Diarrhoea, acute respiratory infection, and fever among children in the Democratic Republic of Congo

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ABSTRACT

Several years of war have created a humanitarian crisis in the Democratic Republic of Congo (DRC) with extensive disruption of civil society, the economy and provision of basic services including health care. Health policy and planning in the DRC are constrained by a lack of reliable and accessible population data. Thus there is currently a need for primary research to guide programme and policy development for reconstruction and to measure attainment of the Millennium Development Goals (MDGs). This study uses the 2001 Multiple Indicators Cluster Survey to disentangle children's health inequalities by mapping the impact of geographical distribution of childhood morbidity stemming from diarrhoea, acute respiratory infection, and fever. We observe a low prevalence of childhood diarrhoea, acute respiratory infection and fever in the western provinces (Kinshasa, Bas-Congo and Bandundu), and a relatively higher prevalence in the south-eastern provinces (Sud-Kivu and Katanga). However, each disease has a distinct geographical pattern of variation. Among covariate factors, child age had a significant association with disease prevalence. The risk of the three ailments increased in the first 8–10 months after birth, with a gradual improvement thereafter. The effects of socioeconomic factors vary according to the disease. Accounting for the effects of the geographical location, our analysis was able to explain a significant share of the pronounced residual geographical effects. Using large scale household survey data, we have produced for the first time spatial residual maps in the DRC and in so doing we have undertaken a comprehensive analysis of geographical variation at province level of childhood diarrhoea, acute respiratory infection, and fever prevalence. Understanding these complex relationships through disease prevalence maps can facilitate design of targeted intervention programs for reconstruction and achievement of the MDGs.

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Introduction

Several years of war have created a humanitarian crisis in the Democratic Republic of Congo (DRC) with extensive disruption of civil society, the economy, and provision of basic services with devastating impacts on health systems. The International Rescue Committee (IRC) estimates up to 4.7 million people died as a result of war from 1998 to 2002 (Roberts et al., 2002). At the time of writing the basis for political stabilisation was in place but major efforts will be required nationally and internationally for reconstruction. These challenges are faced against a background of heavy global disease burden, especially of HIV/AIDS, tuberculosis, diarrhoea, acute respiratory infection, and malaria.

Worldwide, one in 12 children born in 2001 died before their fifth birthday from eminently preventable and treatable conditions, such as pneumonia, diarrhoea and malaria. Acute respiratory infection (ARI) and diarrhoeal diseases are leading causes of the global burden of disease and account for more than 7% (ARI) and 3.7% (diarrhoea) of the global burden of disease and mortality, mostly in developing countries (Lopez, Mathers, Ezzati, Jamison, & Murray, 2006; Parashar, Bresee, & Glass, 2003; Ezzati & Kammen, 2001). Globally as more than 2 billion people continue to rely on biomass (wood, charcoal, agriculture residues, and dung) as the primary source of domestic energy, exposure to indoor air pollution, especially to particulate matter, from the combustion of bio-fuels will continue to be implicated as a causal agent of respiratory diseases in developing countries (Parashar et al., 2003; Ezzati & Kammen, 2001; Ezzati et al., 2002). The reduction of the global burden of disease attributable to these ailments requires targeted intervention.

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In the DRC, health policy and planning are constrained by lack of reliable and accessible population data. For example, UNICEF estimates the under-five mortality rate to be 205 per 1000 live births for both 1990 and 2005 and makes estimates of the prevalence of pneumonia (11%), diarrhoea (17%) and malaria (45%) based on available data (UNICEF, 2008 Smith et al., 2000; Snyder and Merson, 1982; UNICEF, 2000). These numbers are likely to be gross under-estimates based on regional trends. We should bear in mind that there are differences between urban and rural areas, and between the regions variably affected by the conflict.

Population level research on the public health aspects of childhood diseases is an important component of programmes for disease prevention and management. Apart from the significant loss of life and injuries in DRC due to conflicts and related diseases, war has become a major element in impoverishment, undermining human security and sustainable development. The impossibility of achieving the United Nations Millennium Development Goals has been evident over almost a decade in this conflict-affected country. However, there is tremendous need for primary research-based information for programme and policy development during the reconstruction phase.

A diverse set of challenges arise from this context, including: (1) social factors (the large numbers of displaced persons and migrants, high adult HIV prevalence, malaria and co-morbidities); (2) health systems (lack of basic health care facilities, unhygienic conditions and absence of basic medications); (3) political issues (the presence of armed forces and groups). Systematic approaches to child health improvements have been impossible to sustain under these conditions.

