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ESTIMATION OF HOSPITALIZATION COSTS OF TOBACCO RELATED ILLNESSES IN LEBANON

by
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AN ABSTRACT OF THE THESIS OF

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Tobacco smoking imposes a heavy burden on society, killing nearly six million people per year according to the WHO statistical releases. While tobacco consumption has been decreasing in industrialized countries, it is unfortunately increasing in developing countries. Tobacco related deaths are estimated to exceed eight million yearly by 2030, with more than 80% of those deaths in developing countries.

In Lebanon, it is estimated that more than 3500 citizen die each year from tobacco-related diseases. This paper attempts to assess one of the costs imposed by smoking by estimating both public and private healthcare expenditures on hospitalization cases of the following smoking-related disease groups: lung and bladder cancers, COPD, stroke, ischemic and hypertensive heart diseases.

This study estimates that the public sector spends LBP 46,666,879,173 on hospitalization of lung and bladder cancers, heart diseases, COPD, and stroke while the private sector spends LBP 54,782,858,160 on hospitalization of the corresponding diseases. Also, total estimated hospitalization expenses for the selected disease groups form 2.71% of GDP which is quite alarming considering that this study does not take into account all smoking related diseases.

This paper aims at being a first step toward conducting a cost effectiveness analysis of various tobacco control policies that could be implemented in the future which is quite necessary to prompt the Lebanese government to impose further regulations aiming at reinforcing tobacco control in the country.

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CHAPTER I

INTRODUCTION

Tobacco use leads most commonly to diseases affecting the heart, bladder and lungs. Today, it is estimated that there are more than 1.3 billion people smoking cigarettes or other tobacco products in the world among them 1 billion are males and 300 million are females. In fact, smoking prevalence among men and women differ between high and low-middle income countries: in industrialized countries 35% of men as well as 22% of women smoke, while in developing countries 50% of men and 9% of women are smokers. More importantly, 82% of smokers reside in low and middle-income countries clearly supporting the view that the trend of tobacco consumption in developing countries has been rising by 3.4% per annum. In contrast, demand for tobacco in industrialized countries has been falling for the past twenty years (CDC 2011-"Smoking & Tobacco Use"; "Tobacco and the developing world ").

In addition, tobacco smoking is the leading cause of preventable death globally and it has been proven that it causes more deaths each year than HIV, illegal drug use, motor vehicle injuries, and alcohol use all combined. In fact,the World Health Organization (WHO) estimated that tobacco use causesnearly 6 milliondeaths per year. Moreover, for people aged more than thirty, smoking caused one out of five deaths among men and one in every 20 deaths among women worldwide. It is also expected that by 2030, annual death rate caused by tobacco will exceed eight million yearly and it is estimated that

developing countries will witness more than 80% of the world's smoking related deaths (World Health Organization 2013-"Tobacco Fact sheet N°339").

Tobacco products are widely varied but share tobacco consumption's negative effects. In fact, tobacco consumption imposes both direct and indirect economic consequences on society: the direct burden arises in the form of death, disease, higher health care costs and transportation to health care facilities. The indirect cost takes the form of productivity losses and premature mortality, together with environmental costs such as the generation of waste and the risk of fires. In fact, studies show that the overall annual cost of healthcare attributed to smoking in high-income countries varies between 6% and 15% of total healthcare expenditures. As for low- or middle-income countries, the tobacco epidemic is still at an early stage and healthcare access is still limited (World Bank, 1999, Ross et al., 2007). This is why an estimate of the health bill related to smoking isn't available for developing countries.

Smoking harms every organ of the human body according to epidemiological studies conducted in 2004 in the US (US DHHS, 2004). Smoking causes several diseases to smokers and second-hand smokers, as shown in table 1.1. In fact, according to global health metrics statistics for the year 2010, tobacco smoking caused 7.87% of total stomach cancer deaths, 27.26% of all esophageal cancer deaths, 15.7% of all kidney cancer deaths, 32.67% of all mouth cancer deaths, and 19.93% of all aortic aneurysm deaths (GBD compare). However, for the purpose of this paper, only lung cancer, bladder cancer, obstructive pulmonary diseases, stroke, as well as ischemic and hypertensive heart diseases will be taken into consideration. Global health metrics statistics show that tobacco smoking caused

23.9% of ischemic heart diseases and 22.87% of stroke deaths worldwide. Also, 62.95% of lung cancers and 26.17% of bladder cancers worldwide are due to tobacco smoking while 37.72% of COPD deaths are attributed to smoking. The reason why we focus on only these diseases is that data on prevalence rates, health care utilization rates and costs for other diseases is unavailable for Lebanon.

More importantly, Lebanon ranked among the highest worldwide in terms of tobacco consumption before the adoption of the new tobacco control policies in 2012 (Chaaban, Naamani, and Salti 2010). It is also estimated that in Lebanon more than 3500 citizen die each year from tobacco-related diseases ("Lebanon - New tobacco-control law adopted").Therefore, assessing the costs imposed by smoking is quite necessary to prompt the Lebanese government to impose further regulations aiming at reinforcing tobacco control in the country. Estimating both public and private healthcare expenditures together with the smoking related disease groups discussed above in Lebanon will be a first step toward conducting a cost effectiveness analysis of various tobacco control policies that could be implemented in the future.

Thus, with the aim of estimating smoking-related healthcare private and public costs for these disease groups affecting Lebanese society, this paper consists of a literature review in Chapter II showing other costing studies that were conducted in industrialized as well as in developing countries, while going over previous work done on Lebanon. Chapter III is devoted to the methodology and assumptions adopted in determining health care cost of each disease. Moreover, chapter IV will include a detailed review of the Lebanese context in terms of the adoption of recent tobacco control measures, as well as the country's current

healthcare system. Chapter V describes primary data figures used for computation purposes together with an analysis of how these data sources will be used to obtain costing funding source, by disease, and by gender of the healthcare cost of each of the disease groups. The focus will be restricted to health care costs related to hospitalizations. The remaining chapters of the thesis are devoted to discussion, conclusions and policy implications.

Table 1.1.Smoking Related Illnesses

Smoking Related Disease
Malignant Neoplasm:
Lip, oral cavity, pharynx
Esophagus
Stomach
Pancreas
Larynx
Trachea, lung, bronchus
Cervix, uteri
Kidney and renal pelvis
Urinary bladder
Acute myeloid leukemia
Cardiovascular Diseases:
Ischemic heart disease
Cerebrovascular disease (stroke)
Atherosclerosis
Aortic aneurysm
Peripheral vascular disease
Arterial embolism and thrombosis
Respiratory Diseases:
Chronic bronchitis, emphysema
Chronic airways obstruction

Source: World Health Organization (2010)

CHAPTER II

LITERATURE REVIEW

According to the economic framework of cost estimation published by the World Health Organization (WHO) in 2009-10, cost studies take two different approaches: a microeconomic one and macroeconomic one. Microeconomic cost studies focus on the burden of tobacco consumption on individual agents, households, and governments. For example, welfare economists study the diseases' effects on health by defining the agent's welfare or utility in terms of his or her consumption of goods, services, health, and leisure. In this perspective, there are three components to evaluating the consequences of a certain disease: the direct effect on health, the effect on consumption other than healthcare, and the effect on leisure time. On the other hand, macroeconomic studies attempt to aggregate the effects of smoking across all agents. One example of macroeconomic cost study is the cost of illness approach whereby the consequences of the diseases are divided into direct in terms of healthcare expenses to treat the disease of interest, and indirect in terms of productivity losses (WHO 2009).

