Family structure, rural livelihoods and child health inequality in Tanzania

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Extended abstract

Background:
Recent decades have witnessed substantial improvements in child health. Global child mortality has reduced by nearly 50% in the last 20 years (IGME 2012) and the prevalence of moderate-to-severe stunting (i.e. chronic malnutrition) declined from 47% to 30% between 1985 and 2011 throughout the developing world (Stevens et al. 2012). These achievements belie persistent and dramatic international inequalities, masking the stagnation of progress in sub-Saharan Africa. Stevens et al (2012), for example, report that while child health has been steadily improving in most world regions since the mid 1980s, many countries in sub-Saharan Africa experienced a period of increasing malnutrition until the late 1990s, followed by only modest gains in the last decade.

These international inequalities are well documented by population scientists. There is also wide recognition that children growing up in rural settings within developing countries are most likely to experience poor health, a pattern generally attributed to socioeconomic disadvantage, poor health infrastructure and, in some studies, the prevalence of certain reproductive norms, such as early maternal age at childbirth and short birth spacing (Fox & Heaton 2012). In contrast, current knowledge of the factors responsible for inequalities in child health within developing rural communities that share similar levels of service provision remains surprisingly limited. Yet improved understanding of which types of household and which children within households, are most likely to thrive against the odds in low-income rural populations has clear potential to improve the design of public health policy and development initiatives. In this study, we explore the determinants of child health inequality across a large ethnically diverse sample of 56 villages in northern Tanzania. Building on theory and previous research by anthropological and evolutionary demographers, we concentrate on quantifying the role of family structure (i.e. family size, polygynous marriage) and alternative rural livelihoods (i.e. farming, pastoralism, wage-labour) in determining child nutritional status.

Family structure, rural livelihoods and child health
Running parallel to the main body of research in population health science, anthropological and evolutionary demographers have made important contributions to our understanding of the impact of family structure on child health through detailed and culturally informed studies of many traditional and developing populations. Reviews of this literature emphasize high levels of contextual variability in the effect of family structure on child health, strongly suggesting that effects documented in one context should not be extrapolated to another (Lawson & Mace 2011; Sear & Mace 2008; Omariba & Boyle 2006). For example, fertility limitation has been argued to benefit children to a lesser degree in
contexts where parents face high extrinsic risks to child health, and so have limited ability to boost chances of offspring success through investing in higher levels of care per child (Lawson et al. 2012). Many studies have also stressed that while polygynous marriage often presents a risk to child health, mothers marrying polygynously may achieve greater resource access compared to those married monogamously to a poorer husband (Gibson & Mace 2007). From an adaptive perspective, this contextual variation is to be expected since behavioural variation in family formation behaviour is seen ultimately to arise from variation in its local effects on offspring and adult wellbeing. However, attempts to quantify the reasons for this variation have so far been typically crude, often relying on comparisons across studies using distinct methodologies (Lawson & Mace 2011; Sear and Mace 2008) or comparing country-level estimates calculated from national surveys (Lawson et al. 2012; Desai 1995; Omariba and Boyle 2006).

A second strand of research in anthropological demography has concerned the impact rural livelihoods on inequalities in adult and child health (Sellen & Mace 1999; Borgerhoff Mulder et al. 2009a; Randall 2009). Of particular relevance to the present study, several studies have considered the health inequalities between pastoralists and agriculturalists. In a recent review of this literature, Randall (2009) rejects the common belief that African pastoralist societies can be characterised by a particular demographic profile, highlighting wide variance in levels of child mortality between pastoralist groups so far studied and common sampling problems. More research is clearly needed, but many sources of secondary demographic data (e.g. the Demographic and Health Surveys) do not provide sufficient data on livelihood and ethnicity to consider inequalities in child health associated with pastoralism. Understanding how alternative livelihoods may establish or associate with distinct profiles of health risk, and the socioeconomic and demographic factors driving observed differences, has important implications as rural livelihoods are shifting in many populations in response to increasing pressures of climate change, conflict and food insecurity.

