The Future of Longevity in Latin America: Consequences of Tobacco Smoking

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Introduction

Gains in life expectancy in the US over the last three decades have been below those attained by other high-income countries and significantly lower than the high achievers among the high income countries. In all these countries the bulk of changes in life expectancy depend on changes in mortality rates at older ages. But life expectancy gains are progressively harder to achieve as the survival function loses curvature. Recent investigations on the nature of mortality changes at older ages suggest that an important fraction of the differences in life expectancy between the US and other high-income countries is rooted in failure to progress at older ages. And the most important factor accounting for the disadvantage is excess mortality due to causes linked to smoking, particularly lung cancer (NRC 2011).

Against this background surges the possibility that progress in longevity in countries where smoking trends had a later onset than but progressed in ways similar to those found in the US will encounter comparable obstacles but at earlier stages of their mortality transition. Countries in the Latin American and Caribbean region are particularly prone to experience such challenges. By and large, the history of mortality decline in Latin America has been one of a chain of successes marked by occasional setbacks due to economic crises. Between 1960 and 2000 these countries experienced significant mortality reductions across all ages. Declines in the force of mortality before age 20 were responsible for almost 6 years of life expectancy gains while decreases between ages 20 and 50 accounted for a whole year of gain and those associated with mortality rates above age 60 contributed a full two years. Our conjecture is that this sort of progress will be increasingly difficult to maintain and that at some point not too distant in the future the whole process could grind to a halt. And the culprit will be the unfavorable changing composition of older cohorts by smoking behavior. Different studies show relatively high prevalence of smoking in some Latin American and Caribbean countries, particularly in urban areas (Champagne et al. 2010; Menezes et al. 2009). These statistics should sound an alarm and yet there are no studies devoted to understanding the consequences of the smoking trajectories that started after WWII in most of the region.

The goal of this paper is to fill this vacuum by computing estimates of the potential losses in life expectancy that could be expected in the next ten to twenty years as a result of an influx of smokers in cohorts reaching older ages.

Background

It is no secret that as a response to the increasing vigilance and massive public health campaigns against tobacco consumption in the US during the 1960's, the tobacco industry has been hard at work opening new markets in Europe, Asia and Latin America (Bianco et al. 2005). Several sociodemographic factors contributed to the expansion of the market of potential smokers in Latin America since the 1950s: the growth in the populations of adolescents and young adults who were prone to initiate smoking, the spread of urban life style and growth of cities, greater access to education, and the entry of women into the labor market (da Costa e Silva and Koifman 1998). Since then the prevalence of smoking in most countries in the region has been increasing without interruption. As in the US, the increasing trend among men anticipates with a long lag the smoking trend among females.

Lopez et al. (1994) developed a model to describe the stages that the tobacco epidemic typically undergoes in developed countries. This model describes four stages: the initial stage is one where smoking prevalence is low for both men and women. During the second stage smoking among men increases while smoking among females lags behind by one or two decades although it catches up rather rapidly. In stage three, male smoking prevalence begins to decrease at all ages

(the surge is particularly noticeable among the younger cohorts) while among females smoking prevalence peaks. In the last stage smoking prevalence initiates a decline among females as well. In the third and last stages the drops in the rates of smoking are much more significant among the highly educated and this tends to sharpen social class gradients in health and mortality. During the first and second stage there are no significant impacts on mortality. Smoking attributable mortality begins to surge at the time of onset of the third stages and throughout the fourth stages before dipping down significantly. The bulk of smoking attributable mortality is associated with two causes of deaths: lung cancer and chronic obstructive pulmonary disease (COPD). While the US and other developed countries are navigating through stage four (Edwards 2004), albeit with a great deal of variation in timing, most countries in Latin American and Caribbean are still in stage two. Some, however, are already advancing into stage three. This is the case of Argentina, Chile and Cuba where tobacco consumption is particularly steep in capital cities but is accompanied by increases in prevalence in the periphery (Champagne et al 2010). That the epidemic has not reached yet a point of impact is confirmed by the fact that in most Latin American countries around 2000, men's mortality rates attributable to lung cancer, the most notorious cancer-related site, were still considerably lower than in Canada and the US. The exceptions to this rule were Argentina, Chile and Cuba. In Argentina, smoking rates have declined since 2000 at a slow but steady pace whereas in Cuba smoking prevalence increased among middle aged men. By the same token, with the exception of Cuba, female lung cancer mortality rates are significantly lower than in US and Canada. Ominously, however, some countries in the region are beginning to follow the US lead as females lung cancer rates begin to climb by 1990, a clear marker of entrance into the third stage (Bosetti et al. 2005).