Also, it is worth noting that depending on the time frame considered for the purpose of the study, an annual cost approach or a life-time approach can be used. The life-time cost approach, known as the incidence-based approach, aims at estimating the excess costs expected to take place as a result of smoking-related diseases for a smoker in

comparison with someone who has never smoked if the smoker continues to smoke. Using longitudinal data, this costing method is nothing but a discounting cash flow exercise where expected costs are discounted into their present value and summed up (Sloan 2004). Healthcare treating smoking related illnesses are offset by forgone expenditures if the smoker decides to quit smoking and enjoy a healthy life.

As longitudinal data are scarce, the lifetime cost approach has not been very widely used in the estimation of smoking costs studies. Using cross-sectional data, the annual cost approach is based on the computation of the excess costs of smoking incurred by smokers (current and former) and second hand smokers during one year. The gross costs taken into consideration are the result of current tobacco consumption together with past exposure. The annual cost approach is therefore a prevalence-based one. In this approach, smokers are compared to never smokers for the calculation of excess costs of illnesses attributed to smoking during a single year (Miller 2010).

Most studies addressing the economic costs and burden on the economy were conducted in industrialized, high-income countries. These studies demonstrated that smoking related health expenses constitute between 6 and 15% of national healthcare costs (World Bank 1999). Also, it has been shown that tobacco imposed high impact losses on the economy: total gross smoking costs reached 1.6% of GDP in the US, 3.4% of GDP in Australia, and 2.2% of GDP in Canada (Lightwood and Collins 2000).

In contrast, not much literature has been developed to assess the economic costs of tobacco in middle and low-income countries. A Chinese study showed that costs of smoking related illnesses accounted for 3.1% of health expenses (Sung 2006) while another study in

Vietnam showed that smoking related costs amounted to 4.3% of total health expenses (Ross 2007). The lack of literature in developing countries can be attributed to facts related to limited access to medical care, as well as to the absence of reliable accounting and statistical agencies that are able to determine the total costs of smoking (Ross 2007).

In Lebanon, a study was conducted in 2010 aiming at estimating the overall loss caused by tobacco on the Lebanese economy. The paper identified the stakeholders affected by tobacco consumption, thus attempting to estimate the cash flows generated and incurred by each of the Ministries of Finance and Health, the state tobacco monopoly, employers, and the overall economy. Given data limitation on smoking related costs in Lebanon, losses attributed to smoking amounted to $55.4 million per year. More importantly, net costs related to the treatment of cardiovascular diseases, cancers (bladder and lung), together with respiratory diseases were estimated as follows:

Table 1.1.Estimated Cost of Smoking Related Diseases in Lebanon

Smoking Related Disease	Estimated Cost (in millions $)
Cardiovascular Disease	104.5
Smoking Related Cancer	33.6
Respiratory Diseases	8.6

Source: Chaaban, Salti, Naamani (2010)

In light of this literature review, it is worth mentioning that this paper takes the form of macro annual costing study that is meant to give more accurate estimates about hospitalization costs of smoking-related diseases in Lebanon by basing our estimates on data extracted from the Lebanese NSSF for the calendar year 2012. Not only will estimation about hospitalization costs be detailed, but also the number of hospitalizations for each specific disease group will be calculated. Results obtained include both the public and private sectors. Hospitalization shares for each funding agency coming into play in the Lebanese health sector are also detailed during the course of the paper.

CHAPTER III

LEBANON CASE STUDY

A. Tobacco Control in Lebanon

The extent of tobacco control varies in each country. However, the effect of tobacco control measures is the same: whenever adopted they will induce a decrease in the consumption of tobacco products thereby reducing the prevalence of smoking related illnesses. In this perspective, the WHO Framework Convention on Tobacco Control (WHO FCTC) was developed in response to the spread of the tobacco epidemic across borders especially with trade liberalization, direct foreign investment, global marketing, and other factors. The WHO FCTC includes several measures aiming at reducing tobacco demand such as regulation of the contents of tobacco products, packaging and labelling of such products, protection from exposure to tobacco, communication and public awareness on the dangerous effects of tobacco use on health, as well as tax increases on tobacco consumption. Also, the WHO FCTC recommends measures to reduce tobacco supply such as providing support for alternative activities ("WHO REPORT ON THE GLOBAL TOBACCO EPIDEMIC, 2013 Enforcing bans on tobacco advertising, promotion and sponsorship").

In Lebanon, the legislature adopted in August 2011 a new tobacco-control act, known as Law 174, banning smoking in all closed public places, and forbidding tobacco companies from conducting advertising campaigns.Tobacco companies were also obliged to place a warning about cigarettes' harmful effect on health that covers 40% of the surface of cigarette packs("New National Law").

B. Smoking Prevalence in Lebanon

With 7.8 billion cigarettes consumed per year, Lebanon has a considerable prevalence of smoking when compared to other countries in the Middle East(Ministry of Health Statistical Report, 2007). It has been shown that male smokers consume on average about 1 pack and a half per day making the consumption rates in Lebanon some of the highest in the world. Monthly cigarette packs consumption is 3 times higher than that of Syria (Chaaban, Naamani, and Salti 2010). The below tables summarize smoking prevalence in Lebanon using cigarettes and water pipe consumption for adults. The data about water pipe smoking prevalence will not be used due to inherent difficulties in reaching accurate figures on the number of smoked water pipes as well as the time spent on water pipe smoking. As shown in table 3.1, for each age group, men consume more cigarettes than women do; however, water pipe consumption is more equal for males and females.

Table 2.1.Cigarette and Water Pipe Smoking Prevalence in Lebanon by Age and Gender Groups for Past and Current Smokers

Age						
	Men			**Women**		
	18-39	**40-59**	**60+**	**18-39**	**40-59**	**60+**
Cigarette Smoking (%)						
Current Smoker	39.6%	53.2%	38.2%	17.1%	42.5%	34.2%
Past Smoker	2.9%	8.7%	25.1%	1.2%	5.25	12.1%
Water Pipe Smoking (%)	36.1%	16.2%	8.7%	32%	15.1%	6.7%

Source: Sibai, and Hwalla (2009)

C. Lebanese Health Sector

The Lebanese civil war had a negative impact on the health system which was only accelerated by the development of a private health sector at the expense of a weakened public sector. Health care expenses are financed by six public funds, the Ministry of Public Health (MOPH), private insurance companies, and out of pocket expenditures as shown in the organizational chart below. The public funds are: the National Social Security Fund (NSSF), the Civil Servant Cooperative, and the Medical Services of the Army and Security Forces with four military schemes. The private share of healthcare expenses is borne by the

private sector composed of private insurance companies and out of pocket payments by individuals and households. According to the National Household Survey conducted in 2005, more than half of the Lebanese population, 53.3% of the residents have no form of insurance coverage (Ammar2009). Some hospitalization costs for this segment of the population might be covered by MOPH.

Data on health expenditures from the World Bank confirmed that for the year 2011, total health expenditures amounted 6.35% of GDP. Since during 2011, GDP was LBP 683,497 billion, total health expenditures can therefore be estimated as LBP 43,057.3[1] billion (World Bank Report).The public share of health expenditures is 25.5%, thus amounting to LBP 11,385 billion[2] (World Bank Report).

