Democracy and growth in divided societies: A health-inequality trap?

Timothy Powell-Jackson a, Sanjay Basu b, Dina Balabanova a, Martin McKee c, David Stuckler a, d, * 

a London School of Hygiene & Tropical Medicine, Department of Global Health and Population, University of Cambridge, Cambridge, UK
b University of California San Francisco, Department of Medicine & San Francisco General Hospital, Division of General Internal Medicine, USA
c London School of Hygiene & Tropical Medicine & European Observatory on Health Systems and Policies, UK
d Department of Global Health and Population, University of Cambridge, Cambridge, UK

A R T I C L E   I N F O

Article history:
Available online 17 May 2011

Keywords:
Political economy
Democracy
Inequality
Fractionalisation
MDGs
Maternal mortality
Child mortality

A B S T R A C T

Despite a tremendous increase in financial resources, many countries are not on track to achieve the child and maternal mortality targets set out in the Millennium Development Goals 4 and 5. It is commonly argued that two main social factors – improved democratic governance and aggregate income – will ultimately lead to progress in reducing child and maternal mortality. However, these two factors alone may be insufficient to achieve progress in settings where there is a high level of social division. To test the effects of growth and democratisation, and their interaction with social inequalities, we regressed data on child and maternal mortality ratios for 192 countries against internationally used indexes of income, democracy, and population inequality (including income, ethnic, linguistic, and religious divisions) covering the period 1970–2007. We found that a higher degree of social division, especially ethnic and linguistic fractionalisation, was significantly associated with greater child and maternal mortality rates. We further found that, even in democratic states, greater social division was associated with lower overall population access to healthcare and lesser expansion of health system infrastructure. Perversely, while greater democratisation and aggregate income were associated with reduced maternal and child mortality overall, in regions with high levels of ethnic fragmentation the health benefits of democratisation and rising income were undermined and, at high levels of inequality reversed, so that democracy and growth were adversely related to child and maternal mortality. These findings are consistent with literature suggesting that high degrees of social division in the context of democratisation can strengthen the power of dominant elite and ethnic groups in political decision-making, resulting in health and welfare policies that deprive minority groups (a health-inequality trap). Thus, we show that improving economic growth and democratic governance are insufficient to achieve child and maternal health targets in communities with high levels of persistent social inequality. To reduce child and maternal mortality in highly divided societies, it will be necessary not only to increase growth and promote democratic elections, but also empower disenfranchised communities.

© 2011 Elsevier Ltd. All rights reserved.

Introduction

In 2001 the member states of the United Nations agreed a series of Millennium Development Goals (MDGs) to be achieved by 2015. Among them, three related specifically to health. These are to reduce child mortality rates by two-thirds (MDG 4), maternal mortality ratios by three-quarters (MDG 5), and to halt and reverse the spread of HIV, tuberculosis, and malaria by 2015 (MDG 6). Despite some signs of reduced maternal (Hogan, Foreman, & Naghavi, 2010) and child mortality (Rajaratnam, Marcus, & Flaxman, 2010), progress towards these health MDGs has in many respects been disappointing (WHO, 2010). While most of the world’s regions have made notable progress in both child and maternal mortality rate, regional averages conceal marked variation among individual countries, some of which have experienced substantial gains while others have lagged behind or worsened. For example, a recent assessment of progress towards the MDGs in Africa reported large reductions between 1990 and 2005 in under-5 mortality in, among others, Eritrea, Ethiopia, Madagascar, Malawi, Niger and Tanzania, while the situation worsened considerably in Botswana, Zimbabwe, Swaziland, Cote d’Ivoire, and Kenya (UN, 2008). An understanding of these differences is aided by the now extensive literature on the determinants of adverse health
outcomes, in particular the importance of specific health interventions such as access to skilled birth attendants, as well as underlying socioeconomic factors, such as poverty and female literacy (Alvarez, Gil, Hernandez, & Gil, 2009; Rajaratnam et al., 2010; Schell, Reilly, Rosling, Peterson, & Ekstrom, 2007). More recently, economic consequences of chronic disease and HIV, with the resultant impoverishment of families, have been implicated in slowing progress towards the MDGs (Stuckler, Basu, & McKee, 2010a). In some countries, the effects of natural disasters, such as tsunamis or earthquakes, or human-produced crises, such as food price bubbles, financial crisis, or wars, have affected child and maternal mortality rates significantly (EU, 2009; Gakusi & Garenne, 2007; Lock, Stuckler, Charlesworth, & McKee, 2009).

