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**Philippines Equity Report: Investment Case for Financing
Equitable Progress towards MDGs 4 and 5 in the Asia-Pacific Region**

by

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PHILIPPINES

**Investment Case for
Financing Equitable Progress
towards MDGs 4 and 5
in the Asia-Pacific Region**

EQUITY REPORT

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August 2011

Acknowledgments

The UPecon Foundation is leading the write-up of the Equity Report in the Philippines as part of the second phase of the Investment Case project, coordinated by the School of Population Health, The University of Queensland.

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The production of the Equity Reports for this multi-country study has been lead by Kim-Huong Nguyen and coordinated by Eliana Jimenez-Soto from the School of Population Health, The University of Queensland.

We hope that the evidence and policy implications presented in the report will support the Philippines' continued progress towards reaching the Millennium Development Goals in an equitable way.

Preface

The Investment Case (IC) for financing equitable progress towards achieving the Millennium Development Goals (MDGs) 4 and 5 is a research-for-policy initiative jointly funded by AusAID and the Bill and Melinda Gates Foundation. ICs have been implemented in India, Indonesia, Nepal, Papua New Guinea and the Philippines by a multi-partner consortium of the AusAID Knowledge Hubs and national research partners, in close collaboration with UNICEF.

The ultimate goal of the IC is to advance the agenda on equitable progress towards achieving MDGs 4 and 5 by providing policymakers and development partners with the best available evidence for an equitable scaling-up of priority interventions that address the burden of maternal, newborn, and child mortality. The IC thus provides policymakers and planners with the evidence required to: (i) assess the extent to which maternal, newborn and child health (MNCH) variables are equitably distributed; (ii) identify the constraints hampering the scale-up of cost-effective MNCH interventions addressing the burden of mortality; (iii) design realistic strategies to address those constraints; and (iv) estimate the expected mortality impact and costs associated with implementing the strategies proposed. Results of the Investment Case analysis are expected to influence the content and process of planning and budgeting in-country.

This project was divided into two main phases. Phase 1 included the mapping of policy documents, analytical work, and the preparation of datasets relevant to MNCH, as well as the identification of gaps in information or data availability for analysis. In addition, the engagement of and consultation with government and development partners was undertaken to ensure the capacity of the Investment Case to effectively contribute to planning and budgeting for MNCH. The main findings of Phase 1 have been documented in the Mapping Reports for the project.

Phase 2 activities involved two major areas: (i) the equity analysis, which examines the equitable distribution of MNCH indicators; and (ii) the scaling-up analysis, which examines the scaling-up strategies, and their associated costs and impact. These activities have been informed by the mapping exercise and through consultation with government and development partners in each country. As a consequence, the scope of the IC is different in each of the study countries.

The equity analysis has been conducted for Indonesia, Nepal, Papua New Guinea, the Philippines, and five states of India (Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, and Uttar Pradesh). Different equity markers, including geographical location, social and economic background, are used to examine levels, trends and distribution of under-five,

infant, and neonatal mortality rates. The business-as-usual mortality rates that would prevail by the year 2015 if the current trend continues have also been estimated. This mortality study is complemented by the analysis of levels, and distribution, of coverage of interventions along the continuum of care for mothers, newborns and children. The use of multivariate regression analyses is also explored to examine the correlations between interventions, risk factors and under-five mortality. Due to limited available data, the Papua New Guinea equity analysis could be undertaken for mortality indicators only.

The scaling-up analysis was undertaken in all countries except Papua New Guinea. In India, this analysis has been completed for the State of Orissa and will be finalised for the State of Uttar Pradesh by the end of 2011. In both states, the devolution process led the IC to focus on district-level analysis. In Indonesia, the difficulties associated with planning and budgeting at a local (district/city) level have been identified as one of the key constraints to efficient provision of MNCH services. The analysis was thus undertaken in four poorly performing districts/cities of different typologies. In Nepal, the IC analysis targeted clusters of districts with poor MNCH outcomes across the three ecological regions. In Papua New Guinea, both the national government and development partners have advised that the health system constraints and scaling-up analysis would not be useful at this time. In the Philippines, the analysis took place in three sub-national sites: two provinces and one city.

Multi-disciplinary teams worked on the IC, including the mapping exercise, in each country. The School of Population Health, The University of Queensland, is leading the multi-country implementation. The Public Health Foundation of India and the Nossal Institute for Global Health are responsible for the scaling-up analysis across two states in India. In Indonesia these activities are coordinated by Gadjah Mada University, the National Institute of Health Research and Development and the School of Population Health, The University of Queensland. New ERA and the Nossal Institute for Global Health have been responsible for the scaling-up work in Nepal. The University of Papua New Guinea and the Burnet Institute are leading the work in Papua New Guinea. The IC in the Philippines is under the leadership of UPEcon, Inc., the Centre for International Child Health (CICH), the Murdoch Childrens Research Institute/The University of Melbourne and the Menzies School of Health Research. UNICEF offices have provided strong support to the IC activities in each country. The equity analysis has been undertaken by the School of Population Health, The University of Queensland, in close collaboration with the Burnet Institute, UPEcon, Inc., Indicus Analytics and the Nossal Institute for Global Health.

Executive summary

This report presents a comprehensive analysis of inequities in child mortality and intervention coverage in the Philippines.

A lack of maternal, newborn and child health (MNCH) equity analysis in recent years has led to a substantive gap in the literature. Responding to this, we use the best available country data and the most advanced methods to investigate the levels and distribution of, and the trends in, both MNCH mortality and intervention coverage. The findings shed light on inequities between rural and urban populations, and between different ethnic groups, development regions and wealth quintiles. Analyses of mortality over time allow the backtrack of mortality progress, enabling the evaluation of past policies' influences on reducing health inequity and of the appropriateness of current and potential future policy. Hence, this Equity Report aims to constitute a milestone for MNCH equity analyses in the Philippines.

Due to a lack of reliable data in maternal mortality, our analysis has focused on neonatal, infant and under-five mortality. Using the most advanced methods available, we have investigated the levels and distribution of, and the trends in, various MNCH indicators. These include not only mortality outcomes and individual risk factors, but interventions and care packages along the continuum of care whose efficacy and technical feasibility in resource-constrained settings are widely appreciated. Without asserting conclusions about causal relationships, we try to combine the findings and extract the essential correlations that could serve as a support for decision-making.

Our methodologies include the measurement of under-five, infant and neonatal mortality rates, the estimation of MNCH intervention coverage and associated inequality indices, and a decomposition analysis between inequality in mortality and the various social, cultural and economic factors, as well as MNCH care packages and interventions. Aggregate figures helped analyse the reduction progress in child mortality at population level, while disaggregated data based on equity markers were used to identify the equity gaps between different socioeconomic and geographic groups within the country.

The major findings and key direct implications from this analysis are as follows:

- Our national mortality estimates show that infant and under-five mortality rates in the Philippines have continuously fallen since 1990, though at a reduced rate after 1995. This was not the case for neonatal mortality, which has barely moved since then, and which now stands at approximately 17 deaths per 1,000 live births.

-
- The first period can be thought of as an era of low-hanging fruit. During this time, large reductions were achieved relatively easily through the expansion of immunisation coverage and other high-yielding programs. After that time, further improvements have relied on the more difficult process of consolidating gains and searching for less obvious solutions.
 - On current trends, the Philippines' under-five mortality rate will be 29 (per 1,000) in 2015, just short of its MDG target of 27. Neonatal mortality is projected to then comprise more than half of all under-five deaths and almost three-quarters of infant deaths. This means that if the Philippines is to achieve its goal, it should concentrate more on interventions relevant to neonatal health.
 - Current and predicted gaps in mortality outcomes for the rural/urban equity marker are high, with rural children faring worse than their urban counterparts on all three mortality measures. Encouragingly, however, this gap appears to be closing overall, with rural U5MR falling faster than urban. This is not the case for NMR; the national near stagnation on this measure is mostly a rural problem, and masks moderate urban progress.
 - Our estimates also suggest that socioeconomic inequality is substantial. There are few signs of overall convergence in mortality differentials between wealth quintiles in the near future. However, the top three quintiles do appear to be converging with each other on all measures, as do the bottom two. Worryingly, the second poorest quintile showed a slight upturn, especially in NMR. Government programs may therefore be ignoring the near poor. Wealth related inequality was higher in urban areas.
 - The regional equity marker presents a large and persistent mortality gap. This is partly due to the exceptionally poor performance of three regions: Ilocos, Cagayan valley, and Northern Mindanao. These have actually reversed recent gains, and seen their mortality rates increase. Meanwhile, wealthier regions such as the National Capital Region (NCR) and CALABARZON, have already met their MDG. A refocusing of effort on flagging regions would do much to rectify these regional inequalities.
 - One region, MIMAROPA, stood out as being particularly disadvantaged, having both high mortality and high wealth-related inequality. Resources directed to the poor in mortality hotspots such as this would help bring them up to the same level as the rest of the country.
 - There was also great variability in access to MNCH interventions. As expected, the poor were much worse off on these measures, as were those living in the countryside and less developed regions. We found both low and unequal coverage for the

following: facility-based delivery, oral rehydration therapy, family planning, quality ANC and tetanus toxoid. Wealth-related inequalities in insurance coverage and consequent treatment-seeking behaviour suggests that financial barriers remain.

- Some low coverage interventions were also quite equitable, such as antibiotics, CPR and care for fever and cough. These offer greater scope for expansion, but would also cost more. Curiously, we found breastfeeding was actually more prevalent among the poor, indicating that significant informational barriers remain for all wealth cohorts.

Prospects for further improvement in mortality are bright. With several low-coverage efficacious interventions, there is great opportunity for scaling up. There is still some scope for improvement in child mortality, but with neonatal mortality comprising an ever greater proportion of under-five deaths, focus should now turn to early interventions.

In spite of the many development challenges facing the Philippines, the country has taken great strides in reducing mortality both in absolute levels and in reducing the comparative disadvantage experienced by its most vulnerable groups. These gains should serve as a demonstration of what can be achieved with concerted attention, effort and collaboration by the many stakeholders involved in improving health and development outcomes for mothers and children. Nevertheless, based on the most recent data available, the Philippines appears likely to miss its 2015 Millennium Development Goal 4—though by a very small margin. Inequalities also persist within its population. Future improvements will increasingly rely on the more difficult task of strengthening health systems, and continued efforts will be needed to capitalise on, and amplify, past gains.

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Introduction

The Philippine commitment to meet the MDG targets is stated in the Philippine Department of Health's (DOH) National Objectives for Health 2005–2010. In addition to the end-goal of (i) achieving better health outcomes, the DOH has also set out for itself the achievement of (ii) a more responsive health system, and (iii) more equitable health care financing. In its stated goal of achieving better health outcomes, the DOH sees as a greater challenge the reduction in inequalities, that is, improving the health of the worse off wherever these inequalities are caused by conditions amenable to intervention (Department of Health, 2005). In specifying these goals, the DOH has been explicit in considering that not only levels matter, but the distribution across population groups.

Research can contribute to the discussion pertinent to achievement of these goals, particularly for maternal and child health, by: (i) measuring trends and levels in neonatal and under five mortality; (ii) assessing who bears the burden of mortality; and (iii) analysing the extent to which low levels, and inequitable distribution, of intervention coverage contribute to the observed inequality in MNCH outcomes.

The mapping exercise conducted as part of Phase I of the Investment Case found that no comprehensive equity analysis of the distribution of MNCH outcomes and interventions had been conducted in recent years. Responding to this gap in the evidence base, this report uses the best available country data and the most advanced methods to examine the levels and distribution of, and the trends in MNCH mortality and intervention coverage.

The lack of reliable data prevented us from measuring maternal mortality and its distribution, so the focus of this report is on neonatal and under five mortality. We examine interventions along the continuum of care for which there is global evidence on their efficacy and technical feasibility in resource-constrained settings. However, this analysis could not be undertaken for critical interventions such as basic emergency obstetric care or risk factors, such as under-nutrition, for which data are not available. In the absence of longitudinal datasets and natural experiments, causal relationships cannot be asserted. We are thus unable to measure the extent to which increases in coverage of particular health interventions (e.g. facility-based delivery) will have an impact on mortality outcomes. However, by putting together the evidence on the levels and distribution of, and the

trends in, mortality and intervention coverage in a coherent framework, some common themes emerge. Our findings highlight the extent to which the burden of mortality falls disproportionately upon the poor and those living in disadvantaged regions, such as the Autonomous Region in Muslim Mindanao (ARMM), Bicol Region, Western Visayas and Central Visayas. The low coverage and unequal distribution of interventions during the birth phase seem to contribute to such inequities in neonatal outcomes. The study also suggests a strong relationship between such unequal distribution and observed inequities in coverage of social insurance.

This report is organised as follows:

This introduction, **Chapter 1**, is followed by a brief discussion on the background of MNCH in the country in **Chapter 2**. The methodology and data sources used are examined in **Chapter 3**. A more detailed technical review is provided in the *Investment Case Report: Technical Supplement to the Equity Analysis*. Findings of the analysis are presented in **Chapter 4**, while conclusions are discussed in **Chapter 5**. Six **Appendices** to this report include relevant maps, as well as table and graph presentations of the analytical results.

Context

The Philippines has adopted the Millenium Development Goals for health as part of its national goals (Department of Health, 2005). In pursuit of the MDGs for health, the government seeks to achieve four major health sector goals. The first is to reduce by two-thirds the child mortality rate, as measured by under-5 mortality rate, infant mortality rate, and the proportion of one-year-olds not immunised against measles. The second goal is to cut by three-quarters the maternal deaths, as measured by the maternal mortality ratio and the proportion of births not attended by skilled personnel. The third objective is to halve the number of people who suffer from hunger, as measured by the prevalence of underweight children below five years of age and the proportion of the population with below the minimum level of energy consumption. Finally, the government sets to halt and begin to reverse the incidence of malaria and other major diseases, as indicated by prevalence and death rates of malaria and tuberculosis.

