Regional variations in adult mortality in Zambia: Do they matter?

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Extended Abstract

Introduction

Adult mortality still remains a major health challenge in most developing countries. Adult mortality is demographically defined as deaths of persons between the ages of 15 and 59 years old. Adult mortality is closely linked to the attainment of major developments goals such as the Millennium Development Goals (MDGs) which are now transitioning into Sustainable Development Goals (SDGs). Improvements in health such as combating of diseases such as HIV/AIDS, Malaria, Non-communicable diseases and other diseases are a part of these goals and adults play a role. Therefore, a significant impact on morbidity and mortality of adults in age group 15-59 affects the attainment of these goals as well as the development of a country demographically, socially and economically. In a sub-Saharan Africa, adults in age group 15-49 have higher HIV/AIDS prevalence than other population age groups. The International Conference on Population and Development (ICPD) Beyond-2014 has noted the rise in Non-communicable diseases (NCDs) in most developing countries especially sub-Saharan Africa affecting mostly adults in age group 15-59 years (United Nations 2014).

Though at global level adult mortality rates have declined from 198 deaths per 1,000 persons alive at age 15 and above or 1 in 5 in the period 1990-1995 to 157 deaths per 1,000 in the period 2010-2015 (United Nations 2013); it still remains a health burden for many developing countries. In Europe, adult mortality rates have stagnated and a rising trend of high level mortality has been observed among adult males (United Nations 2013). Adult mortality rates are lowest in the North American and Oceania regions with rates of 99 and 101 deaths per 1,000, respectively (United Nations 2013). In Africa, however, despite the decline adult mortality remains the highest globally with a rate of 296 deaths per 1,000. Males have the highest rate at 317 deaths per 1,000 and females at 275 deaths per 1,000 (United Nations 2013). A ratio of 1.2 times higher than female mortality. At global level, adult mortality is 1.5 times higher among males than females. It is highest in Europe with a ratio of 2.4 times higher than female mortality (United Nations 2013). In Africa, adult mortality rates increased through the 1990s and reached the peak in early 2000s mainly due to HIV/AIDS (Bendavid, Holmes, Bhattacharya *et al.* 2012; United Nations 2013).

In Zambia, adult mortality is also a major health challenge with multidimensional socioeconomic implications on households, communities and the nation (Baggaley, Godfrey-Faussett, Msiska *et al.* 1994; Mutangadura and Webb 1998; Ainsworth, Beegle and Koda 2005; Bradshaw and Timaeus 2006; Dzekedzeke, Siziya and Fylkesnes 2008; Muhwava, Herbst and Newell 2013). Adult mortality rates ($_{45}q_{15}$) are estimated at 356 per 1,000 for males, 303 per 1,000 for females and 330 deaths per 1, 000 at national level (WHO, 2013). Estimates by the United Nations Population Division (UNPD) are 458 deaths per 1,000 for males, 450 deaths per 1,000 for females, and 454 deaths per 1,000 in total (United Nations 2013). The World Bank estimates are 325 deaths per 1,000 for males, 268 deaths per 1,000 for females (World Bank, 2014). The 2013-2014 Zambia Demographic and Health Survey estimated the probability of dying between age 15 and 50 years ($_{35}q_{15}$) at 330 deaths per 1,000 for males, 294 death per 1,000 for females. These estimates show a decline from 471 deaths per 1,000 for males, and 446 deaths per 1,000 in 2001-2002) (Central Statistical Office (CSO) [Zambia], Ministry of Health (MOH) [Zambia] and ICF International 2014). It is notable that there are differences in the adult mortality estimates by source for Zambia. What is evident, however, is that adult mortality remains high in Zambia. All these studies,

however, have not produced adult mortality estimates at regional level in Zambia. For this reason, they have not examined regional variations in adult mortality in Zambia. This study, therefore, fills this gap. Furthermore, much attention has been given to infant and child mortality than adult mortality as a result more is known about regional variations in infant and child mortality than the latter in Zambia. For example, under-five mortality is highest in Eastern province and lowest in Copperbelt province, 115 and 63 deaths per 1,000 live births, respectively (Central Statistical Office (CSO) [Zambia], Ministry of Health (MOH) [Zambia] and ICF International 2014). In addition, urban areas experience lower under-five mortality than rural areas, 72 and 85 deaths per 1,000 live births, respectively (Central Statistical Office (CSO) [Zambia], Ministry of Health (MOH) [Zambia] and ICF International 2014). Consequently, there are more health programmes and interventions targeting infant and child mortality than adult mortality. The notable few available interventions for adults are those targeting HIV/AIDS, that is, Anti-retroviral Treatment (ART), and not other diseases.

