

Impact of Tobacco Tax Increases on the Social, Economic and Health Burden from Tobacco use in Latin America

A Cost- Effectiveness Analysis in Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Honduras, Mexico, Panamá, Peru and Uruguay

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- Introduction. Overview of the project. Economic model development.
- Results (so far)
- Projects in progress and expected results



Development and Validation of an Economic Model to Evaluate the Disease Burden Associated with Smoking and the Cost-Effectiveness of Tobacco Control Interventions in Latin America

Argentina: Institute for Clinical Effectiveness and Health Policy (IECS)	Colombia: IETS, National Ministry of Health
Bolivia: Clinical Epidemiology Unit, Universidad Mayor de San Andres	México: Tobacco Research Department, National Institute of Public Health (INSP) Ministry of Health, National Center for Clinical Excellence (CENETEC).
Brasil: Fernandes Figueira Institute/Oswaldo Cruz Foundation - Brazilian Ministry of Health. Universidad Federal de Río de Janeiro, Unidad de Epidemiología Clínica	Perú: Clinical Epidemiology Unit, Universidad Peruana Cayetano Heredia
Chile: Health Economics Department, National Ministry of Health. Clinical Epidemiology Unit, La Frontera University - CIGES/UFRO	

FUNDING

- **International Development Research Center (IDRC)**
- **IC-Health**, Initiative for Cardiovascular Health Research in the Developing Countries
- **INCLEN Trust**, International Clinical Epidemiology Network
- **American Cancer Society** and **Cancer Research UK**.



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Objective

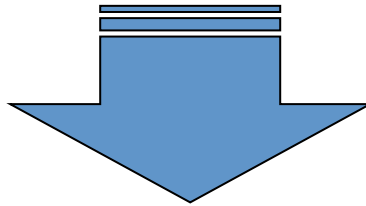
To develop a health economic model to estimate:

- The disease burden of smoking in Latin America
- The cost-effectiveness of tobacco control interventions



Development stage

- **A model developed and validated in Latin America**
- **Model characteristics and input requirements defined taking into consideration the availability and quality of the epidemiological data in the region**
- **Designed to meet the information needs of local decision makers**



1. Review of existing tobacco economic models (Forty-four studies and seven reviews were critically assessed).
2. Assess the availability and quality of relevant information to be incorporated in each country-specific analysis (local epidemiology and cost of smoking related diseases).
3. Survey to health Decision Makers (DM) in order to explore country-specific information needs when deciding on the implementation and coverage of smoking control interventions.
4. Decision Makers and decision making/regulatory institutions were included from the beginning of the project as part of the research team



Main characteristics

- Microsimulation model
- Incorporates the natural history, costs and quality of life of the main tobacco-related adult-specific diseases:
 - Coronary (CHD) and non-coronary heart disease
 - Cerebrovascular disease
 - COPD, pneumonia, influenza,
 - Lung cancer and nine other neoplasms.
- Main outcomes include (both for the disease burden and cost-effectiveness analyses): Life years, quality adjusted life years, disease events, hospitalizations, disease incidence, and disease cost (out-patient and in-patient).
- Visual Basic & Excel



available at www.sciencedirect.comjournal homepage: www.elsevier.com/locate/jval

Development and Validation of a Microsimulation Economic Model to Evaluate the Disease Burden Associated with Smoking and the Cost-Effectiveness of Tobacco Control Interventions in Latin America

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ABSTRACT

Objective: To describe the development and validation of a health economic model (HEM) to address the tobacco disease burden and the cost-effectiveness of smoking cessation interventions (SCI) in seven

decision makers. It considers all tobacco-related diseases (i.e., heart, cerebrovascular and chronic obstructive pulmonary disease, pneumonia/influenza, lung cancer, and nine other neoplasms) and can incor-

Source: Pichon-Riviere A, Augustovski F, Bardach A, Colantonio L. for the LatinCLEN Tobacco Research Group. *Development and Validation of a Microsimulation Economic Model to Evaluate the Disease Burden Associated with Smoking and the Cost-Effectiveness of Tobacco Control Interventions in Latin America*. Value Health. 2011 Jul-Aug;14(5 Suppl 1):S51-9.

Table 1 – (A) Acute events, (B) chronic disease states, and (C) causes of death included in the model.

A. Acute events	B. Chronic disease states	C. Causes of death
Disease acute events MI Non MI CHD event Stroke COPD diagnosis COPD progression Pneumonia/Influenza Cancer diagnosis: lung, bladder, renal, lip/oral/pharynx, larynx, stomach, esophagus, pancreas, cervical cancer, leukemia Smoking behavior events Performing a quit attempt Succeeding in a quit attempt Relapsing after successful quit attempt Probability calculation Disease events: Baseline Risk in non-smokers (age/sex specific) x RRsmoking.status COPD progression: Baseline Risk in non-smokers (sex and years-in-previous-stage specific) x RRsmoking.status Performing or succeeding quit attempt: Baseline population probability (age/sex specific) x RR.INTERVENTION Relapsing: Risk based on years in former-smoker state (sex specific)	CHD patient Post - Stroke COPD Stage Lung cancer Bladder cancer Renal cancer Lip/oral/pharynx cancer Larynx cancer Stomach cancer Esophagus cancer Pancreas cancer Cervical cancer Leukemia Smoking status: Smoker Former smoker Never smoked	MI Non MI CHD event Stroke Pneumonia/Influenza Non-ischemic CV death COPD Lung cancer Bladder cancer Renal cancer Lip/oral/Pharynx cancer Larynx cancer Stomach cancer Esophageal cancer Pancreas cancer Cervical cancer Leukemia Mortality for all other causes Probability calculation Acute events deaths: Probability of the event x its lethality (age/sex specific) Non-ischemic CVD death: Baseline Risk in non-smokers (age/sex specific) x RRsmoking.status COPD: Stage specific mortality (sex specific) Cancer: Tumor annual specific mortality during the first five years after diagnosis (except lung cancer: 10 years) Mortality for all other causes General population mortality minus the mortality of the diseases included in the model (sex and age specific)
CHD, coronary heart disease; COPD, chronic obstructive pulmonary disease; CV,cardiovascular; MI, Myocardial infarction; RR.INTERVENTION, relative risk of the intervention (either to improve the probability of performing a quit attempt or to improve the success rate of the quit attempt); RRsmoking.status, disease specific relative risk according to smoking status.		

where $R_{pop,event}$ is the age-, sex- and country-specific baseline event based on the specific mortality rate and the lethality of the event:

$$R_{pop,event} = \frac{R_{death}}{L}$$

where L is the lethality of the event and R_{death} is the sex-specific mortality of the condition. Once this is calculated, the age-, sex- and country-specific baseline event based on the specific mortality rate and the lethality of the event:

$$R_{nosmk} = \frac{R_{pop,event}}{(RR_{smk} \times f_{smk}) + (RR_{formersmk} \times f_{formersmk}) + f_{nosmk}} \quad (2)$$

where R_{nosmk} is the baseline event annual incidence in non-smokers, $R_{pop,event}$ is the age- and sex-specific population risk (obtained with formula 1), RR_{smk} and $RR_{formersmk}$ are the relative risks of the event in smokers and former-smokers versus nonsmokers, and f_{nosmk} is the proportion of the population that are non-smokers.

as well as the estimated yearly survival rate since diagnosis. The age- and sex-specific risk of diagnosis for each cancer was related with the following formula:

$$Rdx_i = \left[\sum_{n=0}^{10} Rm_i \times P_n \right] \times \frac{1}{1 - S_{10}}$$

where Rdx_i is the risk of diagnosis at age i ; Rm_{i+n} is the probability of death from the specific cancer at age $i+n$; P_n is the probability of survival for n years after diagnosis.

In each country:

- Data gathering stage:
 - Epidemiological data (e.g. smk prevalence, mortality, incidence, case fatality rates)
 - Economic and cost data (e.g. event costs, price elasticity, tax revenues)
- Calibration
- Validation
- Results

Calibration

Results (1):

The validation showed adequate internal validity, with all simulated events rates falling within $\pm 10\%$ of the source publications. R^2 between predicted and observed values ranged from 0.758 to 0.999. External validation showed an excellent correlation between published data and model results.

