Do socioeconomic inequalities in neonatal mortality reflect inequalities in coverage of maternal health services? Evidence from 48 low- and middle-income countries

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Competing Interests
We declare that we have no competing interests.

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Abstract

Objective: To examine socioeconomic and health system determinants of wealth-related inequalities in neonatal mortality rates (NMR) across 48 low- and middle-income countries.

Methods: We used data from Demographic and Health Surveys conducted between 2006-2012. Absolute and relative inequalities for NMR and coverage of antenatal care, facility-based delivery, and Caesarean delivery were measured using the Slope Index of Inequality and Relative Index of Inequality, respectively. Meta-regression was used to assess whether variation in the magnitude of NMR inequalities was associated with inequalities in coverage of maternal health services, and whether country-level economic and health system factors were associated with mean NMR and socioeconomic inequality in NMR.

Results: Of the three maternal health service indicators examined, the magnitude of socioeconomic inequality in NMR was most strongly related to inequalities in antenatal care. NMR inequality was greatest in countries with higher out-of-pocket health expenditures, more doctors per capita, and a higher adolescent fertility rate. Determinants of lower mean NMR (e.g., higher government health expenditures and a greater number of nurses/midwives per capita) differed from factors associated with lower NMR inequality.

Conclusion: Reducing the financial burden of maternal health services and achieving universal coverage of antenatal care may contribute to a reduction in socioeconomic differences in NMR. Further investigation of the mechanisms contributing to these cross-national associations seems warranted.

Keywords: neonatal mortality; maternal health services; socioeconomic inequality; meta-regression; low- and middle-income countries

Introduction

Over the past decade, research and policy efforts dedicated to improving neonatal survival in low- and middle-income countries (LMIC) have increased exponentially [1]. The realization that neonatal mortality rates (NMR) have been declining at a slower pace than under-five child mortality rates has heightened the visibility of NMR as an important global health issue [2]. Recent global estimates of NMR range from 1 neonatal death per 1000 live births in Japan and Iceland to more than 48 neonatal deaths per 1000 live births in Mali, Sierra Leone, and Somalia [3]. In addition to huge differences between countries, there are also substantial inequalities in NMR within countries according to wealth, education, ethnicity, and access to health care services [4-6]. Addressing these inequalities is recognized as a critical component of global efforts to improve neonatal survival [7, 8].

We recently published an analysis of trends in socioeconomic inequalities in NMR across 24 LMIC and found substantial wealth- and education-related inequalities in NMR in the majority of countries.[4] Across all countries, the estimated difference for babies born to low versus high-educated mothers was 10.9 neonatal deaths per 1000 live births, or a 41% relative difference[4]. There was, however, considerable variability in the magnitude of NMR inequalities across countries. An associated commentary to the article pointed out that a logical next step is to understand why inequalities in NMR are larger in some countries than others [9]. Identifying factors that explain this heterogeneity across countries may help contribute to the development of effective polices to reduce inequalities.

Inadequate care during pregnancy, childbirth, and in the immediate postnatal period is widely acknowledged to be a major contributor to NMR worldwide. Although the majority of LMIC have made progress increasing coverage of maternal and newborn health interventions over the past two decades, these interventions are not reaching many of the women and newborns who need them most [2, 10]. Slow and uneven progress increasing coverage of essential health services and reducing NMR is attributed to numerous factors: weak health systems, poor geographical access to health services, high out-of-pocket (OOP) expenditures, and social determinants such as low education and gender discrimination [11]. While achieving equitable and universal coverage of high-impact maternal and newborn interventions is one of the guiding principles of the World Health Organization's (WHO) 2014 Every Newborn action plan, the evidence is not yet clear on the most effective policy approaches to reach poor and vulnerable population groups with essential health services [7, 12].

The objectives of this paper are twofold. First, while the presence of large socioeconomic inequalities in coverage of maternal and newborn health services is well established, little is known about whether inequalities in these factors are associated with inequalities in NMR [13]. Thus, using comparable methodology and equivalent inequality metrics, we compared patterns of inequality in NMR and in coverage of three maternal health indicators: receipt of 4+ antenatal care visits, facility-based delivery, and Caesarean delivery (as a marker of access to emergency obstetric services) [14]. Second, we explored the relationship between national socioeconomic and health system factors (e.g., gross national income per capita (GNIpc), OOP health expenditures, medical professionals per capita) and NMR inequalities across countries. National-level determinants of mean NMR include socioeconomic determinants (e.g., GDP and fertility rate) and coverage of health interventions (e.g., skilled birth attendance) [11]. However, as has been shown for other health outcomes, factors associated with better average outcomes do not necessarily lead to lower inequalities [15, 16]. Therefore, given the explicit interest in reducing socioeconomic inequalities in NMR, we sought to identify country characteristics that may be associated with large NMR inequalities.

Methods

Data

We used nationally representative household survey data from the Demographic and Health Surveys (DHS) program (http://dhsprogram.com) for 48 LMIC that had recent surveys conducted between 2006-2012. The DHS collect information on household socioeconomic and environmental conditions, along with complete birth histories and information on the use of maternal health services for all women aged 15-49 living in each household.

We estimated the magnitude of socioeconomic inequality in NMR and coverage of antenatal care, facility-based delivery, and delivery by Caesarean section. Neonatal mortality was measured retrospectively by deaths reported within the first month of life among infants who were born alive. Antenatal care is the percentage of women who reported receiving at least four antenatal care visits from a skilled health worker (as defined in the DHS reports for each country). Facility-based deliveries are births reported to have taken place in a public or private health facility (hospital, health center, maternity, clinic). Women also reported whether each birth took place by Caesarean section. In the majority of the countries in our sample, rates of Caesarean section are around or below the minimum 5% recommended by the WHO and, as such, the majority of procedures are likely to reflect life saving obstetric procedures [14]. A few countries (e.g., Colombia, Peru, Egypt) have higher Caesarean section rates than the maximum 15% recommended by the WHO, reflecting a high proportion of elective procedures [17, 18]. Multiple births were considered as a single observation for the three maternal health service outcomes. Analyses included live births in the 5 years preceding each survey date. In most countries, information on antenatal care was asked only for the most recent birth in the past 5 years.

We used the DHS asset-based household wealth index as our measure of socioeconomic position [19]. The wealth index is estimated separately for each survey using information on ownership of household goods, housing quality, and water and sanitation facilities, and thus represents each household's position in the wealth distribution relative to other households within the same country. Asset-based measures of wealth are widely used in research on health inequalities in LMIC [20].

We assessed the relationship between NMR inequalities and several established or presumed contextual determinants of neonatal or infant mortality or mortality inequalities in LMIC [7, 11, 15, 21]. Estimates of GNIpc, total per capita health expenditure, OOP expenditure as a percentage of total health expenditure, adolescent fertility rate (births per 100 women ages 15-19), doctors per 1000 people, nurses/midwives per 1000 people, and the Gini index of inequality were obtained from the World Bank's World Development Indicators and the WHO Global Health Expenditure Database, using Stata's *wbopendata* module (http://data.worldbank.org/developers/apps/wbopendata). We used the Institute for Health Metrics and Evaluation's 2008 estimates for the mean number of years in school for women aged 15-44 years [22]. As information on maternal health services and neonatal mortality was ascertained over a 5-year period preceding each survey, we used country variable estimates for 2 years prior to the year each survey was conducted. For example, country estimates for a country whose survey was conducted in 2010 (i.e., births between 2005-2010) refer to the year 2008. In cases where this year's estimate was unavailable, which was most frequent for the Gini index and estimates of doctors and nurses/midwives per 1000 people, we used estimates for the closest year (between 2001-2013).

