

Socio-economic inequalities in childhood mortality in low- and middle-income countries: a review of the international evidence

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Introduction: In low- and middle-income countries (LMICs), the probability of dying in childhood is strongly related to the socio-economic position of the parents or household in which the child is born. This article reviews the evidence on the magnitude of socio-economic inequalities in childhood mortality within LMICs, discusses possible causes and highlights entry points for intervention.

Sources of data: Evidence on socio-economic inequalities in childhood mortality in LMICs is mostly based on data from household surveys and demographic surveillance sites.

Areas of agreement: Childhood mortality is systematically and considerably higher among lower socio-economic groups within countries. Also most proximate mortality determinants, including malnutrition, exposure to infections, maternal characteristics and health care use show worse levels among more deprived groups. The magnitude of inequality varies between countries and over time, suggesting its amenability to intervention. Reducing inequalities in childhood mortality would substantially contribute to improving population health and reaching the Millennium Development Goals (MDGs).

Areas of controversy: The contribution of specific determinants, including national policies, to childhood mortality inequalities remains uncertain. What works to reduce these inequalities, in particular whether policies should be universal or targeted to the poor, is much debated.

Areas timely for developing research: The increasing political attention for addressing health inequalities needs to be accompanied by more evidence on the contribution of specific determinants, and on ways to ensure that interventions reach lower socio-economic groups.

Keywords: health inequality/child mortality/low- and middle-income countries/socioeconomic factors/review

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Introduction

Each year, over 9 million children die before their fifth birthday.¹ These deaths are not equitably distributed across the world: nearly all occur in low- and middle-income countries (LMICs).² Under-five mortality varies from 262 per 1000 live births in Sierra Leone to 3 per 1000 in Iceland.¹ Childhood mortality has lately received renewed policy and research attention.^{3–7} Millennium Development Goal (MDG) 4, for example, calls for a two-third reduction in under-five mortality between 1990 and 2015.⁸

Also within countries, inequalities in childhood mortality are huge: the probability of dying in childhood is systematically higher for those born in poor households and to less educated mothers.^{9–11} Policy makers are learning that improving average population health is not enough. Monitoring and tackling inequalities in health between socio-economic groups within countries has become an increasingly important objective.^{12–17}

Whereas research on socio-economic health inequalities is a well-established tradition in high-income countries,^{18–21} it is only recently that such inequalities are being studied more systematically in relation to LMICs as well. Increasing data availability for these countries has greatly stimulated research in this field. This article aims to review the evidence on the magnitude and determinants of socio-economic inequalities in childhood mortality in LMICs, and to highlight entry points for intervention.

Sources of data

Measuring inequalities in childhood mortality require information, preferably at the individual level, on births and deaths or survival time, and on socio-economic position, usually of the parents or household. In high-income countries, vital registration systems are a main source of information. In LMICs, however, these systems are notoriously inadequate: almost no country with an under-five mortality rate over 25/1000 has a virtually complete vital registration system.^{22–24} Moreover, births in poorer households and by less educated mothers are least likely to get registered.²⁵ Therefore, household surveys,^{26,27} demographic surveillance sites²⁸ and population censuses²⁹ are main data sources for health inequalities research in these countries.

The Demographic and Health Surveys (DHS) programme is one of the main data sources for such research.²⁶ Set up in the mid-1980s to monitor population, health and nutrition programmes, it currently

includes over 70 LMICs. DHS contains full birth histories, i.e. birth and death information for all children ever born to the respondent, as well as information on socio-economic and geographic stratifiers including household ownership of assets, maternal education and rural/urban residence. It also includes direct mortality determinants, such mother's fertility history, water and sanitation facilities, housing characteristics, health care use and childhood malnutrition. Although information on births and deaths is reported retrospectively by the mother, estimates of levels and trends in under-five mortality are generally accurate.^{30,31}

A brief history of research on health inequalities in LMICs

There is a long-standing tradition of research on socio-economic health inequalities in contemporary high-income countries.^{18–21} Early research in this field was often done by physicians engaged in social movements,^{18,19,32} who focussed on the influence of living conditions on health. Attention for socio-economic health inequalities has ebbed and flowed since the nineteenth century.³² At the start of the twenty-first century, there is overwhelming evidence that there are systematic and substantial health inequalities between social groups, which run across the entire social hierarchy.³³ Research tends to focus on health outcomes in adults and sometimes old age, perhaps because childhood mortality levels are relatively low in these countries.

