Changes in Child Mortality Over Time Across the Wealth Gradient in Less-Developed Countries

WHAT’S KNOWN ON THIS SUBJECT: In developed countries, child health disparities across wealth gradients are commonly widening; at the same time, child mortality in low- and middle-income countries is declining. Whether these declines are associated with widening or narrowing disparities is unknown.

WHAT THIS STUDY ADDS: A systematic analysis of the evidence on child mortality gradients by wealth in less-developed countries shows that mortality is declining fastest among the poorest in most countries, leading to declining disparities in this important indicator of child health.

abstract

BACKGROUND: It is unknown whether inequalities in under-5 mortality by wealth in low- and middle-income countries (LMICs) are growing or declining.

METHODS: All Demographic and Health Surveys conducted between 2002 and 2012 were used to measure under-5 mortality trends in 3 wealth tertiles. Two approaches were used to estimate changes in under-5 mortality: within-survey changes from all 54 countries, and between-survey changes for 29 countries with repeated survey waves. The principal outcome measures include annual decline in mortality, and the ratio of mortality between the poorest and least-poor wealth tertiles.

RESULTS: Mortality information in 85 surveys from 929,224 households and 1,267,167 women living in 54 countries was used. In the subset of 29 countries with repeat surveys, mortality declined annually by 4.36, 3.36, and 2.06 deaths per 1000 live births among the poorest, middle, and least-poor tertiles, respectively (P = .031 for difference). The mortality ratio declined from 1.68 to 1.48 during the study period (P = .006 for trend). In the complete set of 85 surveys, the mortality ratio declined in 64 surveys (from 2.11 to 1.55), and increased in 21 surveys (from 1.58 to 1.88). Multivariate analyses suggest that convergence was associated with good governance (P ≤ .03 for 4 governance indicators: government effectiveness, rule of law, regulatory quality, and control of corruption).

CONCLUSIONS: Overall, under-5 mortality in low- and middle-income countries has decreased faster among the poorest compared with the least poor between 1995 and 2012, but progress in some countries has lagged, especially with poor governance. Pediatrics 2014;134:1–9

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KEY WORDS
child mortality, health disparities, wealth inequalities, global health

ABBREVIATIONS
CI—confidence interval
DHS—Demographic and Health Surveys
GDPpc—gross domestic product per capita
LMICs—low- or middle-income countries
MDGs—Millennium Development Goals
TFR—total fertility rate
5q0—probability of dying before reaching age 5 per 1000 live births

Dr Bendavid had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. He also conceived and designed the analysis, acquired and analyzed the data, and drafted and revised the manuscript.

The funding agencies had no part in the design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review, or approval of the manuscript.

doi:10.1542/peds.2014-2320

Accepted for publication Sep 12, 2014

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275). Copyright © 2014 by the American Academy of Pediatrics

FINANCIAL DISCLOSURE: The author has indicated he has no financial relationships relevant to this article to disclose.

FUNDING: This work was supported by the NIH/National Institute of Allergy and Infectious Diseases (K01-AI084582), the Doris Duke Charitable Foundation, and the Dr George Rosenkranz Prize for Health Care Research in Developing Countries. Funded by the National Institutes of Health (NIH).

POTENTIAL CONFLICT OF INTEREST: The author has indicated he has no potential conflicts of interest to disclose.
Narrowing the gaps in mortality and preventable burden of disease between rich and poor nations was a central motivation behind the creation of and support for the Millennium Development Goals (MDGs). The signatories of the United Nation’s Millennium Declaration, which laid the foundation for the MDGs, stated that “In addition to our separate responsibilities to our individual societies, we have a collective responsibility to uphold the principles of human dignity, equality and equity at the global level.” The MDGs set targets that defined success based on national improvements, and progress for health-related MDGs has commonly focused on measuring changes in national indicators, such as maternal and under-5 mortality.2 National trends, however, say little about health inequalities within countries. Improvements in population health metrics may be associated with either narrowing or widening gaps in mortality among socioeconomic strata. Faster declines in mortality among the wealthy compared with the poor may lead to widening differences across the wealth gradient, whereas faster declines among the poor may lead to convergence. Preferential use of health care or the development of new health technologies that address diseases whose burden is differentially distributed across the wealth gradient may lead to uneven progress. These processes have been used to explain widening gaps in life expectancy in the United States by education, race, and wealth.3–4