Statistical Analysis

We measured absolute and relative wealth-related inequalities in NMR, antenatal care, facility delivery, and Caesarean delivery using the Slope (SII) and Relative Index of Inequality (RII), respectively [23]. The SII represents the estimated difference in the outcome between the bottom and the top of the wealth distribution. Figure 1 depicts graphically the SII, which is estimated as the slope obtained from regressing the outcomes of interest against each individual's relative rank in the cumulative distribution of household wealth. For example, an SII of -27 signifies that NMR is 27 deaths per 1000 live births greater for the bottom compared to the top of the wealth distribution. For the maternal health interventions, positive SII values indicate pro-rich inequality (i.e., better coverage among the rich). The RII is the proportionate difference in the outcome across the wealth distribution, with negative values indicating pro-rich inequality for NMR and positive values indicating pro-rich inequality for antenatal care, facility delivery, and Caesarean delivery. Random effects meta-analysis was used to generate regional and overall pooled estimates, using the DerSimonian and Laird inverse-variance method [24]. RII and SII estimates incorporated sampling weights and clustering at the level of primary sampling unit.

We used random effects meta-regression to assess whether heterogeneity in the magnitude of NMR inequalities was associated with inequalities in coverage of maternal health services and country-level economic and health system factors. We applied log transformations to account for skewed distributions of several of the predictor variables: GNIpc, health expenditure per capita, doctors per 1000 people, and nurses/midwives per 1000 people. Meta-regression estimates were weighted by the inverse variance of the SII or RII estimates, which gives greater weight to more precise estimates [24]. We performed univariate linear regression analyses across all countries, as well as separately for low-income and middle-income countries (categorized using the 2009 World Bank income classification, shown in Table 1 of the Supplementary Material). Given the high collinearity between GNIpc and other predictor variables (e.g., health expenditures, health care workers, maternal education), we performed stratified analysis by income group rather than conditioning on GNIpc. We also estimated meta-regression models that included World Bank region fixed effects. The adjusted R-squared statistic is presented as a measure of the relative reduction in between-country variance upon including additional covariates in our models [25]. All analyses were performed using Stata version 12.1 [26].

Results

Table 1 presents characteristics of the surveys, estimates of NMR and coverage of antenatal care, facility delivery, and Caesarean section, as well as country-level economic and health care indicators. NMR ranged from less than 12 neonatal deaths per 1000 live births in Peru and Colombia to more than 38 in Pakistan, India, and Nigeria. Lower mean NMR was associated with higher coverage of antenatal care, facility delivery, and Caesarean section, as well as increasing values of GNIpc, per capita health expenditure, mean years of education, and doctors and nurses/midwives per 1000 people (see Table 2 in the Supplementary Appendix). There was a small non-significant association between higher mean NMRs and greater relative inequality in NMR (*r*=-0.23, *p*=0.11; see Figure 1 in the Supplementary Material).

Country-specific RII and SII estimates for NMR and the three maternal health care indicators are presented in Table 2, along with overall and region-specific random-effects pooled estimates. The overall pooled SII for NMR is -6.7 (95% CI: -10.1, -3.2), indicating that moving from the bottom to the top of the wealth distribution is associated with an estimated 6.7 fewer neonatal deaths per 1000 live births. In relative terms, this corresponds to a 25% difference (95% CI: 13, 37). The magnitude of NMR inequality was substantially greater for middle-income countries (RII=-0.39, 95% CI: -0.56, -0.23; SII=-8.8, 95% CI: -13.9, -3.6) compared to low-income countries (RII=-0.16, 95% CI=-0.31, -0.01; SII=-4.7, 95% CI: -9.2, -0.2). There are huge pro-rich inequalities for all three maternal health services, with pooled estimates across all 48 countries indicating average absolute differences (measured by SII) of 35.4 percentage points for antenatal care (95% CI: 28.0, 42.7), 54.6 for facility delivery (95% CI: 48.6, 60.6), and 16.7 for Caesarean delivery (95% CI: 13.8, 19.7).

Table 3 presents the linear meta-regression estimates between NMR inequalities and inequalities in coverage of antenatal care and facility delivery across 48 countries. For inequality in coverage of Caesarean delivery, we restricted the analysis to the 35 countries that have a mean Caesarean prevalence less than 10%. The rationale for this restriction is that large inequalities in Caesarean delivery that are present in countries with high rates of elective surgeries (e.g., Egypt, Dominican Republic) do not reflect socioeconomic inequalities in access to a life-saving obstetric procedure, but rather very high rates of elective surgeries among the rich. The strongest association was between NMR inequalities and inequalities in antenatal care (Figure 2). A 10-percentage point reduction in the rich-poor gap for antenatal care (i.e., 10-point reduction in SII) was associated with an estimated reduction in the rich-poor gap for NMR of 2.9 neonatal deaths per 1000 live births (95% CI: 1.4, 4.4). Pro-rich inequality in facility delivery was also generally consistent with pro-rich NMR inequality, particularly absolute inequality, although 95% CIs for the estimates crossed the null. Including fixed effects for region reduced the magnitude of effect estimates and explained a considerable proportion of the between-country variance (as evidence by the large increase in the Adjusted R-squared values). Greater inequality in antenatal care reflected greater NMR inequality similarly for both low-income countries and middle-income countries. However, there only seems to be a relationship between inequality in facility delivery and NMR inequality in middle-income countries. Higher pro-rich inequality in Caesarean delivery is also consistent with greater NMR inequality, although estimates are imprecise.

Results of the meta-regressions between NMR inequality and country-level socioeconomic and health system predictors are presented in Table 4. Higher relative and absolute inequality in NMR was most strongly associated with higher OOP expenditures, a greater number of doctors per capita, and a high adolescent fertility rate. Across all countries, a 10 percentage-point decrease in OOP expenditures was associated with a 9.2% reduction in the rich-poor gap in NMR (95% CI: 3.3%, 15.2%), or an absolute decrease in the gap of 3.0 neonatal deaths per 1000 live births (95% CI: 1.2, 4.7). Higher NMR inequality was also consistent with higher GNIpc and greater income inequality (Gini index), although estimates are imprecise with 95% CIs slightly crossing the null. Including region fixed effects in the meta-regression models tended to reduce the point estimates and explained a substantial proportion of between-country variance. Results stratified by low versus middle-income countries were generally similar to the overall results. OOP expenditures appeared to have a stronger association with NMR inequality in low-income countries.

Discussion

We examined socioeconomic and health service determinants of wealth-related inequalities in NMR across 48 countries. In general, the magnitude of pro-rich inequality in NMR was greater in middle-income countries compared to low-income countries and for the region of south and Southeast Asia compared to Latin America & the Caribbean and Africa. NMR inequality also tended to be greater in countries with higher OOP health expenditures and more doctors per capita and where poorer women are much less likely than richer women to receive antenatal care.