Therefore, the contribution of the study lies in examining regional variations in adult mortality as they matter for policy and programme interventions. Regional variations in mortality of any country to a great extent reflect the inherent inequalities in livelihoods, access to social amenities, health care, poverty in populations (Khosravi, Taylor, Naghavi *et al.* 2007; Saikia, Jasilionis, Ram *et al.* 2011). In most cases, policies and interventions are designed in a manner that is blind and does not pay attention to the variations in mortality existent in the population. Variations in mortality by geographical location such as region and residence imply that there are disparities in socioeconomic living conditions of the populations in these places. They may also reflect variations in health related behaviour geographically. The same applies to differences in mortality by age and sex. Certain diseases affect one particular age group and sex than the other, for example, HIV/AIDS in sub-Saharan Africa is concentrated in the age group 15-49, and women have a higher HIV prevalence than men. For instance, in Zambia, HIV prevalence among women is 15.1 per cent while among men it is 11.3 per cent. By rural and urban residence, it is 9.1 per cent and 18.2 per cent, respectively. Whereas, by region or province, HIV prevalence is highest in Copperbelt province, 18.2 per cent and lowest in Muchinga province, 6.4 per cent (Central Statistical Office (CSO) [Zambia], Ministry of Health (MOH) [Zambia] and ICF International 2014). There is need, therefore, for policies to recognize the regional variations in mortality so as to design more appropriate and target specific programmes and interventions.

Methods

Data

Cross-sectional data from the 2010 Zambia census of population and housing were utilised to examine regional variations in adult mortality in Zambia. A single questionnaire was used to capture individual, household and housing characteristics from the population. The 2010 census collected information on household deaths in the last 12 months. A question, "Is there any member of this household who died in the last 12 months?" was asked. Additional information was collected on the sex, age and cause of death of the deceased person (Central Statistical Office (CSO). 2012).

Analysis

Descriptive statistics in form of percentages were computed first to describe the distribution of adult deaths by age, sex, cause of death, residence, and province. Second, crude death rates for the age adult mortality age group 15-59 for each province were computed. Then indirect standardization was performed by applying national age-specific mortality rates in age group 15-59 years as a set of standard rates used to compute expected deaths for each province. Indirect standardization was performed to account for the effect of age on adult mortality. Standardized mortality rates (SMRs) were computed with

95 per cent confidence intervals (CIs) for each province and used for comparison (Bruce, Pope and Stanistreet 2008). Adult mortality rates, that is, probabilities of dying between exact age 15 and 60 years ($_{45}q_{15}$) for each province, rural, urban residence, and by sex were computed from life tables constructed after adjustment of the reported household deaths for completeness by applying the Brass Growth Balance method as elaborated above. The Brass Growth Balance method spreadsheet developed by Moultrie et al., (2013) was utilized for computations of adult mortality rates. The spreadsheet has in-built relational model life tables based on the Brass logit transformation (Dorrington 2013) which allows a production of smooth or adjusted mortality rates that are used in constructing a life table from which adult mortality rates a estimated.

Results

The analysis has shown that there are variations in adult mortality in Zambia. Table 1 below shows that adult mortality is higher among men than women in the age group 15-59 years. Mortality is highest in the age group 25-29 for women whereas for men it is in age group 30-39 years.

Rural and urban variations in adult death distribution

Adult mortality is higher in urban than rural areas. In both rural and urban areas, adult mortality is higher in age group 25-39. In comparison, more female adult deaths occurred in rural areas than urban areas. In addition, female adult mortality in age group 25-29 is higher than for males in both rural and urban areas. Furthermore, the proportion of adult females who died from sickness and disease is higher than for males in both rural and urban areas. Conversely, adult males deaths attributed to accidents and injuries were twice as high as those of females. Similarly, the proportion of adult male deaths due to suicide and violence was higher than for females in both urban and rural areas.