The literature characterizing changing health inequalities is predominantly from developed countries, whereas the trends in low- and middle-income countries (LMICs) are largely unknown.6–8 One analysis of nationally representative child mortality data in 22 LMICs between 1991 and 2001 found no evidence to suggest that inequalities in under-5 mortality by wealth changed over that 10-year span.10 Modeling studies suggest that inequalities in child mortality could grow or shrink based on relative progress in achieving the MDGs by different wealth groups.11 These studies argue that, because the burden from communicable diseases in LMICs is highest among the poorest, whereas that from noncommunicable diseases is highest among the least poor, accelerating control of communicable diseases would decrease rich-poor gaps, and accelerating control of noncommunicable diseases could increase inequalities.12 Since 2000, substantial efforts and resources have been invested in the control of communicable diseases, such as HIV, malaria, tuberculosis, and vaccine-preventable illnesses.13 At the same time, the poorest appear to use the health services afforded by these investments (immunizations, antiretroviral drugs, or oral rehydration therapy) less than those who are better off.11 In addition, data on the overall balance of efforts to control communicable and noncommunicable diseases in LMICs is scant because accounting of domestic resource for disease control is rarely available, posing challenges to any projections of health inequalities.

Understanding whether countries are experiencing converging or diverging under-5 mortality matters for policymaking. Child survival improvements that are associated with growing health inequalities may lead to different policy decisions in comparison with improvements with converging mortality trends. This analysis addresses this knowledge gap.

METHODS

Data Sources

This study uses all standard Demographic and Health Surveys (DHSs) with nationally representative information on wealth status and complete birth registries, a total of 85 surveys from 54 countries conducted between 2002 and 2012.14 In a subset of 29 countries, 2 DHS waves have been completed. This subset was used in an analysis of repeated measurements of child mortality (the earliest and most recent waves were used for Indonesia and Bangladesh, where 3 waves have been completed during this period); the entire set of 54 countries was used in creating and analyzing longitudinal records from the birth registries. Table 1 contains the list of surveys and relevant descriptive information.

Wealth Status

Wealth status in DHSs is indicated in each survey by using quintiles of a continuous wealth index, normalized to each survey’s information. The index is obtained by using a principal components analysis of household assets and services, such as electricity, water supply, and floor material.15,16 Wealth was regrouped into tertiles from the household population datasets, such that the analyses compared the poorest, middle, and least-poor tertiles. This regrouping was done to increase the sample size within each tertile and to reduce measurement error from miscategorization of individuals into the wrong quantile because of inaccurate measurement of household assets or changes in the household’s relative wealth status over time. Additional details on the wealth tertile regrouping procedure are in Supplemental Appendix 1.