Ensuring universal health care coverage and removing financial barriers for essential health services are becoming health priorities in countries of high, low and middle income [27, 28]. High OOP spending on health care has been shown to exacerbate poverty and deter appropriate health care seeking [29]. We found that NMR inequality was largest in countries with high OOP expenditures, although there was little association between OOP expenditures and mean NMR. This suggests that relatively low NMRs can be attained in the presence of high OOP spending through achieving disproportionately lower mortality rates among more advantaged populations (i.e., greater inequality). Indonesia, for example, has relatively high OOP expenditures (45% of health expenditures), relatively low mean NMR (18.8 neonatal deaths per 1000 live births), and considerable NMR inequality (rich-poor gap (SII) of 15.0 neonatal deaths per 1000 live births). Further investigation of the mechanisms underlying the cross-national association between OOP expenditures and NMR inequalities seems warranted.

We found greater public expenditures on health, expanded coverage of maternity services, and a greater number of skilled health care workers to be significantly associated with lower mean NMR. However, these indicators were not associated with lower NMR inequalities. For example, while countries with more doctors per capita tended to have lower mean NMR, they also had substantially greater levels of inequality. These findings are in line with previous evidence that expanding interventions within existing health services may differentially benefit more advantaged populations—at least initially—leading to increased socioeconomic inequalities in health services utilization and health outcomes [30, 31]. For example, it would not be surprising for increased physician services to be disproportionately concentrated in urban areas and more easily accessed by wealthier women, which would tend to widen inequalities. Policies that explicitly target services to disadvantaged populations may help mitigate this tendency for inequalities to widen as services are scaled up from initially low levels within a country [12].

Consistent with previous evidence, we found large inequalities in maternity care were present in nearly all LMIC [13, 32-34] . Of the three maternal health service indicators we examined, the magnitude of socioeconomic inequality in NMR was most strongly related to inequality in antenatal care. For example, the large rich-poor gap in NMR observed in Pakistan (47.8 neonatal deaths per 1000 live births) may partly reflect the massive 70.7 percentage point difference in receipt of antenatal care between the top and bottom of the wealth distribution. Antenatal care interventions are critical in order to identify high-risk pregnancies and prevent and treat infections (malaria, tetanus, syphilis), along with preventing mother-to-child transmission of HIV [11]. Newborn deaths due to tetanus and other infections are often easier to prevent than those resulting from complications at the time of delivery, which may require more specialized obstetrical interventions. While there has been a greater emphasis on increasing coverage of skilled care at birth and basic and emergency obstetric care to improve neonatal survival [7], our results reinforce the importance of achieving universal coverage of antenatal care, particularly among disadvantaged populations and in areas lacking high-quality health services.

A main limitation of this paper is the imprecision of many of our estimates, particularly the SII and RII estimates for NMR, which results from the limited survey sample sizes used to study the relatively infrequent outcome of newborn death. While this is certainly a limitation, we were able to use random effects meta-regression (which accounts for the imprecision of individual estimates) to identify potential determinants of NMR inequalities across countries. In addition, the maternal health care coverage variables are self-reported for births in the past 5 years and may be subject to recall bias. It is also well known that maternity services vary in quality between and within LMIC and that self-reported utilization of services does not actually mean that skilled care was obtained [35]. We also did not have comprehensive information across surveys on specific newborn interventions (e.g., neonatal resuscitation) that may contribute to NMR inequalities. Moreover, the estimates presented in this paper reflect cross-national associations, not causal effects, with our aim being to provide some insight on the socioeconomic and health service determinants that may help explain variation in NMR inequalities across countries. Finally, the cross-national associations identified among our sample of 48 LMIC cannot necessarily be generalized to all LMIC.

Newborn survival in LMIC has rapidly gained attention by United Nations agencies, international organizations, and national governments over the past decade [1]. While most of the focus to date has been on achieving reductions in mean NMR, recent initiatives have begun to emphasize the importance of addressing social disparities in newborn health [7, 8]. In this paper, we found that factors associated with lower NMR (e.g., health expenditure per capita, number of nurses/midwives per 1000 people) differ from factors associated with lower NMR inequality (e.g., OOP expenditures on health). As such, traditional policy approaches that focus on increasing national health expenditures and training additional healthcare personnel may not contribute to a narrowing of inequalities (and may even exacerbate inequalities). Further research that explores the mechanisms contributing to the observed associations between OOP costs and socioeconomic inequalities in NMR will help inform effective policy approaches to lower the financial burden of health services and reduce inequalities.

Figure 1: Slope Index of Inequality

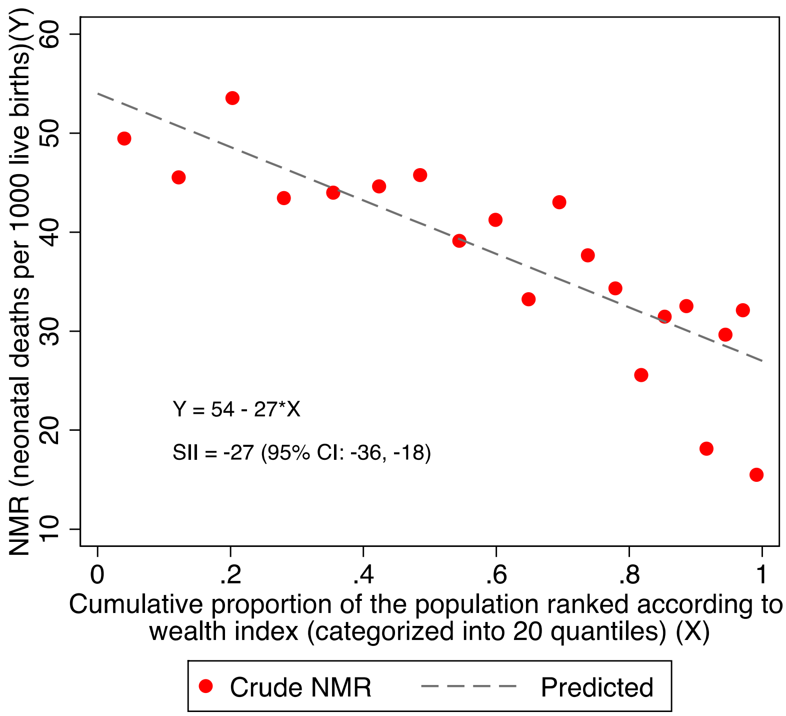


Table 1: Survey characteristics and descriptive statistics for 48 low- and middle-income countries. Demographic and Health Surveys, 2006-2012