The government has recognised that in order to improve aggregate health outcomes towards the achievement of the MDGs, the focus of attention should be towards improving the poor's health status, which is seen to be worse than that of the rich.

In specifying the key strategies and reform areas in health, therefore, particular attention has been paid to the poor. In the case of achieving better health outcomes, for instance, the government sees as a greater challenge the reduction in inequalities, that is, "improving the health of the worse off wherever these inequalities are caused by conditions amenable to intervention" (Department of Health, 2005). The reforms that have been envisioned to attain these goals are organised into four components, known locally as Formula One for Health. These include: (i) reforms in health financing that are aimed at securing increased, better and sustained investments in health to provide equity and improve health outcomes, especially for the poor; (ii) reforms in health care delivery aimed at improving the accessibility and availability of basic and essential health care for all, particularly the poor; (iii) reforms in health regulations that are aimed at assuring access to quality and affordable health products, devices, facilities and services, especially those used by the poor; and (iv) reforms in governance for health that are aimed at improving national and local health systems' performances by improving governance in local health systems,

improving coordination across local health systems, and improving national capacities to lead and manage the health sector.

As seen in Table 2.1, the Philippines has progressed towards achieving some of the MDG goals as infant and under five mortality have been steadily decreasing over the last 15 years. Reported infant and under five mortality rates have declined gradually from about 38 and 64 deaths per thousand, respectively, in 1993 to about 25 and 34 deaths per thousand, respectively, in 2008. Remarkable progress has also been observed in nutrition indicators. In 2003 the stunted-for-age figure was recorded at nearly one in three children under five years of age and decreased to less than one in four children under five years of age in 2005 (Food and Nutrition Research Institute, 2007).

These achievements have been partly attributed to the specific child health programs that contributed to the reduction of child deaths after birth (National Economic and Development Authority, 2010). They have included the Expanded Program on Immunization (EPI), micronutrient supplementation, and the Infant and Young Child Feeding Program (IYCF). The coverage of these programs was further enhanced by the Garantisadong Pamabata (GP) campaign. GP is designed to support various health programs to reduce child illness and deaths and is carried out in partnership with the LGUs and other government and non-government organisations. Conducted twice yearly, the campaign includes vitamin A capsule supplementation, catch-up immunisation, distribution of iron supplements to infants and pregnant women, and promotion of positive care-giving behaviours, such as exclusive breastfeeding for infants from birth to six months of age and complementary feeding starting from six months of age.

Table 2.1: **Current estimates of mortality rates, the Philippines**

Year	Source	IMR	U5MR	MMR
1993	NDHS	38	64	<i>n.a.</i>
1998	NDHS	35	48	209
2003	NDHS	29	40	172
2006	FPS	24	32	162
2008	NDHS	25	34	<i>n.a.</i>

Note: the expression "n.a." indicates "not available"

However, the Philippines's progress towards reducing the maternal mortality ratio remains wanting. From the 1990 estimate of 209 per 100,000 live births, MMR was placed at around 172, based on the 1998 NDHS; and around 162, based on the 2006 Family Planning Survey. This slow rate of decline makes it very difficult to achieve the 2015 target of 52 per 100,000 live births. While there have been maternal health initiatives in various geographical areas supported by development partners, such as UNFPA, UNICEF, EU, JICA and the World Bank, these initiatives were not sustained and not scaled up nationwide. In response to this slow progress, the Department of Health has issued a new

Maternal, Neonatal and Child Health and Nutrition (MNCHN) policy that brings about a shift from a risk approach that focuses on identifying pregnant women at risk of birth complications to one that considers all pregnant women as being at risk of complications. This is embodied in Administrative Order No. 2008-0029, Implementing Health Reforms for Rapid Reduction of Maternal and Neonatal Health. This new strategy seeks to (i) encourage women to deliver at facilities that are equipped to render basic emergency obstetric and newborn care and (ii) shift management of the MNCHN service delivery to a local level from the centrally controlled national program. However, the impact of this policy remains to be seen as the full implementation is currently ongoing.

The government has recognised that priority groups that need more interventions have to be identified in order to reach not only the 2015 target but also to reduce disparities. It has recognised differences in child mortality across urban/rural place of residence, and across regions and income. Scant reliable data on maternal mortality ratios show that there may be regional variations in MMR which also reflect differences in incomes. Better targeting of child health and maternal health interventions have been seen as possible means to address these disparities. It is towards these ends that this report seeks to contribute. Thus, we look more closely at the inequalities in mortality experience of mothers and children, seeking to pinpoint where the inequalities are widest. We also assess whether there are inequalities in the coverage of interventions that may be significant in addressing the causes of death of mothers and children. We then try to tie them together by looking at the contributions of these interventions in reducing the inequalities in mortality.

Data and methodology

This chapter provides a brief overview of methodology and datasets used in this equity analysis.

Methodologies discussed here relate to: (i) the measurement of under five, infant and neonatal mortality; (ii) estimation of MNCH intervention coverage and associated inequality indices; and (iii) quantifying the association between inequality in mortality and the various social, cultural and economic factors, as well as MNCH care packages and interventions. Since the methodology involves some complex techniques and procedures, a detailed discussion is presented in a separate document accompanying this report. Readers interested in methodological details and issues are referred to the *Investment Case Report: Technical Supplement to the Equity Analysis*.

Analysing progress in the reduction of child mortality based on aggregate figures at the national level can mask differences in mortality between different socioeconomic and geographic groups within the population. Disaggregated analyses identify where differences in mortality and coverage of interventions exist between different groups in the population (equity gaps), upon which policy recommendations to be drawn. The choice of equity markers selected for this analysis was informed by the available data, the literature and through consultation with experts and advisers.

3.1 Equity markers

The equity markers used in this paper were partly determined by available data on, and by observed differences in, health outcomes and health care use across these equity markers. We assess the presence and extent of inequalities across three dimensions: (i) wealth, (ii) urban/rural location, and (iii) geographic location. The presence of a health outcome income/wealth gradient is a robust finding in the Philippine context (e.g. Capuno & Kraft, 2009; Lavado, 2007; Lavado & Lagrada, 2008; Quimbo, et al., 2008). Access to care in the Philippines is constrained by relatively high poverty levels and relatively unequal income distribution. The proportion of individuals whose annual per capita income falls below the poverty threshold stood at 32.9 percent in 2006; in other words, nearly one in three

individuals is poor. While this has fallen from the 1991 level of 45.3 percent, it is still way above the MDG target of 22.7 percent (National Economic and Development Authority, 2010). Income distribution is also highly unequal, with the Gini coefficient scarcely moving from 0.4680 in 1991 to 0.4580 in 2006. These figures are high compared with the country's Asian neighbours.

The choice of urban or rural location as an equity marker provides additional dimensions to the analysis. In the Philippines, the incidence, depth and severity of poverty are higher in rural than urban areas (Arsenio & Hill, 2003). Thus, urban or rural location can serve as a proxy for wealth and income inequalities. In addition, the degree of income inequality is higher in urban than in rural areas. Thus, inequalities in mortality across urban and rural areas would suggest different policy directions or approaches. Reducing inequalities in urban areas would have to also involve expanding the access of the low-income groups to necessary health interventions.

Ideally, another equity marker should be used – one that would represent different health service delivery capacities. In this respect, location across cities, municipalities and provinces would represent these differences. However, due to their large number, disaggregating by municipalities and cities may not be practical. The province may be the best location indicator to use as provinces are in charge of several health facilities, including the provincial and district hospitals. Moreover, the national government has embarked on a program of investment planning for health at the province level as part of the implementation of the health sector reform agenda. However, available household data sources are not representative at the province level but only at the regional level. Thus, we resort to regions, a grouping of relatively homogenous provinces, as our location indicator. Using the regions as a location indicator is also convenient from the policy standpoint as the Department of Health (DoH) engages groups of provinces through regional Centers for Health Development (CHDs). There are currently 17 administrative regions in the country.

Concerning ethnic or religious divisions that may affect access to care and mortality experience, it may be that differences between Muslims and Christians could be significant. However, the regional indicator – in particular, location in the ARMM, may already capture these inequalities.

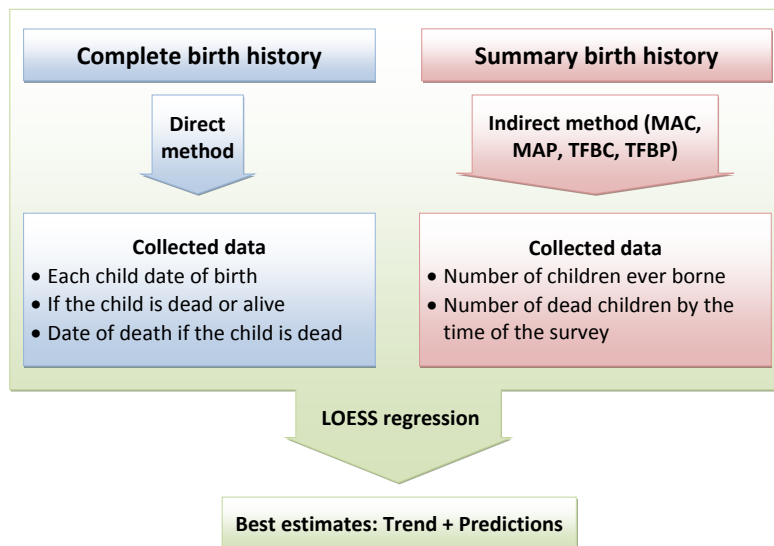
The NDHS datasets include wealth index variables that are used to group households and individuals by wealth quintiles. These wealth indices were constructed using principal component analysis wherein factor coefficient scores (factor loadings) were computed based on all household assets and utility services. The individual household scores were computed by multiplying the loadings and the indicator values and summed (Rutstein & Johnson, 2004). However, neither the specific assets that were used, nor the factor scores computed, are published in the NDHS reports. The NDHS datasets also did not break down or compute separate wealth indices for urban/rural residents. For our purposes, therefore,

we constructed our own wealth index variables using the methodology outlined in Filmer & Pritchett (2001) and utilised in Vyas & Kumaranayake (2006). We utilised the assets variables that were available in the various years of the NDHS to compute wealth indices at the national level and wealth indices for the urban and rural populations. (See Appendix A for the assets used). We checked that these indices were internally consistent by testing the distribution of household by the computed scores with the distribution of households by housing materials. We found that the wealth indices tracked the distribution of households by housing materials well.

3.2 Mortality estimates

We estimate levels of, and trends within, under five, infant and neonatal mortality from 1993 to 2008 (2008 is the latest year for which appropriate data are available) at the state and sub-state level by selected equity markers: urban/rural; caste/ethnicity; and wealth quintile. Business-as-usual mortality rates, that is, mortality rates that would prevail if the trends of 2008 continue, have been predicted for the 2008–15 period. Advanced methods (e.g. Murray, et al., 2007) have been used to combine various mortality estimates (e.g. summary and complete birth histories) into one estimate (see Figure 3.1).

Figure 3.1: **Approach to mortality estimation**



As further described in the technical supplement, the methods used in this report represent substantial improvements upon earlier methods of mortality estimation. The current analysis uses actual survey and census data, while earlier methods relied on life tables to fit mortality models. The methods used in this report also correct for the over-estimation of mortality in the years closer to the survey and account for effects influencing

under five mortality that are unique to the Philippines. Additionally, they take into account the uncertainty surrounding the individual estimates.

3.3 Data sources

Eight datasets from the Philippines were identified to cover the time period of interest (i.e. 1990 to the present). These included four Demographic and Health Surveys (DHS), a World Health Survey (WHS), and three Family Planning Surveys. As outlined in Table 3.1, only the DHSs and the WHS have the necessary modules to calculate under five mortality rates.¹ The Family Planning Surveys 2002 and 2005 did not ask about childrens deaths. The Family Planning Survey 2006 did ask about childrens deaths but the reported age categories for death were not fine enough to be used. It was found that the World Health Survey underestimates under five mortality rates in the recent time periods as compared to the other five surveys. A similar problem was seen with the World Health Survey in Nepal. Therefore, the World Health Survey was excluded to prevent it from erroneously affecting the final estimates.

Eventually, only the Demographic and Health Surveys were used for the final estimates of mortality. The surveys include modules on reproduction, illness, and health care utilisation by mothers and children. They also include household level modules covering household assets, sources of financing, and housing characteristics, such as housing materials and sources of water. Rider modules pertaining to specific health issues are also included per round. These allow us to calculate the intervention coverage and compute inequality indices.

Table 3.1: **Datasets available for estimating child mortality in the Philippines**

Dataset	Module for child mortality	
Demographic and Health Survey 1993	Complete birth histories	Included
Demographic and Health Survey 1998	Complete birth histories	Included
Demographic and Health Survey 2003	Complete birth histories	Included
Demographic and Health Survey 2008	Complete birth histories	Included
Family Planning Survey 2002	Modified complete birth histories*	Excluded
Family Planning Survey 2005	Modified complete birth histories*	Excluded
Family Planning Survey 2006	Modified complete birth histories*	Excluded
World Health Survey 2002	Complete birth histories	Excluded

*Note: * means the survey has a module very similar to complete birth histories, but lacks all or part of the crucial information on deaths.*

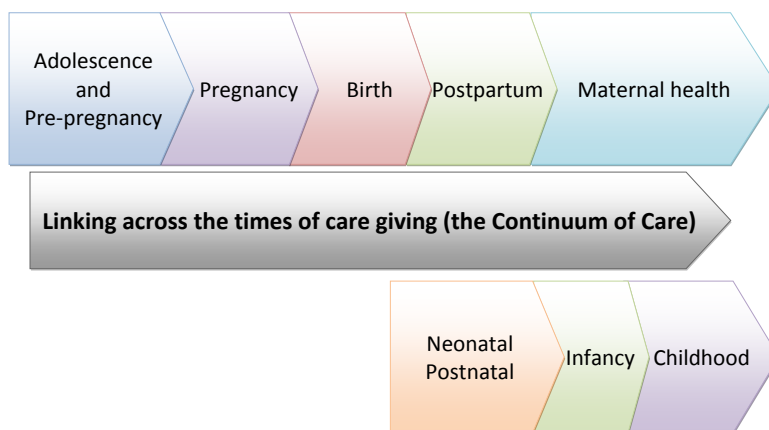
¹The datasets were cleaned by deleting duplicates and dropping children that had unreasonable birth-days and death ages, e.g. child reported to die after the interview date.

