

Adult Mortality and the Wealth Gradient in Sub-Saharan Africa

Julia Callaway¹, Carlos Riumallo Herl^{2,3,4}, and Angela Chang^{5,6}

¹ Interdisciplinary Centre on Population Dynamics, University of Southern Denmark, Odense, Denmark; ² Erasmus Centre for Health Economics Rotterdam, Erasmus University Rotterdam, Rotterdam, Netherlands; ³ Erasmus School of Economics, Erasmus University Rotterdam, Rotterdam, Netherlands; ⁴ Tinbergen Institute, Erasmus University Rotterdam, Rotterdam, Netherlands; ⁵ Danish Centre for Health Economics, University of Southern Denmark, Odense, Denmark; ⁶ Danish Institute of Advanced Studies, University of Southern Denmark, Odense, Denmark

Background and Theoretical Focus

The gap in life expectancy between the richest and poorest percentiles in high-income countries is at least a decade.^{1,2} Socioeconomic inequalities in mortality, defined as the differences in mortality rates between those of high socioeconomic status (SES) and those of low SES, are costly, and are a major source of social inequality that can disrupt domestic and international stability.^{3,4} However, we know little about the socioeconomic inequalities in adult mortality in Sub-Saharan Africa. The main reasons for this are a lack of high-quality data, a lack of data that link mortality and SES, and few methodologies that can be applied under such constraints. We overcome these challenges by applying kinship methods to publicly available data. The aim of this study is to estimate age-specific adult mortality rates by wealth quintile across Sub-Saharan Africa, over time.

Data and Methods

We analyzed sibling survival data from Demographic and Health Surveys (DHS). The criteria for inclusion were: 1) the survey was conducted in or after 2000; 2) the country was in Sub-Saharan Africa, as defined by the UN Statistics Division; and 3) the maternal mortality module was completed, which contains questions about sibling survival.

Siblings were included for whom survival status was reported, who were between the ages of 15 and 49 during the specified study periods, or died between the ages of 15 and 49 during the specified study periods. Sibling wealth quintiles were assumed to be the same as those of the survey participant.

We estimated mortality rates by calculating the number of deaths divided by the number of person years of exposure. For our preliminary analyses, we calculated mortality rates in the following ways: 1) by five-year age group and wealth quintile, stratified by sex and region; 2) by five-year age group and wealth quintile, stratified by sex and survey year; and 3) by survey year and wealth quintile, stratified by sex and region. All analyses were done in R.

Preliminary Findings

Preliminary analyses were conducted on 73 DHS datasets from 35 Sub-Saharan African countries for the years 2000 to 2022. There were 455,559 deaths and 86,737,255 person-years of exposure across the study population. Table 1 summarizes mortality data by sex, wealth index, age group, and region.

When analyzing age-specific mortality rates by wealth index, stratified by sex and region for the whole study period 2000-2022, we found the greatest inequalities in mortality to be in Southern Africa. Figure 1 shows that in Southern Africa, starting from the 20-29 age group, women in the

richest group (group 5) start to have significantly lower mortality than women in the other wealth groups. The same divergence is seen among men beginning in the 30-39 age group. Among both men and women in Southern Africa, the poorest group (group 1) had the second-lowest mortality rate at the oldest ages (40-49 years), after the wealthiest (group 5). Preliminary findings did not suggest any evidence of mortality inequalities across Eastern, Western, or Middle Africa.

Our results of age-specific mortality rates by wealth index, stratified by sex and survey year for all Sub-Saharan Africa (Figure 2) indicate that the greatest inequalities in mortality were in 2000-2004, and that gaps in mortality inequalities have been decreasing. However, results also suggest that inequalities could have increased in the 2020-2022 survey years, especially among women, which include the first surveys conducted after the COVID-19 pandemic. Generally, mortality rates have been decreasing for women and men over time.

Figure 3 illustrates mortality rates for the entire adult population, aged 15-49 by wealth index, stratified by sex and region. Although adult mortality rates have been decreasing over time, they have not been doing so equally. These results illustrate the stark geographic inequalities in mortality, with Southern Africa generally experiencing higher mortality than other regions at all time points, and greater mortality inequalities.