Country	Survey year	Sample size	NMR (95% CI)	ANC (%)	Facility delivery (%)	C-section (%)	GNIpc	Gini[a]	HEpc	OOP (%)	Doctors per 1000	Nurses/ midwives per 1000	Teen fertility rate	Educ (years)
South and southeast Asia														
Bangladesh	2011	8902	31.7 (27.5, 35.9)	23.9	24.9	14.1	2543	32.1	82	61	0.29	0.22	8.2	4.7
Cambodia	2010	8358	26.9 (22.6, 31.3)	59.6	54.2	3.0	2332	35.2	143	62	0.23	0.88	4.5	4.6
India	2005-06	52385	38.7 (36.5, 40.9)	37.3	38.8	8.5	3009	33.4	135	67	0.60	1.30	5.5	4.9
Indonesia	2012	18309	18.9 (15.7, 22.1)	88.4	63.7	12.4	8267	35.6	273	45	0.29	1.38	4.8	8.3
Maldives	2009	3859	10.1 (5.7, 14.4)	97.6	96.8	32.4	11103	37.4	753	20	1.60	5.03	0.8	5.7
Nepal	2011	5397	32.8 (26.5, 39.1)	50.1	35.9	4.6	1951	32.8	124	46	0.21	0.46	7.8	3.2
Pakistan	2012-13	11960	55.0 (48.3, 61.8)	36.6	48.3	14.1	4380	29.6	122	55	0.83	0.57	2.7	4.2
Philippines	2008	6686	15.8 (12.4, 19.2)	78.1	44.3	9.6	6244	44.0	203	56	1.15	6.00	5.3	10.2
East Timor	2009-10	9916	21.6 (18.2, 25.0)	55.4	22.1	1.7	4595	30.4	87	4	0.10	1.11	6.0	4.4
Region total*			36.7 (29.4, 43.9)	44.0	41.8	9.9	3828	33.6	147	62	0.59	1.37	5.3	5.4
Southern and east Africa														
Burundi	2010	7842	30.5 (25.7, 35.3)	33.5	62.2	4.0	721	33.3	63	26	0.03	0.19	3.2	3.1
Comoros	2012	3191	23.1 (16.4, 29.8)	57.4	77.8	9.7	1423	64.3	99	41	0.15	0.74	5.1	4.8
Ethiopia	2011	11858	37.2 (32.0, 42.4)	19.1	10.0	1.5	1169	33.6	60	34	0.03	0.24	8.1	2.1
Kenya	2008-09	6148	31.5 (24.2, 38.8)	48.1	42.7	6.3	2313	47.7	81	46	0.14	0.79	9.9	8.0
Lesotho	2009	4044	46.5 (37.1, 55.9)	72.0	59.8	6.7	2437	54.2	200	20	0.05	0.62	9.0	9.2
Madagascar	2008-09	12657	24.0 (20.3, 27.6)	49.9	35.6	1.5	1401	38.9	64	39	0.16	0.32	13.2	5.1
Malawi	2010	20295	31.1 (27.6, 34.5)	45.8	75.1	4.6	671	46.2	68	11	0.02	0.28	15.0	5.1
Mozambique	2011	11255	30.3 (25.9, 34.6)	51.2	56.0	3.9	871	45.7	61	7	0.03	0.41	14.3	2.8
Namibia	2006	5243	23.4 (18.6, 28.3)	78.4	81.3	12.7	7266	63.9	513	3	0.30	2.78	7.6	8.1
Rwanda	2011	9142	26.6 (22.9, 30.3)	35.5	70.4	7.1	1202	50.8	148	19	0.06	0.69	3.5	4.2
Swaziland	2006-07	2849	21.8 (15.9, 27.8)	81.7	74.6	7.9	5527	51.5	398	14	0.16	3.20	9.1	8.2
Tanzania	2010	8125	25.7 (21.2, 30.3)	43.0	51.0	4.5	1949	37.6	106	32	0.01	0.24	12.6	5.8
Uganda	2011	8024	26.5 (21.9, 31.1)	48.5	58.0	5.3	1464	44.3	163	37	0.12	1.31	13.1	5.5
Zambia	2007	6477	33.8 (28.6, 39.0)	61.1	48.0	3.0	2436	54.6	124	38	0.05	0.71	14.0	6.4
Zimbabwe	2010-11	5617	30.1 (23.3, 37.0)	65.7	66.0	4.5	1415	N/A	N/A	N/A	0.06	1.34	6.3	9.0
Region total*			30.8 (28.3, 33.4)	40.7	42.0	3.9	1538	41.2	94	32	0.06	0.56	10.6	4.8
Latin America and Caribbean														
Bolivia	2008	8748	27.1 (22.3, 31.9)	72.3	67.8	18.6	4564	56.9	240	27	0.47	1.00	7.7	8.6
Colombia	2010	18041	11.4 (9.2, 13.6)	89.7	95.7	34.4	10100	56.0	714	18	1.43	0.62	7.1	8.3

Dominican Republic	2007	11341	22.4 (17.8, 27.0)	96.5	98.8	42.1	8239	51.9	384	47	1.49	1.33	10.9	9.3
Guyana	2009	2206	24.5 (16.2, 32.8)	91.3	91.3	13.3	5787	N/A	206	26	0.21	0.53	9.6	10.9
Haiti	2012	7355	30.3 (25.7, 34.9)	67.7	36.4	5.5	1522	59.2	117	29	N/A	N/A	4.2	5.7
Honduras	2011-12	11064	17.3 (14.1, 20.5)	88.9	83.0	18.7	4108	51.6	365	51	0.37	1.08	8.6	7.6
Peru	2010	9459	8.9 (6.2, 11.6)	93.0	82.5	20.4	8628	46.9	489	37	0.92	1.27	5.2	10.1
Region total*			15.7 (9.5, 22.0)	87.2	82.9	25.7	7632	53.4	490	30	1.08	0.95	6.9	8.6
West, central and north Africa														
Benin	2011-12	13582	22.8 (19.8, 25.9)	61.1	87.2	5.4	1633	43.5	81	39	0.06	0.77	9.3	2.8
Burkina Faso	2010	15275	28.0 (24.7, 31.3)	33.7	66.7	1.9	1358	39.8	97	33	0.06	0.56	12.1	1.5
Cameroon	2011	11918	31.0 (27.0, 35.0)	62.9	62.1	3.8	2542	40.7	133	62	0.08	0.44	11.9	6.5
Congo (Brazzaville)	2011-12	9439	21.3 (16.2, 26.4)	79.3	92.0	5.8	4221	40.2	155	28	0.09	0.82	12.7	7.7
Congo Democratic Republic	2007	9134	41.2 (34.0, 48.4)	48.8	71.6	4.1	529	44.4	20	50	0.11	0.53	13.2	5.1
Cote d'Ivoire	2011-12	7930	37.6 (31.7, 43.6)	44.5	58.5	2.7	2601	43.2	172	58	0.14	0.48	12.9	3.4
Egypt	2008	11022	16.0 (13.0, 18.9)	66.5	71.8	27.6	9034	30.8	462	56	2.43	3.52	4.8	7.5
Gabon	2012	6164	25.9 (19.9, 31.9)	79.0	92.7	10.1	14296	42.2	670	40	0.29	5.02	10.3	8.2
Ghana	2008	3032	29.8 (23.0, 36.6)	80.0	57.6	6.9	2644	42.8	134	22	0.11	0.98	6.6	6.6
Guinea	2012	7156	33.2 (27.7, 38.7)	56.9	40.7	2.4	1069	33.7	56	53	0.10	0.04	13.1	1.8
Liberia	2007	5869	31.4 (25.8, 37.0)	74.3	37.7	3.5	373	38.2	54	38	0.03	0.27	14.2	3.1
Mali	2012	10445	33.8 (28.9, 38.7)	41.6	55.9	2.7	1587	33.0	98	61	0.08	0.43	17.6	1.6
Niger	2012	12763	24.2 (20.4, 28.0)	32.9	42.4	1.4	835	31.2	55	60	0.02	0.14	20.5	1.3
Nigeria	2008	29058	39.9 (37.0, 42.8)	49.4	36.1	1.8	4194	40.0	290	60	0.40	1.61	12.3	6.0
Sao Tome & Principe	2008-09	1958	19.7 (12.0, 27.3)	78.2	80.6	5.3	2796	33.9	177	63	0.49	1.87	7.4	5.3
Senegal	2010-11	12489	28.6 (24.7, 32.5)	51.2	73.1	5.9	2153	40.3	99	38	0.06	0.42	9.6	2.6
Sierra Leone	2008	5716	35.8 (29.5, 42.0)	68.1	25.5	1.5	1160	39.5	124	79	0.02	0.17	11.5	2.1
Region total*			33.7 (29.4, 38.0)	52.8	54.9	6.1	3325	53.4	198	54	0.48	1.26	11.7	5.1