Table 1: Percentage distribution of adult deaths by age, sex, cause of death and rural-urban residence, Zambia 2010

	Rural		Urban		Total	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
Age group						
15-19	9.3	11.0	5.5	9.3	7.5	10.2
20-24	9.9	12.1	9.3	12.0	9.6	12.1
25-29	13.6	16.8	15.4	17.7	14.5	17.2
30-34	15.1	14.9	18.8	17.0	16.9	15.8
35-39	16.1	14.8	17.5	15.0	16.8	14.9
40-44	12.1	10.6	11.5	9.4	11.8	10.1
45-49	10.1	7.8	10.2	7.5	10.2	7.7
50-54	7.5	7.2	7.3	7.2	7.4	7.2
55-59	6.2	4.8	4.4	4.9	5.3	4.9
Cause of death						
Accidents and injuries (V01-Y98)	7.3	2.9	6.4	2.4	6.8	2.7
Suicide and violence (X60-X84, Y87.0)	5.0	1.8	3.4	2.5	4.2	2.1
Sickness and disease (A00-B99)	72.3	78.6	80.5	86.3	76.3	82.1
All other causes (R00-R99)	15.4	16.7	9.8	8.8	12.7	13.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number (15-59)	1862	1663	1770	1398	3632	3061

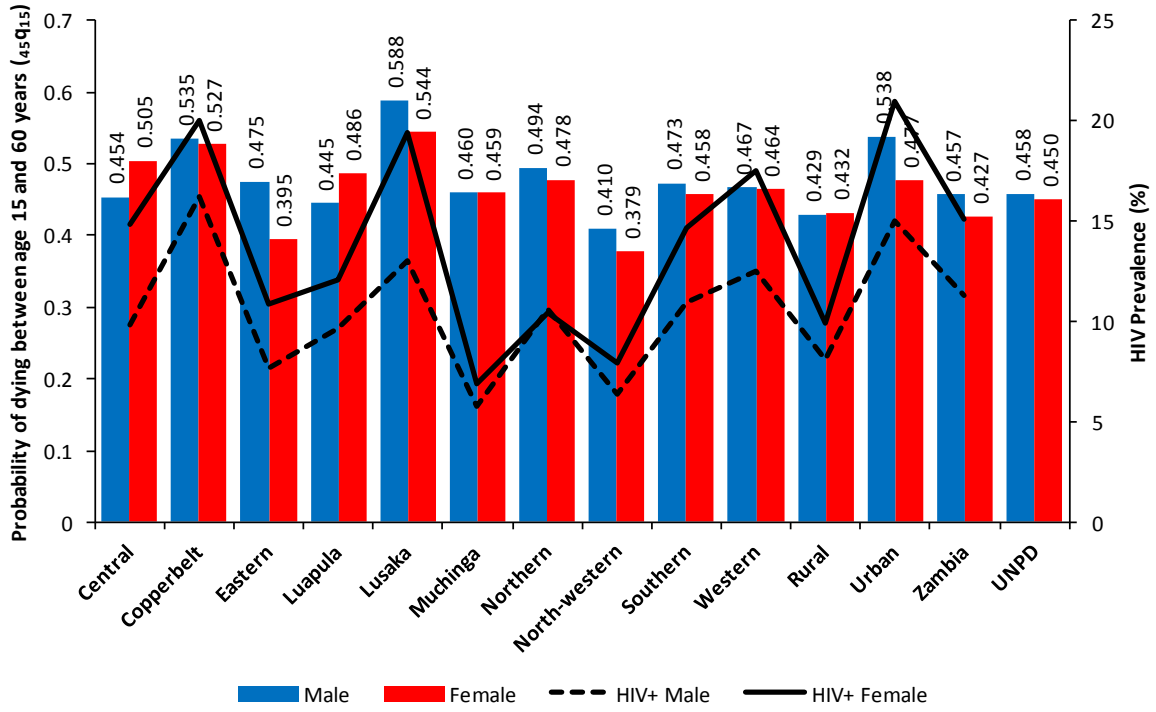
Source: Author computations using 2010 census data files.