1. Funding agencies constituting the health care system in Lebanon

- MOPH

-The MOPH covers all Lebanese patients not covered under any health insurance scheme. An uninsured patient pays 5% of the bill in public hospitals, and 15% in private hospitals according to the Decree numbers 2195 and 3686, while the MOPH covers the rest of the hospitalization bill. Coverage includes drugs' procurement for patients with chronic illnesses (Ammar 2009).

- NSSF

Created in September 1963, the NSSF aimed at establishing a mandatory insurance plan for private sector employees by introducing three funds: the maternity and sickness fund, the

[1] This amount is equivalent to US $2.86 billion
[2] The amount is originally computed in US Dollars then adjusted to the exchange rate 1$=1500 LBP

end-of-service indemnities fund, and the family allowances fund. The NSSF is considered a public enterprise although its financing is private; more specifically, the employees together with their employers both contribute according to monthly salaries, with one exception concerning the end-of- service payment. The NSSF automatically covers private school teachers, university students, taxi drivers, newspapers sellers, mayors, and physicians, enrolled students up to twenty five years old, as well as people aged over sixty who are incapable of self-support, such as parents living with their children who are at the same time beneficiaries. In 2000, a "voluntary" health insurance plan was introduced providing medical coverage for people above sixty-four, provided that they have no other insurance. Any employee is eligible to benefit from the NSSF's coverage but can choose to waive his or her coverage right by opting for private medical insurance (Ammar 2009).

- Civil Servants Cooperative

-The law establishing the Cooperative of Civil servants (COOP) was issued in 1964 by virtue of the Decree no.14273 issued in October 1963 to insure all public employees in the Civil Service. Civil servants and their dependents are also insured after the employee's retirement. The Coop is under the tutelage of the Presidency of the Council of Ministers, and covers 90% of hospitalization expenses for the employee and 75% of hospitalization costs for the employee's family members in first, second, or third class, depending on the employment grade.

- Security Forces

-Coverage is through a multitude of sources: the military is coveredby the Military Medical Services; the staff of the Public and State Security is covered under two

different funds, while the InternalSecurity forces (ISF) have their own plan. All staff members are covered, including their dependents with a ratio of 3.5 persons per enrollee. Also, members get their hospitalization expenses covered at a rate of 100 %.

- Private Insurance

-According to Ministry of Economy sources, 70 private insurance companies provide both complementary and comprehensive health insurance coverage. The 2004/5National Survey on Households Living Conditions in Lebanon showed that 6.5% of the interviewed residents have a private insurance plan. Looking at data related to the group of private insurance companies selected by Ammar, it is shown that 35.8% of the privately insured appear to be simultaneously covered by the NSSF. This clearly shows that the privately insured do not all pay the whole insurance premium; rather private insurance covers the gaps in the benefits provided by the NSSF (Ammar 2009).

- Out of Pocket Payments

-Out of pocket expenditures are by far the most important component of the total healthcare expenses bill. These include direct expenses borne by individuals, incremental expenses borne by adherents to MOPH, NSSF, or any other private insurance, and full payments incurred by those who are not insured and not benefiting from MOPH assistance.

The following figure summarizes the funding agencies in the Lebanese healthcare system:

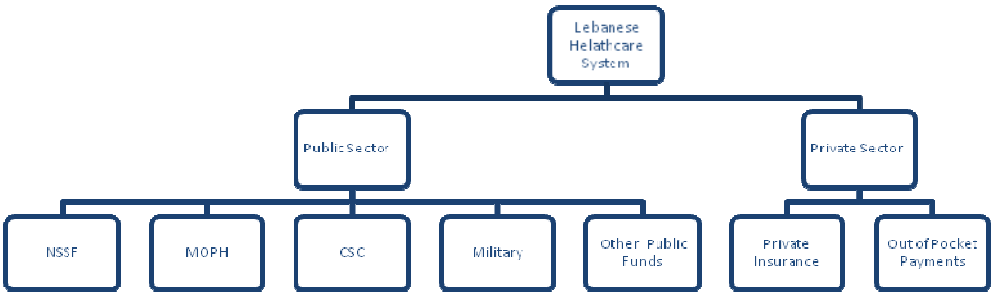

Figure 1.Lebanese Healthcare System Organization

Source: Ammar (2009)

In 2005, the private sector was still funding 50.6% of the total expenditures, with out of pocket payments (OOP) amounting to 44% of total health expenses. The MOPH had made it a priority to lower the households' financial burden, through a rationalization of health expenditures. As shown in figures 2 and 3, the MOPH's plan proved effective as, according to Households Living conditions Surveys conducted both in 1998 and 2005, households' out of pocket expenditures (OOP) decreased from 1.2 to 1.1 billion LBP (Ammar 2009). Figure 4 sheds light on the diminishing but still very high burden imposed on private Lebanese households in funding their healthcare expenses.