3.4 Intervention coverage

The choice of interventions and care packages included in the equity analysis is influenced by their potential contribution to the reduction of under five mortality and the availability of data for the Philippines. The four DHS datasets were used to compare coverage of health packages and interventions across equity groups.

Maternal, newborn and child health intervention coverage was analysed across the continuum of care from pre-pregnancy (family planning) to the postpartum period for the mother, and from the neonatal period to five years of age for the child (see Figure 3.2). Environmental factors were also considered by referring to household access to safe water and sanitation.

Figure 3.2: **Connecting care giving across the continuum of care for maternal, newborn and child health**



Source: Adapted from Partnership for Maternal, Newborn and Child Health, http://www.who.int/pmnch/about/continuum_of_care/en/index.html, accessed December 2010.

The utilisation of health services during pregnancy, delivery, and the immediate postpartum/postnatal period, is a major determinant of maternal and newborn health outcomes. Conversely, child health outcomes are strongly influenced by the utilisation of health interventions and by environmental conditions during childhood. In particular there are several interventions that have been proven at a global level to be efficacious against major causes of maternal, neonatal and child mortality (for instance, Jones, et al., 2003; Darmstadt, et al., 2005; Bhutta, et al., 2008). By studying levels of intervention coverage across sub-national groups it is, therefore, possible to provide some explanation for mortality differences between these groups.

3.5 Concentration index

To measure the inequality in mortality and intervention coverage, we use the concentration curve and concentration index (C index). The concentration curve is a plot of the *cumulative percentage of a health variable* (e.g. mortality or an intervention) on the *y-axis* against the *cumulative percentage of the population* on the *x-axis*, ranked by wealth status, with the *poorest on the left* and *richest to the right* of the x-axis.

The C index is measured as twice the area between the concentration curve and the equality line. The index is negative when the curve lies above the line of equality, indicating a disproportionate concentration of the health variable among the poor, and is positive when it lies below the line of equality. If the health variable is a bad one, such as ill health, a negative value means ill health is higher among the poor (O'Donnell et al., 2008).

Unlike basic cross-tabulation, bivariate analysis and range estimation, the concentration index allows us to quantify the degree of socioeconomic-related inequality of a health variable at a point in time,² and to compare the indices across time and health variables.

The computation of concentration indices requires the equity marker to be a continuous variable. In our analysis, the indices measure the extent of inequality across wealth groups. As discussed in Section 3.1, for the purposes of this analysis, separate wealth indices have been estimated for urban, rural and national populations. The available data also permit us to calculate concentration indices for the entire country, for urban and rural populations and for regions.

3.6 Decomposition analysis of the concentration index of mortality

To establish the association between the inequality in mortality and inequalities in intervention coverage, as well as various socio-cultural and economic factors, we decompose the mortality concentration index (with respect to wealth) into the contributions of individual factors. As with many standard regression analyses, these results should be interpreted with caution. In the absence of longitudinal data and natural experiments, they show factors most strongly associated with mortality and inequality of mortality, but do not imply a causal relationship.

A factor can contribute to socioeconomic inequality in mortality through its *association with mortality* (e.g. access to clean water is correlated with lower probability of child death) and its *unequal distribution across the wealth spectrum*. A negative (or positive) contribution implies that the respective factor is correlated with lower (or higher) wealth-related inequality of mortality. The direction of association is outlined in Table 3.2.

²A detailed methodology and calculation can be seen in O'Donnell et al. (2008).

The decomposition analysis is conducted separately for under five, neonatal, and child mortality, and for each equity marker. This approach is taken because the underlying causes of death, and relevant efficacious interventions and care packages, vary between different developmental stages of children. A detailed explanation of the procedure of analysis is described in the *Technical Supplement*.

Table 3.2: Possible contributions to inequality in mortality

Association with mortality (elasticity)	Inequality (C index)	Contribution	Percentage contribution	Interpretation
Positive (increased likelihood of dying)	Positive (more prevalent amongst rich)	Positive	Negative	Lowering inequality of mortality
Positive (increased likelihood of dying)	Negative (more prevalent amongst poor)	Negative	Positive	Increasing inequality of mortality
Negative (decreased likelihood of dying)	Positive (more prevalent amongst rich)	Negative	Positive	Increasing inequality of mortality
Negative (decreased likelihood of dying)	Negative (more prevalent amongst poor)	Positive	Negative	Lowering inequality of mortality

Note: Assuming mortality is more prevalent amongst the poor (negative C index).

The contribution is the product of elasticity and the C index;

Percentage contribution is the contribution divided by the C Index of mortality.

Main findings

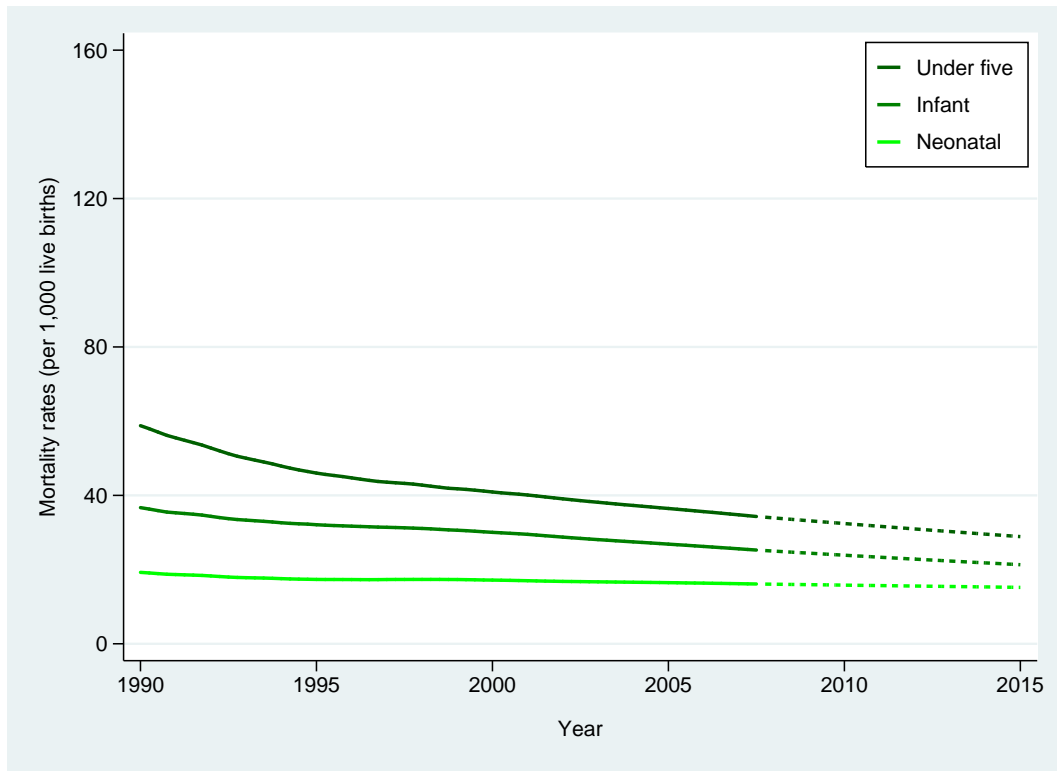
4.1 Mortality estimates: trends and causes

At the national level, we observe a reduction in under five mortality from more than 80 per 1,000 live births in 1990 to around the middle 30s per 1,000 in 2008. The decline in U5MR was sharp in the early 1990s, averaging 4.5 per cent per annum, but dropped to only 2.1 per cent from 1996 onwards. The greater progress in this earlier period can be partly attributed to an increase in the coverage of immunisations through the Expanded Program of Immunization (EPI) that was continuously implemented by two secretaries of health. Given this rate of decline, the under five mortality is projected to reach 29 per 1,000 in 2015, which is slightly short of the MDG target of 27 per 1,000 live births (Figure 4.1 on page 14).

The downward trend in under five mortality is mirrored by the decline in infant mortality, though the latter has declined at a slower rate. At the current rate of decline, infant mortality is expected to reach 21 per 1,000 – again slightly short of the MDG 4 target of 19 per 1,000. This is largely accounted for by the lack of progress in decreasing neonatal mortality. Neonatal mortality has remained relatively flat, staying at around 17 to 18 per 1,000 live births and thus accounts for about 40 per cent of under five deaths. If current rates of decline in infant and neonatal mortality prevail, then by 2015 nearly three-quarters of infant, and one half of under five, deaths would be accounted for by neonatal deaths. This seems to indicate that further reductions in U5MR and IMR would have to come from reductions in neonatal deaths. As the shortfalls in the targets are relatively small, well-targeted interventions focusing on worst-performing groups may help realise the targets.

While the general pattern of decline in under five, infant and child mortality is observed in both urban and rural areas, children residing in urban areas are better off in terms of mortality reduction than their rural counterparts. In fact, urban under five mortality in 2008 was already very near the MDG target (see Figures 4.2 on page 15). While we see that under five mortality reductions in the rural areas were slightly higher than those in the urban areas in the early 2000s, there still remains a large and persistent gap in U5MR

Figure 4.1: Estimates of under five, infant and neonatal mortality, the Philippines



which is nevertheless closing – but very slowly. Urban/rural gaps have even widened in terms of infant and neonatal mortality, as infant and neonatal mortality rates have dropped faster in the urban areas (Figures 4.3 and 4.4). Of particular concern is the inability to further reduce neonatal mortality in the rural areas, with a slight upturn noted in the latter part of the first decade of the 2000s. This implies that efforts to reduce neonatal mortality should target those residing in rural areas, and, in particular, such efforts should address the barriers to care.

Differences in performance across wealth groups are also observed, with the highest wealth quintiles registering the lowest under five, infant and neonatal mortality and the bottom quintile registering the worst performance (see Figures 4.5, 4.6 and 4.7). There are significant drops in mortality in the 1990s but the gap between those in the lowest two wealth quintiles and the upper three wealth quintiles remains wide. Under current trends, it is likely that convergence would be reached by the upper three quintiles but the lowest two quintiles would remain far behind. It may be noted that the two lowest wealth quintiles may be considered as those falling below the poverty line, as the poverty incidence of the Philippines was around 33 per cent in 2006 (National Economic and Development Authority, 2010). A disturbing finding is the seemingly upward trend in mortality of those belonging to the second lowest quintile; this is most apparent with neonatal mortality. Such a trend may also indicate that, while the government is reaching the poorest of the poor, it may still be ignoring the “near-poor”. These findings suggest