CI, confidence interval; ANC, receipt of 4+ antenatal care visits per 100 live births; GNIpc, Gross national income per capita (PPP international dollars) HEpc: total expenditure on health per capita (PPP international dollars); OOP, out-of-pocket expenditure as a percentage of total health expenditure; Teen fertility rate, births per 100 women ages 15-19; Education, mean years of education among women age 15-44; N/A, data not available.

[a] Gini index measures the extent to which income is unequally distributed within a country's population, with 0 representing perfect equality.

Note: Regional totals are weighted averages, where weights are the estimated number of births in each country for the year 2008 (based on UN Population Division estimates)

Table 2: Absolute and relative inequalities in neonatal mortality, antenatal care, facility-based delivery, and Caesarean delivery, Demographic and Health Surveys 2006-2012

	NMR (neonatal deaths per 1000 live births)		**4+ antenatal care visits (per 100 live births)**		**Facility delivery (per 100 live births)**		**Caesarean delivery (per 100 live births)**	
	RII (95% CI)	SII (95% CI)	RII (95% CI)	SII (95% CI)	RII (95% CI)	SII (95% CI)	RII (95% CI)	SII (95% CI)
South and southeast Asia								
Bangladesh	-0.46 (-0.92, -0.01)	-14.7 (-29.1, -0.4)	2.11 (1.91, 2.30)	50.3 (45.7, 55.0)	2.28 (2.10, 2.46)	56.9 (52.4, 61.3)	3.04 (2.71, 3.37)	42.7 (38.1, 47.4)
Cambodia	-1.21 (-1.77, -0.64)	-32.5 (-47.7, -17.2)	0.83 (0.74, 0.92)	49.6 (44.2, 55.0)	1.11 (1.01, 1.21)	60.1 (54.9, 65.3)	3.08 (1.97, 4.19)	9.2 (5.9, 12.5)
India	-0.76 (-0.96, -0.57)	-29.5 (-37.2, -21.9)	1.95 (1.90, 2.01)	72.8 (70.8, 74.8)	1.94 (1.89, 1.99)	75.2 (73.3, 77.1)	3.38 (3.15, 3.61)	28.7 (26.7, 30.6)
Indonesia	-0.79 (-1.31, -0.27)	-15.0 (-24.8, -5.1)	0.38 (0.34, 0.42)	33.4 (29.8, 37.0)	1.05 (1.00, 1.10)	67.0 (63.7, 70.3)	1.91 (1.66, 2.17)	23.8 (20.6, 26.9)
Maldives	0.11 (-1.32, 1.53)	1.1 (-13.3, 15.4)	0.03 (0.00, 0.06)	2.6 (-0.2, 5.3)	0.12 (0.07, 0.16)	11.3 (7.1, 15.6)	0.65 (0.44, 0.85)	20.9 (14.2, 27.7)
Nepal	-0.34 (-0.89, 0.20)	-11.3 (-29.2, 6.7)	1.23 (1.12, 1.35)	61.6 (55.8, 67.4)	1.94 (1.80, 2.09)	69.6 (64.4, 74.8)	3.89 (2.80, 4.98)	17.9 (12.9, 22.9)
Pakistan	-0.87 (-1.27, -0.47)	-47.8 (-69.6, -26.0)	1.93 (1.79, 2.08)	70.7 (65.4, 76.0)	1.33 (1.21, 1.45)	64.3 (58.4, 70.2)	2.58 (2.21, 2.95)	36.3 (31.1, 41.5)
Philippines	-0.59 (-1.33, 0.16)	-9.2 (-21.0, 2.6)	0.54 (0.48, 0.60)	42.0 (37.5, 46.6)	1.74 (1.68, 1.81)	77.3 (74.2, 80.3)	3.23 (2.75, 3.71)	30.9 (26.2, 35.5)
East Timor	-0.23 (-0.80, 0.34)	-5.0 (-17.3, 7.4)	0.65 (0.55, 0.76)	36.0 (30.2, 41.8)	2.94 (2.62, 3.26)	65.1 (58.0, 72.2)	3.23 (2.06, 4.40)	5.6 (3.6, 7.6)
Region pooled	-0.68 (-0.86, -0.49)	-17.4 (-26.2, -8.6)	1.07 (0.56, 1.58)	46.5 (27.2, 65.9)	1.60 (1.05, 2.15)	60.8 (48.1, 73.4)	2.74 (1.91, 3.57)	23.9 (15.4, 32.5)
West, central and north Africa								
Benin	-0.06 (-0.50, 0.38)	-1.4 (-11.5, 8.6)	0.89 (0.82, 0.95)	54.1 (49.9, 58.2)	0.45 (0.38, 0.51)	38.9 (33.2, 44.7)	1.85 (1.37, 2.33)	10.0 (7.4, 12.6)
Burkina Faso	-0.43 (-0.80, -0.06)	-12.1 (-22.4, -1.8)	0.80 (0.67, 0.94)	27.0 (22.4, 31.5)	0.79 (0.71, 0.87)	52.8 (47.4, 58.1)	3.04 (1.95, 4.14)	5.9 (3.8, 8.0)
Cameroon	-0.28 (-0.75, 0.18)	-8.8 (-23.3, 5.6)	0.98 (0.89, 1.06)	61.5 (56.1, 66.9)	1.39 (1.32, 1.47)	86.4 (81.7, 91.0)	3.32 (2.55, 4.09)	12.7 (9.8, 15.7)
Congo (Brazzaville)	0.27 (-0.41, 0.95)	5.7 (-8.8, 20.1)	0.46 (0.39, 0.52)	36.1 (30.8, 41.3)	0.35 (0.26, 0.43)	32.1 (24.2, 40.0)	2.18 (1.54, 2.83)	12.6 (8.9, 16.3)
Congo Democratic Republic	-0.74 (-1.36, -0.12)	-30.4 (-55.9, -4.9)	0.36 (0.14, 0.57)	17.4 (7.0, 27.8)	0.72 (0.61, 0.84)	51.6 (43.4, 59.9)	1.22 (0.56, 1.89)	5.0 (2.3, 7.7)
Cote d’Ivoire	0.05 (-0.53, 0.64)	1.9 (-20.1, 23.9)	1.17 (1.01, 1.32)	52.1 (45.3, 58.8)	1.09 (1.00, 1.17)	63.9 (59.1, 68.7)	3.06 (2.06, 4.06)	8.4 (5.7, 11.2)
Egypt	-0.49 (-1.09, 0.10)	-7.9 (-17.4, 1.6)	0.87 (0.83, 0.92)	58.1 (54.9, 61.4)	0.81 (0.76, 0.86)	57.9 (54.2, 61.6)	1.40 (1.25, 1.54)	38.6 (34.6, 42.6)
Gabon	-0.40 (-1.07, 0.28)	-10.3 (-27.8, 7.1)	0.48 (0.40, 0.56)	37.8 (31.4, 44.2)	0.36 (0.28, 0.44)	33.3 (25.5, 41.2)	1.65 (0.80, 2.50)	16.6 (8.0, 25.2)
Ghana	0.09 (-0.67, 0.85)	2.7 (-20.1, 25.4)	0.49 (0.40, 0.57)	38.8 (31.7, 45.8)	1.35 (1.27, 1.43)	77.7 (72.9, 82.4)	2.34 (1.62, 3.07)	16.2 (11.2, 21.2)
Guinea	-0.36 (-0.92, 0.20)	-11.9 (-30.5, 6.8)	0.92 (0.82, 1.02)	52.2 (46.4, 58.0)	1.70 (1.55, 1.84)	68.9 (63.1, 74.7)	3.85 (2.52, 5.17)	9.4 (6.1, 12.6)
Liberia	0.18 (-0.43, 0.78)	5.6 (-13.4, 24.5)	0.55 (0.45, 0.65)	40.9 (33.3, 48.6)	1.54 (1.29, 1.78)	58.0 (48.7, 67.2)	2.46 (1.60, 3.31)	8.5 (5.6, 11.5)
Mali	-0.17 (-0.58, 0.23)	-5.9 (-19.7, 7.9)	1.34 (1.22, 1.46)	55.9 (50.9, 60.9)	1.29 (1.20, 1.37)	71.9 (67.3, 76.5)	2.54 (1.80, 3.27)	6.8 (4.8, 8.7)
Niger	-0.18 (-0.71, 0.35)	-4.4 (-17.2, 8.5)	0.72 (0.56, 0.87)	23.6 (18.6, 28.7)	1.38 (1.24, 1.53)	58.7 (52.7, 64.7)	3.00 (1.79, 4.22)	4.2 (2.5, 5.9)
Nigeria	-0.31 (-0.56, -0.06)	-12.5 (-22.4, -2.5)	1.71 (1.66, 1.75)	84.2 (81.9, 86.5)	2.31 (2.22, 2.39)	83.1 (80.0, 86.3)	4.67 (3.72, 5.61)	8.5 (6.8, 10.2)
Sao Tome & Principe	-0.30 (-1.74, 1.15)	-5.8 (-34.2, 22.6)	0.49 (0.37, 0.60)	38.1 (29.0, 47.3)	0.37 (0.27, 0.48)	30.0 (21.6, 38.5)	1.06 (0.11, 2.01)	5.6 (0.6, 10.7)
Senegal	-0.41 (-0.82, 0.01)	-11.6 (-23.3, 0.2)	0.95 (0.83, 1.07)	48.4 (42.3, 54.5)	0.97 (0.89, 1.06)	71.1 (64.9, 77.3)	2.95 (2.00, 3.90)	17.5 (11.9, 23.2)
Sierra Leone	-0.31 (-0.94, 0.32)	-11.1 (-33.7, 11.5)	0.42 (0.30, 0.54)	28.6 (20.7, 36.4)	0.99 (0.73, 1.25)	25.4 (18.7, 32.0)	3.16 (1.45, 4.87)	4.7 (2.2, 7.3)
Region pooled	-0.26 (-0.38, -0.14)	-7.1 (-10.5, -3.7)	0.80 (0.58, 1.02)	44.5 (34.2, 54.9)	1.05 (0.80, 1.30)	56.8 (48.0, 65.5)	2.50 (2.04, 2.96)	11.0 (8.0, 13.9)
Latin America and Caribbean								
Bolivia	-1.09 (-1.71, -0.48)	-29.6 (-46.1, -13.0)	0.66 (0.59, 0.73)	47.7 (42.4, 52.9)	1.19 (1.12, 1.25)	80.5 (76.0, 84.9)	2.62 (2.37, 2.87)	48.8 (44.1, 53.5)