In contrast, the field of research on socio-economic health inequalities in LMICs is relatively new. Studies usually focus on childhood mortality and its determinants, as this remains an important public health problem in these countries. Moreover, the availability of data on adult mortality remains limited. A landmark article by Caldwell in 1979,³⁴ describing the association between maternal education and childhood mortality in Nigeria, greatly stimulated research into this area. For the next decade and a half, research on social determinants of childhood mortality in LMICs focussed largely on maternal education. These studies were part of a broader debate on what the main determinant of population health improvement in LMICs is: social change (including female education), economic growth or medical technologies.^{35–39} They showed a strong association between maternal education and childhood mortality, both among and within countries,^{40–44} and highlighted some of the pathways through which maternal education influences childhood mortality, with a particular focus on health-related behaviours.^{40–44}

In recent years, research on the social determinants of childhood mortality in LMICs has been brought into the framework of and into the debate on socio-economic inequalities in health.⁴⁵ Relative and

absolute mortality gaps between lower and higher socio-economic groups are now explicitly measured,^{10,46–48} often from the perspective that these inequalities are socially unjust.^{49,50} Concurrently, there has been a shift in attention from maternal education to household economic status as a determinant of childhood mortality.⁴⁷ Studies on possible causes have broadened their scope to include factors such as unequal access to health care. The greater data availability, through the DHS in particular, has greatly stimulated research in this field. New methods to measure household economic status have been developed, as income or expenditure data often remain unavailable.^{10,51}

Description: the magnitude and pattern of socio-economic inequalities in childhood mortality in LMICs

Six key messages on the magnitude of socio-economic inequalities in childhood mortality in LMICs can be distilled from the international evidence. First, poorer and less educated groups exhibit systematically and considerably higher childhood mortality rates than better-off citizens in virtually all LMICs with available data.^{9–11,43} Figure 1 shows under-five mortality rates for the poorest and richest population

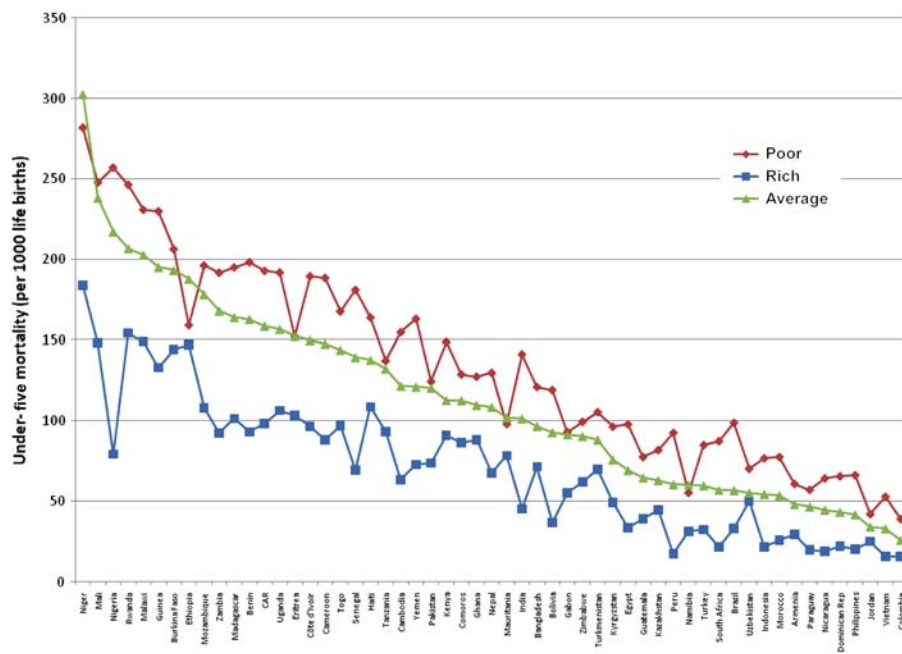


Fig. 1 Under-five mortality (per 1000 live births), among the poorest and richest quintile and the total population, 55 countries. Demographic and Health Surveys between 1996 and 2004.

quintile within 55 countries based on household ownership of assets.⁵¹ In virtually every country, the mortality rate among the poorest children exceeds by far that of the richest group. Childhood mortality inequalities within countries are an important problem, in addition to the well-known inequalities between countries.