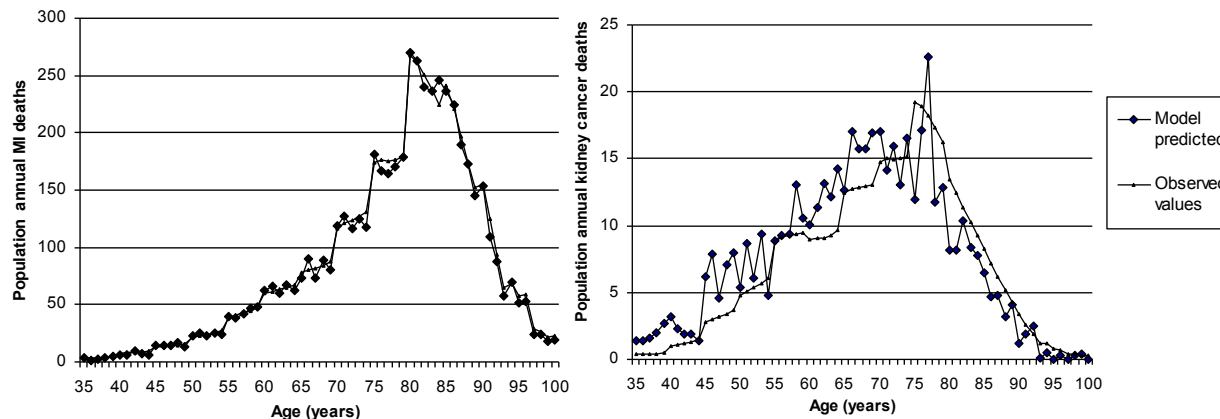


Figure 1. Calibration: Annual number of deaths predicted by the model in Argentina for each age strata compared to the 2005 Argentinean national vital data (35) in two selected conditions: (a) Myocardial Infarction (females); (b) Kidney cancer (males)

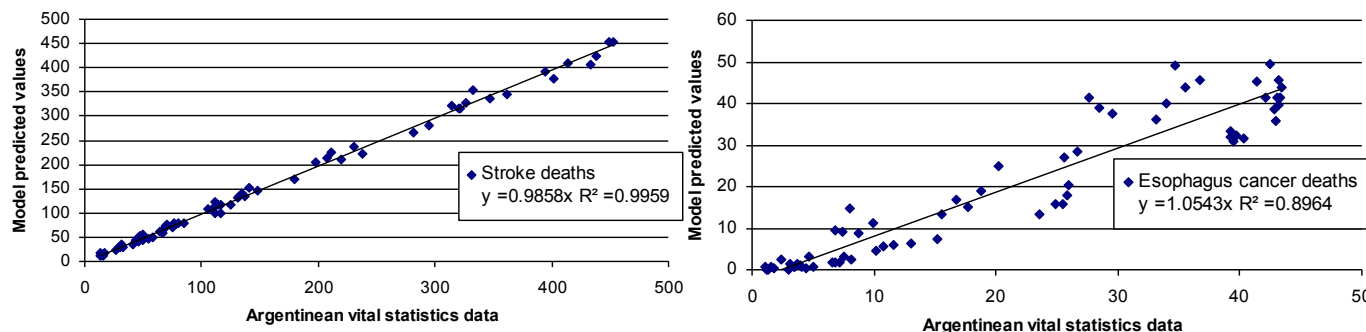
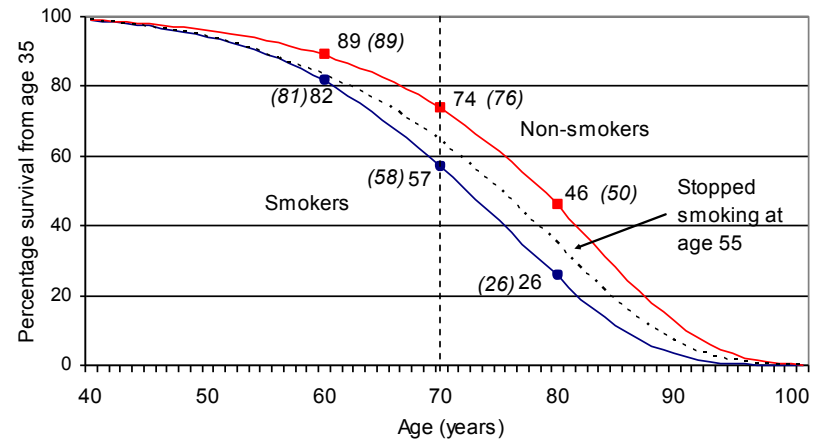
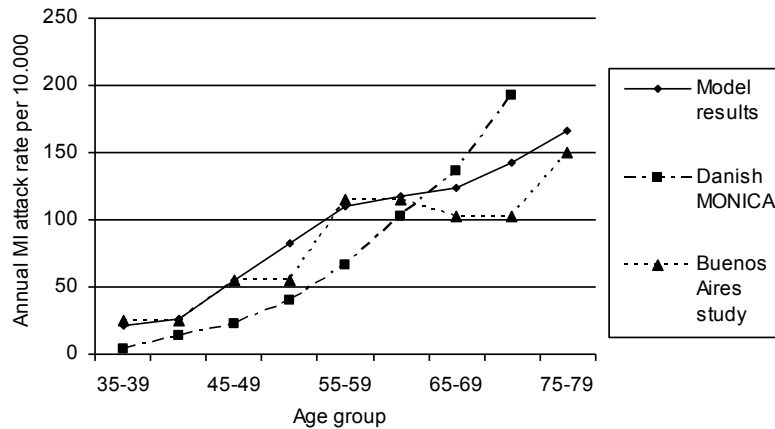
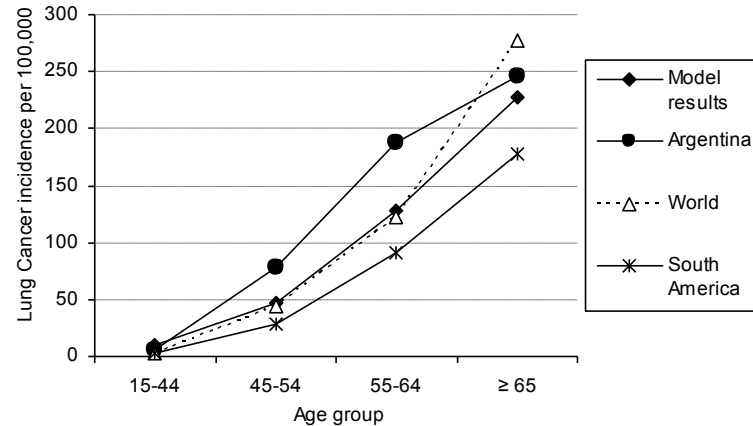
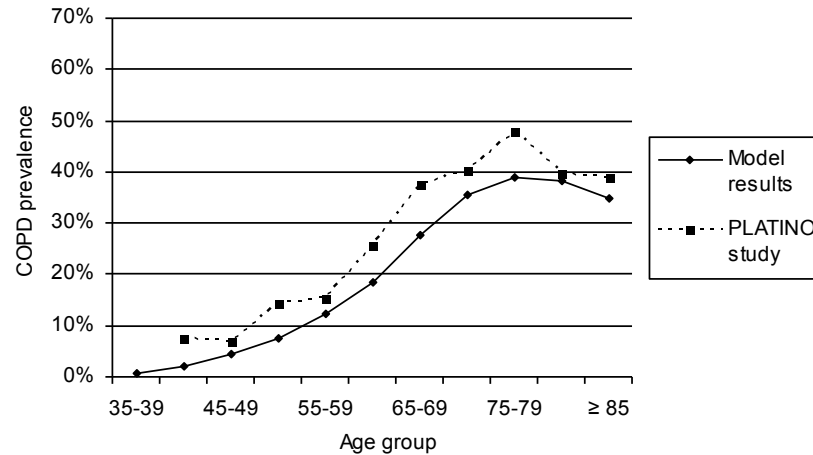


Figure 2. Correlation plot of model predicted versus reported age specific deaths in two selected conditions: (a) Stroke (females); (b) Esophageal cancer (males). The gradients of regression lines (y) and the correlation coefficients (R^2) are reported in each graph. Reference population: Argentina 2005.

External validation

External validation: model results were validated against selected published epidemiological and clinical studies not used to provide input data.



External validation showed a high correlation between published data and model results.