Next steps

This study is part of the project, *Harmonised Approach for Measuring Mortality Inequalities among Adults in Low- and Middle-Income Countries (HARMONIA)*. Although the methods employed in this preliminary study are used to calculate official mortality rates in low- and middle-income countries, as well as in other populations with data challenges, there are many limitations. For example, two of the conditions for inclusion in these analyses are that 1) the individual has a sibling; and 2) their sibling is alive. This method also rests on the assumptions that the living sibling, i.e., the survey participant, is accurately able to report the mortality statuses of their siblings, and that they have the same wealth index as the siblings they are reporting on. In the next phase of this project, we plan to apply more sophisticated kinship methods that account for these shortcomings, for example, orphanhood methods and parental methods, that give a more complete and nuanced picture of adult mortality across the wealth gradient in Sub-Saharan Africa.

Table 1: Summary of deaths by characteristic

Total deaths	455,559
Sex	
Female	219,328
Male	236,231
Wealth index	
1 (poorest)	38,065
2	39,809
3	41,037
4	45,489
5 (richest)	47,058
Age group	
15-19	22,368
20-29	70,268
30-39	83,091
40-49	48,583
Region	
Eastern	220,886
Western	127,798
Middle	60,877
Southern	45,998

Figure 1: Age-specific mortality rates by wealth index and age group for survey years 2000-2022, stratified by region and sex, with 95% confidence intervals

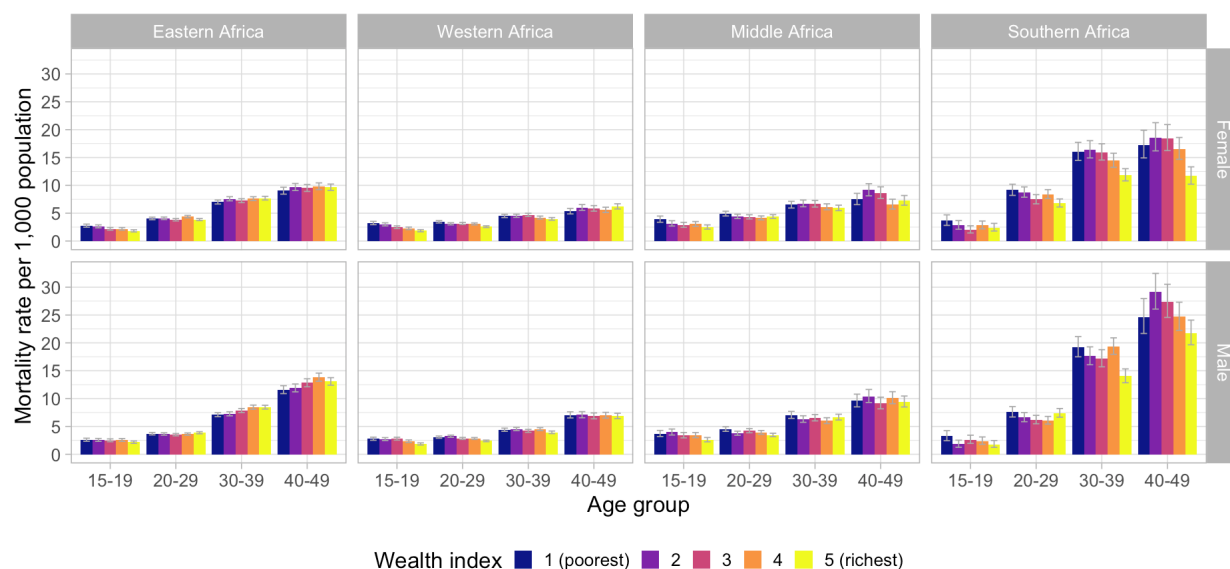


Figure 2: Age-specific mortality rates by wealth index and age group for all Sub-Saharan Africa, stratified by survey year and sex, with 95% confidence intervals



Figure 3: Mortality rates for adults aged 15-49 by wealth index, stratified by region and sex, with 95% confidence intervals



References

- 1 Chetty R, Stepner M, Abraham S, *et al*. The Association Between Income and Life Expectancy in the United States, 2001-2014. *JAMA* 2016; **315**: 1750.
- 2 Kinge JM, Modalsli JH, Øverland S, *et al*. Association of Household Income With Life Expectancy and Cause-Specific Mortality in Norway, 2005-2015. *JAMA* 2019; **321**: 1916.
- 3 McKenzie D. Poverty, Inequality, and International Migration: Insights from 10 Years of Migration and Development Conferences: *Revue d'économie du développement* 2018; **Vol. 25**: 13–28.
- 4 Woodward A, Kawachi I. Why reduce health inequalities? *J Epidemiol Community Health* 2000; **54**: 923–9.