Secondly, huge population health gains could be made if socio-economic inequalities in childhood mortality were addressed. Over 3.5 million of the 10.8 million under-five deaths worldwide in the year 2000, or 33%, would have been averted if all had rate of richest 40% within countries (calculations by author). The potential decline in under-five mortality varies from 5 to 50%, with the majority of countries experiencing at least a 20% decline.¹¹ Potential gains would, obviously, be even larger if the richest 20% population group were taken as reference. So the potential impact of tackling socio-economic inequalities on improving population health and on attaining international goals such as the MDGs is large.

Thirdly, mortality inequalities are observed across the entire wealth hierarchy and not only affect the poorest children as compared with the rest (Fig. 2). This is called the social gradient in health.³³ Yet, in many countries, inequalities in under-five mortality do not exhibit a linear gradient. Some countries with the highest under-five mortality levels (mostly in sub-Saharan Africa) show a gap between the elite, with relatively low mortality rates and the rest of the population. A reverse pattern, with a gap between the poor and the rest of the population, is observed in some countries with low under-five mortality rates.

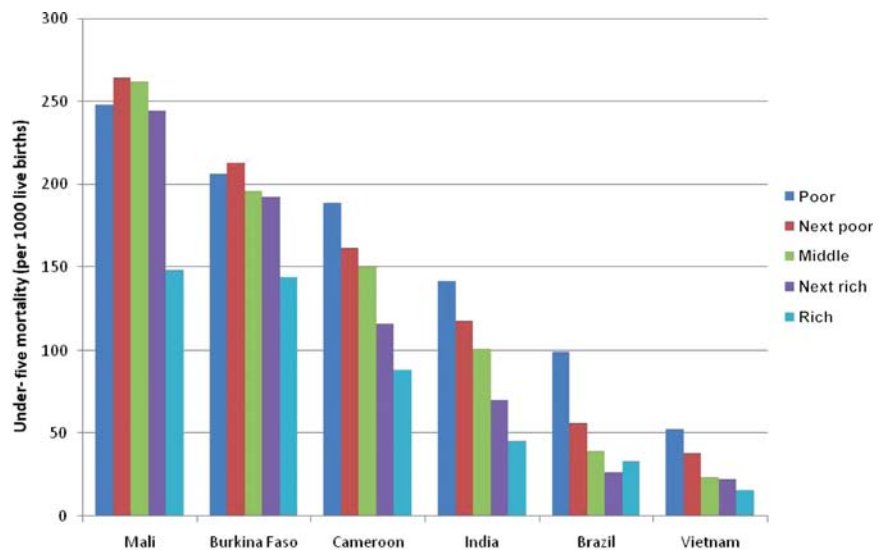


Fig. 2 Under-five mortality (per 1000 live births) by wealth quintile. Data source: Demographic and Health Surveys. Survey data between 1996 and 2004.

This implies that the population groups in particular need of child health programs vary between countries.

Fourthly, absolute inequalities in infant mortality (0–11 months) are generally larger than those in child mortality (12–59 months). For two-thirds of LMICs, absolute inequalities in under-five mortality consist for the major part (>50%) of inequalities in infant mortality.¹¹ About 20–25% of under-five mortality inequalities arise in the neonatal period.⁵² This shows the importance of tackling inequalities in mortality among infants and neonates in order to reduce absolute inequalities in under-five mortality.

Fifthly, the magnitude of childhood mortality inequalities varies between countries and over time,^{11,29} suggesting that it is amenable to policy intervention. Although absolute mortality inequalities are generally larger in countries with higher overall childhood mortality levels, some countries exhibit lower inequalities than others at the same stage in the epidemiological transition.⁵³ Relative inequalities in childhood mortality tend to increase when overall childhood mortality levels fall, perhaps due to inequitable uptake of new interventions.^{11,54} Positive examples, however, show that this is not inevitable.¹¹ Socio-economic inequalities in childhood mortality declined, for example, during a period of economic growth and improvements in child survival in Indonesia.⁵⁵

Lastly, childhood mortality inequalities are found along many dimensions of social stratification. Apart from household wealth, inequalities by maternal education have been described most frequently. These inequalities are often large.⁹ A review suggests a linear relationship between maternal education and childhood mortality⁴³ and the absence of a threshold effect: even a little maternal education makes a difference.⁴¹ Inequalities have also been described by ethnic group,⁵⁶ religion,⁵⁷ caste,⁵⁸ migration status,⁵⁹ and fathers education⁶⁰ and occupation,⁹ though these dimensions of stratification have received far less research attention. Different dimensions of stratification can act on health through different pathways. This implies that policies aimed at addressing inequalities in childhood mortality should not only focus on the poor in the strict economic sense of the word, but give particular attention to families who are disadvantaged in other social aspects as well.