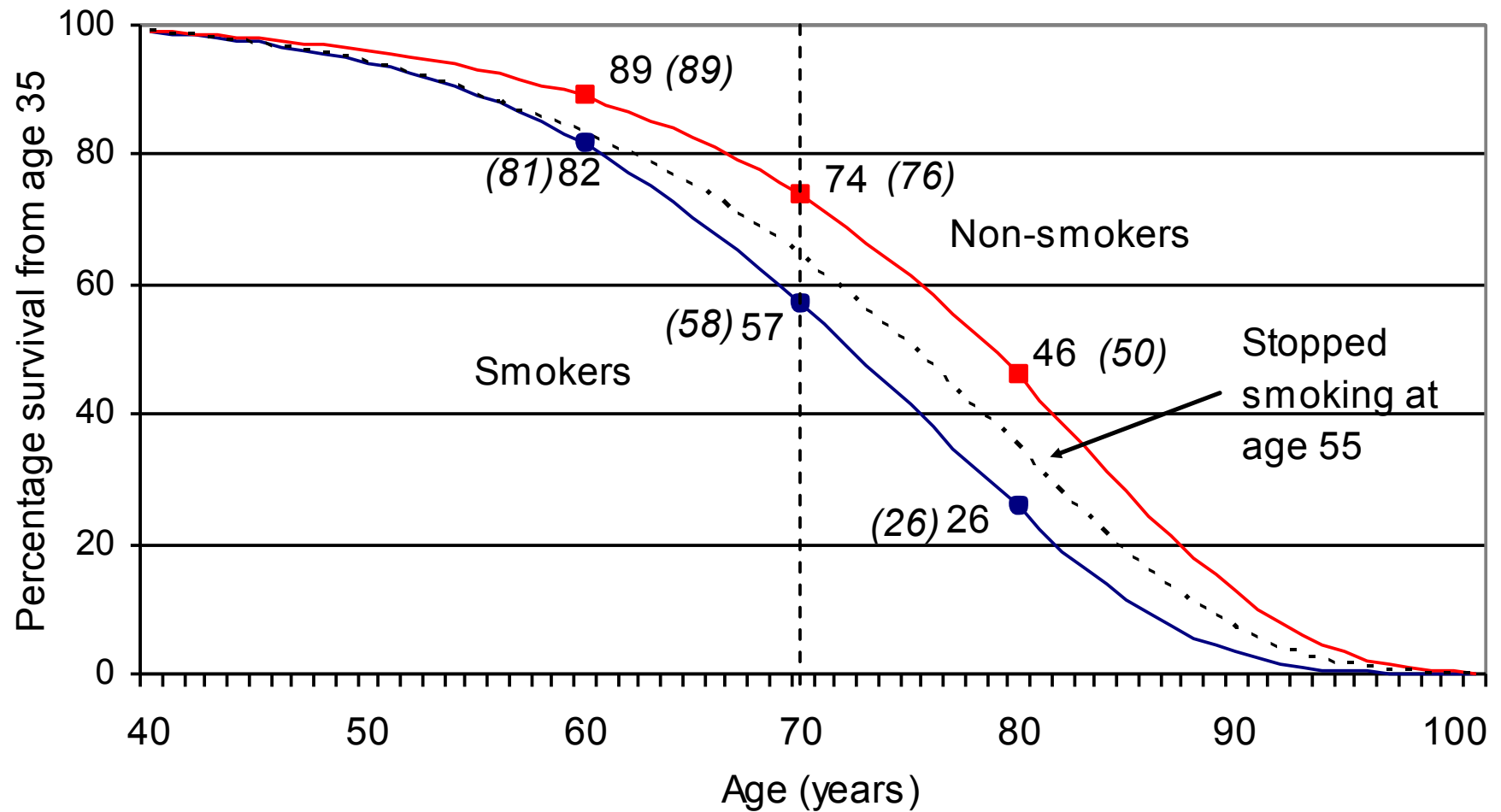


Figure 1. Survival from age 35 for male smokers and non-smokers, and effect on survival after stopping smoking at age 55. Results of the model for simulated cohorts of 250,000 subjects. In parentheses, at ages 60, 70 and 80, the results are compared to the male cohorts from the British Doctors study.

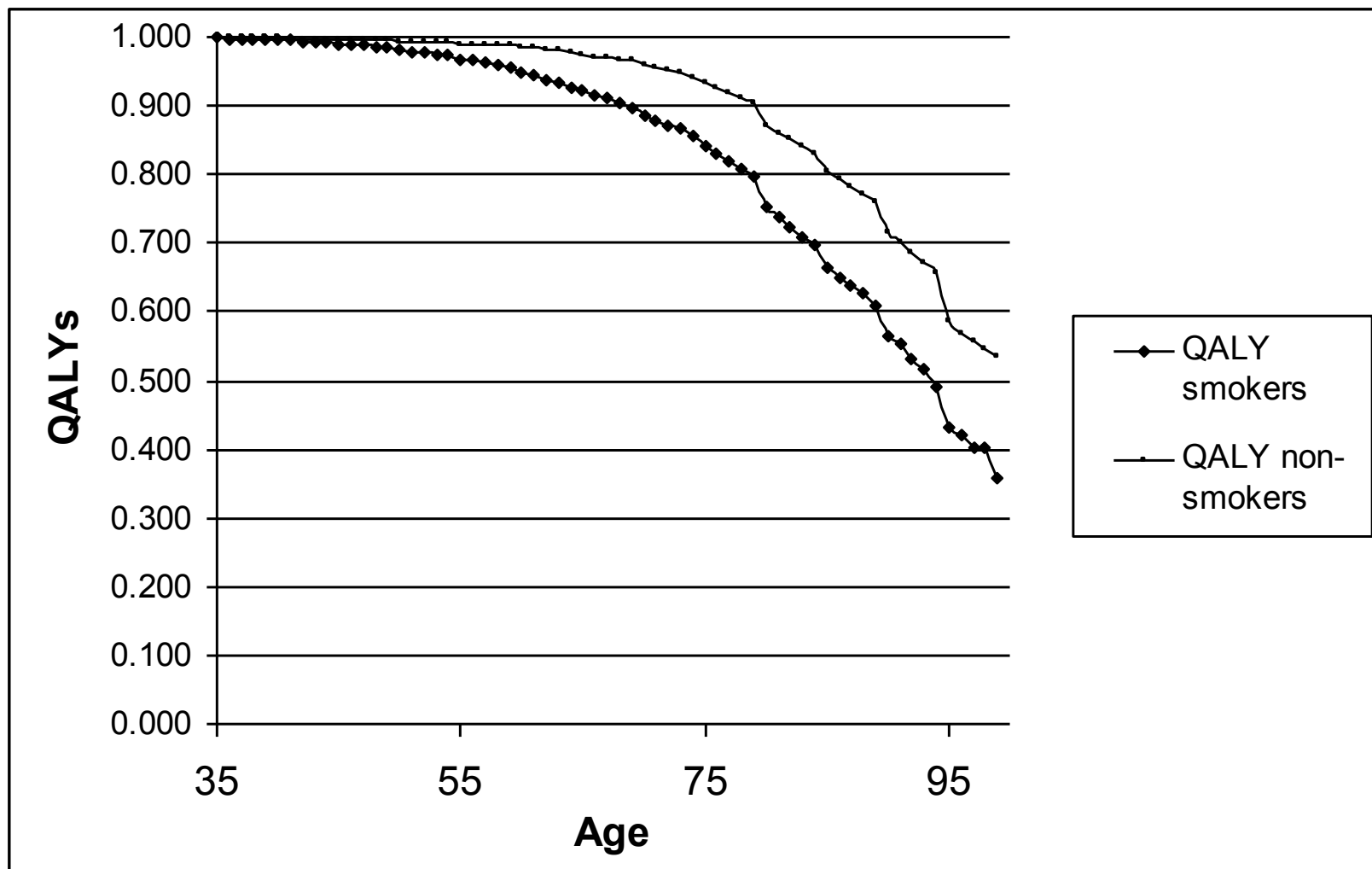


Figure 3. Evolution of QALYs based on smoker status. Data for women.

RADIOGRAFÍA DEL TABAQUISMO EN MÉXICO

MUERTE, ENFERMEDAD Y COSTOS
ATRIBUIBLES AL TABACO PARA EL AÑO 2013.

118 PERSONAS MUEREN POR DÍA
en México a causa del tabaquismo.

61,252 MILLONES DE PESOS SON GASTADOS CADA AÑO
para tratar los problemas de salud provocados por el tabaco.

Los resultados que aquí se muestran forman parte de una investigación colaborativa realizada por un equipo de más de 40 investigadores y decisores sanitarios en universidades, centros de investigación e instituciones públicas de Argentina, Bolivia, Brasil, Chile, Colombia, México y Perú.

Se utilizó un modelo matemático para estimar las probabilidades que tienen las personas de enfermar o morir por cada una de las condiciones asociadas con el tabaquismo.

8.4 %

DE TODAS LAS MUERTES QUE SE PRODUCEN EN EL PAÍS SE ATRIBUYEN AL TABAQUISMO



43,246
MUERTES
POR AÑO

QUE
PODRÍAN SER
EVITADAS

MUERTES POR ENFERMEDADES ATRIBUIBLES AL TABACO



11,469	Enfermedades Cardíacas
10,664	EPOC (Enfermedad Pulmonar Obstructiva Crónica)
6,035	Cáncer de Pulmón
5,154	Otros Cánceres
4,975	Tabaquismo Pasivo
3,218	ACV (Accidente Cerebro Vascular)
1,730	Neumonía



16,408

PERSONAS SON
DIAGNOSTICADAS
DE UN CÁNCER
PROVOCADO POR
EL TABAQUISMO
ANUALMENTE.

CADA AÑO,
EL TABAQUISMO ES
RESPONSABLE DE

94,033

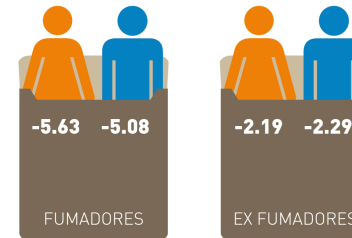
**INFARTOS Y
HOSPITALIZACIONES
POR ENFERMEDAD
CARDIACA**

EN TOTAL CADA AÑO
SE PIERDEN

1,081,206
AÑOS
DE VIDA

POR MUERTE
PREMATURA
Y DISCAPACIDAD

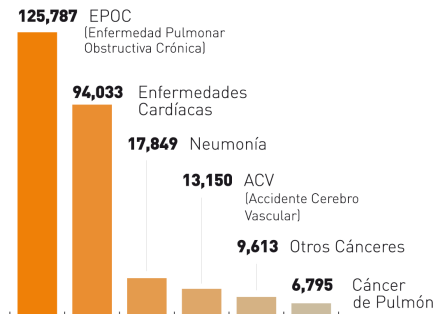
**AÑOS DE VIDA PERDIDOS
POR FUMAR**



**COSTOS ASOCIADOS
CON EL TABAQUISMO**



**PERSONAS QUE
ANUALMENTE ENFERMAN
POR MOTIVOS ATRIBUIBLES
AL TABACO**



\$61,252,296,177

**DE COSTO DIRECTO
EN EL SISTEMA DE SALUD
ATRIBUIBLE AL TABAQUISMO**

MUERTE, ENFERMEDAD Y COSTOS ATRIBUIBLES AL TABAQUISMO PARA EL AÑO 2013

El tabaquismo es la principal causa prevenible de muerte y enfermedad en el mundo. Cada año, más de cinco millones de muertes son atribuibles al consumo de cigarros y, de seguir las tendencias actuales, se espera que este número aumente a 10 millones en el año 2025. Se estima que **el tabaquismo es responsable de más de un millón de muertes anuales en toda América**. Su consumo está creciendo en forma constante, sobre todo entre los más pobres, las mujeres y los jóvenes. En México, aproximadamente el 8% de las mujeres y el 24% de los hombres son fumadores.