Figure 4.2: Urban/rural under five mortality rates

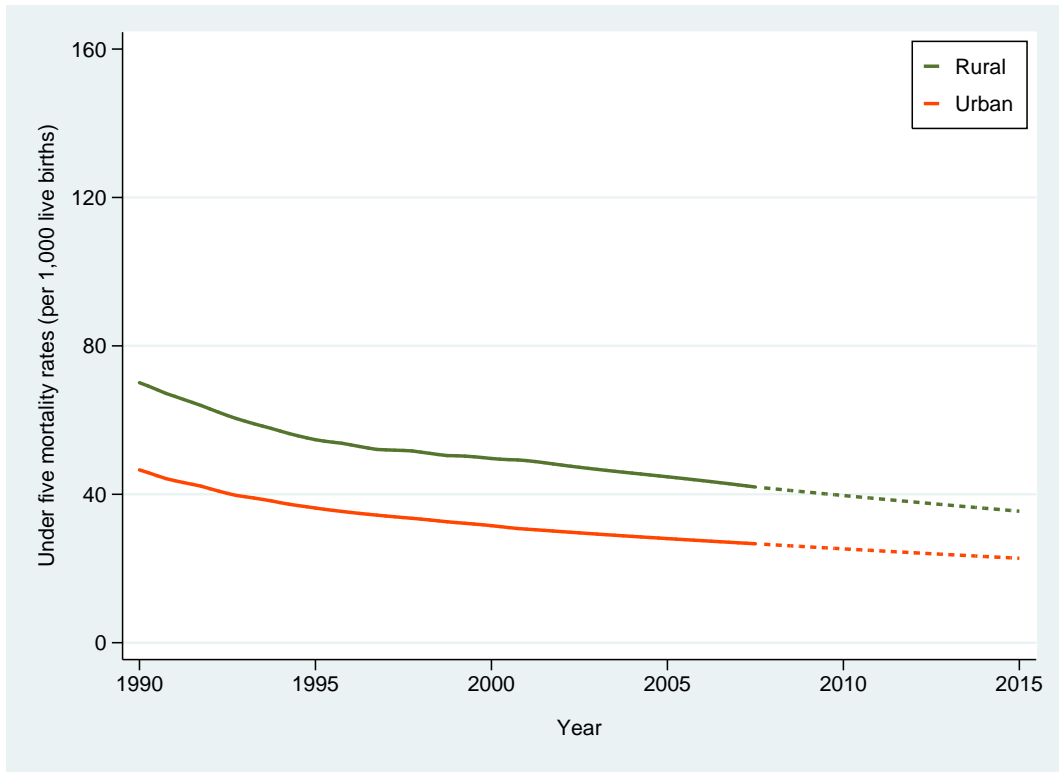


Figure 4.3: Urban/rural infant mortality rates

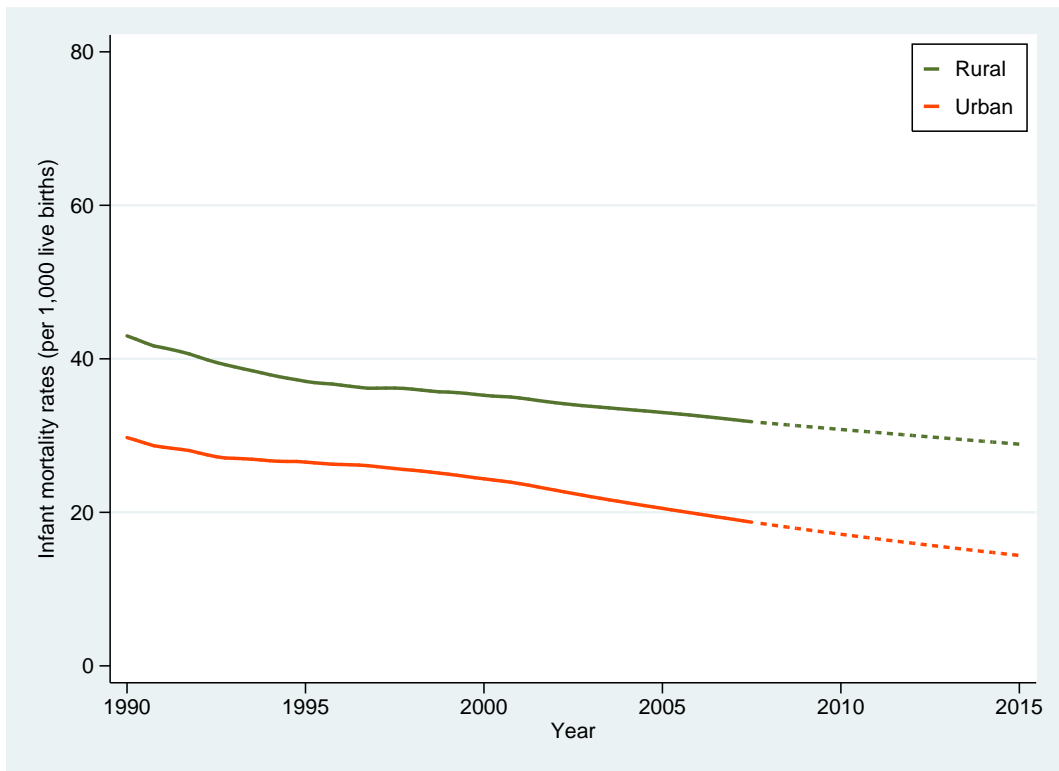
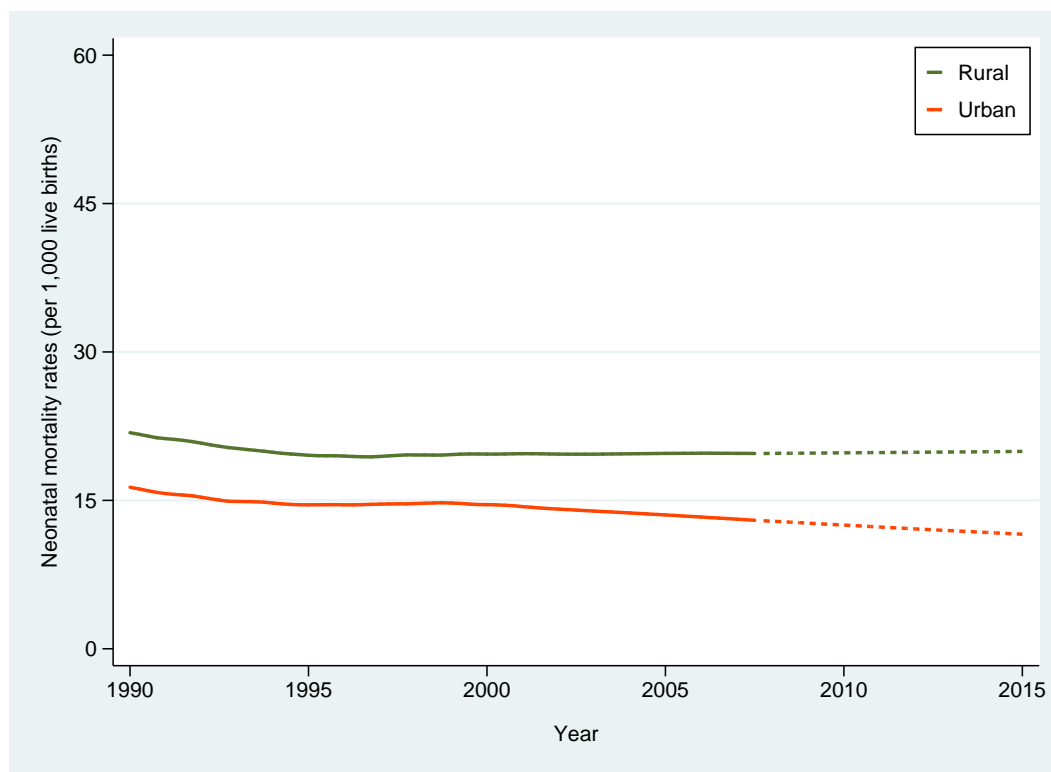


Figure 4.4: Urban/rural neonatal mortality rates



that the differences in living conditions and the risk factors and barriers to care between the lowest two quintiles may not be significantly different and that targeting efforts should consider these two groups as one. In fact we see that the majority of those belonging to the bottom two quintiles are each located in the rural areas.

With the devolution of health services in the Philippines, the delivery of health services has become largely the responsibility of local government units at the municipal, city and provincial levels. Analysis of performance of mortality should ideally focus on these local variations. However, our data is representative only at the regional level, which comprises a group of fairly homogeneous provinces. We see that there are regional differences in under five mortality with the Autonomous Region in Muslim Mindanao having the highest under five mortality (see Figure 4.8 on page 19). Underlying the number of deaths are reports of a lack of health professionals and of a lack of inaccessibility to health facilities, as was highlighted earlier. Extreme poverty and persistent armed conflict are also important factors. A disturbing trend is that, for some regions, namely Ilocos and Northern Mindanao, under five mortality has been on an upward trend since 2005. For some, however, downward trends in mortality have been sustained, indicating that some success may have been gained in programs to reduce mortality despite the devolution of health services. In fact, wealthier regions, such as the NCR and CALABARZON, have achieved the MDG targets. With these trends, however, regional gaps are not expected to close by 2015. While maintaining support for all the other regions, these trends highlight

Figure 4.5: Under five mortality rates by wealth quintile

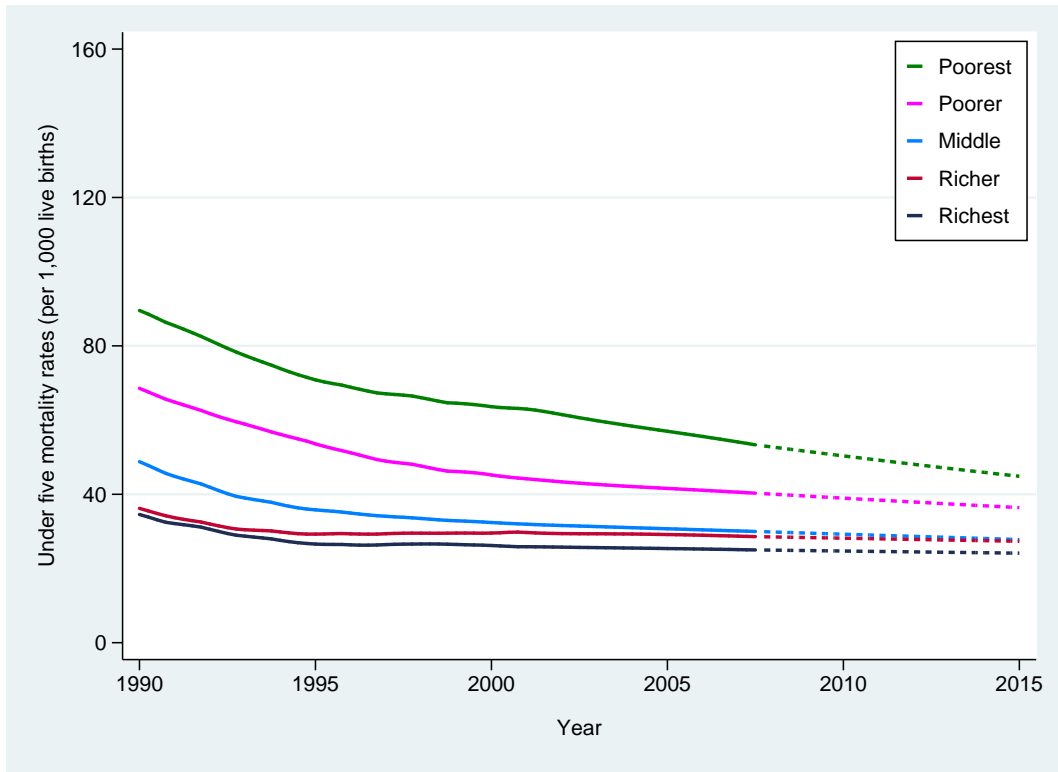


Figure 4.6: Infant mortality rates by wealth quintile

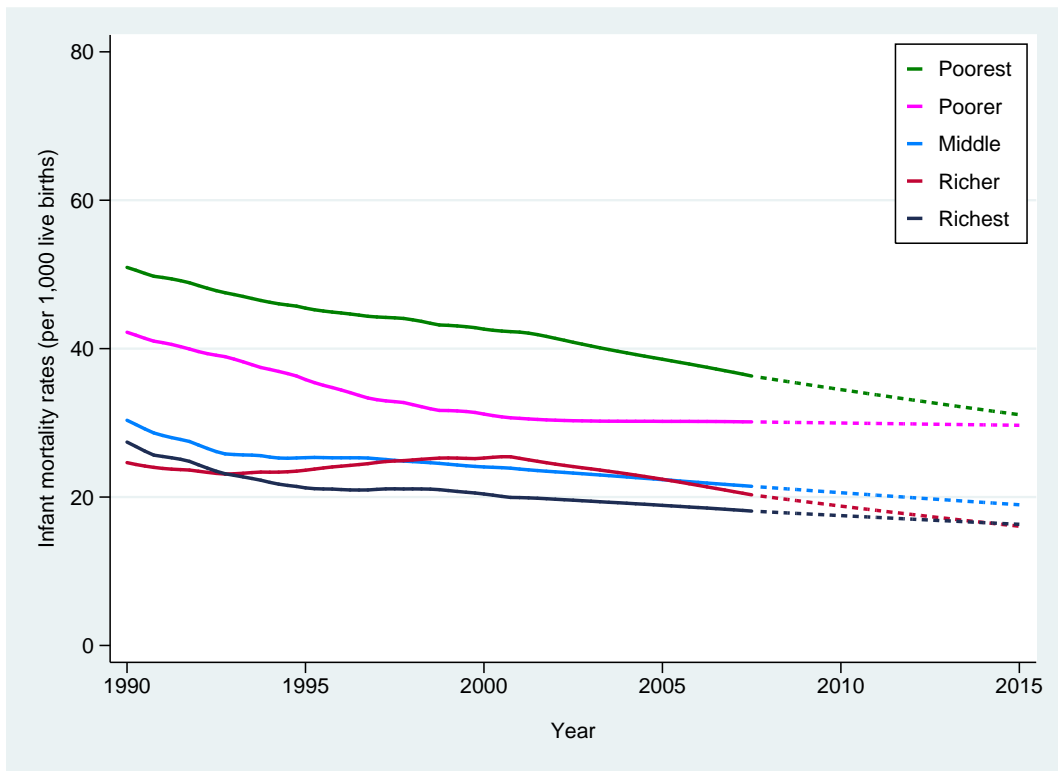
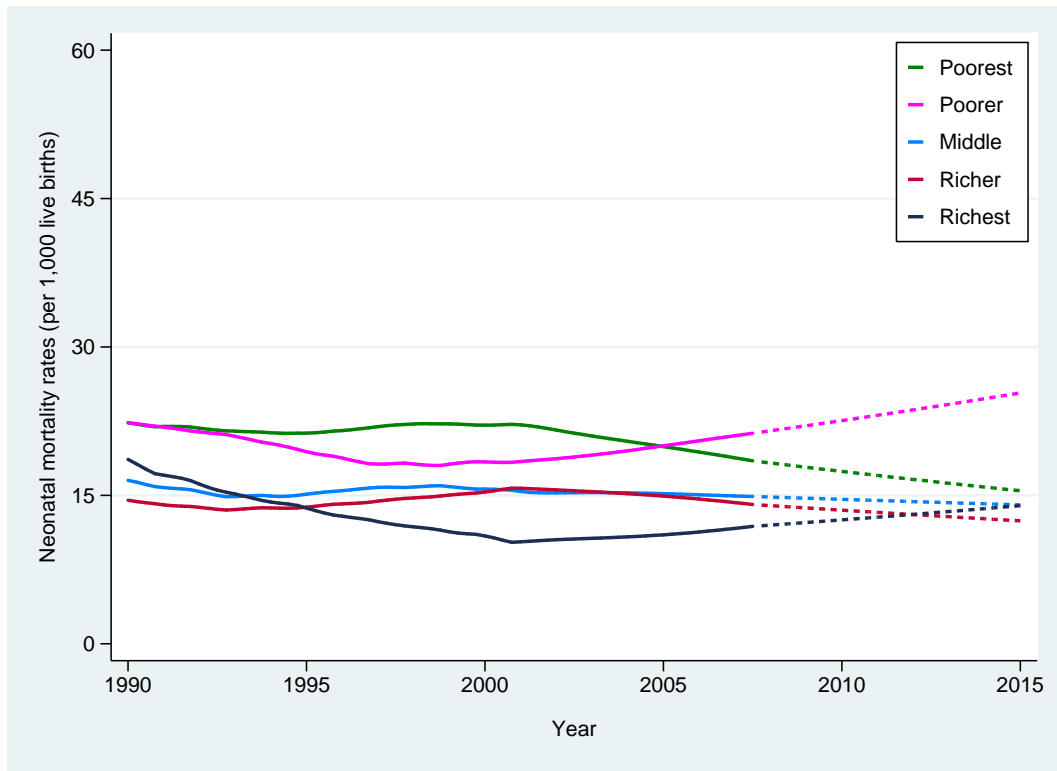