Under-5 Mortality

Under-5 mortality was estimated from the DHS birth registries. Complete birth registries, obtained from women 15 to 49 years old in sampled households, contain, for every live birth, the month of birth, survival status, and age at death (in months) for children who died. Using this information, synthetic cohort life tables for under-5 children were constructed following the DHS approach to produce a standard metric of under-5 mortality, the probability of dying before reaching age 5 per 1000 live births (5q0).17 Although recent studies suggest short time windows may be appropriate...
<table>
<thead>
<tr>
<th>Country</th>
<th>Survey Year</th>
<th>No. of Mothers</th>
<th>No. of Under-5 Children at Time of Survey</th>
<th>DHS Surveys Used in the Analysis and the Most Recent Under-5 Mortality by Wealth in Each Survey</th>
<th>Under-5 Mortality by Wealth During the 5-y Period Preceding the Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple surveys</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Armenia</td>
<td>2005</td>
<td>6566</td>
<td>1450</td>
<td>21.9 (11.3 to 42.2) 25.2 (17.3 to 41.7) 26.3 (22.7 to 59.7)</td>
<td></td>
</tr>
<tr>
<td>Armenia</td>
<td>2010</td>
<td>5922</td>
<td>1473</td>
<td>16.9 (7.9 to 38) 13.6 (6.1 to 30.2) 24.7 (12.6 to 48)</td>
<td></td>
</tr>
<tr>
<td>Bangladesh</td>
<td>2004</td>
<td>11 440</td>
<td>6908</td>
<td>56.7 (46.9 to 68.4) 80.0 (68.6 to 93.2) 89.0 (78.2 to 101.1)</td>
<td></td>
</tr>
<tr>
<td>Bangladesh</td>
<td>2007</td>
<td>10 996</td>
<td>6150</td>
<td>48.0 (38.0 to 60.5) 73.4 (61.5 to 87.4) 67.4 (57.7 to 78.5)</td>
<td></td>
</tr>
<tr>
<td>Bangladesh</td>
<td>2011</td>
<td>17 842</td>
<td>8753</td>
<td>41.1 (33.7 to 50.0) 50.0 (42.1 to 59.4) 58.0 (50.2 to 66.8)</td>
<td></td>
</tr>
<tr>
<td>Bolivia</td>
<td>2003</td>
<td>17 654</td>
<td>10 448</td>
<td>35.3 (26.1 to 47.6) 64.9 (56.6 to 74.3) 84.5 (78.7 to 93.1)</td>
<td></td>
</tr>
<tr>
<td>Bolivia</td>
<td>2008</td>
<td>16 939</td>
<td>8805</td>
<td>32.9 (24.9 to 43.5) 34.4 (27.9 to 42.4) 71.1 (63.3 to 79.8)</td>
<td></td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>2003</td>
<td>12 477</td>
<td>10 645</td>
<td>119.2 (105.2 to 134.9) 162.9 (148.1 to 177.9) 174.4 (160.2 to 184.9)</td>
<td></td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>2010</td>
<td>17 087</td>
<td>15 045</td>
<td>73.1 (63 to 84.6) 114.1 (103.9 to 125.4) 137.1 (126.8 to 148.1)</td>
<td></td>
</tr>
<tr>
<td>Cambodia</td>
<td>2005</td>
<td>16 623</td>
<td>8290</td>
<td>34.8 (28.6 to 43.3) 84.3 (72.7 to 97.7) 102.5 (92.0 to 114.1)</td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>2010</td>
<td>15 794</td>
<td>8252</td>
<td>26.5 (19.8 to 35.7) 51.4 (42.9 to 61.4) 72.2 (63.6 to 81.8)</td>
<td></td>
</tr>
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<tr>
<td>Tanzania</td>
<td>2003</td>
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<td></td>
</tr>
<tr>
<td>Tanzania</td>
<td>2004</td>
<td>10 329</td>
<td>8564</td>
<td>77.6 (65.1 to 92.4) 107.2 (94.9 to 121) 110.6 (98.9 to 125.3)</td>
<td></td>
</tr>
<tr>
<td>Tanzania</td>
<td>2009</td>
<td>10 139</td>
<td>8023</td>
<td>74.8 (63 to 88.7) 72.8 (62.9 to 84.2) 71.3 (61.5 to 82.5)</td>
<td></td>
</tr>
<tr>
<td>Tanzania</td>
<td>2006</td>
<td>8531</td>
<td>8369</td>
<td>93.1 (79.2 to 109.1) 112.4 (100 to 126.2) 121.1 (109.2 to 134.2)</td>
<td></td>
</tr>
</tbody>
</table>
mortality ratio between surveys was estimated with a linear regression model, in which the dependent variable was the mortality ratio in each survey, and the independent variables included the year of the survey and country dummies (fixed effects). This provided the estimated within-country annual change in the mortality ratio between repeated surveys. All regression specifications are in Supplemental Appendix 2.