There is a growing recognition of the importance of looking at what have been termed the “causes of the causes” (Marmot, Friel, Bell, Howelng, & Taylor, 2008), by which is meant the underlying social and economic determinants of health, such as income, education, employment, housing, and social inclusion (Stuckler, Basu, & McKee, 2010c). This has focused on the role of economic development and income inequality; richer, more equal countries have generally achieved better overall health outcomes (Frey & Field, 2000; Houweling & Kunst, 2010; Pritchett & Summers, 2000). This has extended the work of Wilkinson and Pickett in the public health literature, which mainly focuses on income inequality as one important and intermediary component of the processes of overall social stratification and division (Wilkinson, 1992; Wilkinson & Pickett, 2006).

In circumstances of high fractionalisation, elites may be less willing to invest in public goods that benefit the entire population. Ethnically diverse countries have achieved lower rates of economic growth and worse educational outcomes as well as reduced investment in infrastructure when compared with countries that are ethnically homogenous (Easterly & Levine, 1997). Studies in the public sector further corroborated these findings with regard to health outcomes (Alesina & Spolaore, 2003; La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1999), although additional determinants also emerged, including a country’s colonial history, legal infrastructure, and political persuasion (Lena & London, 1993). Public transfers are lower in more fractionalised countries (Alesina, Glaeser, & Sacerdote, 2001). Communities that are more divided are also less likely to produce public goods (Alesina, Baqir, & Easterly, 1999; Miguel & Gugerty, 2005), while, within the USA, states that are more racially divided have less generous welfare regimes (Alesina & Glaeser, 2004). Individuals living in more racially divided communities appear less likely to support redistributive policies, (Luttmer, 2001) although it is necessary to look separately at ethnic, religious and linguistic fractionalisation as they are poorly correlated to one another and show different associations with social outcomes (Alesina & La Ferrara, 2005).

Fractionalisation has been observed to exert the greatest adverse effect on economic growth where regimes are non-democratic (Collier, 2000), although this effect is mitigated by the existence of strong legal and political institutions (Easterly, 2001). Therefore, it could be argued that improved economic growth and democracy could overcome any negative effects of ethnic fractionalisation on healthcare distribution or the distribution of capital for expenses related to child and maternal mortality.

For these reasons, it remains controversial whether development agencies should push forth with a narrow agenda on democratisation and economic growth, or whether they should recognise explicitly the level of fractionalisation in countries when designing programmes to assist towards the health MDGs. Is promoting economic growth and democratic elections sufficient, or because of social inequalities should preferential treatment be given to those most disadvantaged? There is evidence that one reason why countries fail to improve is the exclusion of the disadvantaged groups (Gwatkin, 2005; Moser, Leon, & Gwatkin, 2005). However, if such fractionalisation does play a role, this may vary according to different levels of economic development and democratisation, or be inconsequential where there is sufficient growth and democracy, as some have argued (Pritchett & Summers, 1996).

In this paper we test the following hypotheses that:

- a) Because fractionalisation can erode state capacity, the benefits of democracy in achieving improved social welfare programs to reduce maternal and child mortality are undermined by
fractionalisation; dominant groups may not promote non-dominant groups of access to care and disease prevention measures even when democratic governance exists. It may also be technically more complex to serve the needs of multiple ethnic groups, which may have very different values and preferences affecting access to care;

b) Because fractionalisation permits the elite to displace funds, the benefits of economic growth to reduce maternal and child mortality are undermined by social fractionalisation. Thus, poverty relief is not sufficient to overcome social inequalities that affect child and maternal mortality outcomes, and preferential options would have to be given to disadvantaged groups (Farmer, 2004).

Data and methods

Regression analysis

Under-5 mortality rates (the probability of dying by age 5 per 1000 live births) and maternal mortality rates (per 100,000 live births) were analysed using data from the Institute of Health Metrics 2009 database for the years 1970–2007 (available years of data). Within-country inequalities in under-5 mortality rates, measured as the difference in mortality of the lowest to highest wealth quintile, were obtained from the World Health Organization Statistical Information System, 2010 edition (housed in their recently renamed Global Health Observatory) (World Health Organization, 2008).