Figure 4.7: Neonatal mortality rates by wealth quintile



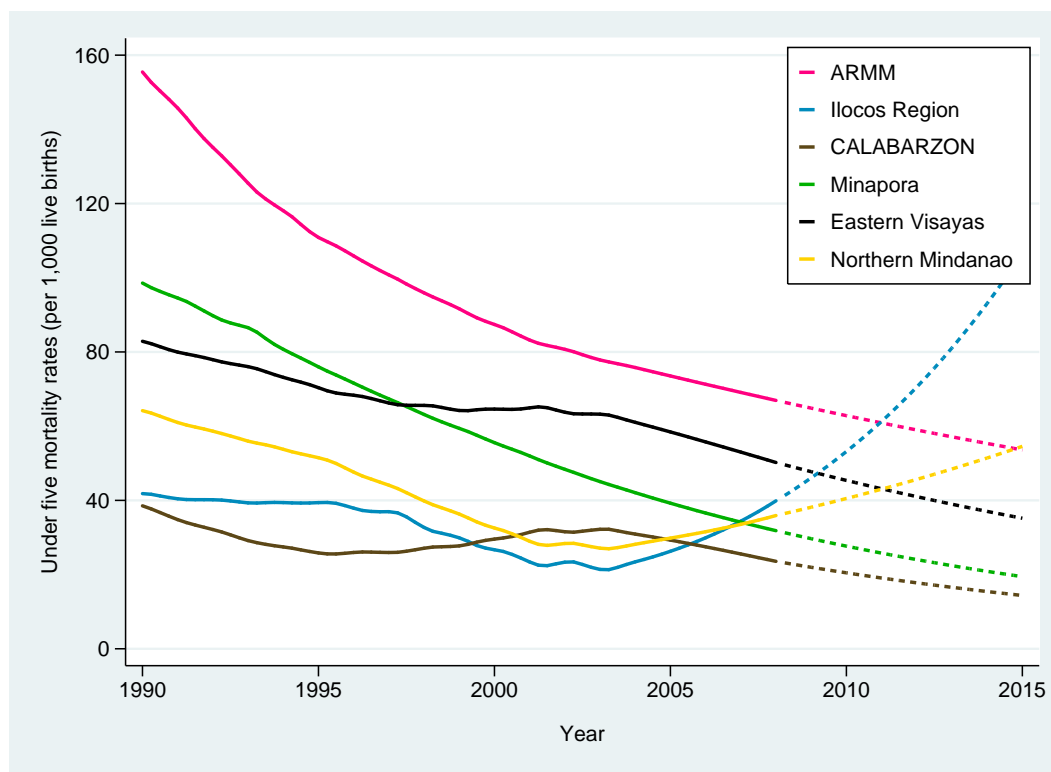
the need to focus on lagging regions and those with projected mortality decline reversals. These include Ilocos, Northern Mindanao, Davao Peninsula, Cagayan Valley and CAR in addition to the ARMM.

A convenient summary measure of inequality in mortality outcomes by wealth is the concentration index of child mortality. This is computed at the national level and for urban/rural and regional sub-populations (see Table 4.1 on page 20).

At both the national and sub-national levels, the burden of neonatal, infant and under five mortality is borne more by the poor. This has remained true over the period 1998 to 2008. At the national level, the degree of inequality is more severe for under five mortality than for infant and neonatal deaths, respectively, implying that there are wider gaps in mortality experience across income groups when it comes to deaths for 1–59-month-old children.

Over the 1998 to 2003 period, we see the inequality in mortality experience worsen, with the inequality indices becoming more negative for neonatal, infant and child mortality rates. Coupled with the general decline that we see in the levels of mortality, we can infer that the poor have been relatively left behind when it comes to mortality reductions, especially in the 1998 to 2003 period, which registered relatively larger negative values for concentration indices. For the period 2003 to 2008, we see that while concentration indices remain negative, they remained fairly stable. This implies that reductions in mortality

Figure 4.8: Under five mortality rates by region



have not been particularly biased towards the rich nor towards the poor.

Dividing the population into rural and urban residents, we find that inequality in neonatal deaths is more severe in the rural sector, while the inequality in infant and under five deaths is more severe in the urban sector. The same trend in worsening inequality over time can be seen with both urban and rural mortality. However, there seems to be greater worsening inequality in the urban sector relative to the rural sector, judged by indicators of neonatal, infant and child deaths. This could imply that interventions that address neonatal deaths need to be focused on the poor in the rural sectors, while interventions that address infant and under five deaths in general need to address the poor in the urban sector.

We computed the inequality index of mortality by region, using the national wealth index to rank families. We see that there are significant variations in the inequality index across regions, and the different regions have had varying experience in reducing inequalities over time.

In 2008, we see that the burden of neonatal and under five mortality is higher among the poor in the Bicol, Western Visayas and Central Visayas regions. However, in the NCR and CALABARZON, neonatal deaths are actually higher among the richer. These are important findings, suggesting that strategies to reduce inequalities in neonatal deaths in poor and rich regions should be slightly different from each other.

Over time, we see increasing inequality in neonatal, infant and child deaths in Central Visayas and Zamboanga Peninsula. Increasing inequality is seen in infant and child deaths in Bicol and Western Visayas. However, we do see Cagayan Valley as managing to reduce inequalities in neonatal, infant and child mortality over the ten-year period. Inequalities in infant and child deaths have been reduced in Central Mindanao. Central Luzon and the Calabarzon areas have also managed to improve equity in outcomes, perhaps owing to the generally rapid economic development that occurred in these regions in the last decade.

However, the inequality indices should always be analysed along with absolute levels of mortality and wealth. Some regions with high mortality can have low wealth-related inequality in mortality because their populations are mostly poor, e.g., ARMM. Efforts to reduce mortality should primarily be focused on regions with high mortality and with relatively poorer populations. Outcomes in these regions are much worse for the poorest of the poor. The region that would be an example of this is MIMAROPA, which is a high mortality–high inequality region for neonatal, infant and child mortality. Western Visayas has high mortality and high inequality for neonates.

Table 4.1: Inequality index of child mortality in the Philippines, 1998–2008

	Neonatal deaths			Infant deaths			Under five deaths		
	1998	2003	2008	1998	2003	2008	1998	2003	2008
National	-0.0744	-0.1035	-0.1118	-0.1315	-0.1511	-0.1542	-0.1504	-0.1814	-0.1860
Rural/urban									
Urban	-0.0228	-0.1063	-0.0476	-0.1138	-0.1148	-0.1349	-0.1259	-0.1471	-0.1855
Rural	-0.0709	-0.0391	-0.0718	-0.1030	-0.1045	-0.1108	-0.1236	-0.1325	-0.1351
Regional									
I – Ilocos Region	-0.0894	0.0230	-0.0444	-0.0809	-0.0378	-0.0946	-0.087	-0.0443	-0.1322
II – Cagayan Valley	-0.1217	-0.0862	-0.0661	-0.1165	-0.1056	-0.0893	-0.1358	-0.1547	-0.0866
III – Central Luzon	-0.1162	0.0008	-0.1081	-0.1135	0.0420	-0.0325	-0.1163	-0.0459	-0.0229
V – Bicol Region	-0.2513	-0.1883	-0.2253	-0.1782	-0.2178	-0.2412	-0.1579	-0.1535	-0.2137
VI – Western Visayas	-0.1333	-0.0675	-0.1775	-0.0509	-0.1219	-0.1678	-0.1018	-0.1435	-0.1679
VII – Central Visayas	-0.1741	-0.0198	-0.2293	-0.1375	-0.0816	-0.2046	-0.1406	-0.1353	-0.1896
VIII – Eastern Visayas	-0.0786	0.0457	-0.0721	-0.0683	-0.0303	-0.0612	-0.0811	-0.0666	-0.0914
IX – Zamboanga Peninsula	-0.0380	0.0268	-0.1381	-0.0820	-0.0705	-0.2991	-0.0856	-0.0569	-0.2512
X – Northern Mindanao	-0.0236	-0.1370	0.0708	-0.1090	-0.2187	-0.0550	-0.1280	-0.2346	-0.1103
XI – Davao Peninsula	0.0465	-0.0300	-0.0246	-0.0801	-0.1805	-0.1282	-0.1268	-0.1973	-0.0838
XII – Central Mindanao	-0.1858	0.0183	0.2018	-0.1868	-0.0641	-0.0348	-0.2248	-0.1271	-0.1018
XIII – CARAGA	-0.0580	-0.1510	-0.0013	-0.1139	-0.1669	0.0170	-0.1182	-0.1866	0.0206
National Capital Region	-0.0528	-0.1327	0.0043	-0.1770	-0.1378	-0.0704	-0.1993	-0.1691	-0.0779
Cordillera Admin Region	-0.0892	0.0107	0.0483	0.0096	-0.1718	0.0479	-0.0239	-0.2127	0.0080
ARMM	0.0396	-0.0104	0.0088	-0.0589	0.0635	-0.0101	-0.0735	0.0602	-0.0168
IVA – Calabarzon	0.0949	-0.0356	0.0519	-0.0697	-0.0662	0.0232	-0.0806	-0.1314	-0.0217
IVB – Mimaropa	<i>n.a.</i>	-0.1958	-0.1201	<i>n.a.</i>	-0.1529	-0.2041	<i>n.a.</i>	-0.2292	-0.2579

Note: the expression “n.a.” indicates “not available”

4.2 Causes of death and intervention coverage

Data from civil registry records, though suffering from under-reporting and biases from misdiagnoses, give some general trends on the major causes of death of mothers and

children. For maternal mortality, Philippine data reveal that obstructed labor accounts for most deaths, followed by eclampsia and haemorrhage. Data from selected regions reveal greater proportions of deaths occurring because of haemorrhage, and, to a lesser extent, hypertensive disorders (see Table 3.1, page 9).

Table 4.2: Major causes of maternal deaths in the Philippines (per cent)

	Philippines			North Samar	East Samar
	1995	2000	2005	2008	2009
Hemorrhage (antepartum)	0.10	8.00	0.12	9.09	16.67
Hemorrhage (postpartum)	20.30	22.40	15.18	63.64	22.22
Hypertensive disorders (Eclampsia)	25.40	23.40	29.45	18.18	33.33
Sepsis/infections (puerperal infection)	<i>n.a.</i>	<i>n.a.</i>	<i>n.a.</i>	9.09	27.78
Abortions	9.00	11.00	7.97	<i>n.a.</i>	<i>n.a.</i>
Obstructed labour	45.30	35.20	47.29	<i>n.a.</i>	<i>n.a.</i>

Note: the expression “*n.a.*” indicates “not available”

Philippine data on the causes of death of neonates are not separated from causes of infant mortality. However, nearly two-thirds of infant deaths are neonatal deaths, as reflected in the leading causes of infant mortality (see Table 4.3, page 22). Infections and respiratory distress of newborns, neonatal aspiration syndrome and birth asphyxia figure prominently.

Pneumonia and diarrhoea remain the leading causes of death in children 1–4 years, though cheap antibiotics and oral rehydration therapy are effective in preventing deaths from these two diseases, respectively (see Table 4.4, page 23). Vaccine-preventable diseases such as measles and polio have largely disappeared as leading causes of death, owing perhaps to concerted government efforts to expand immunisation coverage. Injuries are emerging as a major cause of death among children aged one to five years.

The preceding discussion highlights the importance of interventions at the pregnancy and birth phases in preventing both maternal and neonatal deaths. Antenatal care coverage could detect hypertensive disorders, while basic and comprehensive emergency obstetric care can prevent deaths due to obstructed labour or haemorrhage, in mothers; and birth asphyxia or severe infection, in neonates. Interventions at the childhood phase, in particular, antibiotics for pneumonia and oral rehydration therapy, are needed to reduce under five mortality. Differences in the coverage of these interventions can partly explain the observed differences in mortality outcomes across groups.

In general, we observe that, as of 2008, there is low overall coverage for some critical interventions efficacious against the causes of death for mothers, children and neonates. Among these interventions are facility-based delivery (which is the platform for delivering crucial interventions at the birth phase, specifically basic and comprehensive emergency obstetric care), breastfeeding within one hour (coupled with temperature management), antibiotics (to reduce under five pneumonia) and ORT (see Figure 4.9 on page 23). We

Table 4.3: Ten leading causes of infant deaths in the Philippines (per cent)

1995		2000		2005	
Causes	%	Causes	%	Causes	%
Pneumonia	20.4	Pneumonia	12.5	Bacterial sepsis of newborn	14.6
Respiratory conditions of fetus and newborn	17.8	Bacterial sepsis of newborn	11.5	Respiratory distress of newborn	10.6
Congenital anomalies	13.1	Disorders related to short gestation and low birth weight not elsewhere classified	9.3	Pneumonia	9.3
Birth injury and difficult labour	5.6	Respiratory distress of newborn	8.8	Disorders related to short gestation and low birth weight, not elsewhere classified	7.4
Diarrhea diseases	4.7	Other perinatal condition	8.5	Congenital pneumonia	7.0
Septicaemia	3.1	Congenital malformations of the heart	5.8	Congenital malformations of the heart	6.7
Meningitis	1.5	Congenital pneumonia	4.9	Neonatal aspiration syndrome	5.3
Avitaminoses and other nutritional deficiency	1.4	Diarrhea and gastroenteritis of presumed infectious origin	4.4	Other congenital malformations	4.7
Other diseases of respiratory system	1.3	Other congenital malformations	4.2	Intrauterine hypoxia and birth asphyxia	4.5
Measles	1.1	Neonatal aspiration syndrome	3.8	Diarrhea and gastroenteritis presumed infectious origin	4.2
Total	69.9	Total	73.5	Total	74.1

also see low coverage of family planning, measured as either contraceptive prevalence rate or met need.