Colombia	-0.27 (-0.94, 0.41)	-3.0 (-10.7, 4.6)	0.25 (0.22, 0.28)	22.6 (19.9, 25.3)	0.25 (0.21, 0.29)	23.7 (19.7, 27.7)	0.77 (0.67, 0.87)	26.4 (22.9, 29.9)
Dominican Republic	-0.20 (-0.93, 0.54)	-4.4 (-20.9, 12.1)	0.09 (0.06, 0.11)	8.4 (6.2, 10.5)	0.09 (0.05, 0.13)	8.7 (4.7, 12.6)	1.04 (0.91, 1.16)	43.7 (38.5, 48.9)
Guyana	0.38 (-0.70, 1.46)	9.3 (-17.2, 35.8)	0.15 (0.09, 0.22)	14.0 (8.0, 20.1)	0.41 (0.31, 0.51)	37.3 (28.0, 46.6)	1.48 (0.89, 2.08)	19.8 (11.8, 27.7)
Haiti	-0.12 (-0.64, 0.39)	-3.8 (-19.3, 11.7)	0.68 (0.59, 0.77)	45.9 (39.7, 52.0)	2.03 (1.91, 2.14)	73.7 (69.4, 78.0)	3.26 (2.42, 4.11)	18.0 (13.4, 22.7)
Honduras	-0.10 (-0.68, 0.49)	-1.7 (-11.8, 8.4)	0.20 (0.17, 0.24)	18.1 (15.2, 21.0)	0.67 (0.61, 0.73)	55.6 (51.0, 60.2)	1.66 (1.47, 1.85)	31.0 (27.4, 34.5)
Peru	-0.17 (-1.42, 1.07)	-1.5 (-12.6, 9.5)	0.20 (0.15, 0.26)	18.7 (13.7, 23.7)	0.78 (0.70, 0.86)	64.2 (57.6, 70.8)	2.16 (1.92, 2.39)	44.1 (39.3, 48.8)
Region pooled	-0.29 (-0.61, 0.04)	-5.0 (-11.6, 1.6)	0.32 (0.19, 0.44)	24.9 (15.4, 34.5)	0.77 (0.39, 1.15)	49.1 (26.8, 71.4)	1.80 (1.27, 2.34)	33.2 (24.7, 41.7)
Southern and east Africa								
Burundi	-0.03 (-0.56, 0.50)	-0.9 (-17.0, 15.2)	0.01 (-0.16, 0.18)	0.4 (-5.5, 6.2)	0.49 (0.40, 0.58)	30.3 (25.0, 35.7)	1.27 (0.67, 1.87)	5.1 (2.7, 7.5)
Comoros	0.48 (-0.63, 1.59)	11.1 (-14.5, 36.8)	0.56 (0.35, 0.77)	32.1 (20.1, 44.1)	0.51 (0.41, 0.61)	39.8 (31.9, 47.7)	1.75 (1.08, 2.41)	16.9 (10.5, 23.3)
Ethiopia	-0.59 (-1.09, -0.09)	-22.0 (-40.6, -3.4)	2.21 (1.91, 2.50)	42.3 (36.6, 47.9)	4.63 (3.66, 5.60)	46.3 (36.6, 56.0)	5.96 (3.24, 8.68)	8.8 (4.8, 12.8)
Kenya	-0.46 (-1.28, 0.37)	-14.3 (-40.2, 11.6)	0.80 (0.66, 0.95)	38.7 (31.7, 45.7)	1.64 (1.51, 1.77)	69.9 (64.3, 75.4)	2.50 (1.80, 3.21)	15.6 (11.2, 20.0)
Lesotho	-0.44 (-1.25, 0.38)	-20.2 (-57.9, 17.4)	0.51 (0.42, 0.59)	36.3 (30.6, 42.1)	1.13 (1.06, 1.21)	67.8 (63.3, 72.2)	2.12 (1.48, 2.75)	14.1 (9.9, 18.3)
Madagascar	0.00 (-0.53, 0.53)	0.0 (-12.7, 12.6)	0.90 (0.81, 0.99)	44.8 (40.2, 49.3)	1.54 (1.40, 1.67)	54.7 (49.9, 59.6)	5.40 (3.67, 7.13)	7.9 (5.4, 10.4)
Malawi	0.27 (-0.11, 0.65)	8.3 (-3.5, 20.1)	0.24 (0.16, 0.33)	11.1 (7.1, 15.1)	0.37 (0.32, 0.42)	27.6 (24.0, 31.2)	1.45 (1.07, 1.83)	6.6 (4.9, 8.4)
Mozambique	0.30 (-0.16, 0.75)	9.0 (-4.8, 22.8)	0.73 (0.62, 0.84)	37.3 (31.5, 43.0)	1.25 (1.17, 1.34)	70.0 (65.3, 74.7)	2.83 (2.19, 3.46)	11.1 (8.6, 13.6)
Namibia	0.01 (-0.72, 0.73)	0.2 (-16.8, 17.2)	0.20 (0.12, 0.27)	15.4 (9.3, 21.4)	0.61 (0.53, 0.69)	49.6 (42.8, 56.4)	2.57 (2.14, 3.00)	32.6 (27.1, 38.1)
Rwanda	-0.44 (-0.93, 0.05)	-11.8 (-24.8, 1.2)	0.23 (0.09, 0.37)	8.1 (3.3, 12.9)	0.39 (0.33, 0.45)	27.4 (23.4, 31.4)	1.36 (0.90, 1.83)	9.7 (6.4, 13.0)
Swaziland	0.02 (-1.01, 1.04)	0.4 (-22.0, 22.8)	0.18 (0.11, 0.25)	14.7 (9.1, 20.3)	0.68 (0.59, 0.76)	50.5 (44.0, 57.0)	0.36 (-0.13, 0.86)	2.9 (-1.1, 6.8)
Tanzania	0.57 (-0.01, 1.15)	14.7 (-0.3, 29.7)	0.62 (0.47, 0.77)	26.7 (20.3, 33.0)	1.17 (1.05, 1.28)	59.6 (53.8, 65.4)	2.47 (1.78, 3.17)	11.1 (8.0, 14.2)
Uganda	0.39 (-0.19, 0.96)	10.2 (-4.9, 25.4)	0.44 (0.31, 0.57)	21.3 (15.1, 27.4)	0.84 (0.74, 0.94)	48.9 (43.1, 54.6)	2.34 (1.68, 2.99)	12.3 (8.9, 15.8)
Zambia	0.22 (-0.29, 0.74)	7.5 (-9.9, 24.9)	0.08 (-0.03, 0.18)	4.6 (-1.8, 11.1)	1.47 (1.35, 1.58)	70.3 (64.9, 75.7)	3.17 (2.02, 4.31)	9.4 (6.0, 12.8)
Zimbabwe	0.00 (-0.78, 0.79)	0.1 (-23.5, 23.7)	0.22 (0.13, 0.31)	14.3 (8.4, 20.3)	0.80 (0.71, 0.89)	52.7 (46.8, 58.6)	1.76 (1.17, 2.36)	8.0 (5.3, 10.6)
Region pooled	0.03 (-0.16, 0.22)	1.2 (-4.2, 6.6)	0.51 (0.34, 0.68)	23.1 (15.4, 30.8)	1.03 (0.81, 1.25)	51.0 (42.2, 59.9)	2.17 (1.72, 2.63)	11.0 (8.6, 13.5)
Overall pooled	-0.25 (-0.37, -0.13)	-6.7 (-10.1, -3.2)	0.69 (0.55, 0.84)	35.4 (28.0, 42.7)	1.11 (0.95, 1.29)	54.6 (48.6, 60.6)	2.34 (2.06, 2.61)	16.7 (13.8, 19.7)