La información que aquí se muestra forma parte de una investigación que en México fue coordinada por el Departamento de Investigación sobre Tabaco del Instituto Nacional de Salud Pública (INSP) y el Centro Nacional de Excelencia Tecnológica en Salud (CENETEC) de la Secretaría de Salud de México junto con el Instituto de Efectividad Clínica y Sanitaria (IECS) de Argentina. **Colaboraron más de 40 investigadores y decisores sanitarios** de universidades, centros de investigación e instituciones públicas de Argentina, Bolivia, Brasil, Chile, Colombia, México y Perú. Los resultados se obtuvieron utilizando un modelo matemático desarrollado por ese grupo de investigación, que fue publicado en la revista científica *Value in Health* en 2011 (1). Este modelo hace posible estimar las probabilidades que tienen las personas de enfermar o morir a causa de cada una de las 17 condiciones asociadas al tabaquismo.

En México el tabaquismo es responsable de una importante cantidad de muertes, enfermedad y costos sanitarios. El mayor peso está dado por las enfermedades cardiovasculares, la enfermedad pulmonar obstructiva crónica (EPOC) y el cáncer de pulmón. Su impacto en la mortalidad y en la calidad

de vida es responsable en forma directa de la pérdida de 1,081,206 años de vida y explica el 8,4% de todas las muertes que se producen en el país cada año. Esto representa **43,246 muertes por año que podrían ser evitadas**.

El tabaquismo genera además un costo directo anual de cerca de 61 mil millones de pesos mexicanos, lo que equivale al 1% de todo el producto interno bruto (PIB) del país y al 11% del monto que México gasta en salud anualmente. La recaudación impositiva por la venta de cigarros es de alrededor de MXN\$ 30 mil millones cada año, un valor que apenas llega a cubrir el 50% de los gastos directos provocados por el tabaco en el sistema de salud.

El equipo de profesionales que realizó esta investigación espera que los resultados de este trabajo aumenten la **conciencia sobre el impacto sanitario y económico del tabaquismo** y sean una herramienta útil para que los gobiernos y sistemas de salud puedan definir medidas más efectivas y eficientes en la lucha contra el tabaquismo.

Este proyecto colaborativo fue financiado a través de una serie de subsidios de investigación otorgados por el Centro Internacional para el Desarrollo de Canadá (IDRC), la Red Internacional de Epidemiología Clínica (INCLEN Trust), la Iniciativa para la Investigación Cardiovascular en países en desarrollo (IC-Health), la Asociación Americana del Cáncer, el Instituto Nacional del Cáncer de Francia y el Instituto de Investigación del Cáncer del Reino Unido.

(1) Pichon-Riviere A, Augustovski F, Bardach A, Colantonio L. Development and Validation of a Microsimulation Economic Model to Evaluate the Disease Burden Associated with Smoking and the Cost-Effectiveness of Tobacco Control Interventions in Latin America. *Value in Health* 2011.

Pichon-Riviere A, Reynales-Shigematsu L M, Bardach A, Caporale J, Augustovski F, Alcaraz A, Caccavo F, Sáenz de Miera-Juárez B, Muños-Hernández J A, Gallegos-Rivero V, Hernández-San Román E. **Carga de Enfermedad atribuible al Tabaquismo en México**. Documento Técnico IECS N° 10. Instituto de Efectividad Clínica y Sanitaria, Buenos Aires, Argentina. Agosto de 2013 (www.iecs.org.ar). El documento completo puede obtenerse de: www.iecs.org.ar; www.controltabaco.mx y www.insp.mx/tabaco



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Tecnológica en Salud



RADIOGRAFÍA DEL TABAQUISMO EN COLOMBIA

MUERTE, ENFERMEDAD Y COSTOS ATRIBUIBLES
AL TABACO PARA EL AÑO 2013.

RADIOGRAFÍA DEL TABAQUISMO EN COLOMBIA

MUERTE, ENFERMEDAD Y COSTOS ATRIBUIBLES AL TABACO PARA EL AÑO 2013.

72 personas mueren por día en Colombia a causa del tabaquismo.

4,23 Billones de pesos son gastados cada año para tratar los problemas de salud provocados por el tabaco.

Los resultados que aquí se muestran forman parte de una investigación colaborativa realizada por un equipo de más de 40 investigadores y equipos sanitarios en universidades, centros de investigación e instituciones públicas de Argentina, Bolivia, Brasil, Chile, Colombia, México y Perú.

Se utilizó un modelo matemático para estimar las probabilidades que tienen las personas de enfermar o morir por cada una de las condiciones asociadas con el tabaquismo.

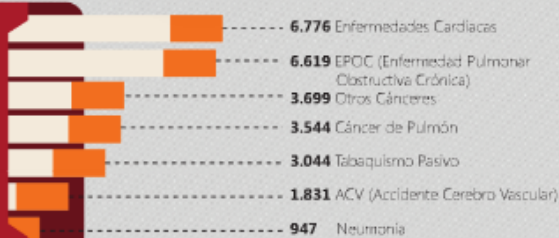
15,9%

DE TODAS LAS MUERTES QUE SE PRODUCEN EN EL PAÍS SE ATRIBUYEN AL TABAQUISMO

26.460

MUERTES POR AÑO QUE PODRÍAN SER EVITADAS

MUERTES POR ENFERMEDADES ATRIBUIBLES AL CONSUMO DE TABACO



SE ESTIMA QUE

10.606

PERSONAS SON DIAGNOSTICADAS DE UN CÁNCER PROVOCADO POR EL TABAQUISMO ANUALMENTE.

SE ESTIMA QUE

CADA AÑO, EL TABAQUISMO ES RESPONSABLE DE

112.891

INFARTOS Y HOSPITALIZACIONES POR ENFERMEDAD CARDÍACA

EN TOTAL CADA AÑO SE PIERDEN

674.262

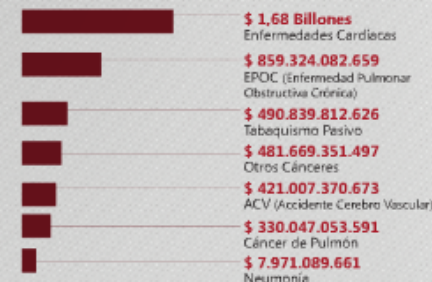
AÑOS DE VIDA

POR MUERTE PREMATURA Y DISCAPACIDAD

AÑOS DE VIDA PERDIDOS POR FUMAR



COSTOS ASOCIADOS CON EL TABAQUISMO



PERSONAS QUE ANUALMENTE ENFERMAN POR MOTIVOS ATRIBUIBLES AL CONSUMO DE TABACO



— \$ 4,23 Billones —
DE COSTO DIRECTO EN EL SISTEMA DE SALUD ATRIBUIBLE AL TABAQUISMO

MUERTE, ENFERMEDAD Y COSTOS ATRIBUIBLES AL TABAQUISMO PARA EL AÑO 2013

El tabaquismo es la principal causa prevenible de muerte y enfermedad en el mundo. Cada año, más de cinco millones de muertes son atribuibles al consumo de cigarrillos y, de seguir las tendencias actuales, se espera que este número aumente a 10 millones en el año 2025. Se estima que el tabaquismo es responsable de más de un millón de muertes anuales en toda América.

Doenças causadas pelo cigarro matam 357 por dia no país

JOHANNA NUBLAT
DE BRASÍLIA

31/05/2012 08h00

Brazil
Folha de S. Paulo

A cada dia, 357 fumantes ou ex-fumantes morrem no Brasil das principais doenças ligadas ao tabagismo, especialmente enfermidades cardíacas, pulmonares e câncer.

Tratar doenças decorrentes do fumo custa R\$ 21 bilhões anuais às redes de saúde pública e privada do país –sem contar o fumo passivo.

Esse valor é cerca de cinco vezes o que o governo federal vai gastar, até 2014, no plano de combate ao crack.

As estimativas são de um estudo encomendado pela ONG ACT (Aliança de Controle do Tabagismo) à Fiocruz e que será apresentado hoje, em evento de comemoração do Dia Mundial sem Tabaco.

Editoria de arte/folhapress

O trabalho se baseia em dados de 2008 sobre doenças e mortes e, a partir de um modelo matemático, estima o impacto do fumo e seu custo.

Apesar de o número de fumantes no país ter caído nas últimas décadas –hoje 14,8% dos adultos fumam–, o cigarro é responsável por 13% das mortes, segundo o estudo.

Essa fatia é equiparável à das mortes por causas externas, incluindo homicídios e acidentes.

Estima-se que, em 2008, 130.152 pessoas morreram das 15 principais doenças atribuídas ao fumo (de um total de 150 ligadas ao tabaco). O Ministério da Saúde diz que, em 2009, 37,6 mil pessoas morreram de acidentes terrestres e 52 mil de homicídio.