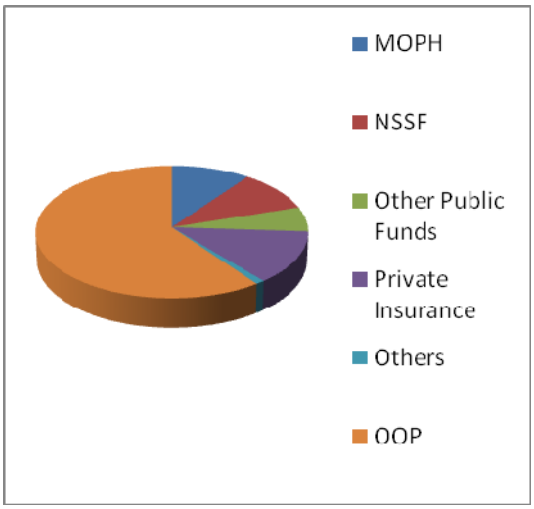

Figure 2.Expenditures by Agency in 1998

Source: Ammar 2009

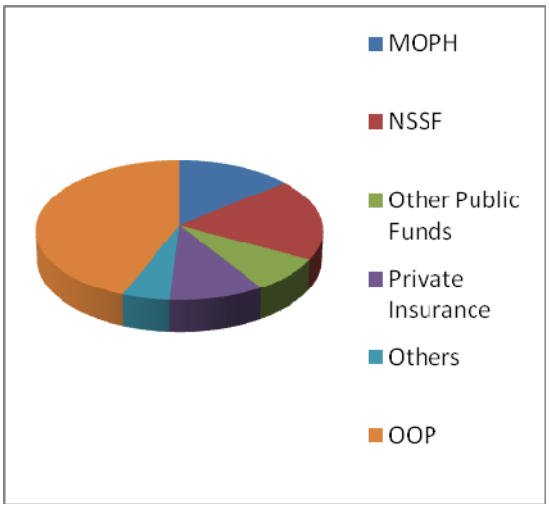

Figure 3.Expenditures by Agency in 2005

Sources: Ammar 2009

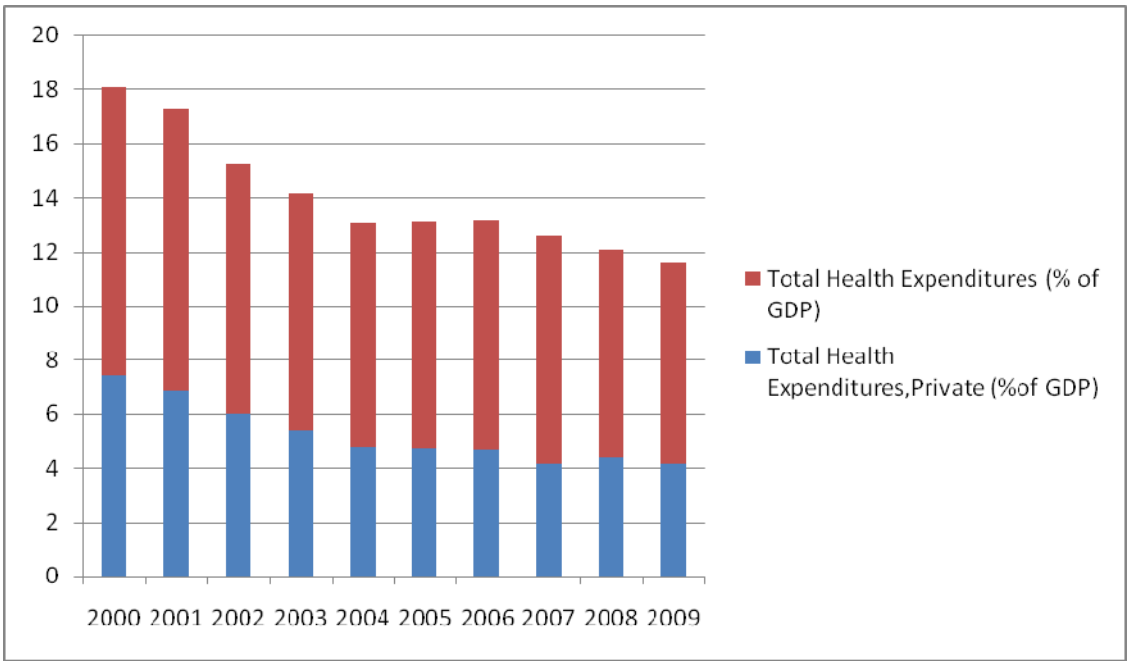

Figure 2.Health Expenditures in Lebanon (% of GDP)

Source: World Bank

CHAPTER IV

METHODOLOGY AND BACKGROUND

A.NSSF Data

Data obtained from the NSSF is specific for the calendar year 2012 in Lebanon and shows total hospitalization expenses borne by NSSF for the year 2012 as well as total number of cases of chemotherapy, open heart surgery, maternity, work accidents, dialysis, and a section reserved for all other types of sicknesses that not related to heart diseases, cancers, maternity, and dialysis for regular and voluntary adherents. We do not observe any information on the number, age, and gender of patients. Using this data, the average cost obtained for each disease should be taken to be 90% of the actual average cost of a hospitalization since NSSF covers 90% of hospitalization costs.

The following table shows percentages of expenses on open heart, chemotherapy, and sickness categories out of total hospitalization expenses borne by the NSSF as well as total number of cases specific to these categories.

Table 4.1.Share of Hospitalization Expenses Bone by the NSSF and Total Number of Cases by Disease Category for 2012

	Open Heart	Chemotherapy	Other Sicknesses
% of Total Hospitalization Expenses	0.1363	0.1805	0.6728
Number of Cases	943	19,485	169,840
Average Costs	1,979,027	3,006,926	1,283,693

Source: NSSF (2012), Author's Estimation

We use NSSF data to estimate the average cost of a hospitalization per diagnosis, and to extract the share of all hospitalizations attributable to tobacco. We will therefore have to make assumptions about:

- The distribution of NSSF cases across the disease categories we are interested in
- The share of the cases in each disease category attributable to tobacco

We also want to do this at a national scale and not just for NSSF so we make another simplifying assumption to extrapolate our results for NSSF to other public and private health payment schemes.

B. Distribution of NSSF Cases across Diagnostic Groups

When it comes to the distribution of NSSF cases across diagnostic groups, it is worth mentioning that the disease categorization provided by NSSF is not ideally suited for our purposes. In order to extract the average number of cases (and average cost per case) for the diagnostic groups that we are interested in, we use GBD data on deaths in Lebanon in 2010. It is worth noting at this stage that the Global burden of Disease (GBD) is founded by Dr. Christopher Murray, a Professor of Global Health at the University of Washington who led the collaborative of 500 researchers allocated from 50 different countries to produce the Global Burden of Diseases, Injuries, and Risk Factors Study in 2010. GBD 2010 is a quantification of the magnitude of health loss due to illnesses, injuries, and risk factors categorized by age, sex, and geography over time.

1. GBD Data

We assume that the share of hospitalizations related to smoking for each disease type is the same as the share of the death rates from that disease type associated to smoking. Data on the share of deathsfrom a disease together with the risk factor attribution, specifically tobacco smoking attribution, are from Global Health Metrics, IHME, GBD compare website.

2. Data Adjustments

In this section, data adjustments are implemented to take into consideration the nature of the data sets as well as their underlying assumptions. Also, such data

reconciliation is meant to determine the adjusted hospitalization expenses by disease and the adjusted number of hospitalization corresponding to each smoking-related disease group. Details incorporating these adjustments are found in appendices II and III.

As mentioned previously, NSSF data does not reveal any information regarding either the gender/age of patients or the detailed categories of illnesses these patients were hospitalized for. As such, GBD data need to be adjusted. The share of death by disease category as well as tobacco consumption contribution which includedata for men and women combined are presented in appendix I.

Moreover, we use GBD data assuming the distribution of hospitalization across disease groups is similar to the distribution of deaths given by GBD.

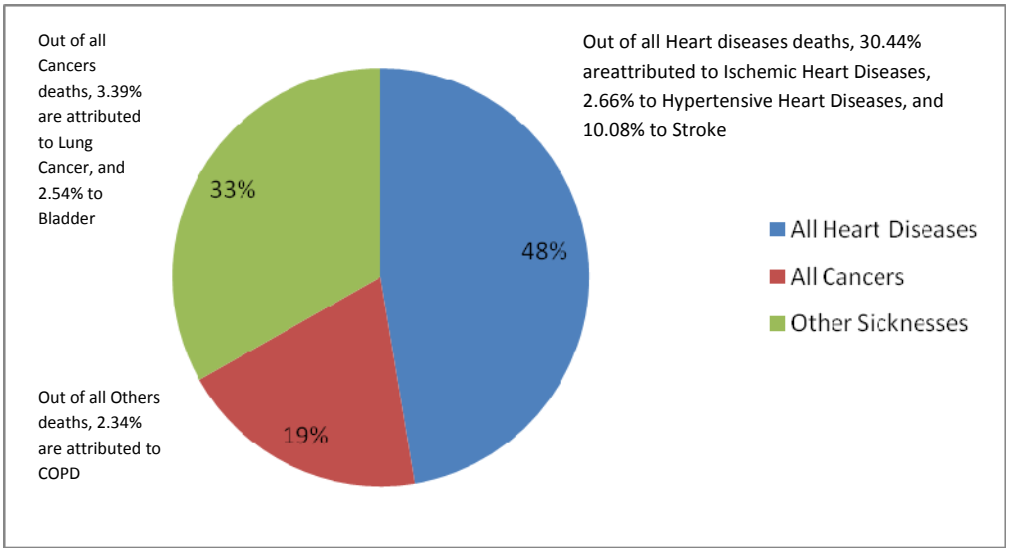

Figure 5.Distribution of Deaths for All Neoplasm, Heart Diseases, and Others

Source: GBD 2010

Applying the divisions we get in the pie chart to NSSF data, we obtain the following:

Table 4.2.Hospitalization Expenses and Hospitalization Cases Specific to the NSSF for Men and Women Combined

		Chemotherapy			Open Heart	
NSSF	COPD	Lung Cancer	Bladder Cancer	Stroke	Ischemic Heart Disease	Hypertensive Heart Disease
Total Cost of Hospitalization	218,022,460,348	58,508,759,171		218,022,460,348	4,443,387,461	
Number of Hospitalizations	169,840	19,485		2,245	2,245	
Average Cost of Hospitalization	1,283,693	3,006,926		1,283,693	1,979,027	

Source: NSSF 2012, Author's Estimation

We also use GBD data on the share of death by disease attributable to tobacco assuming the share of hospitalization attributable to tobacco is similar.