The level of democracy in a country was assessed by the Polity2 democracy score from the Polity IV database (Polity IV database, 2010), which is most widely-accepted and commonly-employed democratisation index in the political science literature (although there are debates about its validity during interregnum periods) (Plumper & Neumayer, 2010). This index scores a country’s democratic system from –10 (least democratic) to 10 (most democratic) based on the competiveness of political participation, constraints on the chief executive and competitiveness of executive recruitment (Polity IV database, 2010). Income was assessed by real Gross Domestic Product per capita (constant 2005 international USD), taken from the Penn World Tables version 6.3 (Heston, Summers, & Aten, 2009).

Income inequality was measured by the GINI coefficient, which ranges from 0 (perfect equality) to 1 (perfect inequality), taken from the World Income Inequality Database 2009 edition. Fractionalisation was measured in terms of ethnicity, language, and religion, reflecting the probability that two randomly selected individuals from a population belong to the same group (Alesina & Spolaore, 2003). Similar to the GINI coefficient, these measures range from 0 (perfect homogeneity) to 1 (complete heterogeneity).

Health system measures (HS) included diphtheria-tetanus-acellular pertussis (DPT3) vaccination rates (Lim, Stein, Charrow, & Murray, 2008), health system spending per capita in constant USD and as a percentage of GDP, and doctors and hospital beds per capita, using the latest available data from the WHO Global Health Observatory 2010 edition.

We first evaluated the longitudinal effect of democracy and income on country health outcomes. Overall variation in cross-national data can be decomposed into two sources: those that occur over time within a country, and those that occur across countries overall. Specifically, we used ‘within-country’ analyses to evaluate longitudinal country relationships over time (‘country-specific’ slopes) and ‘between-country’ analyses to evaluate long-term differences across countries. One advantage of the within-country analysis is that it controls for unobserved country-level factors that are relatively fixed over time, such as environmental risk factors (Jones, 2000). Our basic model was:

$$H_{i,t} = \alpha + \beta SDH_{i,t} + \mu_i + \epsilon_{i,t}$$  

$$H_{i,t} = \alpha + \gamma SDH_{i,t} + \sigma$$

Here $i$ is country and $t$ is year. $H$ is the Millennium Development Goal outcome, which may be under-5 mortality rates or maternal mortality rates, logged to adjust for positive skew; SDH is the social determinant of health being evaluated, either the Polity2 democracy index or per capita income in log form; $\mu_i$ was a set of country fixed effect (or a set of unique indicator variables for $n$–1 countries) (Jones, 2000). $\epsilon$ and $\sigma$ are the error terms from the fixed and between-country effect models, respectively. These iterations of Equation (1) combined for an estimation total of eight statistical models (as summarised in Table 1). In robustness checks, we additionally corrected for urbanization and population size, as well as a series of additional measures of democracy, such as its duration. As a robustness check we also included a series of year indicator variables to account for non-linear time trends which could be unrelated to economic growth and democracy, such as aid commitments in pursuit of the Millennium Development Goals. None of the results was qualitatively changed by the inclusion of year indicator variables.

In order to assess the effect of income inequality and ethnic, linguistic, and religious fractionalisation, we estimated the following set of models, which could account for between-country inequalities:

$$H_{i,t} = \alpha + \gamma INEQUALITY_{i,t} + \beta GDP_{i,t} + \epsilon_{i,t}$$

The effect of fractionalisation was measured in a similar fashion, substituting the fractionalisation variable for INEQUALITY. Then, we assessed whether high levels of inequality or fractionalisation modified the relationship between democracy, income, and health using an interaction term, as follows:

$$H_{i,t} = \alpha + \beta DEM_{i,t} + \gamma INEQUALITY_{i,t} + \sigma GDP_{i,t} \times \epsilon_{i,t}$$

again substituting the fractionalisation variable for INEQUALITY as appropriate.

Table 1

<table>
<thead>
<tr>
<th>Social Dimension of Development</th>
<th>Under-5 Mortality (MDG 4)</th>
<th>Maternal Mortality (MDG 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Within-Country</td>
<td>Between-Country</td>
</tr>
<tr>
<td>Income Per Capita</td>
<td>-0.81 (0.13)</td>
<td>-0.87 (0.041)</td>
</tr>
<tr>
<td>Democracy Index</td>
<td>-0.046 (0.0033)</td>
<td>-0.10 (0.012)</td>
</tr>
</tbody>
</table>

Notes: Results presented from eight separate regression models. Robust standard errors in parentheses clustered by country to reflect non-independence of sampling. Democracy index is the Polity2 Democracy Index. Income per capita is in constant USD for the base year 2000. Full Models are provided in Electronic Appendix 2. All results significant at $p < 0.001$. 