The second analysis used the information contained within each survey to create longitudinal within-survey estimates of inequalities in under-5 mortality. This was accomplished by restricting the birth cohort to the 5-year period preceding each year, up to 10 years before the year of the survey. For example, for a survey conducted in 2007, the estimated under-5 mortality in 2007 used birth registry data from 2002 to 2007; in the same survey, under-5 mortality in 2006 used data from 2001 to 2006, and so on until 1997 (the first year of measurement was 1995). This approach has several limitations: distant retrospective data suffer from recall bias, retrospective cohorts may not be nationally representative, and the wealth status of households whose relative wealth changed significantly over the 10-year period may be misclassified. On the other hand, it allows an examination of a greater number of countries, 54 as compared with 29, by using longitudinal analyses of single survey data, whereas consecutive surveys may differ based on sampling or other chance events. The combined data for all 85 survey waves is in Figure 1, separate figures for all surveys are available in Supplemental Appendix 3. These data were used to analyze the differences in under-5 mortality rate declines by wealth, as well as the changes in the mortality ratio within surveys.

with larger DHS surveys, 5-year windows were used throughout.18

Estimating Trends in Under-5 Mortality by Wealth

Two principal approaches were used for examining the trends in mortality over time. The first approach measured between-survey changes among those 29 countries that had >1 DHS wave. These countries are in the first portion of Table 1. Two measures were used to characterize changes in under-5 mortality in repeated surveys: the average annual change in under-5 mortality between the first and second wave for each wealth tertile (slope), and the ratio between under-5 mortality among the poorest and least-poor tertiles (mortality ratio). Nonparametric analysis of variance (Kruskal-Wallis) was used to test the equality of the slopes among the 3 wealth tertiles. The change in under-5 mortality ratio between surveys was estimated with a linear regression model, in which the dependent variable was the mortality ratio in each survey, and the independent variables included the year of the survey and country dummies (fixed effects). This provided the estimated within-country annual change in the mortality ratio between repeated surveys. All regression specifications are in Supplemental Appendix 2.

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Finally, additional analyses explored the correlates of mortality ratio changes. The difference in the mortality ratio between the first year of measurement and the most recent year for each survey was used to define the changing mortality ratio. This difference in the mortality ratio was then associated in univariate and multivariate ordinary least squares regressions with gross domestic product per capita (GDPpc), total fertility rate (TFR), urbanization (percentage living in cities), HIV prevalence among adults, the portion of gross domestic product spent on public health, and all 6 Worldwide Governance Indicators (Government Effectiveness, Rule of Law, Control of Corruption, Regulatory Quality, Voice and Accountability, and Political Stability and Absence of Violence) from the World Bank. These regressions were not intended to suggest causal pathways, but to explore broad relationships between development indicators and convergence of under-5 mortality. All the analytic code (in Stata version 13.1 [Stata Corp, College Station, TX]) is available on request from the author.

RESULTS

Information in 85 surveys (54 countries) from 1,267,167 women living in 929,224 households was used to create datasets with under-5 mortality estimates by wealth tertile. Overall, there is consistent evidence to suggest that the wealth gradient in under-5 mortality has been closing between 1995 and 2011. This convergence is measurable in both the mortality rate difference and in the ratio of under-5 mortality rates between the poorest and least poor.

