**\subsection\*{Young adults}**

Young adults (ages between 15 and 39) show a converging pattern towards the low mortality benchmark in all states just until 2005. A sudden increase in homicide rates widened the gap with the low mortality benchmark by almost four times on average in 2010, relative to the level observed in 2005. Previous research documented losses in the overall life expectancy up to three years in the state of Chihuahua (the bordering state with Texas, USA) and almost two years in Sinaloa, Durango (North) and Guerrero (South) between 2005 and 2010 due to homicides \cite{Aburto2015}. Our findings show that the trend towards the low mortality benchmark was reversed after 2005 due to the increase in homicide mortality, with a peak in 2010-2011. Although homicide rates decreased after 2011, they still are the main cause of death contributing to the gap between the observed survival and the low mortality benchmark in particular states, such as Sinaloa, Durango in the North, Nayarit and Michoac\'an in the cetral region, and Guerrero in the South. These findings underscore the need for effective interventions to reduce homicide mortality, as it still contributes the most to survival shortcomings among the young-adult population and mortality inequality among states. Even ten years after the national security strategy that aimed at reducing drug cartels' operations started and homicides begun to spread all over the country \cite{espinal2015analysis}, the effect of homicide on average survival is appalling. Between-state inequality in female survival was much smaller over the same period.

**\subsection\*{Older adults}**

In Mexico, since the beginning of the 1990's, adult survival in ages 40-74 deteriorate for males and stagnate for females. Our results help explain on this pattern showing that the low mortality benchmark decreased as a result of state-specific mortality trends and the interaction between specific causes of death. In particular, there are offsetting effects between improvements in causes amenable to medical service, such as infectious and respiratory diseases, and deterioration in diabetes, isquemic heart diseases (IHD), and behavior-related mortality through cirrhosis and homicides.

Out of 35 potential years, adult females in Mexico are living less than 33 and males less than 31 since the 1990's. The increase in diabetes, IHD and cirrhosis mortality is at the heart of survival's deterioration, with clear regional variations. Although improvements in causes amenable to medical service were witnessed, almost every state still has potential to improve in this ages, in particular the Northern states of Sonora, Chihuahua and Baja California. Diabetes mortality increased over the period and contributed to increases in the gap to achieve the low mortality benchmark. Diabetes-related mortality increased 23\% from 1998 to 2002, and the prevalence of diabetes was estimated at 14.4\% in the adult population in 2006. These figures underscore the emerging epidemic of diabetes \cite{glassman2010confronting}. To put this in perspective, Coahuila, the state of Mexico, Guanajuato, the Federal District, Tabasco and Puebla could increase survival by almost one year if diabetes mortality were to achieve the low mortality benchmark. Similarly, mortality related to IHD contributes to lowering life expectancy in adults. There is a clear regional pattern in the country. Almost all the states in the Northern region could potentially benefit with one additional year in life expectancy if the low mortality benchmark were reached, where as the Central and Southern regions present a lower impact of IHD. Cirrhosis-related mortality shows a higher impact in the Southern and Central states of the country, particularly in Quer\'etaro, M\'exico state, Hidalgo (central area) and Puebla and Oaxaca in the South. Both diabetes and IHD mortality are closely related to obesity prevalence, previous research anticipated that the increasing levels of obesity in Mexico could compromise gains in life expectancy \cite{monteverde2010obesity}. These regional differences on cause-specific mortality led to increases in health inequalities in adults aged 30-74 after 2006 for males and stagnation among females (figure \ref{fig:Gini}).

There is still potential for improvements to reduce state-mortality differences and improve the survival among the adult population in Mexico. Several screening and prevention strategies (e.g. PREVENIMSS) for early diabetes and hypertension have been implemented in the country. However, as previous research has found, they are far from achieving the ultimate goal and including the entire population \cite{castro2010potential}. In addition, \cite{behrman2013health} show that the conditional cash transfer program PROSPERA improves health significantly for adult women older than 50. The authors also noted that the effect on men's health is much lower. They argue that this could be the result of the lack of inclusion of men in the program and the main role of women in the program's requirements. Women are recipients of the monetary transfers and they are more likely to attend clinic visits and follow health measures given by doctors in these clinics than men.\\

This discordance between age groups point towards disparities in ages within states and highlight the place of residence as a factor on the life expectancy depending on the stage of life an individual is.

**\section\*{Conclusion}**

Health inequalities have been previously identified as a current challenge for Mexico \cite{gomez2016dissonant,gutierrez2016health}, here we give cause and age-specific targets to improve longevity and at the same time reduce inequalities between states. Since different risk factors are present at different ages for different causes of death in each state, we quantify potential gains in survival of achieving a low mortality benchmark conditioned to surviving at different ages in all 32 states by sex. This allowed us to identify three main stories over the last 25 years. Firstly, improvements in causes amenable to medical service, such as infectious \& respiratory diseases and birth conditions, led to achieve almost full survival below age 15 for the 32 states.

and the stagnation and worsening in mortality on ages above 50

and identify the varied impact of different causes of death over the life course conditional on survival

We showed that conditions amenable to health behavior and healthcare, such as diabetes, IHD and lung cancer, are having a sizable impact in determining why mexican states are not improving life expectancy after age 50 in the last 25 years. As a consequence of the very variety of epidemiological patterns between states and over the life course, there are discordant patterns of mortality over age groups and regions. These results point towards strengthening preventive care among the adult population to improve healthy behaviors...

Identifying specific opportunities to improve and put forward solutions to reduce the gap of the unequal impact of public health interventions on health is a necessary step to promote equitable increases in survival among the Mexican population.% the high degree of social and health inequalities present in the country \cite{Frenk2006}

In addition, given the improvements in health care coverage, the strong role %of institutions, and ongoing public

%health interventions,