- **Table 1**: Effect of income and democracy on millennium development goals 4 and 5 for child and maternal mortality rates, within- and between-countries, 1970–2007.
Simulation and path analysis

Using the results from the longitudinal modelling of the varying links between mortality and democracy and income distribution variables, as specified in the within-country model of Equation (3), we analysed the consequences for under-5 mortality of a series of alternative development scenarios: high or low social division and high or low levels of democratisation. Our scenarios were based on typical middle income countries (i.e., the mean country income in our sample of $5000 per capita income). To construct these scenarios, we also needed to account for the uncertainties that were inherent in the statistical models. In order to do so, rather than take just one data point and calculate an associated confidence interval, we estimated 1000 beta coefficients from model 3, which were then used to calculate 1000 expected mortality outcomes. Based on these mortality estimates we could estimate the distribution of child mortality outcomes for each of the four possible scenarios (King, Tomz, & Wittenberg, 2000).

As a final analysis, to test plausible mechanisms by which the hypothesised social determinants affected progress towards MDG 4 and 5, we evaluated a series of health system pathways that relate democracy, income, and inequality to child and maternal health outcomes. This was done by re-estimating Equation (3) but using alternative outcomes, including diphtheria immunization rates, public health spending as a percentage of GDP and in per capita terms, and doctors and hospital beds per capita.

Data were analysed using Stata v10.1; scenarios were evaluated using the Stata CLARIFY module. Standard errors were clustered by country to reflect non-independence of sampling and ensure robustness of inference testing to potential heteroskedasticity. Models and codes are available from the authors upon request.

Results

Effects of income and democracy on millennium development goals 4 and 5

Table 1 shows the results of our basic model assessing the relationship between two main social determinants of child and maternal health MDGs: income and democracy. Consistent with previous studies of the impact of poverty and democracy on population health (Besley & Kudamatsu, 2006; Franco, Alvarez-Dardet, & Ruiz, 2004), we found significant and protective associations of greater economic and democratic development with child mortality rates. Each 1% rise in income per capita was associated with a 0.81% reduction in under-5 mortality rates and 0.55% drop in maternal mortality rates. We also found that each increment in the democracy score (on a scale from −10, lowest democracy, to 10, highest democracy) was associated with 4.6% drop in child mortality and a 2.2% drop in maternal mortality. Overall, income and democracy can explain more than four-fifths of between-country inequalities in child and maternal mortality rates (see Electronic Appendices 1 and 2 for model diagnostics and scatter plots).

Effects of social inequality on progress towards millennium development goal 4 and 5

Table 2 compares the effects of inequalities in income, as well as in the ethnic, linguistic, and religious heterogeneity in the population on MDG 4 and 5 outcomes, adjusted for levels of income per capita (see Electronic Appendix 3 for full results). As shown in the table, income inequality had the greatest positive association with child and maternal mortality, followed by ethnic fragmentation. For example, a country with a low level of ethnic fractionalisation such as Cambodia (0.21 fractionalisation) would be estimated to have about a 40% lower child mortality rate than a country with a similar level of economic development but a much higher degree of ethnic fractionalisation such as Angola (0.79 fractionalisation) (the actual difference is about 50% lower). Linguistic fractionalisation also had a significant association with greater child and maternal mortality rates, but religious fractionalisation had no significant effect.

Interaction of fractionalisation with rising income and democracy

Table 3 further presents tests of the interaction of income per capita and democracy with ethnic fractionalisation. As shown in the table, when incomes rise and democratic institutions develop in countries with high degrees of inequality, the child and maternal outcomes are less favourable than in low inequality countries and, in some cases, rising income and democratisation even produces worsening mortality in highly unequal countries. For example, each

### Table 2: Effect of social heterogeneity on millennium development goals 4 and 5 for child and maternal mortality rates, 1970—2007.