Explanation: determinants of socio-economic inequalities in childhood mortality in LMICs

A conceptual framework for explaining the magnitude of mortality inequality

Of the existing explanatory frameworks for health inequality,^{15,61} the model by Mosely and Chen is probably the most often used in the

context of child health in LMICs.⁶² Building on a model by Davis and Blake,⁶³ they combined socio-economic determinants and biological determinants of childhood mortality into an, at that time novel, framework. They argued that socio-economic determinants, such as maternal education, can only exert an effect on childhood mortality through more proximate, or direct, determinants of mortality. This insight has now become generally accepted.^{15,61}

Following Figure 3, which uses the Mosely and Chen framework as basis, the magnitude of socio-economic inequality in childhood mortality is influenced by: the extent and interrelationship of social and geographic stratification (A); the relationship between social stratification and inequality in proximate determinants (B); the relationship between inequality in specific proximate determinants and mortality inequality (C); a reverse impact of ill-health on socio-economic position (D); and extent to which these relationships are modified by the wider context, including country (E, F, G, H) and global (I) level determinants. Compared with high-income countries, far less explanatory research has been done for LMICs. Hence, many of these relationships have not yet been fully empirically examined.

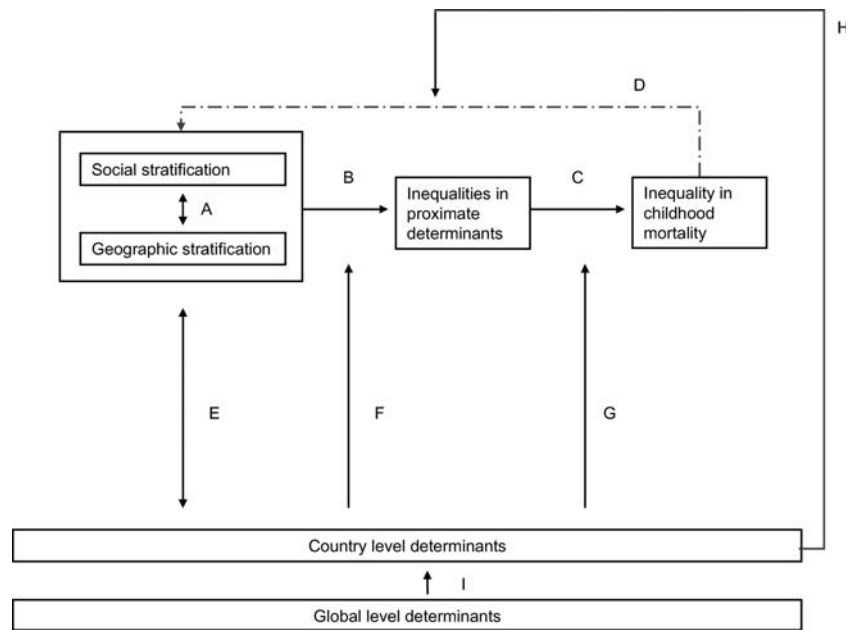


Fig. 3 Conceptual framework, showing the relationship between social and geographic stratification and inequality in childhood mortality. *Source:* Houweling¹¹. Reproduced with permission of the author.

Social and geographic stratification (A)

Social and geographic stratification often go hand in hand, such that lower socio-economic groups often live in more deprived regions within countries. Geographic mortality inequalities are usually substantial in LMICs. Rural areas, for example, exhibit higher childhood mortality rates than urban areas, though with some exceptions.^{9,64} Socio-economic inequalities in childhood mortality are often partly explained by geographic inequalities. Yet, individual and household level socio-economic characteristics usually also have independent mortality effects.⁶⁵ Large intra-urban and intra-rural poor-rich inequalities in childhood mortality have, for example, been reported for many countries.^{10,66} Even within small and seemingly uniformly poor areas, substantial poor-rich inequalities in childhood mortality have been observed.⁶⁷

The relative importance of attributes of people and place will vary between countries. Geographic mortality inequalities in African countries, for example, have been suggested to be particularly large, possibly indicating the importance of the macro disease environment.⁶⁸ The mortality effects of place characteristics are also time-dependent. Geographic stratification, for example, has become increasingly important in Indonesia.⁵⁵ Finally, the relative importance of characteristics of people and place also varies with the outcome studied. Although immunization coverage, for example, is strongly clustered at the community level, factors at the household or individual level are probably of key importance to childhood malnutrition.⁶⁹

