Using INDEPTHStats to analyse mortality trends in children and young adults in three rural regions of Ghana

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Abstract

Though children, adolescents and young adults aged 1-24 represent about half of the world population, less is known about their health, including their mortality. This study examines trends in mortality of people mortality trends in people aged 1-24 in three rural areas of Ghana (Dodowa, Kintampo and Navrongo). The study relies on data from INDEPTHStats database. Findings from and Poisson's regression models revealed a substantial decline in child mortality (1-4) between 2005 and 2010. By contrast, improvements in mortality in young adults (20-24 years) were much lower. Young children (1-4 years) benefited most from the epidemiological transition and efforts to achieve the Millennium Development Goal 4, where adolescent might face HIV/AIDS and injury challenges.

Introduction

Progress in under-five mortality has increased population sizes in later childhood and adolescence. However, though children and young aged 1-24 years account for about half of the world's population, less is known about their health, including mortality. Number of scholars assumed that later childhood and adolescence are the healthiest time. Furthermore, available data from cross-sectional surveys are limited to under-five mortality. Typical problem with survey data includes the completeness with which births and deaths are reported and recorded. The most common problems are misreporting of age at death, misreporting of dates of birth, and event underreporting (of both the birth and death). Furthermore, data from other sources such as health information systems are aggregated with generally three major age groups: 0–14, 15–44, and 45 years and above.

However, the evidence showed that over the past 50 years, the changes in socioeconomic and political landscape have adversely affected patterns of health and disease in adolescents and young adults [6]. In 2007, the World Bank reported that adolescent health has substantial long-term effects on development and deployment of social and economic capital. Against this background, this study aims to examine mortality trends in children and young adults in three rural areas of Ghana (Dodowa, Kintampo and Navrongo).

Data and Methods

This study relies on data collected from 2005 to 2010 in three Ghana Health and Demographic Surveillance Systems (HDSSs) (Dodowa, Kintampo and Navrongo) posted on the INDEPTHStats database (http://www.indepth-ishare.org/indepthstats/), launched on 1st July 2013. This database collates yearly health and demographic indicators by INDEPTH member centres. The INDEPTHStats population and mortality database was accessed on 2nd July 2013 and data aggregated in the age groups of 1–4, 5–9, 10–14, 15–19, and 20–24 years, stratified by sex was extracted. Data from Health and Demographic Surveillance Systems (HDSSs) of INDEPTH Network offer an opportunity to analyze trends in age specific mortality in Low-and-Middle-Countries (LMICs).

The outcome of interest in this study was age-specific mortality rates (ASMR) defined as the number of deaths in a specific age-group divided by the person-years lived in that age-group, expressed in deaths per 1000 person years. For instance, child mortality ($_4q_1$) is the probability of dying between exact age one and five.

Statistical methods include the trend analysis and the Poisson regression. The trend analysis was carried out at the ecologic level - the unit of analysis is time periods. Plots of mortality rates for each year were produced in order to understand the general shape of the trend. Poisson regression model was used to estimate average annual percent change in age-specific mortality rates.

Sites description

The Dodowa Health and Demographic Surveillance System (DHDSS) operates in the south-eastern part of Ghana. It was established in 2005 by the Dodowa Health Research Centre (DHRC) to have an accurate population base for piloting a community health insurance scheme. As at 2010, the DHDSS had registered 111,976 residents in 22,767 households.

The Kintampo HDSS (http://www.kintampo-hrc.org/) area (constituting of Kintampo North Municipality and Kintampo south district) has a surface area of 7,162 square kilometers. The Surveillance System was established in 2003 to determine and track the longitudinal dynamics of the resident population. As of July 2006, the resident district population was 139,510, consisting of 24,671 households.

The Navrongo health and demographic surveillance system (NHDSS) (http://navrongo-hrc.org/) was established in 1992 by the Navrongo health research centre (NHRC). It is located in the Kassena-Nankana districts of northern Ghana. The total population currently under surveillance is 152,000 residing in 32,000 households.

Results

Analysis of all-cause mortality age specific mortality in 2005-2010 revealed highest mortality among children aged 1–4 years (Figures 1, 2, 3). In the three sites, child mortality was declining over the study period. However, this decrease in child mortality was lowest (2.0%) in Kintampo compared to 14.7% observed in Dodowa and 7.6% in Navrongo. Reductions in child mortality were fastest among females compared to males. Mortality in young people aged 10-14 years in Navrongo increased at an average annual percentage of 4.7% over the period 2005 to 2010. These increases were about 8 times faster in females (10%) than in males (1.3%). Mortality among adolescents aged 15-19 was lower than that among young adults aged 20-24 years in all the three rural areas. On average, the annual percent reduction is fastest among female adolescents in Dodowa (Reduction = 22.2%). On the contrary, mortality among older children aged 10-14 years increased over the period 2005 to 2010 in Navrongo with annualized yearly increase of 4.7%.