Convergence in Repeated Surveys

The first wave of surveys among the 29 countries with repeat surveys was conducted between 2002 and 2007, and the second wave between 2008 and 2012 (Table 1). Convergence in mortality was measurable both in mortality rate differences, and mortality ratio measures. Figure 2 shows that the annual decline in under-5 mortality between surveys was, on average, greatest among the poorest. The average annual decline in under-5 mortality was 2.06 per 1000 live births among the least poor (95% confidence interval [CI] 1.06 to 3.07), 3.36 points among the middle tertile (95% CI 1.81 to 4.91), and 4.36 (95% CI 2.78 to 5.94) among the poorest. A Kruskal-Wallis analysis of variance suggests that these declines are meaningfully different from one another (P = .031). Overall, the mortality ratio in the 58 surveys has been declining gradually (Supplemental Appendix 5). The ratio of under-5 mortality between the poorest and least poor was 1.68 (95% CI 1.47 to 1.88) in the first wave and 1.48 (95% CI 1.30 to 1.66) in the second wave. Regression analysis also suggests that, within countries, the ratio has been declining by 0.04 per year (95% CI 0.01 to 0.07, P = .006).

Within-Survey Longitudinal Convergence

Examining the longitudinal trends generated from all 85 surveys in the 54 study countries provides additional support for convergence. Figure 1 shows the distribution of under-5 mortality estimates from the 85 surveys along with a smoothed (median spline) fit curve for each wealth stratum from 1995 to 2011. Overall, under-5 mortality declined in the study countries from a median of 146 per 1000 live births in 1995 to 75 per 1000 live births in 2011. Table 2 and Supplemental Appendix 5 demonstrate that the difference in under-5 mortality between the poorest and least poor has been shrinking along with the overall mortality declines. Table 2 also shows that between 1995 and 2011, the median under-5 mortality declined by 106.5 per 1000 live births among the poorest (194.4 to 87.9) and 37.5 per 1000 live births among the least poor (104.7 to 67.2).

Regression analysis supports the convergence of under-5 mortality across wealth tertiles in the 54-country sample. In a linear model, regressing under-5 mortality on an interaction between the year and wealth tertile indicators with country fixed effects to examine within-survey trends and robust SEs
TABLE 2 Temporal Trends in Under-5 Mortality by Wealth in 85 Surveys Between 1995 and 2011

<table>
<thead>
<tr>
<th>Year</th>
<th>Median 5q0 (IQR)</th>
<th>Among the Poorest Tertile</th>
<th>Among the Middle Tertile</th>
<th>Among the Least Poor Tertile</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>194.4 (129.0–254.4)</td>
<td>147.8 (83.1–236.1)</td>
<td>104.7 (44.9–158.5)</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>175.8 (107.7–298.2)</td>
<td>139.6 (75.0–238.5)</td>
<td>97.9 (45.7–165.6)</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>165.2 (85.4–250.1)</td>
<td>131.3 (58.8–229.1)</td>
<td>85.9 (40.6–149.3)</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>156.5 (80.0–241.9)</td>
<td>130.7 (65.0–215.3)</td>
<td>86.5 (44.5–142.5)</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>132.8 (81.1–191.8)</td>
<td>112.0 (61.4–179.5)</td>
<td>86.0 (38.2–130.1)</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>113.1 (68.6–169.9)</td>
<td>96.1 (50.5–146.1)</td>
<td>89.4 (34.4–115.7)</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>98.4 (46.8–153.0)</td>
<td>89.8 (33.1–145.4)</td>
<td>86.5 (30.7–104.7)</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>94.5 (67.3–123.4)</td>
<td>83.9 (46.1–122.0)</td>
<td>67.5 (31.9–83.9)</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>87.9 (62.2–101.1)</td>
<td>79.7 (49.5–91.6)</td>
<td>67.2 (35.2–79.5)</td>
<td></td>
</tr>
</tbody>
</table>

The data for this table use the longitudinal measurements of under-5 mortality within each survey from all 85 surveys between 1995 and 2011. Where multiple surveys provided point estimates for the same country and year (for example, the Armenia 2005 and 2010 surveys both provide estimates for under-5 mortality for 2000 to 2005), the data with the shorter retrospective period were retained. IQR, interquartile range.