Inequalities in proximate determinants (B, C)

Social and geographic stratification influence the social distribution of proximal, or 'direct', mortality determinants. Maternal education is thought to exert its influence through increased status and decision making power of mothers within the household, increased willingness and ability to travel outside the community, more timely use of health care, greater negotiating power with health care providers, increased knowledge, skills and identification with modern health systems and responsiveness to new ideas.^{43,44} On the other hand, about half of the effect of maternal education is estimated to be accounted for by its association with household wealth, and probably the associated better living conditions and ability to pay for health services.^{40,43}

In low-income countries, the major causes of under-five mortality are neonatal disorders (an estimated 33% of under-five deaths), diarrhoea (22%), pneumonia (21%), malaria (9%), AIDS (3%) and measles

(1%), though the pattern varies between countries.² Important proximate determinants include malnutrition (an underlying cause in over half of all under-five deaths²) and exposure to disease pathogens.⁷⁰ In turn, these are influenced by, among others, quality of water and sanitation facilities, housing conditions, breastfeeding and complementary feeding practices, hygiene behaviour such as hand washing with soap^{71,72} and other practices related to child care.^{62,73,74} Also specific characteristics of the mother, such as her age at childbirth, her nutritional status before and during pregnancy, as well as fertility characteristics such as parity and child spacing, are determinants of under-five mortality.^{62,74} The degree of inequality in these proximate determinants and the size of their effect on childhood mortality, influence the magnitude of mortality inequalities.

Indeed, most proximate determinants show worse levels for lower socio-economic groups. Socio-economic and rural-urban inequalities in chronic (stunting) and acute (wasting) childhood under-nutrition are observed in many LMICs (Fig. 4).^{75,76} Chronic under-nutrition exhibits much larger absolute and relative socio-economic inequalities than acute under-nutrition in these countries.⁷⁶

Exposure to infections is influenced by services provided at the community level, such as piped water supply. Social and geographic inequalities in access to such services are often large.⁷⁷ Lower socio-economic groups also have less opportunity for healthy home care practices. The availability of soap in the household, for example, declines with increased distance to the water tap,⁷⁷ and insecticide treated bednets are less likely to be available in poor households.⁷⁸

Maternal factors are also likely to contribute to inequalities in childhood mortality. Inequalities in modern contraceptive use are large and increasing.^{77,79} Fertility rates are much higher (Fig. 5), and birth

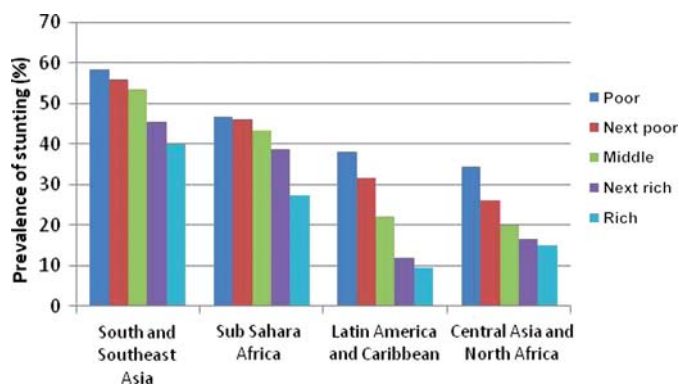


Fig. 4 Median levels of stunting prevalence in children younger than 5 years, by wealth group by world region. On the basis of data from Van de Poel *et al.*,⁷⁶ using most recent Demographic and Health surveys for 47 countries (surveys between 1990 and 2004).