<table>
<thead>
<tr>
<th>Dimension (0 – complete homogeneity to 1 – complete heterogeneity)</th>
<th>Under-5 Mortality</th>
<th>Maternal Mortality*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income Inequality</td>
<td>150.6%</td>
<td>243.9%</td>
</tr>
<tr>
<td>Ethic Fractionalisation</td>
<td>70.0%</td>
<td>102.7%</td>
</tr>
<tr>
<td>Linguistic Fractionalisation</td>
<td>43.2%</td>
<td>96.4%</td>
</tr>
<tr>
<td>Religious Fractionalisation</td>
<td>-12.5%</td>
<td>10.2%</td>
</tr>
</tbody>
</table>

Notes: Estimates adjusted for income per capita; * - data are for 1980-2007. All findings are significant at p < 0.001 except for religious fractionalisation which were not significant at p < 0.05. Income inequality based on 128 countries for which data were available from the World Inequality Database 2009 edition. Ethnic, linguistic, and religious inequality based on 166 countries for which data were available.

### Table 3: Interactive effect of ethnic fractionalisation with rising GDP and democratisation on millennium development goals 4 and 5 for child and maternal mortality rates, 1970—2007.

<table>
<thead>
<tr>
<th>GDP Per Capita*</th>
<th>Under-5 Mortality</th>
<th>Maternal Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect a 1% rise with zero inequality</td>
<td>-1.44%</td>
<td>-0.78%</td>
</tr>
<tr>
<td>Modifying effect of complete inequality Democratic**</td>
<td>1.44%</td>
<td>0.57%</td>
</tr>
<tr>
<td>Effect a 1 point increase with zero inequality</td>
<td>-6.71%</td>
<td>-5.96%</td>
</tr>
</tbody>
</table>

*All results are significant at p < 0.05.
**All results are significant at p < 0.01.
0.10 unit higher degree of ethnic fractionalisation reduces the protective effect of a 10% rise in income on maternal mortality rates by 5.74% (95% CI: 0.52%–10.96%).

To illustrate the magnitude of these interactive effects, at the level of ethnic fractionalisation observed in Sweden (about 0.10), a 1% rise in income per capita is estimated to reduce child mortality by 1.30%. However, in a country such as Gambia, with ethnic fractionalisation of about 0.90, each 1% rise in income is associated with only about a 0.14% reduction in child mortality. With regard to democracy, a one point increase in the democracy index in Sweden would correspond to about a 5.25% drop in child mortality, but in Gambia, the benefits would be reversed in a context of ethnic fractionalisation, resulting in a 0.75% increase in maternal mortality.

Robustness check

Before proceeding to evaluate the magnitude and mechanisms of these effects, we performed a series of robustness checks. We included controls for urbanization and population size. None of our results was changed. We removed the controls for country-effects; the effect sizes were increased in magnitude. We also added a set of year effects (which could adjust for geo-spatial correlations and yearly advances distributed across all countries, such as vaccines or technological development). Electronic Appendix 5 provides a full replication of results using these additional controls. The relationship of economic development to mortality was attenuated when adding 37 additional year fixed effects (potentially over adjusting). Nonetheless, in proceeding, we continue with this more conservative model.

Simulation of alternative development scenarios

To estimate the magnitude of the combined effects of these three major social determinants of the child survival MDG, we simulated four scenarios for a middle income country of about $5000 per capita (close to the sample mean).

1. High fragmentation (75th quartile)/Low democracy (25th quartile)
2. High fragmentation (75th quartile)/High democracy (75th quartile)
3. Low fragmentation (25th quartile)/Low democracy (25th quartile)
4. Low fragmentation (25th quartile)/High democracy (75th quartile)

Fig. 1 presents the results of these scenarios. As shown in the figure, scenario 1 was the best, estimated to have about 45.4 deaths among children under-5 per 1,000 live births (95% CI: 44.8–46.0), closely followed by scenario 4, which was estimated to have about 46.7 deaths per 1,000 live births (95% CI: 46.1–47.4). Scenario 3 was next (53.0 deaths per 1,000 live births, 95% CI: 52.2–53.9), followed