CI, confidence interval; SII, slope index of inequality; RII, relative index of inequality.
Note: Pooled estimates are from random effects meta-analysis, for which the inverse-variance DerSimonian and Laird method was used.

Table 3: Meta-regression estimates for the association between NMR inequalities and inequalities in coverage maternal health services

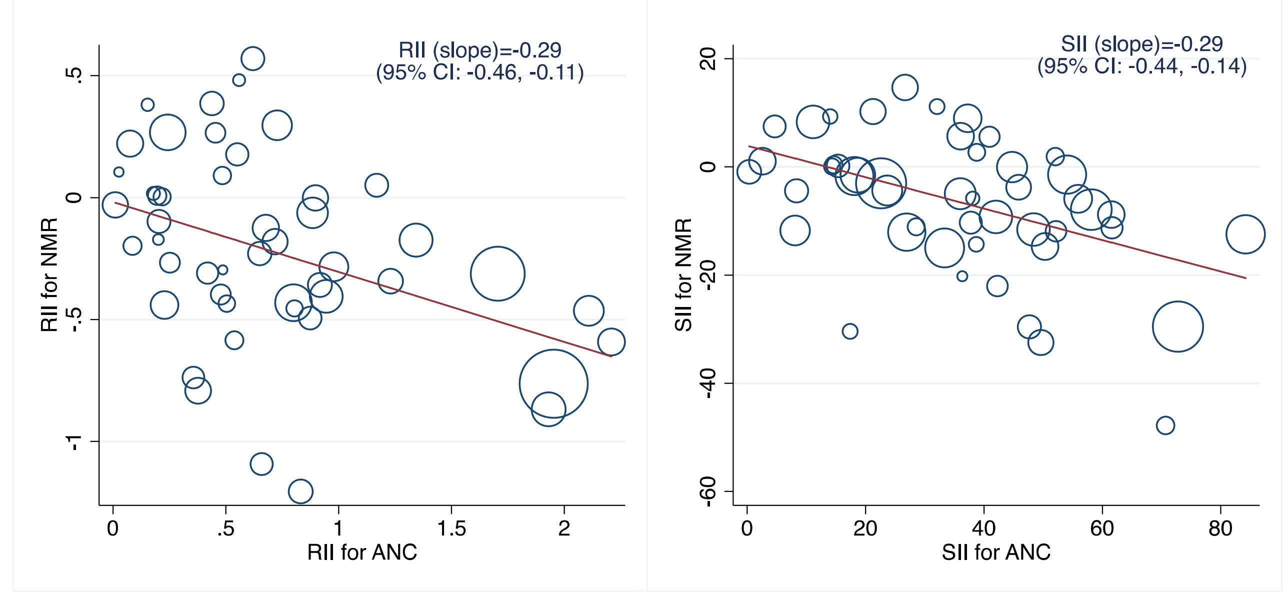
	All countries (N=48)				**Low income countries (N=26)**		**Middle income countries (N=22)**	
	Univariate		Adjusted for region fixed effects[a]		Univariate		Univariate	
	RII (95% CI) R^2	SII (95% CI) R^2	RII (95% CI) R^2	SII (95% CI) R^2	RII (95% CI) R^2	SII (95% CI) R^2	RII (95% CI) R^2	SII (95% CI) R^2
SII/RII for antenatal care (estimate for a 10% reduction in the rich-poor gap)	-2.9 (-4.6, -1.1) 39.0%	-2.9 (-4.4, -1.4) 43.5%	-1.4 (-3.1 0.2) 88.6%	-2.3 (-0.4, -0.1) 71.2%	-2.8 (-5.6, -0.1) 28.3%	-2.1 (-4.8, 0.5) 12.9%	-2.5 (-4.9, -0.2) 38.1%	-3.2 (-5.0, -1.4) 61.7%
SII/RII for facility delivery (estimate for a 10% reduction in the rich-poor gap)	-1.2 (-2.6, 0.2) 8.1%	-1.9 (-3.6, -0.1) 16.8%	-0.6 (-1.7, 0.5) 83.5%	-1.2 (-2.8, 0.4) 55.0%	-1.1 (-2.9, 0.7) 5.0%	-0.4 (-3.5, 2.8) -7.6%	-1.5 (-3.9, 0.8) 2.8%	-2.6 (-4.7, -0.5) 38.8%
	Countries with Caesarean prevalence under 10% (N=35)							
SII/RII for Caesarean delivery (estimate for a 10% reduction in the rich-poor gap)	-0.9 (-2.1, 0.3) 9.7%	-0.5 (-1.1, 0.1) 13.6%	-0.5 (-1.5, 0.4) 78.7%	-0.0 (-0.7, -0.6) 46.8%				