"A carga é muito pesada. Você tem um fator de risco, o fumo, que toma 0,5% do PIB, da sua riqueza", diz Márcia Pinto, economista da Fiocruz que coordenou o estudo com um instituto argentino.

O trabalho avalia quantos anos de vida e de atividade social e produtiva se perdem por conta do tabagismo.

A estimativa média é que o consumo do tabaco encurte em 4,5 anos a vida de uma mulher fumante e em cinco anos a vida de um homem. Embora a presença do cigarro esteja ficando mais forte entre as mulheres, os homens ainda são os que mais fumam e que mais adoecem.

O PREÇO DO CIGARRO

357 brasileiros morrem por dia por fumarem



COMO FOI FEITO

Foi utilizado modelo baseado nos dados de 2008 e de estudos que estimam a probabilidade de fumantes desenvolverem doenças e morrerem delas; o modelo não entra

O PREÇO DO CIGARRO

357 brasileiros morrem por dia por fumarem ou serem ex-fumantes



COMO FOI FEITO O ESTUDO

Foi utilizado modelo matemático, baseado nos dados de mortalidade de 2008 e de estudos científicos que estimam a probabilidade de fumantes desenvolverem doenças e morrerem delas; o fumante passivo não entra na conta



DOENÇAS E MORTES*

Número anual estimado de pacientes cujas doenças são atribuíveis ao tabaco



CAUSAS DE MORTES ATRIBUÍDAS AO TABACO



MORTES

13% das mortes por ano no país podem ser atribuídas ao tabagismo



Das 130.152 mortes atribuídas ao tabagismo,

73% foram entre homens

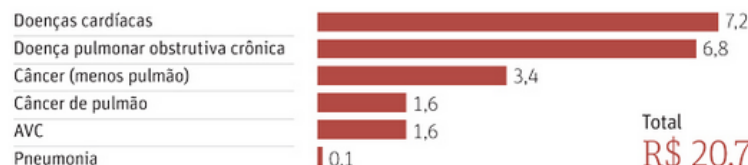


357 pessoas morrem por dia por serem fumantes ou ex-fumantes

ESTIMATIVA DE ANOS PERDIDOS DE VIDA EM DECORRÊNCIA DO FUMO

	Mulheres	Homens
Ex-fumantes	1,32	2,05
Fumantes	4,47	5,03

CUSTOS LIGADOS AO CIGARRO, EM BILHÕES DE REAIS**



Total
R\$ 20,7 bi

*Os dados, colhidos em 2008, são tidos como estáveis nos últimos anos; foram acompanhadas as doenças mais impactadas pelo tabagismo
**Referentes a 2011, abrangendo as redes privada e pública de saúde. Fonte: "Carga das doenças tabaco-relacionadas para o Brasil" (Fiocruz, Instituto de Efectividad Clínica y Sanitaria da Argentina, ACT Brasil)

/ SAÚDE | PESQUISA

Brasil gasta R\$ 21 bi ao ano por causa de males do cigarro

Levantamento ainda apontou que doenças relacionadas ao tabagismo matam 357 brasileiros por dia

🕒 31/05/2012 às 08:50 - Atualizado em 31/05/2012 às 10:47

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Saúde

Brasil gasta R\$ 21 bi com tratamento de doenças relacionadas ao tabaco

LIGIA FORMENTI, BRASÍLIA
30 maio 2012 | 12h 30

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Brasil gasta R\$ 21 bi com tratamento de doenças relacionadas ao tabaco

31.05.2012 03:40

Ligia Formenti, Estadão.com.br

Salud **SEGUIR** Seguí este tema y a otros más **PROBALO** Cómo funciona

Jueves 30 de mayo de 2013 | Publicado en edición impresa

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Salud / Bajo impacto de las estrategias de los últimos años

No bajan las muertes por el tabaco en el país: hay 111 por día

El sistema de salud debe gastar unos 21.000 millones de pesos por año para tratar las enfermedades asociadas

Por **Fabiola Czubaj** | LA NACION

Comentá **93** **f** Facebook **536** **t** Twitter **268** **+**

Más notas para entender este tema

- Más del 50% de los infartos no se trata o se trata tarde
- Herramienta contra la promoción del cigarrillo

que se han adoptado para contrarrestar esta epidemia.

La primera radiografía de los daños que está produciendo el humo de tabaco en la salud de nuestra población y en la economía del país es preocupante. El tabaquismo sigue haciendo estragos en la Argentina, a pesar de medidas como los ambientes 100% libres de humo

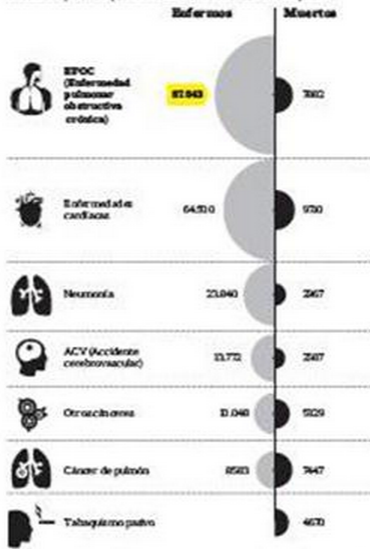
Radiografía de una epidemia

El tabaquismo produce 40.391 muertes al año que corresponden a 111 por día



CONSECUENCIA DE LA EXPOSICIÓN

Cantidad de personas que enferman o mueren a causa del tabaquismo



COSTO INDIRECTO PARA EL SISTEMA DE SALUD

Enfermedades relacionadas al tabaquismo. En millones de pesos anuales



Fuente: Instituto Gubernetivo de Estadística y Censos | LA NACION

The burden of smoking-related diseases in Brazil: mortality, morbidity and costs

Estimativa da carga do tabagismo no Brasil: mortalidade, morbidade e custos

Estimación de la carga de enfermedad atribuible al tabaquismo en Brasil: mortalidad, morbilidad y costos

Pinto MT, Pichon-Riviere A, Bardach A. The burden of smoking-related diseases in Brazil: mortality, morbidity and costs. *Cad Saude Publica*. 2015 Jun;31(6):1283-1297. Epub 2015 Jun 1. English, Portuguese. PubMed PMID: 26200375

*Márcia Teixeira Pinto*¹
*Andres Pichon-Riviere*²
*Ariel Bardach*²

Abstract

Advances in tobacco control in Brazil can be reflected in the decrease in prevalence over the past two decades. Death statistics and the occurrence of events and direct costs attributable to tobacco-related diseases have not been frequently estimated in the country. The goal of this article is to estimate the burden of smoking in 2011 regarding mortality, morbidity and medical care costs of the main tobacco-related

Resumo

Os avanços no controle do tabagismo no Brasil podem ser verificados na redução da prevalência nas últimas duas décadas. As estatísticas de óbitos, ocorrência de eventos e custos diretos atribuíveis às doenças tabaco-relacionadas não são estimadas com frequência no país. O objetivo deste artigo foi estimar a carga do tabagismo em 2011, em termos de mortalidade, morbidade e custos da assistência médica das principais doenças tabaco-

¹ Instituto Nacional de Saúde da Mulher, da Criança e do Adolescente Fernandes Figueira, Fundação Oswaldo Cruz, Rio de Janeiro, Brasil.
² Instituto de Efectividad Clínica y Sanitaria, Buenos Aires, Argentina.

SMOKING: THE SITUATION IN LATIN AMERICA

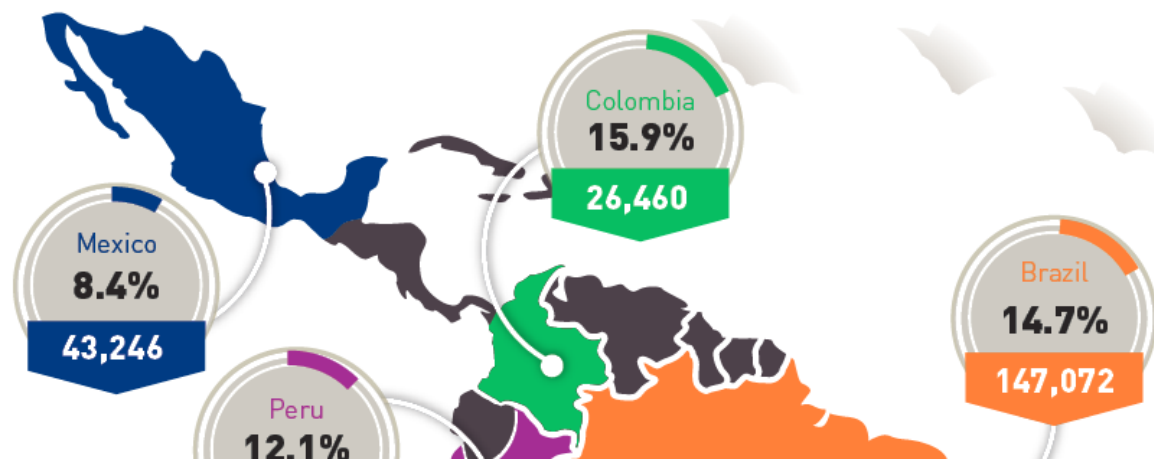


A SILENT KILLER
AND TAXES THAT SAVE LIVES

1,039 PEOPLE DIE EVERY DAY
because of smoking.

