



The global burden of child burn injuries in light of country level economic development and income inequality

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ARTICLE INFO

Article history:

Received 13 October 2016

Received in revised form 23 February 2017

Accepted 25 February 2017

Available online 02 March 2017

Keywords:

Child
Burn
Mortality
Income inequality

ABSTRACT

Child burn mortality differs widely between regions and is closely related to material deprivation, but reports on their global distribution are few. Investigating their country level distribution in light of economic level and income inequality will help assess the potential for macro-level improvements. We extracted data for child burn mortality from the Global Burden of Disease study 2013 and combined data into 1–14 years to calculate rates at country, region and income levels. We also compiled potential lives saved. Then we examined the relationship between country level gross domestic product per capita from the World Bank and income inequality (Gini Index) from the Standardized World Income Inequality Database and child burn mortality using Spearman coefficient correlations. Worldwide, the burden of child burn deaths is 2.5 per 100,000 across 103 countries with the largest burden in Sub-Saharan Africa (4.5 per 100,000). Thirty-four thousand lives could be saved yearly if all countries in the world had the same rates as the best performing group of high-income countries; the majority in low-income countries. There was a negative graded association between economic level and child burns for all countries aggregated and at regional level, but no consistent pattern existed for income inequality at regional level. The burden of child burn mortality varies by region and income level with prevention efforts needed most urgently in middle-income countries and Sub-Saharan Africa. Investment in safe living conditions and access to medical care are paramount to achieving further reductions in the global burden of preventable child burn deaths.

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1. Introduction

The Millennium Developmental Goals document the remarkable achievements towards a 50% reduction in deaths for under-fives since 1990 (GBD 2013 Mortality and Causes of Death Collaborators, 2015) due to interventions focused on targeting infectious and communicable diseases and improving access to essential child health services. Yet, many countries are now facing the double burden of infectious and non-communicable diseases combined (Global Burden of Disease Study 2013 Collaborators, 2015). Child injuries contribute to a high share of non-communicable diseases in children, but they have received limited attention in spite of their preventability (Byass et al., 2013; Alonge & Hyder, 2014). Injuries as a whole and burns in particular are, in fact, major causes of both death and social inequalities in child health

(Laflamme et al., 2009). Children have an inherently higher risk of sustaining burn injuries due to their physical size and skin sensitivity (Peden et al., 2008) and those living in deprived and densely populated environments have a greater exposure to a range of hazardous products (Peck, 2011; Burrows et al., 2010; Othman & Kendrick, 2010).

Historically, gross domestic product (GDP) and gross national income (GNI) have been used as a summary measure to compare living standards between countries and it is now established that population health is significantly higher and better in richer countries than in poorer ones (Bell et al., 2013; Commission on Social Determinants of Health, 2008). This relationship has also been established in the injury field for children under five (Khan et al., 2015) and in the 1–19 age group globally (Peden et al., 2008). For child burns, 2004 data at the global level showed that mortality was nearly 11 times higher in low-income countries than in high-income countries (Peden et al., 2008).

Another factor of interest when investigating macro-determinants of child health and safety is country level income inequality, which is associated with a range of worse child health outcomes in resource rich and poor nations (Pickett & Wilkinson, 2015a), including injuries (Sengoelge et al., 2014). In the case of burns, it is reasonable to expect

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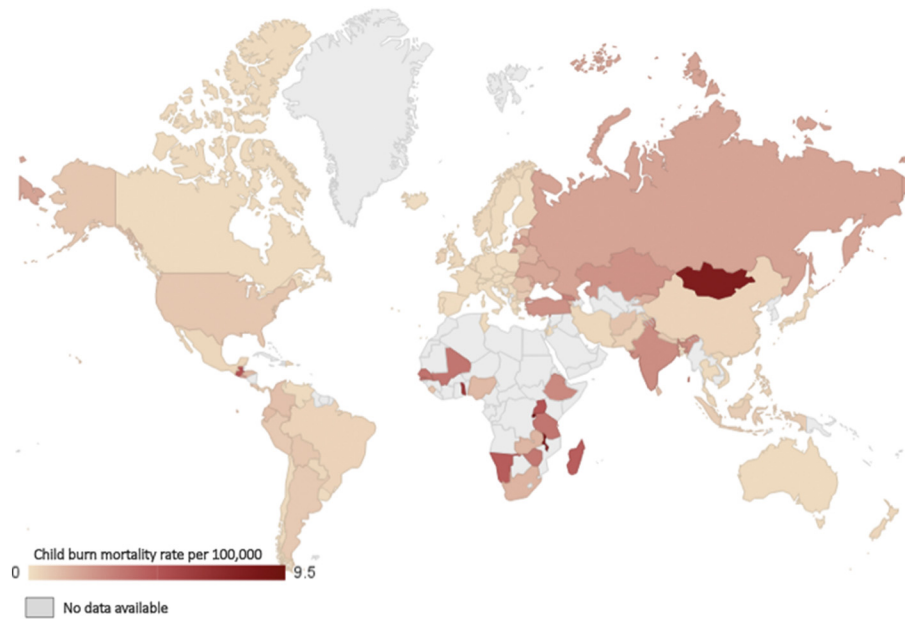


