STEP survey in the year 2015 and RR were derived from international literature, that is, systematic reviews on related cancers.

RESULTS

AFs for smoking and ST were calculated based on the RR obtained through the published meta-analysis studies in the literature (table 1).

Direct healthcare cost

Table 2 contains the direct healthcare costs of smoking and ST attributable cancers disaggregated by inpatient and outpatient care. Inpatient and outpatient care costs relate to state expenditure on healthcare while OOPE is borne by households.

The total estimated direct healthcare cost is US$29.5 million for smoking and US$12.6 million for ST. Total direct cost accounts for 35% of the total economic cost attributable to tobacco (table 4).

Cancer of the lip, oral cavity and pharynx accounted for the highest direct healthcare cost of smoking while lung cancer was the second highest.
Estimated cancer accounted for the highest indirect cost. Premature mortality accounted for US$33.2 million and absenteeism accounted for US$21.2 million.

The indirect costs of ST were estimated at approximately US$24.7 million (Table 4). Cancers of the lip, oral cavity, and pharynx had higher indirect costs than for oesophageal cancer. A premature mortality cost was US$13.8 million, while an absenteeism cost was US$10.9 million for ST.

Indirect cost accounted for 65% of the total economic cost of tobacco-related cancers that were studied.

**DISCUSSION**

Economic cost of tobacco-related cancer in Sri Lanka for the year 2015 was US$121.2 million, which accounted for 16.06% mortality accounted for US$33.2 million and absenteeism accounted for US$21.2 million.

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**DISCUSSION**

Economic cost of tobacco-related cancer in Sri Lanka for the year 2015 was US$121.2 million, which accounted for 16.06%
Economic cost of tobacco-related cancer was 0.15% of the total GDP (US$82,838.66 million) in the year 2015 in Sri Lanka.21

Total tobacco tax revenue for the year 2015 was US$92.7 million, which is 20.4% of our cost estimate for tobacco-related cancers.21 However, economic costs of other conditions such as non-communicable diseases should be added to the cost to obtain a fair comparison between the taxes and economic costs.

Indirect costs made up the largest cost component accounting for approximately 65% of the total cost, which is similar to findings in previous studies undertaken on this topic.22,23 The results show that tobacco exerts a substantial economic burden on the Sri Lankan population. It is imperative, therefore, that policymakers should consider these estimates in developing and implementing public policies and tobacco control measures.

In this paper, we present only the economic costs of selected tobacco-related cancers. It is well established that non-communicable diseases other than cancers comprises a substantial proportion of burden of tobacco-related diseases. The economic costs of these non-communicable diseases related to tobacco, which include heart disease, cerebrovascular disease, diseases of the respiratory and other systems are not included in the final costs presented. Therefore, these findings related to cancers, if taken alone, will substantially underestimate the total economic costs of tobacco in Sri Lanka. Studies have shown that the cost attributable to cancers ranged from 13% of the total cost of smoking in India24 to 25% in Thailand22 and 35% in Vietnam.25

Given these findings, the total economic cost of tobacco in Sri Lanka for 2015 may fall within the range of US$346.3 million to US$932.3 million.

Although there are published costing studies in other countries, a direct comparison of the results is challenging as different studies include different types of diseases, costing methodologies, healthcare consumption patterns. Given similarities in consumption of tobacco products and the challenges posed by tobacco-related cancers in the South Asian region, this study methodology could also provide a sound framework for costing exercises in other countries in the region. The methodology used in this study could be further expanded in the future to consider impacts such as secondhand smoke and the opportunity cost of spending on tobacco in income constrained poor households.

There are some limitations of this study which should be taken into account when interpreting the results. First, this study involved reviewing data from different Departments and Ministries of the government of Sri Lanka. Therefore, the methodologies used, completeness and the timeliness of the reports differ. Second, when calculating the direct cost, cost of prevention, early detection and management of premalignant stages were not considered.

Third, while secondhand smoking is also related to many health hazards, we have only considered the passive smoking effects for breast and cervical cancers. The cost for providing healthcare in the private sector is not considered in this study. However, it is estimated that about 90% of the patients having malignancies seek treatment from the government sector.

When calculating the AFs, RRs were obtained from the systematic reviews, the local RR is available only for lung cancer. Lastly, psychosocial costs of suffering from cancer incurred by patients and their family members have not been assessed.

CONCLUSIONS

Burden of tobacco smoking and ST-related cancers in Sri Lanka is significant. As shown in this study, the economic costs associated with these diseases are enormous, resulting in negative impacts on both the healthcare system individual families and the country’s economy. Therefore, policymakers should take note of this burden and take immediate and effective steps to control tobacco consumption.

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