The problem
As countries in the region begin to transition from stage two to stage three and as the cohorts who have been exposed to past smoking begin to attain ages when the cumulated effects of smoking begin to be felt, an increase in mortality rates associated with smoking seems inevitable. The issue is not if but when and by how much. This expectation is based on considerable amount of research and evidence that suggests that at the very least two conditions should become more prevalent among those most exposed: lung cancer and COPD (Glei et al. 2010; Streppel et al. 2007; Menezes et al. 2005). There is of course evidence that implicates smoking on the incidence of other types of cancers and chronic illnesses (Doll et al. 2005) but the connections are 'softer' in these cases than with lung cancer and COPD.

The question we ask is as follows: given patterns of smoking consumption among those who attained ages 50 and over during the period 1980-2010, what should be the increase in the rates of mortality attributable to lung cancer as well as to other diseases linked to smoking? And what is the equivalent reduction in life expectancy at age 50? How does this change compare with changes attributable to smoking that were experienced in the US? Could these potential losses overshadow progress and slow down the progress toward longevity in the continent?

Data and Methods
We study conditions in five countries, Argentina, Brazil, Chile, Mexico, and Uruguay for which we have assessments of smoking behavior for people at all ages over 20 from health interview surveys. These surveys contain information on current smoking status, intensity and duration of smoking. In addition for Argentina, Brazil, Chile and Mexico we retrieve detailed information on smoking for individuals over 50 from surveys of elderly people.

In the first part of the paper we estimate excess mortality associated with smoking for the population 50 and above around 2000-2005. To do so, we use alternative estimation procedures applied to a large mortality (by cause) data base for countries of the region. These estimates are compared to those obtained with similar procedures but on US data to assess disparities in the processes that elevate morality risks due to smoking. We then compute life expectancies at age 50

that are expected when removing smoking and compare them with those obtained assuming the current distribution of smoking by age groups (derived from the surveys).

The second part of the paper introduced two procedures to project mortality incorporating information on smoking. The first projection relies on projected prevalence rates for the period 2010-2030 for the cohorts aged 40 and above during the period 2000-2005. These projections baseline prevalence figures and probabilities of discontinuation estimated from the health interview surveys.   We then combine the projected prevalence of smoking with estimated attributable risks due to smoking to determine overall mortality levels. The second projections estimate a time series for the mortality rates attributable to smoking from 1980 up to 2010 estimated in the first part of the paper and apply standard techniques to forecast mortality during the period 2010-2030.

The consequences

The most important message is that there are real dangers ahead for many countries in the region but especially for those whose population adopted smoking behaviors that led to high levels of smoking prevalence. The course of longevity in Latin America is unlikely to be overwhelmed by rapid adoption of high-end medical technology that, in any case, has been so far totally ineffective against chronic conditions such as lung cancer. Instead the short run course of longevity depends heavily on the changing composition of cohorts by smoking profiles. We argue that due to the long lags required to translate smoking behavior into mortality risks, the mortality landscape at older ages for the next twenty years could be dominated by smoking-related risks. And if current trends in obesity continue unabated the decline of mortality expected to occur due to smoking cessation will be obscured and offset by morbidity and mortality associated with obesity.

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