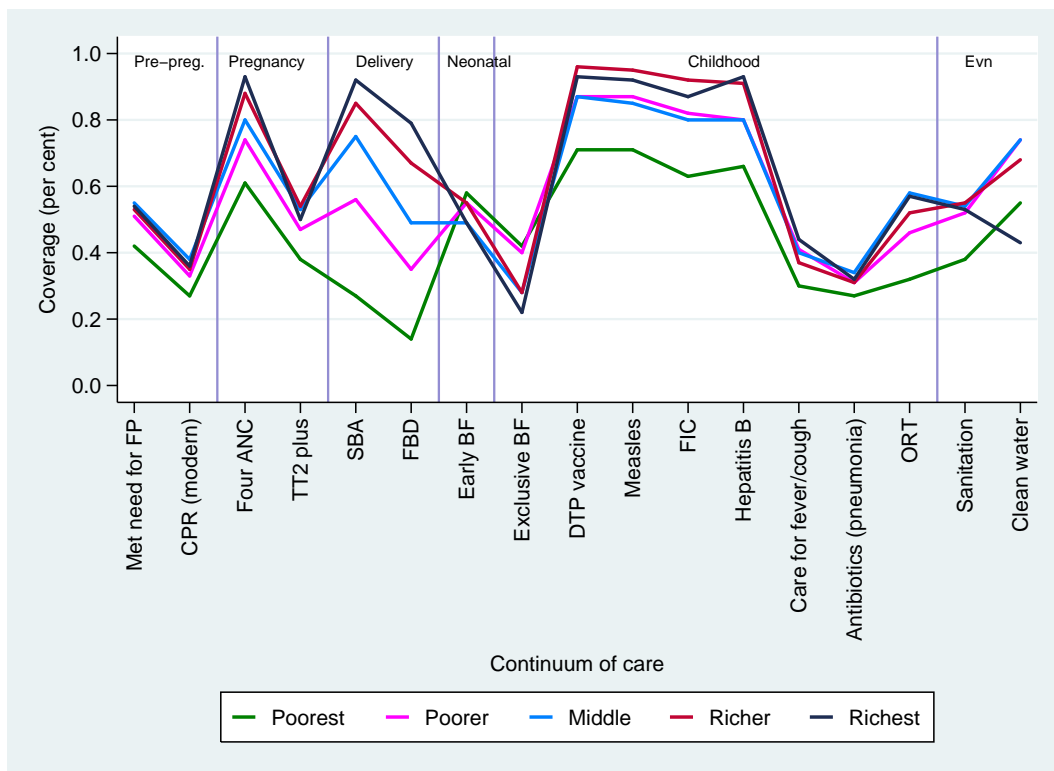
We also see that there are missed opportunities in the delivery of various interventions. For instance, while there is a relatively high coverage of antenatal care, coverage of tetanus toxoid (which can be given during antenatal care visits) remains low. Antenatal care visits can also be the platform for birth planning and for advocacy for skilled birth attendance, yet skilled birth attendance, much less facility-based delivery, remains low. These findings also imply that if we consider various quality aspects of the antenatal care visit, the effective coverage of antenatal care may actually be lower.

We see that the low coverage can be explained by highly uneven movements across interventions over time (see Figure 4.10, page 24). Increases in coverage were sustained for antenatal care visits, skilled birth attendance and the provision of tetanus toxoid injections over the 15 years ending in 2008 (Intervention coverage and inequality indices over time are shown in Appendix C). Immunisation coverage, while barely moving from

Table 4.4: Ten leading causes of deaths for children 1-4 years in the Philippines (per cent)

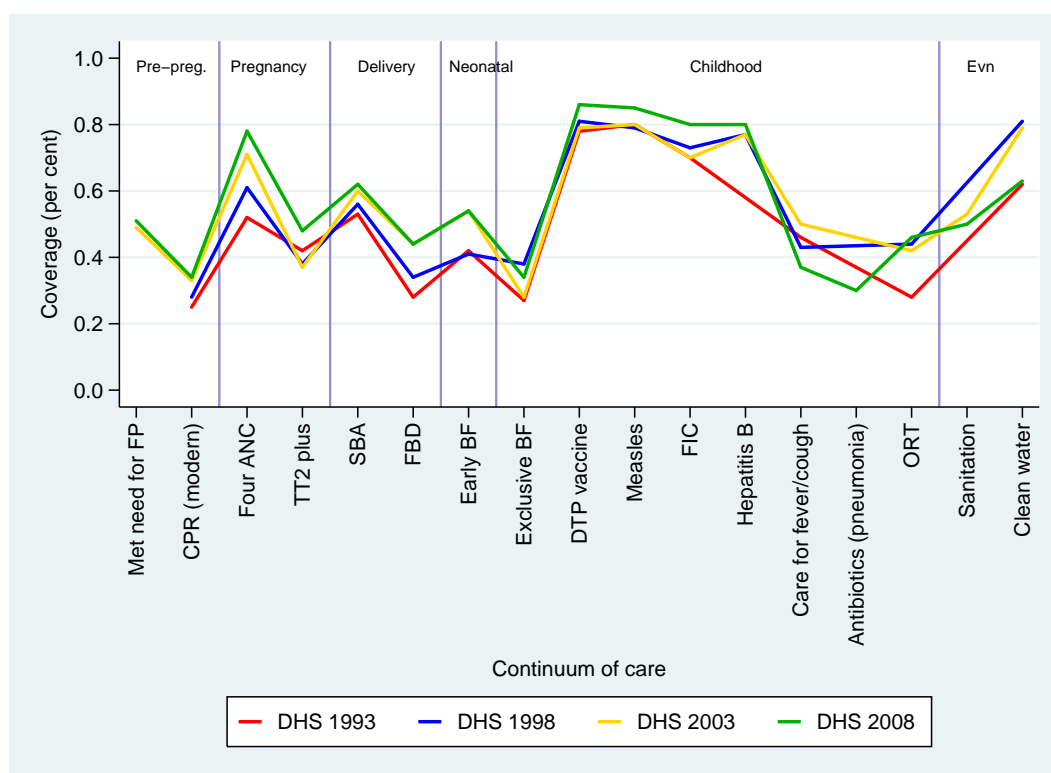
1995		2000		2005	
Causes	%	Causes	%	Causes	%
Pneumonia	34.7	Pneumonia	24.7	Pneumonia	21.3
Diarrhea	9.4	Accidents	11.5	Accidents	11.0
Accidents caused by submersion suffocation and foreign bodies	4.6	Diarrhea and gastroenteritis presumed to be of infectious origins	10.6	Diarrhea and gastroenteritis presumed to be of infectious origins	11.0
Measles	4.3	Measles	7.5	Congenital anomalies	8.9
Malnutrition	4.3	Congenital anomalies	5.9	Ill-defined and unknown causes of mortality	5.1
Congenital anomalies	4.1	Malignant neoplasm	3.2	Other disease of the nervous system	4.2
Meningitis	3.1	Meningitis	3.1	Meningitis	3.6
Motor vehicles and traffic accidents	1.4	Septicemia	3.0	Chronic lower respiratory diseases	3.5
Nephritis, neprotic syndrome, nephrosis	1.2	Chronic obstructive pulmonary disease and allied condition	2.9	Other protein-calorie malnutrition	3.2
Leukaemia	0.9	Other protein, calorie malnutrition	2.9	Septicaemia	3.3
Total	68.1	Total	75.2	Total	75.0

Figure 4.9: Coverage of selected interventions, by wealth group, 2008



an already relatively higher coverage in 1993–2003, managed to further increase in 2008. However, while the coverage of facility-based delivery increased from 1993 to 2003, coverage barely moved thereafter. Coverage of oral rehydration therapy, exclusive breastfeeding and seeking care for fever and cough (as the precursor of antibiotic treatment) have not been marked with significant improvements over the last 15 years and are, in fact, in danger of backsliding. These findings imply that the performance of the health delivery system has not progressively improved over the last 15 years, and barriers to the utilisation of certain interventions remain.

Figure 4.10: Coverage of selected interventions, 1993-2008



The degree of income inequality in relation to intervention coverage is also uneven across the different interventions. The combination of level of coverage and degree of income inequality has implications for the kinds of policies and strategies for scaling up that could be effected. Figure 4.9 (page 23) plots the 2008 intervention coverage across wealth quintiles, while Figure 4.11 plots the intervention coverage vis-a-vis the concentration index. Thus, we can characterise interventions as to whether they have high or low coverage and as to whether coverage is relatively equal or unequal. Of utmost concern would be those interventions which have low levels of coverage and are associated with relatively high inequality.

In the case of facility-based delivery, oral rehydration therapy, tetanus toxoid, and family planning, for instance, the low overall coverage (i.e. less than half of the intended population) is accompanied by huge gaps across wealth groups (positive concentration

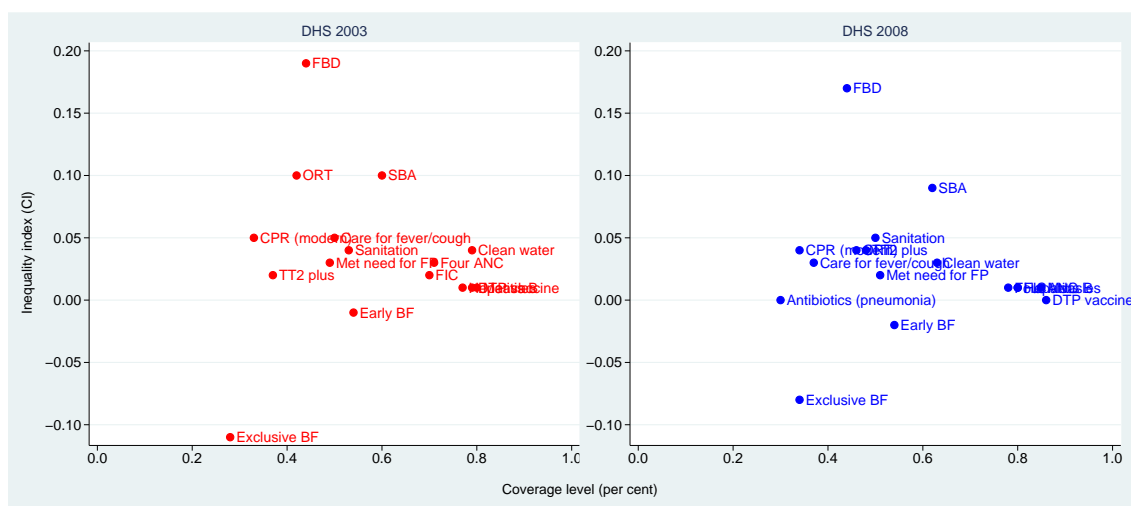
indices). Thus, we see them in the upper left part of Figure 4.10 (page 24). However the worst concentration is registered by facility-based delivery. For these interventions, increasing coverage would involve massive efforts directed at the lowest income groups but with efforts, nevertheless, also directed at the higher income groups.

In cases of antenatal care visits and immunisation coverage for children, we see an overall high coverage, and a relatively low concentration ratio, which reflects the narrow gap between the upper four quintiles. However, we still see a huge gap in coverage between the lowest wealth quintile and the upper four quintiles. This implies that while current efforts to maintain coverage for the upper income quintiles should be maintained, extra effort should be exerted to increase coverage for the lower income groups.

Of interest is the case of antibiotics for under five pneumonia, which has low coverage and low inequality. CPR and care for fever and cough can also be classified as being of low coverage with some inequality. For these interventions, there is scope for expansion in coverage. However, since there are no huge gaps in coverage across wealth quintiles, efforts at scaling up would involve scaling up across all the wealth levels.

Interestingly, there are some efficacious interventions that are more prevalent among the lower wealth quintiles, especially breastfeeding. These interventions have negative concentration indices, which indicate that they are concentrated among the poor. However, we see that overall coverage is still low. In these instances, efforts to increase coverage need to target all socioeconomic groups.

Figure 4.11: Coverage and concentration index of selected interventions

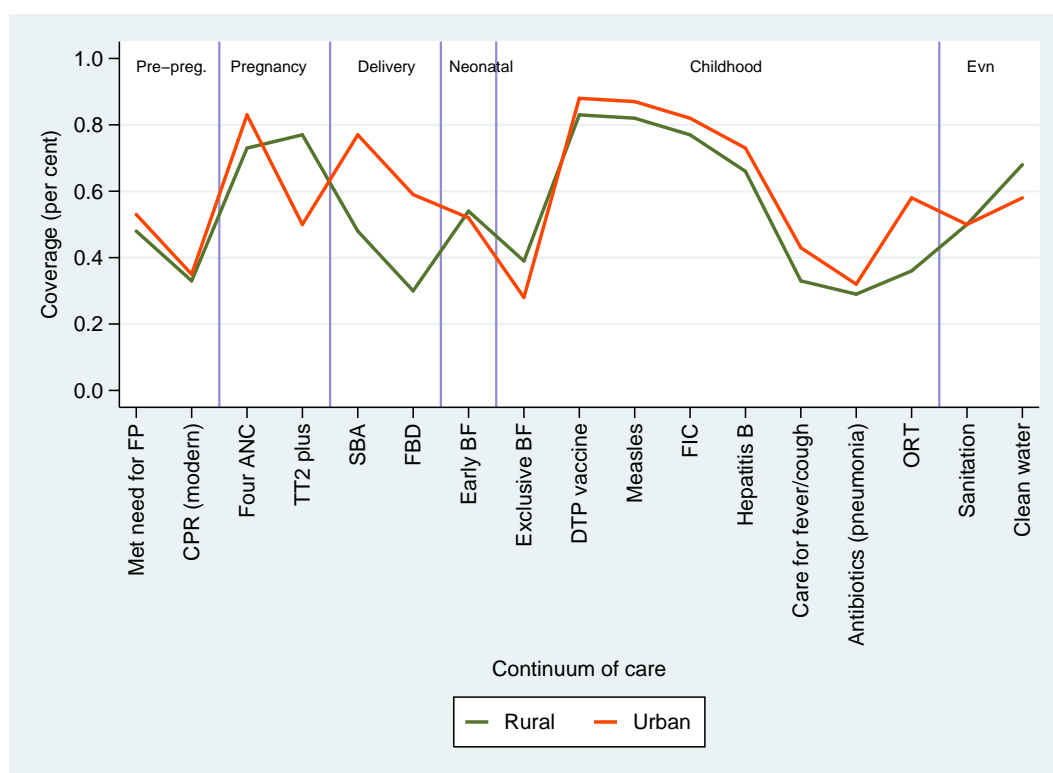


In general, the coverage of interventions is higher among the urban population. However, while we see gaps in intervention coverage across urban and rural populations, the gaps are not wide enough to explain the disparities in intervention coverage across income groups. The exception in this case is for skilled birth attendance, facility-based delivery and oral rehydration therapy, where the gaps between urban and rural populations are

wide (see Figure 4.12).