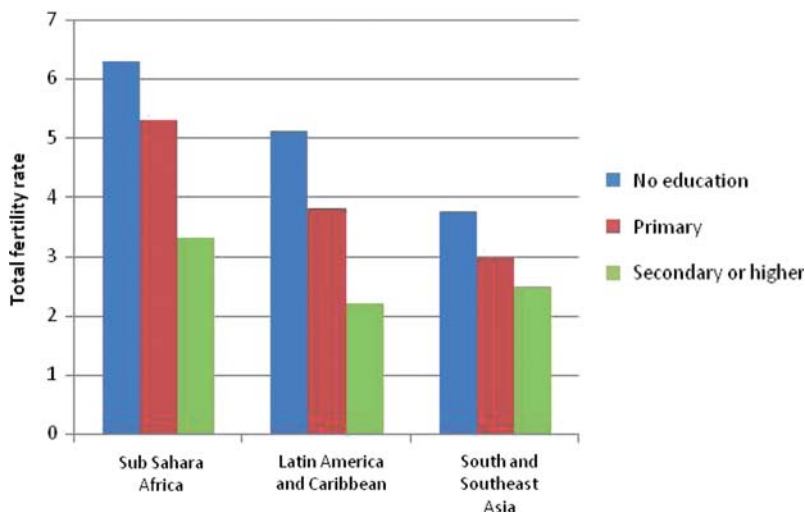


Fig. 5 Median total fertility rate, by educational attainment, by world region. *Data source:* Demographic and Health Surveys, using most recent surveys for 49 countries (survey data between 1995 and 2007). Due to the very small number of women in the lower educational categories in Central Asia and North Africa, this region is not presented in this figure.

intervals tend to be a few months shorter among poorer and less educated women in LMICs. Also, teenage pregnancies occur more often among lower socio-economic groups.⁷⁷ In addition, the prevalence of anaemia is higher among poorer and less educated mothers.⁷⁷

Use of modern health services, including maternity care, childhood vaccination and medical treatment of respiratory infections, diarrhoea and fever, is much lower among poorer and less educated groups within LMICs^{74,80–82} (Fig. 6). Even in seemingly homogeneously poor communities, inequalities in health care use are observed.⁸³ Inequalities in professional delivery care are particularly large, with 80% of women in the richest quintile receiving such care in most LMICs, in contrast to 30% or less in the poorest quintile.⁸⁰ Public sector inequalities make up a major part of these inequalities in professional delivery attendance.⁸⁰ Even delivery care provided by nurses is pro-rich in most of the countries. In LMICs, on average 65% of all deliveries without professional care take place among the rural-poor, showing that the greatest scope for improving maternity care lies in this population group (calculations by author).

Inequalities in proximate determinants usually pervades the entire society, and not only affect the poorest children as compared with all other children. In many countries, however, such disparities do not resemble a linear gradient. Some patterns are illustrated in Figure 6B. In countries with low levels of proximate determinants such

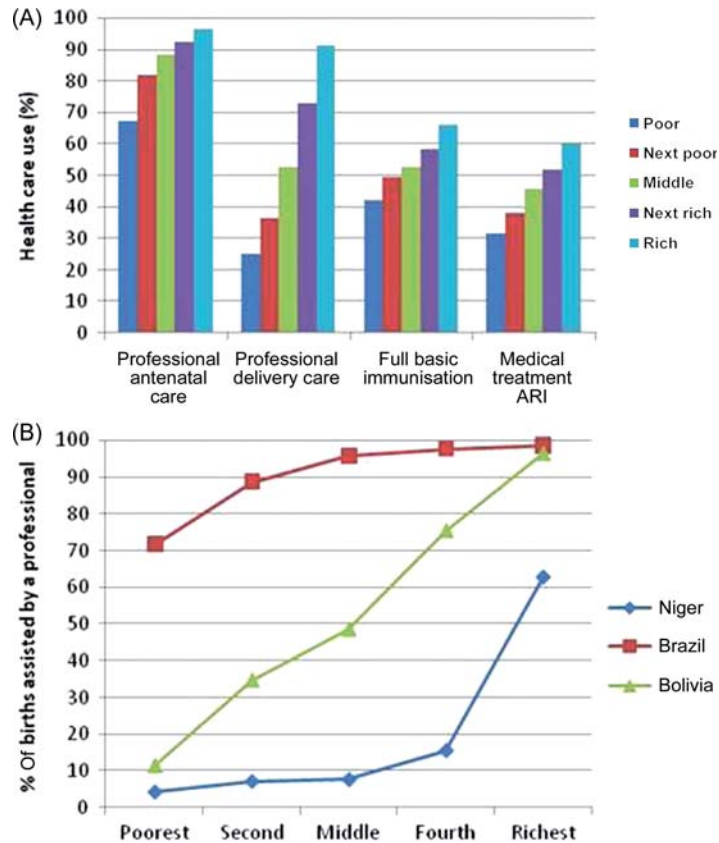


Fig. 6 (A) Median levels of health care use across 47 to 55 low- and middle-income countries (number of countries varies according to data availability for the four types of health care use), among population quintiles within countries. (B) Patterns of inequality in professional delivery care for three countries. ARI = acute respiratory infections. *Data source:* Demographic and Health Surveys. Survey data between 1995 and 2004.

as skilled delivery attendance, immunization coverage or contraceptive use, there is a gap between the elite and the rest of the population. A reverse pattern is observed in some of the countries with a high overall prevalence, with fairly high levels among all groups except the poorest.¹¹ These different patterns have implications for the specific groups that need special attention in the design of interventions.