Table 4.1 computes the share of all hospitalizations covered by NSSF in three categories, and shows the number of hospitalizations in each category. We use these figures to calculate the average hospitalization expenses for the open heart, total chemotherapy, and other sicknesses categories.

The below tables show the average costs, adjusted number of hospitalization, as well as number of hospitalization cases due to tobacco consumption for men and women combined specific to the NSSF case. With shares of total hospitalization expenses and the

corresponding number of hospitalizations relating to open-heart surgeries, chemotherapy, and sickness, average costs can be obtained by dividing expenses by the number of cases.

Table 4.3.Adjusted Hospitalization Expenses and Hospitalization Cases Specific to the NSSF for Men and Women Combined

Adjusted Number of Hospitalizations	12,738	3,402	2,549	477	1,441	126
Average Cost of Hospitalization	1,283,693	3,006,926		1,283,693	1,979,027	
Actual Average Cost of Hospitalization (=average cost/0.9)	1,426,326	3,341,028		1,426,326	2,198,919	
Number of Cases due to tobacco	6,667	2,515	623	162	511	31
Total Cost due to tobacco	8,558,471,681	7,562,894,541	1,874,507,989	207,356,318	1,010,823,370	61,396,195
Percentage of total health expenses	*0.0264*	*0.0233*	*0.0058*	*0.0006*	*0.0031*	*0.0002*

Source: NSSF, Author's estimation

C.Hospitalization Data by Plan

Using Ammar's distribution of health expenses shown in chart 3, and knowing the NSSF total hospitalization expenditures, we can deduce the expenditures specific to each funding agency as follows:

Table 4.4.Total Health Expenditures by Plan (LBP)

Funding Agency	NSSF	MOPH	Other Public Funds	Others	Private Insurance	OOP
% of Total Health Expenditures	0.19	0.14	0.08	0.05	0.1	0.44
Total Health Expenditures by Agency	324,038,599,615	238,765,283,927	136,437,305,101	85,273,315,688	170,546,631,376	750,405,178,056

Source: Ammar (2009), Author's estimation

Applying the ratio of hospitalization expenses due to tobacco to total health expenditures for each plan and specific to each disease group obtained for NSSF, we estimate hospitalization expenses to each disease by applying the share of total hospitalization expenses for that particular disease for the NSSF to total health expenditures of the agency being studied.

Table 4.6 also computes the total estimated national hospitalization costs due to tobacco.

Table 4.5.Total Estimated National Hospitalization Costs due to Smoking (LBP)

Costs per Disease Groups due to Tobacco Smoking (Men and Women)							
	COPD	**Lung Cancer**	**Bladder Cancer**	**Stroke**	**Ischemic Heart Disease**	**Hypertensive Heart Disease**	**Total**
NSSF	8,558,471,681	7,562,894,541	1,874,507,989	207,356,318	1,010,823,370	61,396,195	19,275,450,093
MOPH	6,306,242,291	5,572,659,135	1,381,216,413	152,788,866	744,817,220	45,239,302	14,202,963,227
Other Public Funds	3,603,567,024	3,184,376,649	789,266,522	87,307,923	425,609,840	25,851,030	8,115,978,987
Others	2,252,229,390	1,990,235,405	493,291,576	54,567,452	266,006,150	16,156,893	5,072,486,867
Private Insurance	4,504,458,779	3,980,470,811	986,583,152	109,134,904	532,012,300	32,313,787	10,144,973,733
OOP	19,819,618,630	17,514,071,568	4,340,965,869	480,193,578	2,340,854,119	142,180,663	44,637,884,427
Total Estimated National Hospitalization Cost Due to Smoking	45,044,587,795	39,804,708,110	9,865,831,520	1,091,349,041	5,320,122,999	323,137,870	**101,449,737,333**

Source: Author's Estimations

Moreover, we use the average cost of treatment obtained using NSSF data as an estimate of the cost of treatment for other plans as well. This allows us to identify the number of cases by disease and plan. These results are shown in appendix IV.

After isolating the hospitalization expenses of smoking-related diseases groups as well as the corresponding number of hospitalization cases, it is worth mentioning the share of expenditures born by each plan. The contribution of each funding agency in the hospitalization of smoking-related illnesses can be summarized as follows: LBP 19.27

billion are borne by the NSSF, LBP 14.2 billion are borne by the MOPH, LBP 8.11 billion are borne by the Other Public Funds, LBP 5.07 billion are levied on the Others category, while LBP 10.14 billion and 44.63 billion are borne by the private insure companies and the OOP respectively.

Also, national average hospitalization expenses can be computed for each specific smoking-related disease. For instance, LBP 1.39 million is spent on average on the hospitalization of COPD and stroke. LBP 3.27 million is spent on average on the hospitalization of lung and bladder cancer. LBP 2.15 million is spent on hospitalization of smoking-related heart diseases.

CHAPTER V

BENCHMARKING AND DISCUSSION

A. Smoking Attributable Factor Approach

Smoking Attributable Factor (SAF) is one of the most important approaches in estimating the economic costs of tobacco; however it has never been applied for Lebanon. This paper attempts to approximate the SAF related to smoking related cancers (bladder and lung cancer), cardiovascular diseases (CVD), chronic obstructive pulmonary disease COPD, and stroke. Also, the SAF approach will primarily be used to check/benchmark results obtained from other estimation techniques detailed below.

By definition, the SAF is the fraction of deaths, healthcare costs and utilization rates, as well as other health outcome measures attributable to smoking. Also known as the population attributable risk (PAR), the SAF is usually multiplied by the measure of interest so that the smoking attributable measure is determined. While SAF studies are usually classified into two categories based on the type of approach used, either the epidemiological or the econometric one, this paper will focus on the epidemiological approach where the SAF is calculated for each specific smoking related illness after determining smoking prevalence (P_s)and relative risk (RR) of developing the disease due to smoking (Sung, Max, Gajalakshm, and Yurekli 11-54).

In other words, $SAF = \frac{Ps*(RR-1)}{Ps*(RR-1)+1}$ as defined by Levin in 1953.