Comparing the lowest wealth quintiles and the highest wealth quintiles across urban and rural populations, we see that the urban segment has fewer inequalities in intervention coverage than the rural segment, as evidenced by higher rural concentration indices (see Table 4.5 on page 27). An exception to this is breastfeeding, which is relatively more concentrated among the poor in both areas. For the richest wealth quintiles, the differences between urban and rural coverage are marginal. However, these findings indicate that, to attain equitable outcomes, we may need to focus more on the poorest among the rural population. Also of note is the difference in inequality between two measures of family planning use. While there do not seem to be differences in inequality across urban and rural populations in terms of family planning, there are significant differences in the coverage of modern method used. These findings indicate that the rural poor may be using non-modern methods of family planning which may be less effective than modern methods in achieving family planning.

Figure 4.12: Coverage of selected interventions, by urban/rural location, 2008



It is in the regional sub-populations that we see inequality in mortality. We thus compute the difference in intervention coverage between the highest and lowest performing regions and divide that by the mean. We exclude the ARMM, which is consistently the poorest performer. We see that, relative to the mean coverage, differences between the region with the lowest coverage and the region with the highest coverage are widest again for facility-based delivery, breastfeeding coverage, and treatment of pneumonia and oral

Table 4.5: Concentration index of selected interventions, urban vs. rural (2008)

Intervention	Urban	Rural
Met need (CPR any method)	0.00379	0.03296
CPR (modern methods)	0.00006	0.06787
At least 4 ANC's	0.01293	0.01917
TT2 plus	0.01486	0.04726
SBA	0.02747	0.11298
FBD	0.08434	0.19177
Breastfed within 1 hour	-0.00805	-0.01775
DTP vaccine	0.00494	0.00968
Measles	0.00481	0.01036
FIC	0.00811	0.01638
Hepatitis B	0.00971	0.01600
Seeking care for fever and cough	0.00356	0.05430
Antibiotics for under five pneumonia	-0.00714	0.06376
Exclusively breastfed (children 0-5 months)	-0.05963	-0.06893
Safe disposal of child feces	0.03543	0.04369
Good quality water	-0.08410	0.03110
ORT	0.01756	0.07005

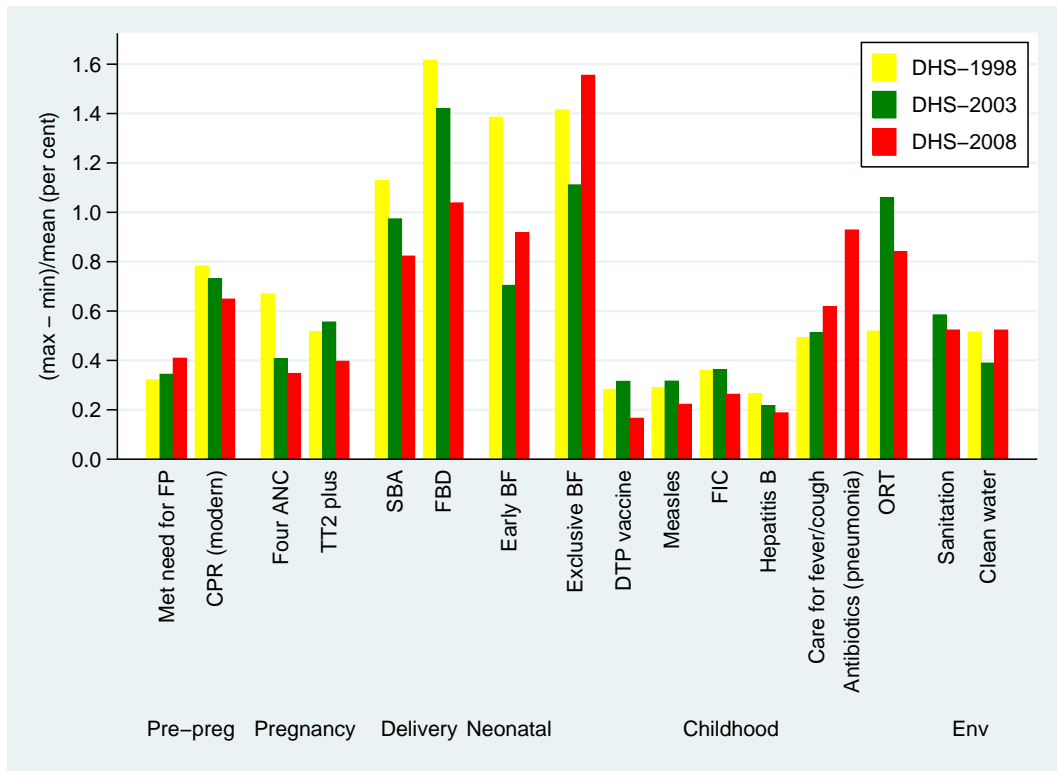
rehydration therapy (see Figure 4.13 on page 28). These findings imply that regional targeting should be used when prioritising scale-up in intervention coverage. (Appendix D shows regional concentration indices for selected interventions.)

4.3 Correlates of mortality inequality

Are the gaps in intervention coverage correlated with the burden of child deaths among the poor? In order to answer this question, we track mortality against various risk factors and interventions known to prevent those deaths. For neonatal deaths, this means the inclusion of interventions that are administered at the pregnancy and birth phases, such as antenatal care, tetanus toxoid, early breastfeeding, and facility-based delivery. In the analysis of under five mortality, however, we are unable to include interventions against pneumonia and diarrhoea since data on childhood-phase interventions (antibiotics, ORT, immunisation) were not available for dead children. We utilised Probit regressions to compute for the marginal effects of the risk factor and intervention coverage variables on deaths.¹ As always, it is important not to confuse correlation with causation. Where assertions about cause are made, we are careful to distinguish between hard statistical evidence supporting the former and speculative hypotheses related to the latter.

¹Due to the survey format, we can only include the latest birth in the last five years as these had relatively complete data for the intervention coverage, as well as for the risk factors.

Figure 4.13: Regional differences in intervention coverage



The results show that education of the mother is negatively associated with the likelihood of the child dying as a neonate and the relative contribution of the mother's education level to the concentration index is quite high (see Table 4.6, page 31). The Probit regression results and the computed marginal effects are shown in Appendix E. Higher education is linked to a lower likelihood of dying but since higher education is unequally distributed in favour of the rich, the effect on the concentration index of neonatal death is negative (producing an increase in inequality).

Among the risk factors, we see that if a child is a twin or one in a larger multiple birth, he or she is more likely to die as a neonate than other children, although the relative magnitude of the contribution of such a factor is quite small. Such a phenomenon is more likely to occur in the richer quintile, resulting in a reduction in the concentration index of neonatal deaths. Children of mothers with histories of terminated pregnancies are also more likely to die as neonates than other children, and the concentration of this phenomenon among the poor increases the concentration index of neonatal deaths. Location did not contribute to the inequality in deaths in 2008 and the magnitudes of the impacts were also small.

Among the interventions delivered at the pregnancy phase, the mother having had at least two tetanus injections is less likely to have her child die as a neonate. This variable may also be capturing access to antenatal care since tetanus toxoid injections are most

likely given during these visits. For the birth phase interventions, breastfeeding within an hour is found to be associated with a lower likelihood of dying as a neonate. Early breastfeeding, on its own, is known to be efficacious against severe infection and diarrhoea, two major causes of neonatal deaths. In addition, early breastfeeding may also be capturing the delivery of other efficacious interventions for newborns, such as temperature management and clean cord care. Delivery attendants who encourage mothers to put their child to the breast within one hour may also be more likely to encourage them to delay bathing and keep skin to skin contact. As expected, delivery in a facility is associated with a lowered chance of neonatal death. This may be capturing the impact of interventions, such as emergency neonatal care and comprehensive emergency obstetric care, which are more easily delivered in facilities.

The higher coverage of tetanus toxoid among the rich contributed to around 8 per cent of the inequality index in 2008. The higher coverage of early breastfeeding among the poor reduced the inequality in neonatal deaths in 2008 by around 6.2 per cent. However, the magnitudes of the contributions are small since the inequality in coverage is relatively low. In terms of contributions to inequality, the higher coverage of facility-based delivery among the rich contributes to as much as 34 per cent of the inequality in neonatal deaths in 2008. This is owing to the relatively high negative effect on the likelihood of dying as well as to the relatively high inequality in coverage. While not discounting the other interventions, these findings imply that reducing the inequalities in facility-based delivery would have a higher impact on reducing inequalities in neonatal deaths.

Contributing to the inequality in the coverage of facility-based delivery in 2008 is the inequality in the coverage of the Philippines' social insurance scheme PhilHealth, implying that alleviating funding constraints for the poor would partly result in increased coverage of this intervention (regression results, estimated marginal effects and decomposition in intervention coverage are shown in Appendix F). The poor's lack of access is unfortunate since PhilHealth is quite a comprehensive system.

Higher birth order children are less likely to be delivered in facilities, and with a greater concentration of higher birth order children among the poorer, this has resulted in increasing the inequality in the coverage of facility-based delivery, and indirectly it has contributed to inequalities in neonatal mortality. This may be capturing some level of confidence of the mothers in delivering at home, especially if previous deliveries had been uncomplicated. However, higher birth order children would most likely have more siblings and younger siblings that require care. Thus, this variable may also be capturing the difficulty of going to facilities for delivery, especially if mothers cannot find caregivers for these young children.

The likelihood of mothers accessing tetanus toxoid injections is likewise lower among mothers pregnant with higher birth order children, and the concentration of higher birth order children among the poor contributes to the inequality in the coverage of this interven-

tion and, indirectly, to inequality in neonatal mortality. Mothers with wanted pregnancies are more likely to avail themselves of tetanus toxoid injections, and the high concentration of this among the rich also contributes to the inequality in intervention coverage.

These two findings suggest that family planning interventions that reduce the number of children or that allow couples to plan the timing of childbearing may decrease inequalities in coverage of critical interventions in the pregnancy phase, which in turn contributes to the decrease of inequalities in neonatal deaths.

Where the mother is located also affects the likelihood of accessing interventions that are relevant to neonatal mortality. Mothers delivering in rural areas are less likely to have facility-based deliveries and the high concentration of poor mothers in rural areas contributes to the inequality in coverage and indirectly to inequalities in mortality. Where the mother is located also affects the likelihood of having tetanus toxoid injections. Location in regions with the highest positive contribution to the likelihood of access to tetanus toxoid injections is relatively unequal, resulting in positive contributions of location in the NCR and Central Luzon to inequalities in tetanus toxoid coverage. If the regional elasticities do indeed reflect service capacities, then improvements in service capacities in those regions with a higher concentration of the poor would contribute to a lessening of the inequalities in tetanus toxoid coverage.

Early breastfeeding refers to the likelihood that the child is put to the breast within one hour of birth. As mentioned previously, early breastfeeding can be a proxy for good quality neonatal care as providers who encourage early latching on may also be more likely to encourage crucial interventions in the birth phase, such as temperature management and cord care. Coverage of this intervention is above fifty percent but it is more prevalent among the poor than among the rich, as reflected in the negative concentration index, thus contributing to a reduction in inequality in neonatal deaths. While concentrating the increase in coverage of early breastfeeding among the poor would tend to contribute to reductions in neonatal mortality inequality, care should be exercised that this should not leave behind the rich.

Children whose mothers have some education, in particular college education, are less likely to be breastfed early. This may reflect higher time costs of more educated mothers or non-compliance with the essential newborn protocol in facilities where these mothers deliver. Thus, breastfeeding campaigns should not be limited to those with lesser education but should also be directed to those with higher education. Another policy implication would be to target those facilities to which these mothers go for briefing on the essential newborn care protocol, includes breastfeeding. Similarly, delivery attendants to whom these mothers go should be briefed. We see that early breastfeeding is also more likely if the mother had been visited by a family planning worker. It may be that visits by family planning workers are used as opportunities for imparting health information to families or occasions to address health concerns in families. This suggests that health worker visits

may be utilised to impart information on crucial interventions and to encourage mothers to access them.

Table 4.6: Decomposition of neonatal mortality, PHL 2008

Covariates	Elasticity	CI	Contribution	% Contribution
Age of mother	0.22210	-0.00040	0.00000	0.00
Mother's education				
<i>Primary</i>	-0.77160	-0.32890	0.25380	-185.38
<i>Secondary</i>	-1.29030	-0.00130	0.00000	0.00
<i>Higher</i>	-0.86060	0.30060	-0.25870	188.97
<i>Married</i>	-0.67050	-0.00070	0.00000	0.00
Region				
<i>I – Ilocos Region</i>	-0.01060	0.19230	0.00000	0.00
<i>II – Cagayan Valley</i>	0.01690	-0.08940	0.00000	0.00
<i>III – Central Luzon</i>	0.06150	0.17370	0.00000	0.00
<i>V – Bicol Region</i>	-0.02270	-0.18180	0.00000	0.00
<i>VI – Western Visayas</i>	0.04870	-0.17420	0.00000	0.00
<i>VII – Central Visayas</i>	0.03380	-0.03080	0.00000	0.00
<i>VIII – Eastern Visayas</i>	0.02910	-0.29290	0.00000	0.00
<i>IX – Western Mindanao</i>				
<i>X – Northern Mindanao</i>	-0.00740	-0.18700	0.00000	0.00
<i>XI – Southern Mindanao</i>	-0.00280	-0.15070	0.00000	0.00
<i>XII – Central Mindanao</i>	-0.02250	-0.25330	0.00000	0.00
<i>XIII – CARAGA</i>	-0.00950	-0.20200	0.00000	0.00
<i>National Capital Region</i>	0.07900	0.31740	0.00000	0.00
<i>Cordillera Admin Region</i>	0.01730	-0.01300	0.00000	0.00
<i>IV – Southern Luzon</i>				
IVA – CALABARZON	-0.09290	0.26160	0.00000	0.00
IVB – MIMAROPA	0.00430	-0.29100	0.00000	0.00
Rural	0.16480	-0.12070	0.00000	0.00
Multiple births	0.01650	0.02830	0.00050	-0.34
Female child	-0.19790	0.00580	0.00000	0.00
Ever had pregnancy termination	0.10830	-0.07550	-0.00820	5.97
TT2 plus	-0.31810	0.03540	-0.01130	8.22
Complicated birth	0.13170	0.03870	0.00000	0.00
FBD	-0.34200	0.16070	-0.05490	40.13
Initiated breastfeeding within 1 hour	-0.48620	-0.01700	0.00820	-6.03
Residual			-0.06630	48.44

Turning to under five mortality, we see that children whose mothers have higher than secondary education are less likely to die before their fifth birthday (see Table 4.7, page 33) and the concentration of higher education among the rich contributes to a worsening of the inequality.