Breastfeeding is an exception to this pattern of worse outcomes among lower socio-economic groups: breastfeeding durations are usually longer among lower educated mothers in LMICs.⁸⁴

The relative contribution of different proximal determinants to inequalities in childhood mortality is still little investigated.⁸⁵ There have been some attempts, among others through decomposition analysis.^{86–88} So far, these applications do not take causal pathways from distal through proximal determinants into account. Moreover, the lack

of data on many proximal determinants for children that have died, as well as a lack of cause of death data, hampers an accurate assessment of the role of different factors. Improving data and methods for further analyses is important for future research.

Differential impacts of ill-health (D)

Poor-rich inequalities in childhood mortality can be due to the effects of poverty on ill-health, but also due to the effects of ill-health on economic status. Out-of-pocket expenditures on health care can force households to sell assets,⁸⁹ can exacerbate poverty⁹⁰ and can be catastrophic, i.e. households having to cut basic expenditures over a period of time to cover the health care costs.⁹¹ Whereas illness of children can have important effects on household economic status, these effects seem to be stronger for the already poor compared with the better-off.^{92,93} Moreover, reverse causation cannot explain the inequalities in childhood mortality by maternal education and ethnicity. Reverse causation therefore can not (fully) explain socio-economic inequalities in childhood mortality.

Country and global level determinants (E–I)

Factors at the country level can impact on the magnitude of mortality inequalities through multiple pathways. First, social stratification is under the influence of government through, among others, taxation, social protection and education policies. Conversely, the extent of social stratification (e.g. size of income inequalities, extent of ethnic fragmentation) can affect public sector performance.⁹⁴ Second, country level variables can modify the relationship between social stratification and inequality in proximate determinants. Health care financing arrangements, for example, can modify the influence of economic status on access to health care.^{95,96} Third, country characteristics can modify the impact of inequalities in proximate determinants on mortality inequality. Quality of care, for example, may influence the extent to which inequalities in health care use lead to inequalities in childhood mortality.⁹⁷ Finally, the extent to which ill-health has impoverishing effects can also be influenced by public policies. The proportion of households making catastrophic health care expenditures varies with health system reliance on out of pocket expenditures.⁹¹

Country level factors are often strongly influenced by the global context: international aid and debt service flows, and structural adjustment programmes, for example, may impact on mortality

inequalities.⁶¹ Trade liberalization, and the associated commercialization of health care, may increase inequalities in access to care and trade agreements that reduce tariffs, can impact on public spending in countries with weak capacity for direct taxing.⁶¹

Clearly, individuals and households are not autonomous units. The mortality impact of socio-economic characteristics at these levels is influenced by factors at higher levels of aggregation. Unfortunately, there has been little empirical research on the relationship between country characteristics and the magnitude of mortality inequalities, though important strides have been made by the Commission on Social Determinants of Health.⁶¹ The lack of evidence is surprising given the importance of assessing the impact of public policies on health inequalities, though understandable given the methodological problems associated with such research.¹¹

Intervention: addressing socio-economic inequalities in childhood mortality in LMICs

Public policies and international efforts such as the MDGs usually focus on improving average childhood survival. Meeting the MDG target for child survival is, however, compatible with a scenario of increasing mortality inequalities.⁹⁸ This scenario is likely, as interventions focussed on averages run the risk of increasing rather than reducing inequalities, at least in relative terms.⁵⁴ The Integrated Management of Childhood Illness programme of WHO and UNICEF, for example, preferentially reached less deprived areas.⁹⁹

There is debate about which approaches work best to address health inequalities, among others whether universal or targeted strategies are more effective. Although pro-poor interventions can certainly be important,¹⁰⁰ singling out poorer groups may lead to social, economic as well as technical problems.⁶¹ The evidence above suggests that the strategy of choice partly depends on the specific inequality pattern observed. For example, when inequalities in a health problem run through the entire social gradient, and also affect middle groups as compared with the best-off, universal policies may strike the best balance between reducing inequalities and improving overall levels.

