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Article

Decomposition of age- and cause-specific adult mortality contributions to the gender gap in life expectancy from census and survey data in Zambia

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ABSTRACT

In the context of high adult mortality and an immense impact on the health burden of Zambia, a decomposition analysis of age- and cause-specific mortality in age group 15–59 was performed to determine the contributions to the gap in life expectancy at birth between males and females. Previous studies on decomposition have examined income groups, ethnicity, and regional differences' contributions to gaps in life expectancy, but not the adult mortality age group 15–59. These studies focus on developed countries and few on developing countries. Arriaga's decomposition method was applied to 2010 census and 2010–2012 sample vital registration with verbal autopsy survey (SAVVY) data to decompose contributions of age- and cause-specific adult mortality to the gap in life expectancy at birth between males and females. The decomposition analysis revealed that mortality was higher among males than females and concentrated in age groups 20–49. Age- and cause-specific adult mortality contributed positively, 50% of the years to the gap in life expectancy at birth between males and females. Major cause-specific mortality contributors to the gap in life expectancy were infectious and parasitic diseases (1.17 years, 26.3%), accidents and injuries (0.54 years, 12.2%), suicide and violence (0.30 years, 6.8%). Female HIV mortality offset male mortality. Neoplasms deaths among females contributed negatively to the gap in life expectancy (-0.22 years, -5.4%). Accidents, injuries, suicide, and violence are emerging major causes of death in age group 20–49 in Zambia which health policy and programmes should target.

Introduction

There is growing interest in decomposing changes in life expectancy in the fields of demography and epidemiology. This is because life expectancy at birth is an important ingredient in international development composite indicators, such as the Human Development Index (HDI), as it summarises mortality conditions which are a reflection of the population's health status (Silcocks, Jenner, & Reza, 2001; United Nations, 2016). Changes in life expectancy reflect either improvements or declines in mortality and living conditions of the population (Mondal & Shitan, 2014; Seale, 2000; Tarkiainen, Martikainen, Laaksonen, & Valkonen, 2012). Decomposition analysis determines age- and cause-specific mortality contributions that impact on changes in the life expectancy (Arriaga, 1984; Das Gupta, 1978). It unmasks information pertaining to inequalities in socioeconomic and health conditions that manifest themselves in widening gaps in life expectancy in the population (Hosseinpoor, Lee, Lynch, Mathers, & Abou-Zahr, 2012; Khang, Yang, Cho, Choi-Jung, & Yun, 2010; Yang, Khang, Chun, Harper, & Lynch, 2012). Variations in life expectancy by region and socioeconomic status reflect differences in access to public health care in the population (Mondal & Shitan, 2014; Seale, 2000; Silber, 1992). Therefore, changes in life expectancy reflect effects of mortality in the age groups as well as due to cause-specific mortality. The effects of mortality changes comprise of two parts: the rate effects which are changes in the age-cause-specific mortality rates, and the compositional effects which are changes in age-specific mortality rates (Arriaga, 1984; Vaupel & Romo, 2002). A decomposition of age- and cause-specific mortality contributions to life expectancy changes provides relevant information for health policy programmes and interventions for targeting specific age groups and causes of death to improve the health status of the population in line with the national and sustainable development goals (SDGs).

Previous studies have decomposed changes in life expectancy mainly in North-American, European, Asian and Middle-East countries

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such as the United States of America (USA) (Trovato & Heyen, 2006), Canada (Auger, Harper, Barry, Trempe, & Daniel, 2012; Trovato & Odynak, 2011), Japan (Trovato & Heyen, 2006), South Korea (Khang et al., 2010; Yang et al., 2012), China (Le, Ren, Shen, Li, & Zhang, 2015), Taiwan (Chen, Kwok, & Yip, 2012), Finland (Martikainen, Valkonen, & Martelin, 2001; Tarkiainen et al., 2012), France (Trovato & Heyen, 2006), Australia (Trovato & Lalu, 1997), Kuwaiti (Al-Ramadhan, 2008), and England and Wales (Trovato & Heyen, 2006). These studies decomposed life expectancy differences by examining age- and cause-specific mortality contributions by applying Arriaga's (1984) decomposition method. Their findings have been consistent and mixed in some countries.

Few studies, however, have decomposed the contributions of age- and cause-specific mortality to differences in life expectancy between males and females in sub-Saharan African countries. This is largely so because of the lack of official statistics on causes of death in most of the sub-Saharan African countries, except for South Africa and Mauritius that routinely collect and publish causes of death data (Bah, 1998; Mberu, Wamukoya, Oti, & Kyobutungi, 2015; Rao, Lopez, & Hemed, 2006).