Table 4

<table>
<thead>
<tr>
<th>Covariate</th>
<th>DPT Immunization Rate</th>
<th>Public Health Spending as Percentage of GDP</th>
<th>Health Spending per capita</th>
<th>Doctors per capita</th>
<th>Hospital Beds per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income per capita</td>
<td>0.075***</td>
<td>0.42***</td>
<td>288.9***</td>
<td>5.03***</td>
<td>9.56***</td>
</tr>
<tr>
<td></td>
<td>(0.0099)</td>
<td>(0.16)</td>
<td>(34.9)</td>
<td>(0.86)</td>
<td>(1.56)</td>
</tr>
<tr>
<td>Democracy index</td>
<td>–0.00044</td>
<td>0.12***</td>
<td>18.1***</td>
<td>0.060</td>
<td>0.071</td>
</tr>
<tr>
<td></td>
<td>(0.0017)</td>
<td>(0.023)</td>
<td>(4.20)</td>
<td>(0.17)</td>
<td>(0.37)</td>
</tr>
<tr>
<td>Ethnic fractionalisation</td>
<td>–0.18**</td>
<td>–1.40**</td>
<td>–193.4</td>
<td>–5.02</td>
<td>–16.9**</td>
</tr>
<tr>
<td></td>
<td>(0.055)</td>
<td>(0.71)</td>
<td>(153.2)</td>
<td>(3.28)</td>
<td>(7.93)</td>
</tr>
<tr>
<td>Number of nation-years</td>
<td>2725</td>
<td>1501</td>
<td>1533</td>
<td>133</td>
<td>132</td>
</tr>
<tr>
<td>Number of nations</td>
<td>153</td>
<td>132</td>
<td>138</td>
<td>133</td>
<td>132</td>
</tr>
<tr>
<td>R²</td>
<td>0.387</td>
<td>0.308</td>
<td>0.499</td>
<td>0.697</td>
<td>0.428</td>
</tr>
</tbody>
</table>

Notes: Robust standard errors in parentheses clustered by country to reflect non-independence of sampling. Democracy index is the Polity2 Democracy Index. Income and health spending per capita is in constant USD for the base year 2000.

*p < 0.05; **p < 0.01; ***p < 0.001.
by scenario 2 (55.8 deaths per 1,000 live births, 95% CI: 54.9–56.6). Similar patterns were observed with regard to maternal mortality (see Electronic Appendix 6).

Path analysis

We tested a series of plausible mechanisms for these observed effects. Reduced healthcare access and financing

Table 4 shows the results of a series of models evaluating the effects of ethnic fractionalisation, GDP per capita and democracy on immunization rates (a key indicator of access to an effective healthcare intervention) and healthcare spending (in terms of percentage of GDP spent). We found that higher ethnic fractionalisation was associated with significantly lower population access to DPT3 and reduced health spending as a percentage of GDP. Higher levels of income were significantly associated with increased immunizations and health spending (both per capita and percentage). Democracy, however, was associated with greater health spending as both a percentage of GDP and per capita, but was not associated with DTaP immunization rates.

Reduced health system personnel and infrastructure

We further tested the associations of these social determinants with the number of doctors and hospital beds per capita, common measures of health system personnel and infrastructure. We found that doubling per capita GDP would, on average, increase hospital beds per 10,000 population by 9.6 (p < 0.001); however, a society with complete fractionalisation would offset this gain by reducing doctors per capita by 16.9 per 10,000 (p < 0.05). Higher scores on the democratisation index had no overall effect on these measures, suggesting that democratisation would be insufficient to increase healthcare infrastructure.

Greater inequalities in child survival (within-country)

Lastly, given the evidence that more ethnically fractionalised societies have significantly lower rates of immunization (after controlling for their level of income and democratic development), we tested whether these societies exhibited greater inequalities between the richest and poorest quintiles in child health outcomes. However, our analysis is limited because, even using the latest available WHO data, there are only 58 available data points. Thus, we present a scatter plot of the cross-national correlation (each point represents a different country for the latest available year). As shown in Fig. 2, higher fragmentation correlates with a greater difference between infant mortality rates of the poorest and richest quintile (r = 0.34; p = 0.0090) (with similar results observed for GINI coefficients and linguistic fragmentation).

Conclusions

While there is growing recognition of the importance of social and economic determinants of child and maternal health, the focus has mainly been on increasing income and democracy, even as some authors have argued for the importance of social and demographic causes of ill health. Our findings reveal that societal stratification on ethnic and linguistic lines may undermine the capacity of poverty-reduction or economic development strategies to ultimately yield health benefits in child and maternal mortality. Thus, broad societal conditions that perpetuate inequalities may determine the population's access to economic growth as well as the effectiveness of governance in resolving underlying causes of ill health.