CI, confidence interval; SII, slope index of inequality; RII, relative index of inequality; R^2, adjusted R-squared statistic.

[a] South and southeast Asia; Latin America and Caribbean; East and southern Africa; West, north and central Africa

Negative coefficients indicate that increasing inequality in health service coverage is associated with increasing NMR inequality.

Figure 2: Bubble plots of the association between NMR inequality and relative (RII) and absolute (SII) inequality in antenatal care (N=48)



Note: Negative RIIs and SIIs indicate pro-rich inequality in NMR; positive values indicate pro-rich inequality in antenatal care. Bubble size proportional to the precision (inverse variance) of country-specific estimates.

Table 4: Meta-regression estimates for the association between NMR inequality and country-level socioeconomic and health system determinants

	All Countries (N=48)				**Low-income countries (N=26)**		**Middle-income countries (N=22)**	
	Univariate		Adjusted for region fixed effects*		Univariate		Univariate	
Country-level predictor	RII (95% CI) R^2	SII (95% CI) R^2	RII (95% CI) R^2	SII (95% CI) R^2	RII (95% CI) R^2	SII (95% CI) R^2	RII (95% CI) R^2	SII (95% CI) R^2
Log of GNI per capita	-13.3 (-27.5, 0.9) 16.2%	-1.6 (-5.7, 2.4) -0.5%	-2.5 (-16.0, 10.9) 81.4%	1.5 (-2.7, 5.7) 48.7%	-14.1 (-47.0, 18.8) 2.4%	-4.5 (-14.7, 5.7) 5.2%	2.5 (-35.0, 40.1) -9.7%	6.8 (-4.1, 17.7) 11.4%
Gini Index	1.3 (-0.1, 2.6) 15.2%	0.4 (0.0, 0.8) 13.0%	0.2 (-1.5, 1.9) 79.9%	-0.1 (-0.4, 0.6) 46.0%	1.7 (-0.4, 3.7) 14.6 %	0.5 (-0.1, 1.1) 14.5%	1.2 (-0.6, 3.0) 25.8%	0.4 (-0.2, 0.9) 11.5%
Log of health expenditure per capita	-5.0 (-21.8, 11.9) -0.7%	0.6 (-3.9, 5.2) -4.4%	-1.4 (-16.1, 13.2) 79.4%	2.0 (-2.5, 6.5) 47.0%	6.8 (-32.0, 45.7) -8.5%	2.6 (-9.8, 15.0) -10.1%	14.6 (-14.9, 44.1) 11.1%	7.1 (-1.0, 15.3) 21.8%
Out-of pocket expenditure as % total health expenditure (estimate is for a 10% increase)	-9.2 (-15.2, -3.3) 36.5%	-3.0 (-4.7, -1.2) 39.0%	-4.8 (-11.0, 1.4) 85.1%	-2.2 (-4.1, -0.3) 64.8%	-11.0 (-19.6, -2.4) 40.1%	-3.5 (-6.1, -0.8) 39.9%	-6.1 (-14.8, 2.5) 15.9%	-2.5 (-5.0, -0.0) 31.0%
Log of number of doctors per 1000 people	-14.9 (-22.8, -7.1) 52.7%	-2.7 (-5.1, -0.2) 16.9%	-7.1 (-16.4, 2.2) 88.8%	-1.0 (-4.0, 1.9) 47.2%	-20.2 (-36.7, -3.7) 41.7%	-5.9 (-10.8, -0.9) 40.5%	-13.7 (-30.3, 2.9) 30.4%	-1.5 (-6.8, 3.8) -7.7%
Log of number of nurses/midwives per 1000 people	-7.0 (-20.0, 6.1) 3.7%	-0.6 (-4.3, 3.0) -2.6%	-2.4 (-12.9, 8.2) 81.2%	1.1 (-2.2, 4.4) 46.3%	-1.6 (-21.2, 24.4) -8.1%	0.8 (-6.1, 7.7) -8.2%	-0.2 (-27.5, 22.7) -9.5%	1.7 (-5.6, 9.0) -8.1%
Mean years of education (women age 15-49)	-0.2 (-5.1, 4.8) -3.5%	0.4 (-1.0, 1.8) -3.0%	0.1 (-4.4, 4.5) 80.0%	0.6 (-0.8, 2.1) 50.0%	5.0 (-3.1, 13.5) 8.7%%	1.6 (-0.9, 4.1) 9.3%	2.6 (-6.5, 11.7) -1.6%	1.9 (-0.8, 4.7) 12.8%
Adolescent fertility rate (births per 100 women age 15-19)	4.4 (1.9, 6.9) 47.0%	0.9 (0.2, 1.7) 18.9%	3.4 (0.9, 5.9) 100%	0.6 (-0.3, 1.5) 51.8%	2.9 (-0.5, 6.3) 21.2%	0.8 (-0.2, 1.8) 19.7%	6.6 (2.6, 10.6) 82.3%	1.1 (-0.6, 2.7) 1.0%

CI, confidence interval; SII, slope index of inequality; RII, relative index of inequality; R^2, adjusted R-squared statistic.

[a] South and southeast Asia; Latin America and Caribbean; East and southern Africa; West, north and central Africa

Positive (negative) coefficients indicate an association between increasing values of the predictors and lower (higher) NMR inequality.

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