Discussion and Conclusion

This study presents a unique overview of mortality trends in children after infancy in three rural areas of Ghana. Overall, mortality declined substantially between 2005 and 2010 in children aged 1-4 years, with annual reduction of between 2.2% and 14.7%. Improvement in early childhood mortality (1-4 years) was lowest in Kintampo, which is consistent with Rajaratnam and colleagues' report of the annual decline in global mortality of 2.2% in children aged 1-4 years between 1970 and 2010. By contrast, improvements in mortality in young adults (20-24 years) were much lower, with annual decline of between 6.3% and 9.7%. The apparent

difference in mortality trends between children and young adults suggests that young children (1-4 years) benefit most from efforts to reach the millennium development goal 4 (MDG4), including progress in child immunization, integrated community-based management of childhood diseases; and from the ongoing epidemiological transition from mortality predominantly caused by communicable diseases to that generally due to non-communicable diseases and injury. Furthermore, adolescents and young adults faced risk of injury-related deaths, HIV/AIDS and maternal mortality for female.

Table 1: Improvement in all-cause mortality (per 1,000 person-years) among children and young adults in three rural areas in Ghana, 2005 - 2010

Age group (years)	2005			2006			2007			2008			2009			2010			Annual % change§		
	Male	Female	Both	Male	Female	Both	Male	Female	Both	Male	Female	Both	Male	Female	Both	Male	Female	Both	Male	Female	Both
Dodowa																					
1-4	-	-	-	7.67	6.92	7.29	4.38	4.43	4.4	3.72	3.88	3.8	5.46	4.22	4.85	3.41	3.59	3.5	**-14.8**	**-14.8**	**-14.7**
5-9	-	-	-	1.92	1.32	1.62	1.79	0.96	1.38	2.1	1.32	1.71	1.47	1.06	1.27	1.48	1.48	1.48	**-7.0**	**3.6**	**-2.6**
10-14	-	-	-	1.54	1.66	1.6	0.8	1.24	1.02	0.45	1.48	0.97	1.03	1.61	1.32	1	1.13	1.07	**-7.7**	**-4.9**	**-5.9**
15-19	-	-	-	1.52	3.97	2.75	1.95	1.58	1.77	2.14	1.28	1.7	1.94	2.03	1.98	1.3	1.41	1.36	**-3.1**	**-22.2**	**-13.2**
20-24	-	-	-	3.89	3.12	3.48	2.4	2.04	2.2	2.09	2.46	2.29	2.48	1.42	1.91	1.18	3.38	2.36	**-22.6**	**0.7**	**-9.7**
Kintampo																					
1-4	8.27	7.14	7.71	8.88	7.86	8.37	6.64	8.9	7.77	5.72	7.2	6.46	6.85	5.56	6.21	8.81	7.57	8.2	**-1.3**	**-2.6**	**-2.2**
5-9	2.85	1.81	2.34	2.02	2.85	2.43	2.98	2.43	2.7	1.7	1.81	1.75	1.81	1.51	1.66	2.64	2.02	2.33	**-3.6**	**-5.1**	**-4.3**
10-14	2.31	1.65	1.99	2.17	1.57	1.88	2.53	2.59	2.56	1.65	1.54	1.59	1.47	0.91	1.2	2.03	1.51	1.77	**-6.1**	**-6.9**	**-6.5**
15-19	2.38	2.02	2.21	1.98	1.62	1.81	2.43	1.09	1.81	3.34	1.62	2.54	1.75	2.41	2.06	1.84	1.24	1.56	**-3.4**	**-1.6**	**-2.7**
20-24	4.59	4.2	4.38	3.38	3.68	3.54	2.6	2.65	2.63	4.43	3.2	3.79	2.19	3.3	2.76	3.76	2.44	3.09	**-4.4**	**-8.3**	**-6.3**
Navrongo																					
1-4	11.8	11.31	11.55	11.15	10.79	10.97	9.82	8.92	9.38	8.04	7.5	7.77	8.31	9.18	8.74	10.44	5.87	8.18	**-4.9**	**-10.8**	**-7.6**
5-9	3.11	2.75	2.93	1.78	2.52	2.14	2.83	1.87	2.36	1.85	0.98	1.43	2.58	2.06	2.33	2.77	1.95	2.37	**-0.2**	**-8.9**	**-3.9**
10-14	1.55	0.9	1.24	2.16	1.13	1.67	1.77	1.78	1.77	2.64	1.12	1.9	1.47	1.9	1.68	1.96	1.55	1.76	**1.3**	**10**	**4.7**
15-19	2.13	1.02	1.61	1.56	1.37	1.47	1.41	0.97	1.2	1.85	0.97	1.43	1.42	1.43	1.42	0.97	1.29	1.13	**-10.7**	**3.8**	**-4.8**
20-24	1.88	3.6	2.72	1.42	2	1.7	2.83	2.44	2.65	1.78	1.91	1.84	1.65	1.5	1.58	2.15	1.86	2.01	**1.3**	**-13.5**	**-6.3**

§ Estimated using Poisson regression, negative values represent a reduction and positive represent an increase

Figure 1 -Trends in all-cause mortality among children and young adults in three rural areas in Ghana