Before interpreting our results further, we note several limitations. First, as with all statistical analyses, there is potential for the associations of democracy, growth, and child and maternal health outcomes to be confounded by unobserved factors. However, our data source.

Unfortunately, there is also a general lack of health system data to evaluate the full effects of political and social determinants on health system strength. However, we were able to draw upon newly available data to assess these social determinants of healthcare access, financing, and infrastructure, identifying highly plausible mechanisms by which underprivileged groups may have reduced access to healthcare coverage and worse health infrastructure.

Third, the data we used to assess ethnic, linguistic, and religious fractionalisation were constant over time. In recent periods, mass migrations or displacements could have lead to changes that were not captured by our measures. In general, however, it has been noted that levels of fractionalisation in the indices used in this study are relatively unchanged over time (Alesina & Spolaore, 2003). However, while this is a strength of these measures, they are limited in that they do not account for the social processes that confer meaning and social values into ethnic categories. These social processes can change rapidly over time, and are potentially
modifiable, so as to mitigate the extent to which language or ethnic differences translate into health and social disadvantage. Future studies should attempt to differentiate the perceived and actual effects of fractionalisation in an effort to understand how to mitigate their adverse effects on public health.

Fourth, although we began to evaluate the determinants of within-country inequalities for many countries, this sub-analysis is limited by high degrees of missing data. However, this is an important first step to move beyond aggregate studies of levels of child and maternal mortality, and studies isolated to individual countries (Ssewanyana & Younger, 2008; Sundewall & Sahlin-Andersson, 2006).

Finally, when interpreting our results, it is unrealistic to expect growth and democracy to have universally positive or negative effects; our study has identified fractionalisation as one key effect modifier, but many others have been identified, such as colonial settlement patterns (Austin, 2010). While some of these factors may not be directly modifiable, as our analysis reveals, they play a crucial interactive role, and directed policy efforts will be needed to counteract their legacies and adverse influences on the development of redistributive and protective welfare systems, including healthcare.

Our findings are consistent with and add to a large body of social science research about the potentially harmful effects of social fractionalisation and inequality. For example, Alesina and colleagues found that ethnic and linguistic fractionalisation, but not religious fractionalisation, reduced economic growth (Alesina & Spolaore, 2003). Analogously, we found that ethnic and linguistic fractionalisation were more important drivers of child mortality than religious fractionalisation. In our sample, we also observed that ethnic fractionalisation and democratisation were negatively correlated with income per capita and democratisation (in our sample, $r_{\text{income}} = -0.38, p < 0.001$ and $r_{\text{democracy}} = -0.28, p < 0.001$, respectively). Our finding that fractionalisation undermines the development of public health systems is also consonant with the work of Wilkinson and colleagues on income inequalities, and further points to broader social division and fragmentation as an equally, if not important, underlying cause of health inequalities (as even after correcting for income inequality, significant effects of ethnic and linguistic fractionalisation persisted).

Importantly, we found that high levels of ethnic fractionalisation could erode, and in some cases reverse, the benefits of democratisation. In countries with high levels of ethnic fractionalisation, the best maternal and child health outcomes were seen where the level of democracy was low, whereas in countries low levels of fractionalisation a high democracy score was found to lead to the best child health outcomes. Together, these results suggest that democratisation is no panacea for achieving the MDGs and, in the context of high social inequality or fractionalisation, could exacerbate risks to poor maternal and child health in part by impeding the development of effective public healthcare. Thus, the benefits of contemporary democratisation to health may be greater in a less fractionalised setting like Egypt (0.18) and Tunisia (0.03) versus Syria (0.53).

These findings also provide an alternative explanation for recent epidemiological findings that, in sub-Saharan Africa, progress to the child MDG is slow and reversing in Angola (0.79), Botswana (0.41), Cameroon (0.86), Congo (0.87), Democratic Republic of the Congo (0.87), Kenya (0.86), Lesotho (0.26), Liberia (0.81), Senegal (0.69), Sierra Leone (0.82), Swaziland (0.06), and The Gambia (0.79). As shown in Fig. 2 and Electronic Appendix 1, many of these countries (apart from small labour-exporters with high HIV-prevalence such as Lesotho and Swaziland) have very high rates of ethnic fractionalisation, among the highest in sub-Saharan Africa. Ethnic fractionalisation, as a major social driver of inequality, has been theorised to account for incidence of violent military and ethnic conflicts, corruption and low bureaucratic capacity, failed public sector development and political instability, all of which in turn are underlying societal determinants of poor child health.