DISCUSSION

This analysis of under-5 mortality trends presents evidence for a grand convergence of mortality across the wealth spectrum in low- and middle-income countries. These findings may be surprising given the large and, according to some measures, growing differences in mortality between wealthy and poor nations and between the rich and poor within nations. This convergence is consistent with the theory that the intensive efforts to reduce the burden of communicable diseases resulted in...
preferential declines of under-5 mortality among the poorest. The global epidemiologic trends of communicable diseases support this position: the relative burden of 4 dominant communicable diseases that preferentially afflict the poorest in LMICs (lower respiratory illnesses, diarrhea, malaria, and measles) has declined from a total of 40% of all disability-adjusted life years lost in 1995 to 32% in 2010 among children in developing countries. Over the same period, the share of disability-adjusted life years lost due to neonatal causes and noncommunicable diseases among under-5 children residing in developing countries has increased from 36% to 43%.

Several possibilities could explain why this convergence is occurring now, whereas an analysis of household survey data up to 2001 failed to find convergence. Development assistance for health increased nearly threefold between 2000 and 2010, and the rise in investments was directed mostly toward the control of communicable diseases through large organizations, such as The Global Fund to Fight AIDS, Tuberculosis, and Malaria and the GAVI Alliance (formerly the Global Alliance for Vaccines and Immunization). The extent to which these investments have effectively reduced the burden of communicable diseases is an active debate. However, recent evidence suggests that under-5 mortality among the poor declined preferentially where greater development assistance investments have been made, particularly for malaria control.

Although improving mortality equity among under-5 children across the wealth spectrum may be welcome news, this analysis also shows that this pattern was not universal. Equity in under-5 mortality decreased over time in nearly a fourth of surveys examined, a relationship associated with poor governance. Several studies suggest that governance matters for child survival through provision of public goods, including public health interventions. This analysis adds to that literature by showing that better governance may be important for improving equity in child mortality, at least in LMICs.

This finding raises questions about the role of health aid institutions in supporting programs in poorly governed countries. On the one hand, the poorest in countries with poor governance may be most in need of public health programs, as the evidence in this study shows they may be falling behind relative to less-poor populations. On the other hand, supporting public health programs in well-governed countries may promote equity in child mortality in addition to providing health benefits. The Global Fund to Fight AIDS, Tuberculosis, and Malaria has been operating in fragile states, although not always successfully. One approach may be to condition health aid on meeting governance standards. This approach has been shown to promote governance reforms with possible evidence of improved management of foreign aid funds.

An important consideration in this analysis is that the primary determinant under scrutiny is relative, not absolute, wealth. Several of the countries in this study witnessed rapid economic growth over the study period, and it is likely that the wealth of many households increased even as they remained in the same relative wealth tertile. Absolute wealth may be a critical determinant if under-5 mortality is proportional to absolute wealth, and wealth gradients also have been converging. Alternatively, absolute wealth may be a critical determinant if increasing absolute wealth led to greater (or more efficient) investments in health among the poorest compared with the least poor. This analysis does not examine the independent role of absolute wealth changes in reducing mortality inequality, although, in high-income countries, increasing absolute wealth has not been associated with mortality convergence, which some speculate may be related to increasing income inequality.
concern raises doubts about misclassification of relative wealth status in the retrospective within-survey analyses. Reducing the number of wealth quantiles was done for that reason, so that households could experience substantial changes in wealth without changing their relative wealth rank. In addition, the wealth index was constructed by using durable household possessions, such as floor material and roof material. Possession of such goods changes slowly over time relative to income or consumption, conferring additional stability to the wealth index.16

The household mortality and wealth data used in this analysis come with uncertainty. The DHS methodologists developed a sophisticated approach for estimating standard errors by using block jackknife to account for the complexity in the statistics and study designs.18,32 The uncertainty in the monthly estimates may bias trend measurements. However, an analysis of DHS surveys suggests that differences >15% in under-5 mortality between consecutive surveys signals true trends (the threshold is lower in bigger surveys).19 Among the 29 countries with repeat surveys, the median reduction in under-5 mortality is 25.2%, and it is <15% in all 3 wealth tertiles in only 1 country (Zimbabwe). Thus, although this analysis relies on the uncertain mortality point estimates, the large changes in under-5 mortality during the study period relax some concerns over uncertainty in the trends.