MORE THAN 33 THOUSAND MILLION DOLLARS SPENT EVERY YEAR
to treat health conditions caused by smoking.

SMOKING- RELATED DEATHS PER YEAR

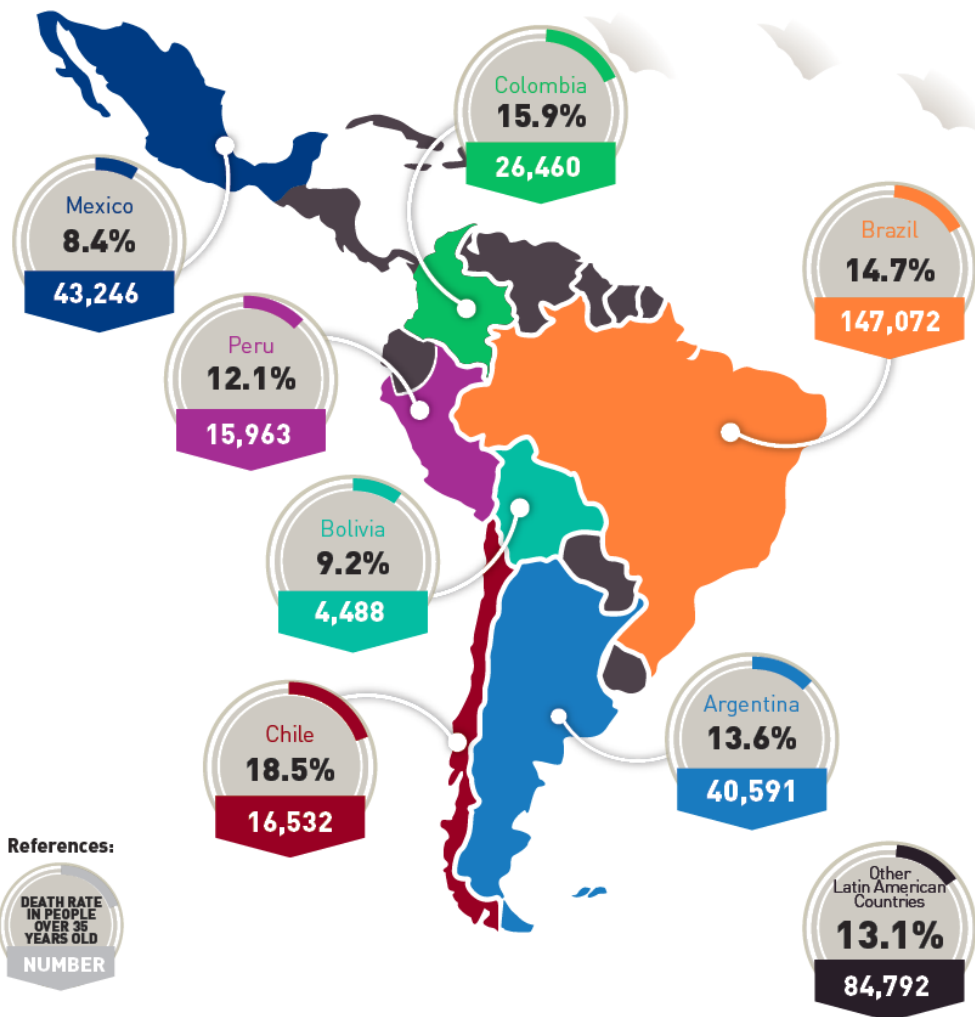


SMOKING-RELATED DEATHS PER YEAR

The information shown is part of a collaborative research conducted by a team of more than 40 investigators and health decision makers from universities, research centers and public institutions from Argentina, Bolivia, Brazil, Chile, Colombia, Peru and Mexico.

A mathematical model was used to estimate the chances people have to get sick or die because of each of the smoking related conditions.

References:



13%

OF ALL
DEATHS
IN PEOPLE OVER
35 YEARS
OLD IN
LATIN AMERICA
ARE ATTRIBUTABLE
TO SMOKING



379,145

DEATHS PER YEAR
THAT COULD BE PREVENTED



162,028

ARE DIAGNOSED
WITH CANCER
DUE TO SMOKING,
ANNUALLY

EVERY YEAR,
SMOKING IS
RESPONSIBLE FOR

730,418

**INFARCTIONS
AND HOSPITALIZATIONS
DUE TO
HEART DISEASE**

GLOBALLY,
EVERY YEAR

**9,738,782
LIFE-YEARS
ARE LOST**

DUE TO EARLY
DEATH
AND DISABILITY

**DEATHS DUE
TO DISEASES
CAUSED BY
SMOKING**



89,782	Heart disease
76,095	COPD (Chronic Obstructive Pulmonary Disease)
56,633	Lung cancer
56,227	Other cancers
43,618	Passive smoking (and other causes)
33,112	Stroke (Cerebrovascular accident)
23,676	Pneumonia

More information:

Model description

- Pichon-Riviere A, Augustovski F, Bardach A, Colantonio L. for the LatinCLEN Tobacco Research Group. Development and Validation of a Microsimulation Economic Model to Evaluate the Disease Burden Associated with Smoking and the Cost-Effectiveness of Tobacco Control Interventions in Latin America. Value Health. 2011 Jul-Aug;14(5 Suppl 1):S51-9.
- McLean S, Barbour V, Wild S, Simpson C, Sheikh A. Models for estimating projections for disease prevalence and burden: a systematic review focusing on chronic obstructive pulmonary disease. J Health Serv Res Policy. 2015 Apr 2.
- Technical report for each country (www.iecs.org.ar)

Results

- Fact sheets & Complete technical reports for each country (www.iecs.org.ar)
- Pinto MT, Pichon-Riviere A, Bardach A. The burden of smoking-related diseases in Brazil: mortality, morbidity and costs. Cad Saude Publica. 2015 Jun;31(6):1283-1297. Epub 2015 Jun 1. English, Portuguese. PubMed PMID: 26200375



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Impact of Tobacco Tax Increases on Revenues and on the Social, Economic and Health Burden of Tobacco in Seven Latin American Countries: a Cost-Effectiveness Analysis in Argentina, Bolivia, Brazil, Chile, Colombia, Mexico and Peru

- Argentina: 1) IECS
2) Directorate of Health Economics, National Ministry of Health
- Bolivia: 3) Clinical Epidemiology Unit, Universidad Mayor de San Andres
- Brazil: 4) Fernandes Figueira Institute/Oswaldo Cruz Foundation - Brazilian Ministry of Health
- Chile: 5) Health Economics Department, National Ministry of Health
6) Clinical Epidemiology Unit, La Frontera University - CIGES/UFRO
- Colombia: 7) Institute of Health Technology Assessment (IETS), National Ministry of Health
8) National Institute of Cancer
- Mexico: 9) Ministry of Health, National Center for Clinical Excellence (CENETEC)
10) Tobacco Research Department, National Institute of Public Health
- Perú: 11) Clinical Epidemiology Unit, Universidad Peruana Cayetano Heredia

Aim: to generate evidence-based-knowledge, at a country-level, to promote and support the adoption of effective fiscal policies for tobacco control in seven Latin American countries: Argentina, Bolivia, Brazil, Chile, Colombia, Mexico and Peru.

General objective: to estimate health and economic impacts of alternative tobacco taxation schemes in seven Latin American countries

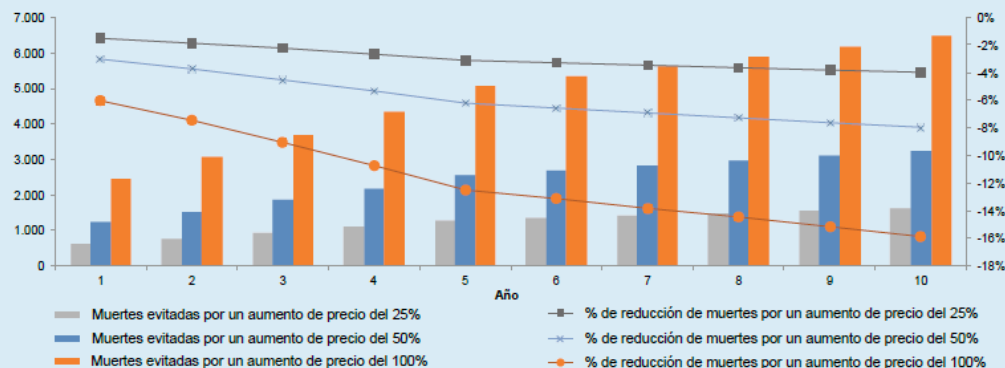
Specific objectives:

1. To quantify the disease burden associated with smoking
3. To analyze the impact of raising taxes on cigarettes both on government revenues and on smoking prevalence.
4. To quantify the effects of the expected reductions in smoking prevalence due to tax increases (objective 3) in terms of health benefits (such as deaths avoided, life years gained, disease events averted) and in its health related economic impact (cost of illness avoided, productivity gains)
5. To present a consolidated analysis of the health and economic outcomes

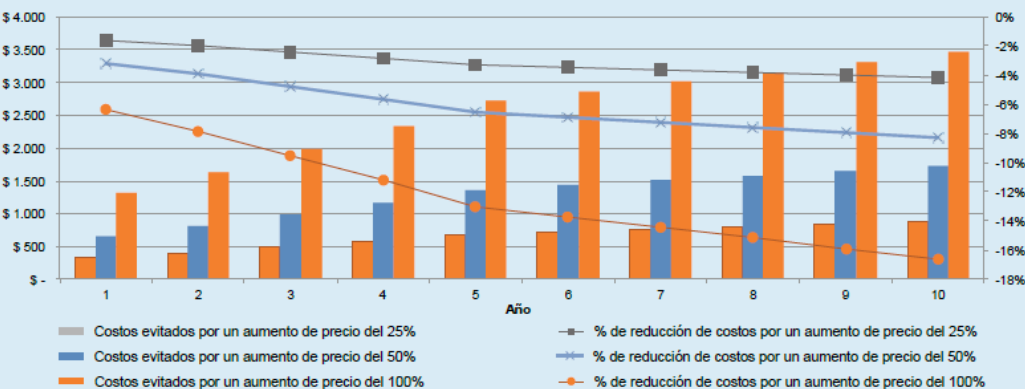
Our hypothesis is that we will show that under all reasonable assumptions tobacco tax increases can provide enormous benefits in terms of years of life, quality of life, death and disease avoided, increased productivity and reduced health care costs without harming local economies. These results will be very valuable to policy makers as they contemplate increasing taxes on tobacco, which is a unique opportunity to improve public health outcomes while producing a net gain to national economies.