Adult mortality in Zambia is among the highest in sub-Saharan Africa and is an issue of major concern as it poses a health burden on households, communities, health system and national economy (Ainsworth, Beegle, & Koda, 2005; Mutangadura & Webb, 1998). About 62 per cent of deaths reported by the 2010–2012 sample vital registration with verbal autopsy survey (SAVVY) were of adults (Central Statistical Office (CSO). 2014). The gap in life expectancy at birth between males and females varied and widened from 2 years in 1980 to 4.2 years in 2010 (Central Statistical Office (CSO) (CSO). 2012). The magnitude and direction of the changes in the life expectancy attributed to contributions of the adult mortality in age group 15–59 remain largely unknown. In the context of high adult mortality in Zambia, there is need to assess the extent to which age- and cause-specific adult mortality changes have contributed to differences in the life expectancy between males and females at birth through a decomposition analysis. Zambia is a landlocked country in southern Africa. The 2010 census estimated the population at 13.1 million with 51 per cent of population being female and 49 per cent male. The adult mortality age group 15 to 59 years comprises about half of the total population (Central Statistical Office [Zambia], 2012). About 40 per cent of the population live in urban areas. Zambia is one of the countries in southern Africa that has experienced a generalized HIV/AIDS epidemic with HIV prevalence rate of 13.3 per cent in age group 15–49 years (Central Statistical Office (CSO) [Zambia] et al., 2014). Nearly 61 per cent of the population live below a dollar a day (Central Statistical Office [Zambia], 2016).

The study seeks to answer the research question: what is the contribution of age- and cause-specific adult mortality rates to the gap in life expectancy at birth between males and females in Zambia? Answering this question generates useful information for national health policy relevant in understanding and focusing programmes on specific interventions needed to address widening gaps in life expectancy attributable to adult mortality conditions.

Literature review

Previous studies show that the contributions of age- and cause-specific mortality to changes in life expectancy vary from country to country after performing a decomposition analysis. For example, in Canada, USA, England and Wales, and France cancer mortality narrowed the life expectancy gap between males and females, whereas in Germany, Italy and Japan the gap widened (Trovato & Heyen, 2006). Cause-specific mortality attributed to accidents, violence and suicide in Japan contributed to widening the gap in life expectancy between males and females (Trovato & Heyen, 2006). In South Korea, age groups 20–44 and ages 50 years and above as well as liver disease, cardiovascular diseases, hypertension-related diseases, transport accidents, and suicide significantly contributed to differences in life expectance between males and females (Khang et al., 2010; Yang et al., 2012). In Quebec and Canada, lung cancer at early ages in Quebec and Cardiovascular diseases at older ages in Canada lowered life expectancy at birth (Auger et al., 2014). The Anglophone had narrower gaps in life expectancy than the Francophone. Tobacco-related causes of mortality contributed largely to the differences in life expectancy (Auger et al., 2012).

In Finland, alcohol-related diseases, cancers, ischaemic heart disease and smoking mortality among adults aged 25 years and above contributed the most to widening the gap in life expectancy (Martikainen, Makela, Peltonen, & Myrskyla, 2014; Tarkiainen et al., 2012). A decrease in ischaemic heart disease mortality among men aged 55–74, and in cardiovascular diseases mortality among women aged 65–84, significantly contributed to an increase in life expectancy (Martikainen et al., 2001). In Kuwaiti, gains in life expectancy were attributed to a reduction in mortality due to neoplams, diseases of the circulatory system, and accidents. Age groups 15–64 contributed the most to gains in life expectancy in both males and females (Al-Ramadhan, 2008). In China, gender differentials in the gap in life expectancy were attributed to age group 60–79 as well as cancers, circulatory diseases, respiratory diseases, traffic accidents and suicide (Le et al., 2015). In Australia, the age group 35–74 and heart disease, breast cancer, lung cancer, accidents and violence narrowed the gap. Whereas, prostate cancer and suicide contributed to widening the gap (Trovato & Lalu, 1997).

In sub-Saharan Africa, Bah (1998) in Mauritius found that mortality attributed to infectious and parasitic diseases was higher among males than females and played a major role in mortality transition. Age group 0–1 contributed the most to widening the gap in life expectancy between males and females. In high HIV/AIDS prevalence populations such as South Africa, a decomposition analysis of age-and cause-specific mortality contributions to the total difference in life expectancy if HIV was eliminated revealed that the age group 30–49 contributed to an increase in life expectancy following the introduction of antiretroviral therapy (Muhwava, Herbst, & Newell, 2013).

Reviewed studies show that many of them have decomposed age- and cause-specific mortality contributions to changes in life expectancy, however, few of them have considered the contributions of the adult mortality age group of 15–59, which is the aim of this study.

Methods

Data

The study used cross-sectional data from the 2010 Zambia census of population and housing (10 per cent sample) and the 2010–2012 SAVVY. The 2010 census collected information on household deaths in the last 12 months country-wide. Information on the age, sex and cause of death of deceased persons was collected. The census questionnaire had precoded categories for the question on causes of death. There is a limitation in this as the responses on causes of death were dependent on the respondent as no standard medical procedure was followed to establish the cause of death. The SAVVY is a nationally representative