Where:

- Ps=Smoking Prevalence
- RR=Relative Risk of a given disease= $\frac{\text{disease incidence rate for a smoker}}{\text{disease incidence rate for a never smoker}}$

Moreover, since in the epidemiological approach, SAF is calculated for each particular smoking-related disease, these studies use the additive approach where the healthcare cost for each disease can be determined by computing the product of total health expenditures on the disease of interest and the SAF and summing up the smoking-attributable healthcare cost for each smoking-related disease. As such, total healthcare costs attributable to smoking can be computed(Sung, Max, Gajalakshm, and Yurekli 11-54).

1. Assumptions

As shown by the formula, computing SAF ratios requires some data on incidence rates, relative risks as well as smoking prevalence for the disease groups considered and specific to Lebanon. However, as data groups are on incidence rates, and relative risks are unavailable for Lebanon, a few assumptions need to be made for the computation of the SAF ratio. In this perspective, relative risks used in the calculation of SAF ratio are borrowed from international data reflecting each of the diseases' incidence rates. When it comes to smoking prevalence, or Ps, it will only include cigarette prevalence for adult current smokers.

2. Smoking Prevalence (Ps)

The age and gender standardized smoking prevalence in table 3.1 will not be used in the computation of the SAF for the sake of data consistency. Details are shown in appendix V.

3. Relative Risk (RR)

Relative Risk data, as discussed in the previous section, is taken from international data showing, when feasible, how many times a male or female smoker is likelier to develop each of the diseases than is a non-smoker. Data was collected from multiple sources such as CDC fact sheets on health effects of cigarette smoking, the American Cancer Society, a voluntary health organization aiming at fighting cancer, the University of Maryland, and the National Stroke foundation, a health charity foundation aiming at preventing and managing the heart diseases and stroke. Also, it is worth noting that relative risks are estimated for men, women, and for both genders combined. Details are shown in appendix V.

4. Smoking Attributable Factor Computation

Combining the information on smoking prevalence and relative risk concerning each category of diseases, smoking attributable factor for Lebanon can be computed for men and women, each taken separately, as well as for both men and women combined.

Table 5.1.Smoking Attributable Factor (SAF) in Lebanon for Men and Women Combined

Disease Category	**SAF=** $\frac{Ps*(RR-1)}{Ps*(RR-1)+1}$
Lung Cancer	0.8824
Bladder Cancer	0.4660
COPD	0.4111
Stroke	0.3037
Ischemic Heart Disease	0.4111

Source: Author's Computations

As shown in the table above, 88.24% of lung cancers as well as 46.6% of bladder cancers can be attributed to tobacco smoking whereas 41.11% of COPD cases, 30.37% , and 41.11% of coronary heart diseases are attributed to smoking. It is worth noting that the reported figures of smoking attributable factors that will be considered are only those specific to both men and women.

B. Share of Deaths Attributable to Smoking Data

To calculate healthcare costs associated with tobacco, we restrict our attention to hospitalizations. We ignore other health care related costs such as outpatient visits, visits to health care practitioners, and spending on drugs and medical equipment. The approach we take relies on a simplifying but strong assumption that the share of hospitalizations attributable to smoking by disease is the same as the share of deaths attributable to tobacco smoking which we can get from GBD. We also assume that, for the disease groups we will be considering, the distribution of diagnoses in hospitalization cases is the same as the distribution of diagnoses in deaths from these diseases.

In this section, we will compute estimates of hospitalization expenses for both lung and bladder cancer using the SAF ratios we have computed earlier in table 5. Only the cancer cases are only taken into consideration due to the difficulty in computing SAF ratios for all disease categories considered. The cases of lung and bladder cancer in NSSF are those obtained in section C of chapter IV.

In this approach, the number of Hospitalization Cases due to Tobacco is calculated using SAF rather than the share of deaths attributable to tobacco obtained from GBD. The below table show national hospitalization costs, adjusted number of hospitalization, as well as the number of hospitalizations due to tobacco consumption for men and women combined specific to lung and bladder under both methods. Details are shown in appendix VI.

Table 5.2.National Hospitalization Expenses and Total Number of Cases for Lung and Bladder Cancer under both Methods

	Share of Deaths Attributable to Smoking Estimation		SAF Estimation	
	Lung Cancer	**Bladder Cancer**	**Lung Cancer**	**Bladder Cancer**
Hospitalization Expenses	39,804,708,110	9,865,831,520	47,509,439,653	18,794,070,483
Number of Cases	20,819	6,958	14,520	5,744

Source: Author's Estimation

Looking at the results shown in the above table, we deduce that total hospitalization expenditures for lung and bladder cancer are higher under the SAF method than in the share of deaths attributable to smoking method. National hospitalization expenses for smoking –related lung cancer are LBP 39.8 billion under the share of deaths attributable to smoking method against 47.5 billion under SAF. While national hospitalization expenses for smoking-related bladder cancer areLBP 9.86 billion under the share of deaths attributable to smoking against 18.79 billion under SAF. A plausible explanation of such a result resides in the fact that relative risks used in the calculation of SAF ratios are borrowed from international data resulting in inflated figures. In other words, the results' differences can be attributed to the varying numbers of calculated SAF ratios and tobacco consumption attribution factors obtained from GBD.

In addition, since tobacco consumption attribution factors reflect tobacco's contribution in smoking-related diseases deaths, these are mortality based fractions may underestimate the true/actual fraction since many tobacco related illnesses such as COPD,

heart diseases and in a few cancer cases do not cause deaths until after a prolonged period of sickness, clearly explaining why total hospitalization expenditures for lung and bladder cancer are higher under the SAF method than in the share of deaths attributable to smoking method.

C. Robustness Checks

In this section, we test the robustness of our results by comparing the number of cases of lung cancer hospitalizations and bladder cancer hospitalizations reported as MOPH cases to the number of cases we attributed using both the share of deaths attributable to tobacco as well as the SAF approaches. Results are shown in the below comparative table.

Table 5.3.Number of Hospitalization Cases by Method

		Lung Cancer	**Bladder Cancer**
Number of Hospitalization Cases	**Share of Deaths Attributable to Tobacco**	1,668	413
	SAF	1,991	788
	MOPH Statistical Bulletin	2,881	1,325

Sources: Harb (2012), Author's Estimation

As shown in the table above, the SAF approach and the share of deaths attributable to tobacco methods both understate the number of hospitalization cases for lung and bladder cancer when compared with the number of hospitalizations reported in the MOPH statistical bulletin. This can be explained by the fact that cancer cases are over-represented in MOPH because more people with cancer seek MOPH treatment than people with other conditions.

Also, we compare our calculated hospitalization expenditures to results obtained in the Salti et al paper on economic costs of tobacco. Smoking related cancers expenditure figures are very close with US$ 33.11 million (share of deaths attributable to smoking method) against US$ 33.6 million (Salti et al paper). However, results for cardiovascular diseases as well as respiratory diseases are very divergent: Our paper estimates cardiovascular diseases hospitalization expenditures due to smoking to amount for US$ 4.48 million compared to US$ 104.5 million and US$ 30.2 million against US$ 8.6 million for respiratory diseases. These divergences can be attributed to theassumptions made in our paper as well as to the differing estimation and expenses computation methods adopted in both papers. For instance, cardiovascular expenses shown in Salti et al paper are the costs incurred on heart surgery, assuming that 10% of smokers will undergo surgery. Heart diseases expenses also include visits to practitioners where patients are assumed to undergo 3 visits per year, paying 50$ per visits. Lung and bladder cancer smoking related expenditures are estimated based on visits to doctors, hospital admissions, chemotherapy treatment, surgery and radiotherapy expenses when applicable. Respiratory diseases expenses are computed based on visits to practitioners.