Across much of the developing world, the recent declines in under-5 mortality have been fastest among the poorest, suggesting a widespread convergence of child mortality. This convergence was not shared across all countries, however. Although the drivers of this convergence remain a topic of investigation, this article presents evidence that good governance was related to this convergence. These findings have important implications for prioritization of global health investments and for future research on global health improvements.35

### TABLE 3 Univariate and Multivariate Associations of Mortality Ratio Changes

| Factor                                      | Mortality Ratio Decline, Univariate Associations (P Value) | Mortality Ratio Decline, Multivariate Associations (P Value) | Mean (95% CI) Among Surveys With Lower Ratio (64 Surveys) | Mean (95% CI) Among Surveys With Higher Ratio (21 Surveys)
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<tr>
<td>GDPpc, constant 2005 USDd</td>
<td>0.05 (.26) NA</td>
<td>NA</td>
<td>1283 (951 to 1635)</td>
<td>838 (543 to 1132)</td>
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<tr>
<td>TFR</td>
<td>−0.05 (.18) NA</td>
<td>NA</td>
<td>4.07 (3.71 to 4.42)</td>
<td>4.55 (3.76 to 5.34)</td>
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<tr>
<td>Urbanization, %</td>
<td>0.12 (.54) NA</td>
<td>NA</td>
<td>40.8 (36.2 to 45.4)</td>
<td>35.6 (27.7 to 43.5)</td>
</tr>
<tr>
<td>HIV prevalence, % of adult population</td>
<td>0.02 (.11) NA</td>
<td>NA</td>
<td>3.96 (2.47 to 5.46)</td>
<td>3.45 (0.88 to 6.01)</td>
</tr>
<tr>
<td>Public health spending, % of GDP</td>
<td>−0.02 (.57) NA</td>
<td>NA</td>
<td>2.86 (2.31 to 3.02)</td>
<td>2.96 (2.14 to 3.78)</td>
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- a These estimates provide the univariate association from separate linear regression models where the dependent variable is the difference between the first and last years of measurement within each survey and the correlates are in the first column. A positive association indicates that higher levels of the correlate were associated with greater convergence of the mortality ratio. The year of each correlate is the year of the survey, although the findings were similar when using the average value over the period of measurement or the first year of measurement for each survey.
- b In multivariate analysis, the dependent variable remained the difference between the first and last years of measurement within each survey; the independent variables included the governance indicators and 5 covariates shown at the top of the table (GDP per capita, total fertility rate, urbanization, HIV prevalence, and public health spending as a percentage of GDP). Each governance indicator was analyzed separately. The effect size and significance of the governance indicators is generally similar, or slightly larger, than in the univariate associations, suggesting a stable relationship between governance quality and convergence of mortality across wealth gradients.
- c These columns indicate the mean of the correlates in 2 groups of surveys: those surveys in which the mortality ratio declined (64 surveys), and those in which it climbed (divergence of mortality, observed in 21 surveys).
- d GDPpc measurements in 1000s of constant 2005 USD were used for the univariate association.
- e The Worldwide Governance Indicators summarize surveys, private sector, and public sector data into a score on 6 dimensions of governance. Complete descriptions of each indicator are available through the Worldwide Governance Indicators portal.34 The composite scores for each indicator are normalized and range from approximately 2.5 to 2.5, with higher values corresponding to better governance. The mean score for all indicators is <0 for the study countries, although the scores were consistently higher in those surveys in which convergence was observed compared with surveys with diverging under-5 mortality.
- * P < .05.
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*Pediatrics*; originally published online November 10, 2014; DOI: 10.1542/peds.2014-2320

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*Pediatrics*; originally published online November 10, 2014;
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