¿QUÉ OCURRIRÍA SI ARGENTINA AUMENTARA UN 50% EL PRECIO DE LOS CIGARRILLOS?

MUERTES QUE PODRÍAN EVITARSE



COSTOS EN ATENCIÓN SANITARIA QUE PODRÍAN EVITARSE



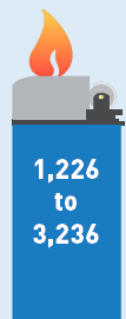
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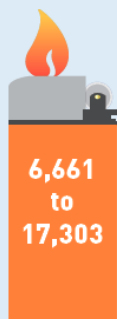
WHAT WOULD HAPPEN
IF ALL LATIN AMERICAN COUNTRIES
DECIDED TO INCREASE
THE PRICE OF CIGARETTES BY 50%?

HOW MANY DEATHS COULD BE PREVENTED PER YEAR?

IF THE PRICE OF CIGARETTES WERE INCREASED BY 50%



Argentina



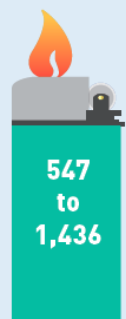
Brazil



Colombia



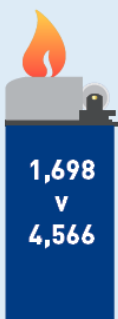
Peru



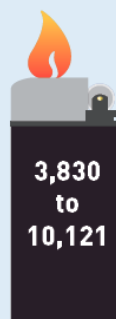
Bolivia



Chile



Mexico



Other
Latin American Countries

**TOTAL:
BETWEEN
17
AND
45
THOUSAND**

THE RANGE
CORRESPONDS TO
ESTIMATES FOR SHORT AND
LONG TERM SCENARIOS.



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WHAT WOULD HAPPEN IF ALL LATIN AMERICAN COUNTRIES DECIDED TO INCREASE THE PRICE OF CIGARETTES BY 50%?

ECONOMIC BENEFITS

(in million dollars, 2014)

**USD 7,258
to USD 9,688
MILLION
DOLLARS**



Between USD 1,385 and
USD 3,815 million dollars
savings in health costs
and
USD 5,873 from additional
tax collection.



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EXPECTED IMPACT RESULTING FROM THE INCREASED PRICE

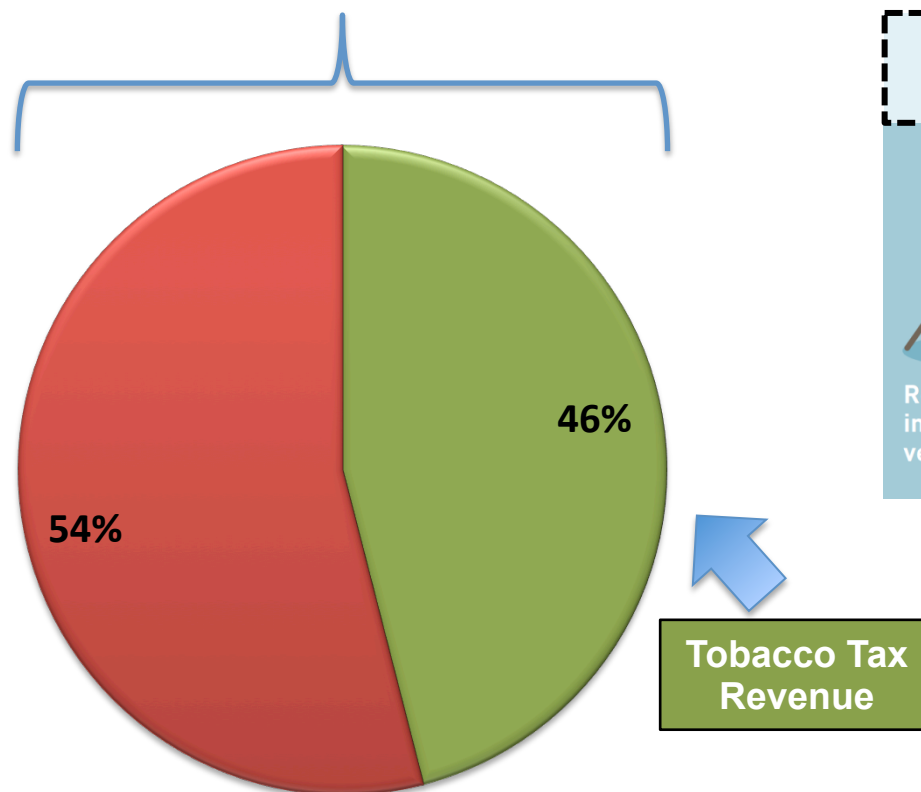
- The price of cigarettes in Latin America is significantly low, compared with other regions worldwide. This makes access to smoking easy, specially among youngsters. If the price of cigarettes increased by 50%, it would still be a cheap product considering international standards, but huge benefits could be achieved.
- Annually, 17,000 to 45,000 deaths could be prevented.
- 453,000 to 1,194,000 healthy life years could be gained.
- The following will be avoided:
 - * 34,379 to 89,327 infarcts and cardiac events.
 - * 17,606 to 34,550 strokes (cerebrovascular accidents).
 - * 6,727 to 18,530 new cases of cancer.
- Tax collection would increase in 5,873 million dollars (although smoking will decrease, significantly).
- There would be USD 1,385 to USD 3,815 million dollar savings per year in health costs for diseases attributable to smoking.
- All these benefits would imply preventing 336,134 deaths in the next 10 years and saving about 28,000 million dollars in health costs (for the same period).



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Smoking is responsible of 33,5 billion US dollars in
direct medical costs



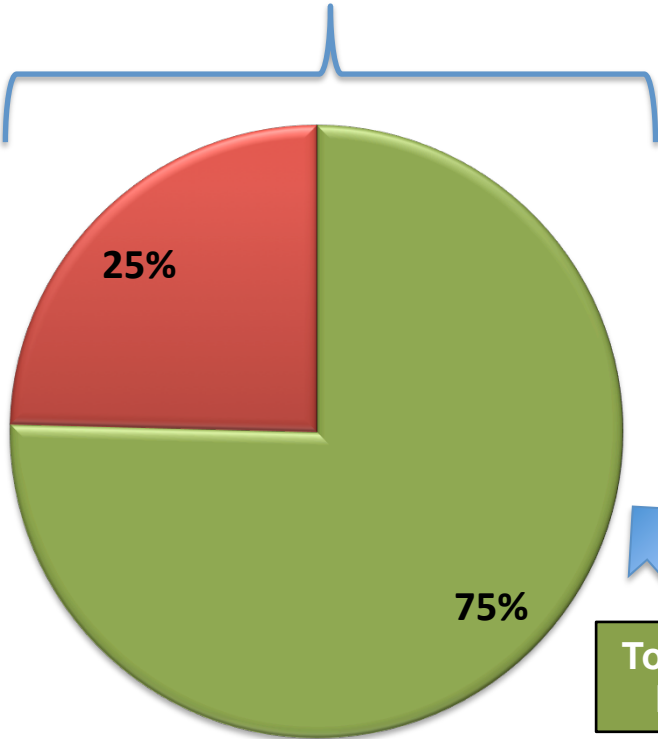
Tax collection from cigarettes does not even cover 50% of the direct expenditures caused by smoking in the health care system



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Smoking is responsible of \$ 1.081.898.801.395 Chilean pesos in
direct medical costs