Entry-points for intervention to reduce health inequalities can be found at various places in the causal pathway (Fig. 3). The extent of social stratification can be influenced by tax and social protection policies. The CSDH recommends universal social protection schemes that are sufficient for a healthy living.⁶¹ The cash transfers that are being set up in several African countries could be a step forward.¹⁰¹

Inequalities in proximal determinants provide another entry-point. Historical research from Stockholm shows that universal access to piped water and sewerage systems, probably in combination with public hygiene measures, virtually eliminated inequalities in diarrhoea mortality in this city.¹⁰² Other interventions have focussed on stimulating demand for preventive and curative services among lower socio-economic groups.¹⁰³ A social marketing campaign in Tanzania reduced relative inequalities in ownership of insecticide treated bednets.⁷⁸ Differential consequences of ill-health can be diminished by reducing out-of-pocket expenditures for health care through, for example, universal health insurance and other pre-payment mechanisms.⁶¹

Addressing inequalities within the health care sector is important. Action across sectors is, however, critical to reduce inequalities in childhood mortality. Many aspects of government potentially influence health inequality. Therefore, intersectoral action and policy coherence should be key components of efforts to address this important public health problem.⁶¹ This requires strong and determined leadership, at the national and international level, over substantial periods of time.¹⁰⁴

Discussion

Socio-economic inequalities in childhood mortality are a major public health problem in LMICs. Childhood mortality is systematically and considerably higher among lower socio-economic groups within countries. These disparities pervade the entire society, and not only affect the most deprived children compared with the rest. The magnitude of inequality varies between countries and over time, suggesting that it is amenable to policy intervention. Reducing these inequalities by improving child survival up to the level of more advantaged groups within countries would substantially improve population health.

The disparities are partly explained by large inequalities in proximate determinants of childhood mortality, including malnutrition, exposure to infections, maternal characteristics and health care use. Yet, inequalities in childhood mortality cannot be fully unravelled by zooming-in on individual and household level factors alone. Zooming-out to community, country and even global-level determinants of childhood mortality is of fundamental importance. More evidence is needed on these higher level determinants.

Although the importance of addressing health inequalities is increasingly recognized, and it is clear that strong leadership and cross-government action are required, there is still debate about what the best intervention strategies are. This partly reflects the dearth of systematic evidence on what works best to address health inequalities.

A first requirement for evidence-based policy to address health inequalities is the availability of health data stratified by socio-economic groups and regions within countries.⁶¹ Governments should set up surveillance systems that routinely monitor and disseminate information on health inequality and its determinants.⁶¹ This may require expanding data collection through, among others, the DHS programme, to an even broader set of LMICs, and a broader set of outcomes, including long-term child morbidity. Monitoring is also important at the intervention level. Intervention studies should assess whether policies and programmes have a smaller or larger impact on lower compared with higher socio-economic groups.

At least three areas are timely for developing research. Further descriptive research should aim to develop tools for the surveillance of socio-economic inequalities in childhood mortality in LMICs. First of all, the potential of existing data sources should be further explored, among others for countries without DHS or similar surveys, or for the estimation of recent trends when interview surveys are not carried out on a regular basis. Second, indicators of socio-economic position need to be further developed. Important improvements have been made in the use of data on household assets and construction of wealth indices. Further work needs to assess the content validity and comparability of these indices, and to complement these by measures based on educational level, ethnicity, geography and other dimensions of social position.^{11,105}

Secondly, explanatory research needs to be expanded. Little is known about the relative contribution of different proximate determinants to inequalities in childhood mortality, nor about the impact of country and global level determinants. A main challenge to research within specific countries and regions is to identify the proximate determinants that contribute most to the higher mortality of children born in disadvantaged groups. Similarly, comparative research should aim to identify country level determinants, including economic and health care policies, which are related to smaller inequalities in childhood mortality. Advancements in methodology and improvements in data availability would be important for progress in these research areas.

Finally, more emphasis on intervention research is needed. Little is known about how to implement interventions such that they contribute to reducing health inequalities. New evidence can be generated from ongoing evaluations of current or recent interventions, by assessing whether the intervention effects observed differ according to socio-economic position. Similarly, socio-economic differentiation should be a standard element to consider in the design of future interventions and evaluation studies in the field of maternal and child health in LMICs. In this way, evidence on how to improve the reach and effectiveness of

interventions among lower socio-economic groups will gradually accumulate.

Conclusion

Socio-economic inequalities in childhood mortality are an important public health problem in LMICs. The increasing political attention for addressing mortality inequalities needs to be accompanied by more evidence on how to ensure that interventions reach lower socio-economic groups. Countries need to set up health inequality surveillance systems and intervention research needs to systematically report differential impacts across socio-economic groups.

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