**Data & Preliminary Results**

Data come from the Whole Village Project (WVP), a project partnership between the NGO ‘Savannas Forever Tanzania’, and the University of Minnesota. The WVP has so far collected detailed quantitative and qualitative data from a total sample of 56 villages in Northern Tanzania between 2010 and 2011 (Figure 1; Borgerhoff Mulder et al 2009b). Within each village 60-70 households were randomly selected for interview, leading to a total sample of 3500+ households. Interviews included a household roster and a demographic survey identifying all household members and their interrelationships. Further survey units collected information on household assets, economic activities, education, agricultural and livestock practices (including information on productivity and losses), household nutrition and food insecurity, and sources of drinking water. Finally an ‘under-five’ module was conducted, consisting of anthropometric measurements of all children under 5yrs in the surveyed
households. Descriptive statistics demonstrate that the WVP data represent an importance source of data for Tanzania, providing anthropometric measures on more children across the seven study regions than collected in the 2010 Tanzanian Demographic and Health Survey, with notable oversampling in the Maasai dominated region of Arusha (Table 1).

Preliminary analyses indicate that out of 3441 children, WHO 2006 growth standards (de Onis et al. 2012) classify 41% as stunted, 16% as underweight and 4% as wasted. These values correspond closely to the national values calculated for the 2010 Tanzania DHS (42%, 16% and 5% respectively). Table 1 also illustrates notable variation in child nutritional status across regions. Wide variation in mean nutritional status between villages is also found (not shown). Massai and Sukuma are the dominant tribal affiliations, each accounting for around 20% of the total sample. Around 25% of household head’s are polygynously married, with an average 5.8 members per household. Around 75% of households rely primarily on agriculture, 11% on livestock, and the remaining households rely on wage-labour or other sources. 25% of households report facing moderate to severe hunger and many respondents report unexpected crop/livestock failure in the year prior to survey.

Figure 2 shows the observed inequalities in child height-for-age (HAZ scores) associated with household head marital status and primary occupation, unadjusted for other child, household or village-level covariates. These data indicate that children who grow up in polygynous households and households that rely primarily on livestock are of poorer health. Preliminary analysis also shows no overall effect of the number of children per adult (i.e. child dependency ratios) on child health measures in the sample (not shown). Presented analyses at IUSSP will use a multilevel modelling strategy to determine the relative important of these factors amid a broader set of socioeconomic and demographic determinants. Furthermore interactions between family structure and household characteristics will be considered to quantify contextual variation the associations between family structure, rural livelihoods and child health. Findings will be discussed with regard to the cultural and socioeconomic factors determining observed patterns, and potential implications for the design of targeted development initiatives focusing on family health.

References:

Tables and Figures

Table 1: Child nutritional status by region in the study sample (WVP) and the 2010 Tanzanian DHS.

<table>
<thead>
<tr>
<th>REGION</th>
<th>Sampling</th>
<th>Height for Age (HAZ) % stunted</th>
<th>Weight for Height (WHZ) % wasted</th>
<th>Weight for Age (WAZ) % underweight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WVP (n 3441)</td>
<td>DHS (n 3150)</td>
<td>WVP</td>
<td>DHS</td>
</tr>
<tr>
<td>Arusha (19 villages)</td>
<td>1080</td>
<td>261</td>
<td>47%</td>
<td>44%</td>
</tr>
<tr>
<td>Mara (3 villages)</td>
<td>195</td>
<td>383</td>
<td>31%</td>
<td>31%</td>
</tr>
<tr>
<td>Manyara (11 villages)</td>
<td>584</td>
<td>189</td>
<td>46%</td>
<td>46%</td>
</tr>
<tr>
<td>Singida (5 villages)</td>
<td>270</td>
<td>290</td>
<td>34%</td>
<td>39%</td>
</tr>
<tr>
<td>Dodoma (7 villages)</td>
<td>369</td>
<td>469</td>
<td>49%</td>
<td>56%</td>
</tr>
<tr>
<td>Mwanza (3 villages)</td>
<td>242</td>
<td>780</td>
<td>34%</td>
<td>39%</td>
</tr>
<tr>
<td>Shinyanga (8 villages)</td>
<td>671</td>
<td>778</td>
<td>32%</td>
<td>43%</td>
</tr>
</tbody>
</table>

Figure 1: Location of the 56 study villages in Tanzania

Figure 2: Preliminary analyses confirm disadvantages associated with polygyny and pastoralism.