It is worth noting that the SAF approach would have yielded more precise estimates of hospitalization expenses as well as number of cases if data on relative risks and incidence rates were available for Lebanon due to the SAF formula ease of application and intuitiveness. However, as the shares of deaths attributable to smoking, even when adjusted, and tobacco risk attribution ratios obtained from GBD are specific to Lebanon, the share of deaths attributable to smoking method yield results that reflect better the actual smoking-related hospitalization expenses borne by the public and private sectors.

CHAPTER VI

INTERPRETATION, IMPLICATIONS, CONCLUSION

A. Discussion

As shown earlier, the Lebanese public sector is made of several funding agencies that can be listed as follows: NSSF, MOPH, Other Public Funds, and Others. Furthermore, if we take total estimated costs for each disease group found in table 15 and pertaining to each of the funding agencies listed above, and add them up, we can reach an estimation of the total cost borne by the public sector related to the hospitalization of the diseases related to tobacco smoking. The same applies for the estimated costs borne by the private sector including both private insurance companies and out-of pockets funding. This being said, the public sector spends 46.7 billion LBP on hospitalization of tobacco related diseases while the private sector spends around 54.8 billion LBP on the hospitalization of these diseases. Results are summarized in the table below:

Table 6.1.Public and Private Sector Contribution (LBP)

Estimated National Hospitalization costs (LBP)	
Public Sector Spending on Hospitalization	46,666,879,173
Private Sector Spending on Hospitalization	54,782,858,160

Source: Author's Estimation

This result is in line with the fact that the bulk of health expenses are levied on the private sector; however, while it is common that the public sector only bears a small portion of total healthcare expenditures, our study shows that smoking imposes a heavy burden on the latter. This is essential in inciting the public sector, to implement further tobacco control policies and procedures such as imposing higher taxes on tobacco products in order to complement the law 174 aiming at increasing reducing the negative effects of tobacco smoking on public health.

B.Results in the Context of the Lebanese Macro-Economy

According to the World Bank, GDP per capital for the year 2012 is LBP 14,641,157.Total GDP for the same year is LBP 64,795,229,000,000. The latest figure related to health expenses per capita reported by the World Bank was LBP 936,421 in 2011, which enables us to compute total health expenditures amounting to LBP 3,745,684,000,000.

In what follows, total hospitalization bill per disease is scaled against total health expenditures. Total hospitalization bill per disease divided by total population is also scaled against GDP per Capita. This is shown in the table below as follows:

Table 6.2.Scaling Total Hospitalization Bill per Disease against Macroeconomic Figures in Lebanon

	Total Hospitalization Bill per Disease	Total Hospitalization Bill per Disease/Total GDP	Total Hospitalization Bill per Disease/Total Health Expenses	Total Hospitalization Bill per Disease/Total Population	Total Hospitalization Bill per Disease/GDP per capita
COPD	45,044,587,795	0.000695	0.012	1,891	0.00077
Lung Cancer	39,804,708,110	0.000614	0.0106	1,393	0.00068
Bladder Cancer	9,865,831,520	0.000152	0.0026	796	0.00017
Stroke	1,091,349,041	0.000017	0.0003	498	0.00002
Ischemic Heart Disease	5,320,122,999	0.000082	0.0014	995	0.00009
Hypertensive Heart Disease	323,137,870	0.000005	0.0001	4,379	0.00001
Total		0.001566	0.0271		0.00173

Source: Author's Estimation

As shown in table 22, estimated national hospitalization bill due to tobacco is approximately equal to 0.16% of GDP, a significantly high percentage when compared with total economic cost of tobacco as a percentage of GDP in industrialized countries where total tobacco smoking costs reached 1.6% of GDP in the US, 3.4% of GDP in Australia, and 2.2% of GDP in Canada (Lightwood and Collins 2000).

Also, at this stage, it is worth showing how the share of public and private sector compare to total health expenditures as well as how the public share compare to the total MOPH budget and to the total NSSF budget. In addition, computing what fraction of private health expenditures is the share borne by private individuals and households or OOP is necessary. Results are shown in the below table:

Table 6.3.Computed Smoking Related Ratios

Ratio	Value
Private Expenses due to Smoking / Public Expenses due to Smoking	1.17
Public Expenses due to Smoking /Total Health Expenses	0.012
Private Expenses due to Smoking /Total Health Expenses	0.015
Total Health Expenses due to Smoking/Total Health Expenses	0.027
Public Expenses due to Smoking /MOPH Budget	0.19
Public Expenses due to Smoking /NSSF Budget	0.14
OOP/ Private Expenses	0.81

Source: Author's Estimation

Looking at table 6.3, we see that the ratio of private expenses due to smoking over public expenses due to smoking is equal to 1.17 which is equal to the ratio of total private health expenses over total public health expenses which we get from figure 3. This shows the negative impact of tobacco smoking.

Total estimated hospitalization expenses due to smoking for the selected disease groups reached 2.7% of total health expenses which is quite similar to results obtained in China as a Chinese study showed that costs of smoking related illnesses accounted for 3.1% of health expenses (Sung 2006). The reason behind such a similarity is because smoking

prevalence in Lebanon is pretty much similar to that in China with one difference residing in the gender of smokers: in Lebanon, men and women smoke evenly while in China, smokers are men only.

Also, according to table 6.3, 20% of hospitalization expenses out of MOPH total budget are going to smoking related diseases. This sheds light on the necessity of a policy limiting tobacco usage which would directly affect and control 20% of total MOPH budget. Similarly, since 14% of all private contributions to the NSSF are smoking related, a policy limiting tobacco consumption would directly be affecting 14% of total NSSF expenses.

In addition, knowing that OOP expenses constitute 81% of total private expenditures, any tobacco control policy would diminish private expenses on smoking. This is also in line with MOPH implemented reforms to reduce private health expenses.

To sum up, tobacco smoking imposes a huge burden on Lebanese society. Not only does tobacco consumption have a negative impact on health but also it is costing both the private and public sector large expenses in terms of hospitalizations due to the tobacco-related diseases that are taken into account in this study. In fact, it has been estimated that the public sector bears LBP 46,666,879,173 on hospitalization of lung and bladder cancers, heart diseases, COPD, and stroke while the private sector bears LBP 54,782,858,160 of the hospitalization of the corresponding diseases. Also, total estimated hospitalization expenses for the selected disease groups reached 2.71% of health expenditures which is quite alarming considering that this study does not take into account all smoking related diseases.

This study aims at increasing awareness on the negative impacts of tobacco consumption on society in the hope that this will lead to taking further corrective actions such as imposing higher taxes on tobacco products. Not only do such actions save lives. They also spare public and private sector money, time and effort that need to be put in getting the hospitalization specific to smoking related illnesses.

Moreover, as we shed light on the accounting gains from imposing further tobacco regulations in Lebanon, we must also take into account economics gains in terms of enhanced productivity and increased labour value, as employers do not have to finance smoking-related expenses for employees when tobacco-related activities are limited.

Last but not least, if we try to limit smokingactivities, accounting gains would have a multiplier effect on labour market and private savings, which could end up in more productive sectors including human capital, economic development, infrastructural projects, and internal security.