Table 2: Percentage distribution of adult deaths by age, sex, cause of death and province, Zambia 2010

	Central		Copperbelt		Eastern		Luapula		Lusaka		Muchinga		Northern		North-western		Southern	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Age group																		
15-19	7.7	10.1	6.8	8.1	6.9	12.3	11.4	13.3	5.4	9.4	6.6	15.3	8.4	13.8	9.4	9.0	9.4	6.9
20-24	7.7	11.6	8.2	11.4	8.6	14.1	11.4	14.4	10.5	10.9	11.9	9.9	16.4	10.3	10.7	15.7	5.5	10.6
25-29	13.8	17.6	15.3	15.9	13.6	12.0	14.2	23.5	14.4	17.7	13.2	15.3	13.2	17.7	11.4	23.9	15.2	18.6
30-34	18.3	16.2	19.8	18.6	12.8	14.7	15.0	12.9	17.0	16.2	18.5	16.2	14.4	16.7	14.1	9.7	17.3	17.2
35-39	18.0	12.7	17.0	15.7	17.2	16.8	17.1	10.2	18.3	15.1	14.6	17.1	12.8	13.3	16.8	12.7	17.3	17.2
40-44	14.1	12.1	8.8	10.8	11.7	11.1	12.2	6.8	14.3	9.6	11.3	9.9	9.2	10.3	12.8	9.0	11.2	10.2
45-49	8.8	8.7	12.4	7.9	11.9	8.1	11.0	7.2	9.2	7.2	6.0	3.6	10.0	6.9	10.1	4.5	9.1	9.5
50-54	6.9	6.1	6.8	7.6	11.1	7.2	2.8	6.8	6.1	7.9	12.6	4.5	6.8	6.9	8.7	9.0	9.7	6.9
55-59	4.8	4.9	4.8	4.1	6.1	3.6	4.9	4.9	4.8	5.9	5.3	8.1	8.8	3.9	6.0	6.7	5.5	2.9
Cause of death																		
Accidents and injuries (V01-Y98)	5.6	4.0	5.2	2.2	4.4	2.4	9.3	1.1	6.8	3.3	7.9	1.8	9.2	4.9	8.7	2.2	10.6	2.9
Suicide and violence (X60-X84, Y87.0)	6.1	3.2	3.0	2.7	7.5	0.6	1.6	1.5	4.1	1.8	2.0	0.0	3.2	2.5	11.4	3.7	2.4	2.6
Sickness and disease (A00-B99)	79.0	82.4	82.4	87.0	76.9	82.0	69.5	80.3	77.9	84.7	68.2	81.1	74.8	72.4	58.4	73.9	73.3	79.9
All other causes (R00-R99)	9.3	10.4	9.4	8.1	11.1	15.0	19.5	17.0	11.2	10.1	21.9	17.1	12.8	20.2	21.5	20.1	13.6	14.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number (15-59)	377	346	731	555	360	333	246	264	706	542	151	111	250	203	149	134	330	274

Source: Author computations using 2010 census data files.

Figure 1: Probability of dying between age 15 and 60 years, and Percentage HIV prevalence by province, Zambia 2010, 2013-2014



Source: Author computations using 2010 census and 2013-14 ZDHS data files.

Conclusions

The study has shown that adult mortality varies by demographic characteristics and geographical area in Zambia. Adult mortality rates were derived and vary by region and rural-urban residence. Adults were mainly dying from sickness and disease especially in age group 25-39 years for both males and females. This pattern is characteristic of high HIV prevalence populations. Accidents and injuries are an emerging cause of death among adult males. Standardization of mortality rates revealed that controlling for the effect of age on adult mortality unmasks what is concealed by age which points to other factors being responsible for adult mortality variations. The variations in adult mortality rates observed indicate that there are factors beyond individual-level that require further examination.

Based on the study findings, programmes aimed at reducing adult mortality in Zambia should design specific targeted interventions in line with regional variations in mortality, and not have a one-size fits all type of interventions. This, therefore, implies that regional variations in adult mortality matter for policy-planning and health-decision making.

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