National reconstruction requires the building and strengthening of capacity within academic and civil institutions. A primary requirement for effective governance is the availability of high quality evidence-based research, without which policy and planning of services can only be based on conjecture. A stable infrastructure of data collection, analysis, synthesis and dissemination is required to provide a flow of such policy-relevant population data.

The Multiple Indicators Cluster Surveys (MICS2) (UNICEF, 2001) are a well established source of reliable population level data with a substantial focus on child health. We utilised these datasets to examine, for the first time in DRC, to our knowledge, the geographical distribution of diarrhoea, acute respiratory infection and fever.

Background on health and social conditions in DRC

The DRC is emerging from a period of violent internal conflict characterised by the active engagement of neighbouring countries, mismanagement and corruption. The entire state structure, health sector, social fabric and economy have been left in a state of disarray and degradation. Sparsely populated (estimated population in 2007 was 66 million) in relation to its area (2,344,858 km^2), the DRC is home to a vast potential of natural resources and mineral wealth. Nevertheless, the DRC is one of the poorest countries in the world, with per capita annual income of about $300 in 2007 (US State Department, 2008).

UNICEF (2008) highlights a series of multifaceted challenges arising from this context: (1) low vaccination rates for the most common childhood diseases (approximately 65% coverage); (2) less than half the population has access to a safe source of clean drinking water and less than one-third has access to adequate sanitation facilities; (3) The adult HIV/AIDS prevalence rate was 4.2% in 2005, a significant increase from 2004. The rate is believed to be significantly higher in areas of recent armed conflict, where sexual abuse and violence against women is widespread; (4) there are over 4 million orphaned children in the country; (5) school enrolment rates are declining. More than 4.4 million children (nearly half the school-age population) are not in school. This number includes 2.5 million girls and 400,000 displaced children; and (6) widespread child labour. More than a quarter of children aged 5–14 are working (UNICEF, 2008).

In the 15 year span from 1990 to 2005, the country has experienced stagnating under-five and infant mortality rates. While under-five mortality is estimated at 205 deaths per 1000, infant deaths, which account for a substantial amount of these, are estimated at 129 deaths per 1000 live birth. Under-five deaths are most often due to neonatal causes. Pneumonia causes 23% of under-five deaths, followed by diarrhoea and malaria. Also, 12% of infants have low birth weight and almost 34% of children under the age of 5 years are underweight (UNICEF, 2008).

The rate of maternal mortality in DRC is also very high at 990 per 100,000 live births. Despite this elevated number, according to the WHO 61% of pregnant women in DRC make antenatal care visits at least once while 47% make 4 visits. Further, 61% of births are attended by skilled birth personnel (WHO, 2008). The Ministry of Planning in DRC has recently completed a Demographic and Health Survey with the technical assistance of MEASURE DHS which will provide information regarding recent demographic, social and health trends in the DRC.

Data and methods

Data

Data were collected from the 2001 DRC MICS2, a nationally representative sample of women and their children. A total of 12,407 women (response rate of 95%) were interviewed regarding various health issues including the recent health history of the women's siblings (UNICEF, 2001). In this analysis we report on the recent episodes of diarrhoea, fever and acute respiratory infection of each child under 5 years of age living in the sampled household. The diagnoses for the three illnesses were based on the self-reported recall by mothers of symptoms that had occurred within 2 weeks prior to the survey date. Illnesses were classified into diarrhoea, fever (define as fever without any other symptoms) and acute respiratory infection (defined as fever with cough or coryza). All information was collected from female interviewees aged 15–49 years. In each survey, the health status of each interviewee's 'young' children (i.e. children aged ≤59 months) was assessed by asking the interviewee: "Has your child had diarrhoea in the last 2 weeks"," Has your child had fever in the last 2 weeks", and" Has your child had fever with cough in the last 2 weeks". The self-reported sickness status (0/1) of each child for each disease was the outcome of interest. Overall, data on 9454 children were collected in the 2001 survey. In the final regression models, the following predictors were examined: child's gender, child's nutritional status, place of residence, asset index, household size, maternal education, maternal body mass index (BMI), and province of residence. In order to facilitate the comparison with previous studies, variables were categorised as follows. Household size was re-categorised as 'small' (if there were fewer than six members), 'medium' (if there were 6–10 members) or 'large' (if there were at least 11 members). Maternal education was categorised as "no education", "primary education", and" secondary or higher education". As a measure of child's nutritional status height-for-age (stunting) was re-categorised as a binary variable (yes/no) defined as being two standard