APPENDIX

I. SHARE OF DEATHS BY DISEASE AND TOBACCO CONSUMPTION ATTRIBUTION

	COPD	Lung Cancer	Bladder Cancer	Stroke	Ischemic Heart Disease	Hypertensive Heart Disease
Share of	0.0234	0.0339	0.0254	0.1008	0.3043	0.0266
Deaths by	0.0228	0.0441	0.0379	0.0599	0.3509	0.022
disease	0.0241	0.0228	0.012	0.1448	0.255	0.0317
Tobacco	0.5234	0.7393	0.2446	0.3384	0.3544	0.2463
Consumption	0.5532	0.7949	0.2787	0.3572	0.3784	0.3081
Attribution	0.4918	0.6084	0.1302	0.3298	0.3189	0.2

Source: GBD Compare Website (2010)

Both

Men

Women

II. DATA ADJUSTMENTS AND RELATIONSHIP BETWEEN DATA GROUPS

The share of death by disease needs to be adjusted for each disease category so that it is in line with NSSF data:

-For Bladder and Lung cancers, we use data on the share of all cancer deaths due to bladder and lung cancers each one a time as follows:

Total Share of Death caused by $Cancer_i$ / Total Share of Death due to all Neoplasm (given that the share of all cancer deaths is equal to 0.1941 according to GBD Health Metrics).

Adjusted Share of Death caused by Lung Cancer= 0.0339/0.1941=0.1746

Adjusted Share of Death caused by Bladder Cancer= 0.0254/0.1941=0.1308

-For Ischemic and Hypertensive heart diseases, we use data on the share of all heart diseases deaths due to hypertensive and ischemic heart diseases each on time as follow given that the total share of deaths due to all heart diseases is equal to 0.474 according to GBD Health Metrics.

Adjusted Share of Deaths caused by Ischemic heart Disease

=Total Share of Deaths caused by Ischemic Heart Disease / Total Share of Deaths due to all Heart Diseases= 0.3043/0.474=0.6419

Adjusted Share of Deaths caused by Hypertensive Heart Disease

= Total Share of Deaths caused by Hypertensive Heart Disease / Total Share of Deaths due to all Heart Diseases= 0.0266/0.474=0.0561

-For the Stroke category, the percentage we want here is the share of non cancer related deaths that are due to Stroke, taking into consideration that Stroke is a cerebrovascular disease and is part of the heart disease category.

Therefore, the adjusted share of deaths caused by Stroke is equal to the following:

Total Share of Death caused by Stroke/Total Share of Deaths due to Heart Diseases =0.100/0.474= 0.2126

-For COPD, the adjusted share of deaths applied to the category designated as “other sicknesses” is as follows:

Share of Death caused by COPD/(1-Total Share of Deaths caused by Neoplasm- Total Share of Deaths due to all Heart Diseases)=0.0249/(1-0.1941-0.474)= 0.0249/0.3319=0.0750

An important assumption we use is that the average cost of treatment is the same across plans. The relative distribution of expenditures across diseases is also assumed to be the same across plans; in other words, the ratio of costs spent on hospitalization/treatment of a particular disease due to tobacco smoking over total health expenditures spent by plan or funding agency is assumed to be the same across all plans.

We use the "sickness" category to compute the number of COPD cases. When it comes to heart diseases hospitalization total number of cases, it is assumed to be equal to number of open heart cases divided by of heart disease hospitalizations attributed to coronary heart diseases given that the majority of coronary heart disease cases are treated

via open-heart surgeries. In that case, this share is equal to 42% according to the Atlas of Heart Diseases. The total number of heart diseases concerning Stroke, Ischemic and Hypertensive heart diseases is equal to 943/0.42=2245 cases.

Moreover, GBD data will be used to adjust the number of hospitalization cases obtained from NSSF data. The shares of cancer deaths which are lung and bladder cancer are applied to the chemotherapy total cases to get the number of chemotherapy cases in NSSF due to lung and bladder.

Multiplying this number by the share attributable to tobacco and by the average cost of chemotherapy will give the total chemotherapy bill due to smoking for the NSSF case in Lebanon.

In summary, data from NSSF and GBP are used simultaneously as follows:

- *Adjusted Number of Hospitalization*= Total number of Hospitalization* Adjusted Share of Deaths from this type of hospitalization due to the Disease
- *Number of Hospitalization Cases due to Tobacco*= Adjusted Number of Hospitalization* Tobacco consumption Attribution

III. TOTAL ESTIMATED NUMBER OF HOSPITALIZATION CASES PER DISEASE GROUPS

Hospitalization Cases per Disease Groups Due to Tobacco Smoking							
	COPD	**Lung Cancer**	**Bladder Cancer**	**Stroke**	**Ischemic Heart Disease**	**Hypertensive Heart Disease**	**Total**
NSSF	6,667	2,515	623	162	511	31	10,509
MOPH	4,421	1,668	413	107	339	21	6,969
Other Public Funds	2,526	953	236	61	194	12	3,982
Others	1,579	596	148	38	121	7	2,489
Private Insurance	3,158	1,191	295	77	242	15	4,978
OOP	13,896	5,242	1,299	337	1,065	65	21,903
Total Estimated National Hospitalization Cases due to Smoking	32,248	12,165	3,015	781	2,471	150	**50,830**

Source: Author's Estimation

IV. RELATIVE RISK AND SMOKING PREVALENCE

	Relative Risk(RR)		
	Men	**Women**	**Both**
Current Smokers	42.9%	26.3%	34.9%
Disease Category			
Lung Cancer	23	13	(22.5 on average)
Bladder Cancer	(3.5 on average)		(3.5 on average)
COPD	6	4.37	3
Stroke	(2.25 on average)		(2.25 on average)
Ischemic Heart Disease	(3 on average)		(3 on average)
Hypertensive Heart Disease	-	-	-

Source: CDC Fact Sheet-Health effects of Cigarette Smoking, American Cancer Society, University of Maryland, National Stroke Foundation, Sibai, and Hwalla (2009)

V. COMPARISON BETWEEN SAF AND SHARE OF DEATHS ESTIMATION METHODS

Funding Agency		Share of Deaths Attributable to Smoking Estimation		SAF Estimation	
		Lung Cancer	Bladder Cancer	Lung Cancer	Bladder Cancer
NSSF	Hospitalization Expenses	7,562,894,541	1,874,507,989	9,026,793,534	3,570,873,392
	Number of Cases	2,515	623	3,002	1,188
MOPH	Hospitalization Expenses	5,572,659,135	1,381,216,413	6,651,321,551	2,631,169,868
	Number of Cases	1,668	413	1,991	788
Other Public Funds	Hospitalization Expenses	3,184,376,649	789,266,522	3,800,755,172	1,503,525,639
	Number of Cases	953	236	1,138	450
Others	Hospitalization Expenses	1,990,235,405	493,291,576	2,375,471,983	939,703,524
	Number of Cases	596	148	711	281
Private Insurance	Hospitalization Expenses	3,980,470,811	986,583,152	4,750,943,965	1,879,407,048
	Number of Cases	1,191	295	1,422	563
OOP	Hospitalization Expenses	17,514,071,568	4,340,965,869	20,904,153,447	8,269,391,012
	Number of Cases	13,896	5,242	6,257	2,475

Source: Author's Estimation

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