Our study reveals a major tension about how to best address the social and economic determinants of health. This study shows the broader social development agenda must look beyond promoting democracy and economic growth to achieve health MDGs and for approaches accounting for socio-political tensions within countries.

What are the potential strategies to address social determinants that go beyond economic and democratic changes? Some authors have argued for a “preferential option” for those most sick, going beyond democratic mechanisms alone. In view of the observation that social inequality is a major impediment of progress towards the child and maternal health MDGs, new strategies will be needed to address them.

Richer societies with moderate fractionalisation, like Canada (0.71) implement a variety of inclusive mechanisms to overcome social inequalities in participation, such as universal healthcare strategies, and politically, through voting drives to facilitate inclusion by providing free transport, food incentives and accompagnateurs to ensure participation. These compensate for inequalities in capabilities to participate, even if their ultimate participation (in this example, a vote) counts equally. There is also evidence from poor countries of how ethnic fractionalisation can be shaped positively by the creation of institutional structures (Posner, 2005) and examples of how politicians have striven to overcome ethnic fragmentation to create a shared national identity. This has been proposed as an explanation for the considerably better performance of Tanzania compared to Kenya (Miguel, 2004), even though both are ethnically highly diverse. Albeit a controversial strategy, the current Rwandan government is working hard to create a common identity among Tutsis and Hutus (Hintjens, 2008).

Another implication of our analysis of health system mechanisms arises from our observation that GDP per capita was positively associated with greater health spending as well as higher health workforce capacity (in terms of numbers of doctors and hospitals per capita) and access to public health services (such as population coverage with DPT3 immunization). We found these public health benefits, however, were significantly counteracted by high levels of ethnic and linguistic fragmentation. Such findings dovetail with research showing that the health benefits of growth are lower in settings of high inequality (Biggs et al., 2010). They are also consistent with research showing that the benefits of growth crucially depend on the extent to which democratic processes exert influence on newly obtained income to allocate resources towards improvement of social welfare (including healthcare) (Stuckler, Basu, & McKee, 2010b).

Even though there is vast documentation pointing to a large number of causes for both the issues studied in this article, child and maternal mortality, the fact is that most social scientists in the last two decades of the twentieth century believed that democracy and economic growth alone would be able to improve the pointers associated with health. However, if we consider the last four decades, we can see that a large number of countries in Latin America, Eastern Europe, Asia and Africa became democracies and many have been growing economically for decades without increasing their level of equity, and with no improvement (and in some cases, even a deterioration) of some health measures (Kim et al., 2000; Klein, 2008). Our research suggests that efforts are need to identify ways to align economic growth and democracy with investments that promote public health and well-being. Unless they are able to do so, there is a risk of a ‘health-inequality’ trap, whereby promoting further growth (including aid) and democracy fails to improve health and, in some cases, could worsen it.
Although these findings can only contribute partially to an understanding of differential progress towards the MDGs, they do make a strong case for much more attention to be paid to the development of systems that can make ethnic fragmentation in a country an advantage rather than a disadvantage. National health systems designed to respond to the needs of diverse ethnic and social groups are likely to lead to better health and help mitigate ingrained societal inequalities. This issue continues to attract major attention in the educational and legal development sectors, but not so far in public health. In understanding the failures to achieve the MDGs, in spite of a massive mobilisation of aid and period of democratisation and growth (Ooms, Stuckler, Basu, & McKee, 2010), attention to the underlying causes of inequity becomes imperative. The post-MDG goals for health and development must begin to address these structural causes of slow progress—taking action on the underlying social determinants of health that necessitate the MDGs in the first place.

Funding
The work of TJP, DB, and MM on this topic was supported by the Rockefeller Foundation as part of the project Good Health at Low Cost.

Role of the funding source
None.

Conflict of interest
None to declare.

Appendix. Supplementary data
Supplementary data associated with this article can be found, in the online version, atdoi:10.1016/j.socscimed.2011.04.013.

References
tics, 12, 225–245.
Jones, A. (2000). Health Economics. In A. Cuyler, & J. P. Newhouse (Eds.), Hand
dbook of health economics (pp. 265–344). Amsterdam; New York; and Oxford: Elsevier Science.