Fig. 1. Geographical distribution of child burn mortality per 100,000 in 2013.

greater mortality where income inequality is higher, as a consequence of lower investments in the provision of minimal living standards and adequate housing conditions for the poorest segments of the population, as well as limited access to universal health care services (Peck, 2011; Bell et al., 2013; Sengoelge et al., 2013). Against this background we provide an update of the geographical distribution of child burn mortality rates worldwide and investigate the association between

country level economic development and income inequality and the mortality burden.

2. Materials and methods

This was a cross-sectional register-based ecological study at country level.

Table 1
Distribution of child burn mortality rate and potential lives saved by region and income level.

Region and income level (N countries)	Deaths 1–14 y	Population 1–14 y	Mortality rate per 100,000 (min–max)	Potential lives saved ^b
All (N = 103) ^a	43,992	1,740,000,000	2.5 (0–9.5)	33,081
High income (N = 39)	1069	176,000,000	0.6 (0–2.1)	Reference
Middle income (N = 49)	13,052	903,000,000	1.4 (0.2–8.1)	7224
Low income (N = 15)	29,871	663,000,000	4.5 (0.1–9.5)	25,857
Sub-Saharan Africa (N = 15)	30,655	685,000,000	4.5 (1.0–9.5)	13,671
High income (N = 0)	–	–	–	–
Middle income (N = 5)	873	34,000,000	2.5 (1.2–4.5)	Reference
Low income (N = 10)	29,782	651,000,000	4.6 (0.9–9.5)	13,671
South Asia (N = 8)	9190	364,000,000	2.5 (0.3–2.6)	–
High income (N = 0)	–	–	–	–
Middle income (N = 5)	9104	353,000,000	2.6 (0.3–2.6)	–
Low income (N = 3)	86	10,300,000	0.8 (0.3–0.9)	–
Latin America and the Caribbean (N = 18)	526	75,700,000	0.6 (0.2–4.9)	297
High income (N = 2)	2	961,989	0.2 (0.2–0.2)	Reference
Middle income (N = 15)	522	73,900,000	0.6 (0.2–4.9)	296
Low income (N = 1)	2.5	855,187	0.3	1
Eastern Europe/Central Asia (N = 18)	721	41,900,000	1.8 (0–3.1)	121
High income (N = 6)	402	21,700,000	1.4 (0–2.1)	Reference
Middle income (N = 12)	319	20,200,000	2.0 (0.2–3.1)	121
Low income (N = 0)	–	–	–	–
Asia East, South East and Pacific (N = 12)	1712	374,000,000	0.5 (0–8.1)	–
High income (N = 4)	15	3,698,756	0.3 (0–0.5)	–
Middle income (N = 7)	1697	369,000,000	0.5 (0.2–0.4)	–
Low income (N = 1)	1	791,218	0.1 (0.3–8.1)	–
Middle East and North Africa (N = 4)	7	3,135,905	0.2 (0.2–0.3)	1
High income (N = 1)	4	1,978,422	0.2	Reference
Middle income (N = 3)	3	1,157,483	0.3 (0.2–0.3)	1
Low income (N = 0)	–	–	–	–
Organization for Economic Cooperation and Development (OECD) (N = 33)	1185	200,900,000	0.6 (0.1–2.5)	356
High income (N = 30)	650	150,000,000	0.4 (0.1–1.2)	Reference
Middle income (N = 3)	535	50,900,000	1.1 (0.2–2.5)	356

^a Certain countries may fall under different categories, so the total n countries may not add up to 103.

^b This was calculated using the lowest child burn mortality rate in each region which showed a graded relationship between income level and burn deaths, therefore the analysis was not conducted in South Asia and Asia East, South East and Pacific.

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