0.8% of the GDP of Chile
11.5% of total health expenditures



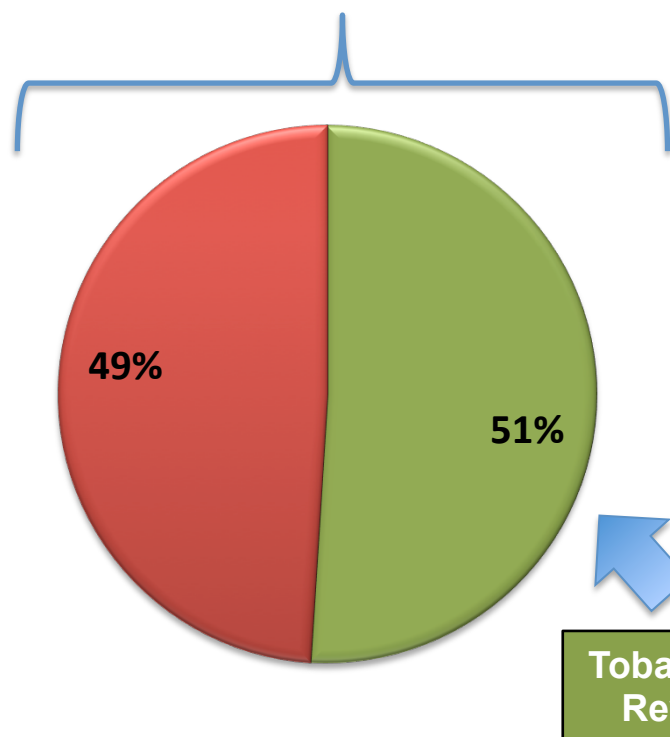
Tax collection from cigarettes barely covers 75% of the direct expenditures caused by smoking in the health care system



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Smoking is responsible of \$ 61.252.296.177 Mexican pesos in
direct medical costs

1% of the GDP of Mexico
11% of total health expenditures



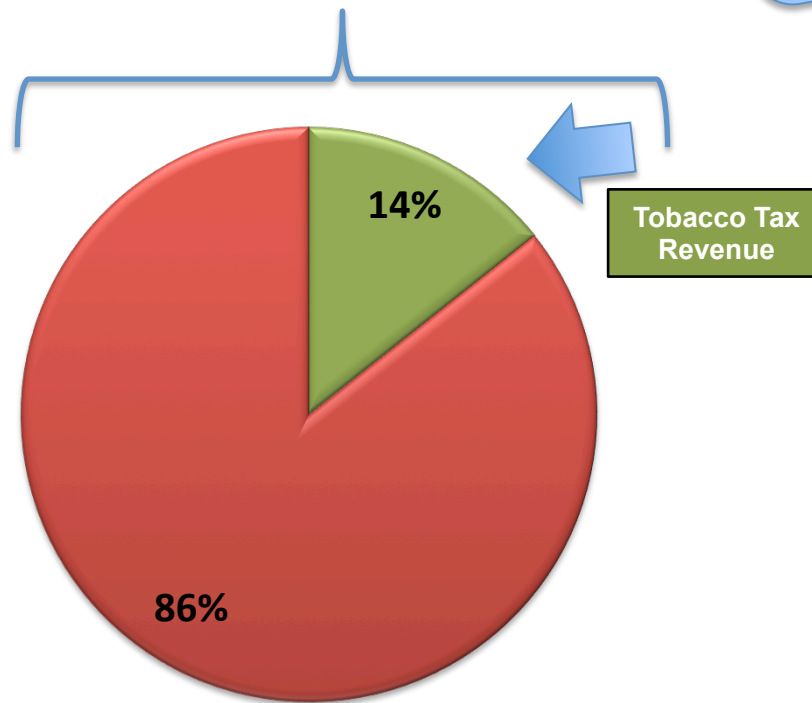
Tax collection from cigarettes barely covers 50% of the direct expenditures caused by smoking in the health care system



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Smoking is responsible of \$ 2.288.667.838 Soles in
direct medical costs

0.4% of the GDP of Peru
8.5% of total health expenditures



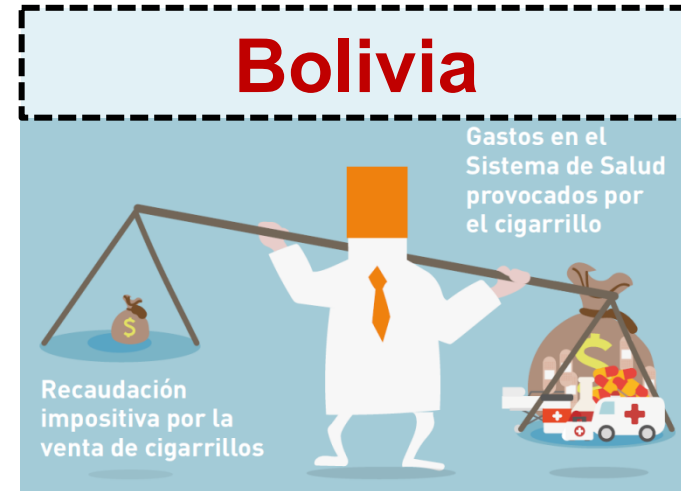
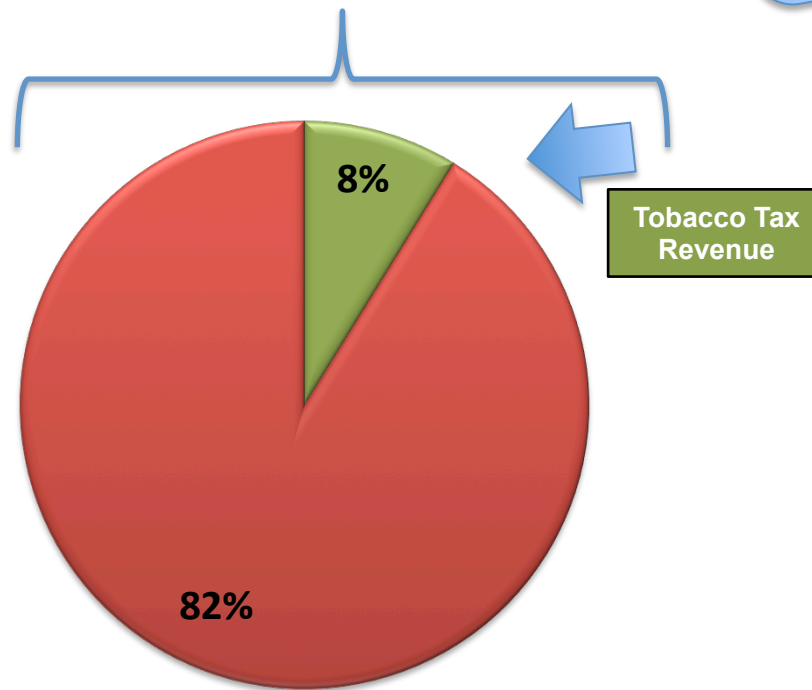
**Tax collection from cigarettes covers less than 15% of
the direct expenditures caused by smoking in the
health care system**



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Smoking is responsible of \$ 1.461.084.735 Bolivian pesos in
direct medical costs

0.8% of the GDP of Bolivia
13.5% of total health expenditures



Tax collection from cigarettes covers less than 10% of the direct expenditures caused by smoking in the health care system



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Empowering healthcare decision makers to achieve regional needs for tobacco control in Latin America

- 1. Impact of Tobacco Tax Increases on the Social, Economic and Health Burden from Tobacco use: a Cost-Effectiveness Analysis in Costa Rica, Ecuador, Honduras, Panamá and Uruguay.**
- 2. Moving forward top priority tobacco control initiatives through evidence packages and cost-effectiveness evaluations.**

Bolivia: Clinical Epidemiology Unit, Universidad Mayor de San Andres

Brazil: Fernandes Figueira Institute/Oswaldo Cruz Foundation - Brazilian Ministry of Health

Chile: Health Economics Department, National Ministry of Health

Chile: Clinical Epidemiology Unit, La Frontera University - CIGES/UFRO

Colombia: IETS, National Ministry of Health

México: Ministry of Health, National Center for Clinical Excellence (CENETEC)

Mexico: Tobacco Research Department, National Institute of Public Health

Perú: Clinical Epidemiology Unit, Universidad Peruana Cayetano Heredia

Ecuador: Ministry of Public Health

Uruguay: CIET, Tobacco Epidemic Research Centre

Panamá: ICGES, Instituto Conmemorativo Gorgas de Estudios de la Salud

Honduras: POSAP - UNAH, National and Autonomous of Honduras

Costa Rica: Ministry of Health

OBJECTIVES

Component “Moving forward top priority tobacco control initiatives through evidence packages and cost-effectiveness evaluations”.

General objective:

To foster the implementation of effective and top priority tobacco control policies in Latin America through the empowerment of decision makers and fulfillment of information needs, summarizing and generating tailored evidence packages, and estimating the impact and cost-effectiveness in Argentina, Bolivia, Brazil, Chile, Colombia, Mexico and Peru.

Specific objectives:

1. To identify top-priority tobacco control interventions and determine decision makers information needs regarding the content and format of the evidence packages and cost-effectiveness analyses.
2. To generate “evidence packages” of 4 to 6 prioritized interventions
3. To generate, among the previous interventions, 2 to 3 cost-effectiveness studies for the participating countries



Productivity cost dimensions

Carga das doenças-tabaco relacionadas para o Brasil e impacto econômica da política tributária sobre desfechos de saúde e de produtividade – Custos Indiretos PAHO - INCA (National Cancer Institute) - Fundação Oswaldo Cruz (Fiocruz)

- Premature death

$$\sum_{j=i}^{edad-x} prob(living)_i^j * Income_j * (1+g)^{j-i} \left(\frac{1}{1+r} \right)^{j-i}$$

- Disability
- Absenteeism
- Reduced productivity



Thank you!

Andres Pichon-Riviere MD MSc PhD
apichon@iecs.org.ar



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