We see that, in 2008, those whose siblings were born less than three years previously are more likely to die; and since this situation is more likely among the poor, this risk factor contributes to a worsening of the inequality in under five mortality. This finding

may be capturing health effects on the child of insufficient recovery of the mother from the previous childbirth. In addition, the variable may be capturing the time costs of accessing care for sick children as families with other small children may be unable to seek care as readily as those without. These possibilities suggest a role for interventions, such as family planning, for spacing births in order to reduce the prevalence of under five mortality and to reduce the burden of that mortality on the poor.

Locational differences contribute to inequality in deaths of children. Those young children who were located in particularly wealthy regions, such as CALABARZON and the NCR, were significantly less likely to die under five. The concentration of rich people in these regions increases inequality. We see that locations in Ilocos and Central Luzon have contributed to the overall worsening of inequality, owing mainly to the unequal distribution of income in these regions. These regional differences may be picking up factors that partly influence the delivery of childhood interventions. These regional differences contribute more to increasing inequalities, suggesting that focusing on the regions with relatively low performance could relieve the burden of excess deaths among the poor.

We have not been able to estimate the relative contributions of antibiotics for under five pneumonia and for oral rehydration therapy to reduce inequalities in the under five mortality burden, since data are available for surviving children only. We have however noted that since these two interventions address two major causes of mortality, and since their coverage is low and relatively unequal, their absence is likely to be contributing to the burden of under five deaths. Antibiotic management of pneumonia is conditional on families seeking care for pneumonia symptoms, such as fever and cough. In 2008, this was more likely among those covered by health insurance, and less likely among rural residents and children with less than a three-year interval with a sibling (see Appendix F). As health insurance coverage is higher among the rich, and as rural residence and shorter birth intervals are higher among the poor, such factors contribute to increasing inequalities in care for pneumonia. Except for location in the NCR, location in the different regions did not significantly contribute to the inequality in intervention coverage in 2008. These suggest that both financial and time costs of accessing care are significant barriers to the poor. Mitigating financial barriers by enrolling more of the poor in PhilHealth could increase treatment seeking and improve equity in the coverage of antibiotic management. Reducing the burden of childcare for other siblings may also reduce the inequalities.

For oral rehydration therapy, the higher prevalence of mothers knowing about ORT among the richer contributes to inequality in coverage (see Appendix F). Policies or programs that make such knowledge more widely available, especially to the poorer, would therefore tend to reduce the inequality. Location differences are also noted, in particular the significant contribution in reducing the inequality in coverage by location in Bicol, Central Visayas and Caraga. However, coverage is made more unequal by location in the richer regions of the NCR and Calabarzon. The increased likelihood of children receiving ORT when sick with diarrhoea in these areas, combined with the relatively high

concentration of the rich there, contributes to increasing inequality in oral rehydration.

Table 4.7: Decomposition of under five mortality, PHL 2008

Covariates	Elasticity	CI	Contribution	% Contribution
Age of mother	0.00350	-0.00100	0.00000	0.00
Mother's education				
<i>Primary</i>	-0.15830	-0.31000	0.00000	0.00
<i>Secondary</i>	-0.35940	0.00500	0.00000	0.00
<i>Higher</i>	-0.35320	0.31950	-0.11290	60.73
<i>Married</i>	-0.31980	-0.00070	0.00000	0.00
Region				
<i>I – Ilocos Region</i>	-0.05290	0.17530	-0.00930	4.99
<i>II – Cagayan Valley</i>	-0.00120	-0.08120	0.00000	0.00
<i>III – Central Luzon</i>	-0.08750	0.18740	-0.01640	8.83
<i>V – Bicol Region</i>	-0.01570	-0.18030	0.00000	0.00
<i>VI – Western Visayas</i>	0.00610	-0.18320	0.00000	0.00
<i>VII – Central Visayas</i>	-0.03100	-0.02760	0.00000	0.00
<i>VIII – Eastern Visayas</i>	-0.01490	-0.28040	0.00000	0.00
<i>IX – Western Mindanao</i>	-0.05470	-0.25330	0.01390	-7.45
<i>X – Northern Mindanao</i>	-0.03710	-0.17250	0.00000	0.00
<i>XI – Southern Mindanao</i>	-0.02390	-0.13500	0.00000	0.00
<i>XII – Central Mindanao</i>	-0.03690	-0.23210	0.00860	-4.61
<i>XIII – CARAGA</i>	-0.02390	-0.18730	0.00450	-2.41
<i>National Capital Region</i>	-0.15700	0.34110	-0.05350	28.81
<i>Cordillera Admin Region</i>	-0.00720	0.02190	0.00000	0.00
<i>IV – Southern Luzon</i>				
IVA – CALABARZON	-0.19000	0.27480	-0.05220	28.10
IVB – MIMAROPA	-0.01540	-0.28630	0.00000	0.00
Rural	0.04900	-0.11580	0.00000	0.00
Multiple births	0.00950	-0.02900	-0.00030	0.15
Female child	-0.07030	-0.00030	0.00000	0.00
Birth interval – less than 3 years	0.26730	-0.06950	-0.01860	9.99
Ever breastfed	-2.23210	-0.00440	0.00990	-5.34
Safe sanitary toilet	-0.11420	0.02080	0.00000	0.00
Residual			0.05040	-27.12

Conclusions and policy recommendations

We have sought to look at the levels of, inequalities and trends in, neonatal and under-five mortality. Our analysis has led us to the following conclusions and recommendations.

Data limitations precluded analysis of mortality across location indicators that best represent health service delivery capacities.

Ideally, outcomes should be compared across health service delivery capacities. In our situation, the province may be the best location indicator to use as provinces are in charge of several health facilities, including the provincial and district hospitals. Moreover, the national government has embarked on a program of investment planning for health at the province level as part of the implementation of the health sector reform agenda. However, available household data sources are not representative at the province level but at the regional level. Thus, a future endeavour that would contribute to a deeper analysis of outcomes and intervention coverage would be the collection of provincial-level representative data.

Progress towards MDG 4 is evident in the Philippines, especially for under-five and infant mortality, but greater effort should be placed on the reduction of neonatal mortality.

Between 1990 and 1995, the Philippines recorded consistent falls in all three mortality indicators: U5MR, IMR and NMR. Since 1995, improvement in the first two of these indicators has continued at a reduced rate, while NMR has been almost flat at approximately 17 deaths per 1,000 live births. Our projections indicate neonatal mortality will comprise more than half of all under-five deaths and almost three-quarters of infant deaths by 2015.

The first period (from 1990 to 1995) can be thought of as an era of low-hanging fruit. During this time there was a large expansion of immunisation coverage, and improvements in child mortality outcomes were relatively easy to bring about. After that came the more difficult process of consolidating gains and searching for less obvious solutions. The poorer

performance of the second period (since 1995) might also reflect several limitations of current MNCH policies, as exhibited by relatively low coverage of some key interventions relevant to neonatal health, such as good quality ANC and FBD. Further reductions in neonatal mortality would require a strengthening of the health system. The current rate of U5MR reduction will be unsustainable without such strengthening and without it, it would leave the Philippines at 29 deaths per 1,000 live births, just short of the MDG target of 27. These findings support the prioritisation of neonatal interventions advocated in the Investment Case scaling-up report for the Philippines.

Persistent inequality in mortality outcomes and coverage of key interventions exist across all equity markers: wealth, the urban/rural divide and the different regions.

Success at the national level in under-five and infant mortality reduction masks inequality in progress at the sub-national level. We found that the burden of mortality is mostly borne by the poor, with differences in intensity between urban and rural populations. Regional differences in neonatal and under-five mortality are also wide.

Wealth-related inequality remains large, though there are signs of convergence for the top three wealth quintiles. The bottom two quintiles, roughly corresponding to those below the official poverty line, remain far behind, but appear to be converging with each other. The second lowest quintile shows a slight upturn, especially in NMR, indicating that government programs may be ignoring the near poor.

We saw that, on all three mortality measures, urban children are better off than their rural counterparts, with urban rates already very near the MDG target. The faster rate of rural decline has seen the U5MR gap slowly decrease. The IMR gap has increased, but both categories – U5MR and NMR – register a reduction. Disaggregating NMR in this fashion reveals that the failure of this indicator to improve is principally a rural problem; urban NMR – already lower than rural – in fact shows a further modest reduction.

Comparisons of wealth-related mortality inequality across the urban/rural divide was a mixed bag; inequality in neonatal deaths were more severe in the rural sector than in the urban, while the inequality for infant and under five was more severe in the urban sector than in the rural. Inequality of all three measures increased over time in urban areas.

Our analysis also identified a large gap between regions in the Philippines. The gap for all three indicators had been closing during the 1990s; this trend now appears to have halted. We attribute this to regional variations in the quality of the countrys decentralised health system, as well as to the presence of extreme poverty and armed conflict in some regions. We note that some wealthier regions, such as the NCR and CALABARZON, have already achieved their MDG, while Mindanao – the worst performer – remains a long way off achieving it. Disturbingly, three regions (Ilocos, Cagayan Valley and Northern

Mindanao) have actually reversed recent gains and registered an increase in all three mortality rate indicators. This highlights the need for a refocusing of effort on these flagging regions.

Wealth-related inequality varies greatly from region to region, with some regions showing a decrease over time, and some an increase. Interestingly, in the best two performing regions, neonatal deaths are actually higher among the rich than the poor, though with such low overall rates the difference was actually small. At the other end of the performance spectrum, MIMAROPA stands out as being particularly disadvantaged, with both high mortality and high inequality. Extra resources should be directed to the poor in hotspots such as this to bring them up to the same level as the rest of the country.

These data point to the need to scale up efficacious interventions against major causes of death among children, focusing particularly on the lower income groups, and those residing in rural areas and in poorly performing regions.

While effective interventions exist for the prevention of child and maternal mortality, the coverage and distribution of these interventions is inadequate and unequal across all equity markers.

A look at the prevailing causes of death highlighted the importance of interventions at the pregnancy and birth phases. We found that efficacious interventions against causes of death not only have low overall coverage but their distribution is highly unequal. Decomposition of inequalities in neonatal deaths confirm that the unequal distribution of coverage of interventions, in particular facility-based delivery and tetanus toxoid, contributes to inequalities in child deaths. Decomposition of inequalities in coverage of selected interventions suggests that barriers to utilisation remain.

The significant contribution of inequalities in insurance coverage to inequalities in facility-based delivery and treatment-seeking for coughs and fsuggests that financial barriers remain. The importance of information barriers is implied by the significant contribution of ORT knowledge in the treatment of diarrhea, visits of health workers in early breastfeeding coverage and education in the selected interventions analysed. The association of intervention coverage with variables, such as birth order and birth interval, suggests that the burden of taking care of young children may be an additional barrier to accessing interventions.

In spite of the many development challenges facing the Philippines, the country has taken great strides in reducing child mortality in both absolute levels and in reducing the comparative disadvantage experienced by its most vulnerable groups. These gains should serve as a demonstration of what can be achieved with concerted attention, effort and collaboration by the many stakeholders involved in improving health and development outcomes for mothers and children. Nevertheless, based on the most recent data available,

the Philippines appears likely to miss its 2015 Millennium Development Goal 4 – though by a very small margin. Inequalities also persist within its population. Future improvements will increasingly rely on the more difficult task of strengthening health systems, and continued efforts will be needed to capitalise on, and amplify, past gains.

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List of assets used in the wealth quintiles

Table A.1: List of assets used in the wealth quintiles: 2008

Asset Variable	National	Urban	Rural
Source of drinking water			
Uses water piped into dwelling		×	×
Uses water piped into yard/plot	×	×	×
Uses water from public tap/stand pipe	×	×	×
Uses water from a tube well or bore hole	×	×	×
Uses water from a protected well	×	×	×
Uses water from an unprotected well	×		×
Uses water from protected spring	×		×
Uses water from unprotected spring	×	×	×
Uses water from lake, ponds, stream, canal or rainwater		×	
Uses bottled/mineral Water	×		×
Time to get water source			
Length of travel time (back and forth)	×	×	
Main source of water for other purposes			
Uses water piped into dwelling	×		
Uses water piped into yard/plot	×		
Toilet Facility			
Uses flush or pour flush toilet	×		×
Uses pit latrine	×	×	×
Uses other type of toilet facility	×		
Uses bush, field or river as toilet facility or has no facility	×	×	×
Main material of the house floor			
Has natural floor (earth or sand)	×	×	×
Has floor made of wood planks	×	×	×
Has floor made of palm/bamboo	×	×	×
Has vinyl floor or asphalt strip floor	×	×	
Has ceramic tiled floor	×	×	×
Has cemented floor	×	×	×
Has carpet marble polished wood floor	×	×	
Household Amenities: Electricity and Appliances			

Continued on the next page. . .

Asset Variable	National	Urban	Rural
Has electricity	×	×	×
Has television	×	×	×
Has refrigerator or freezer	×	×	×
Household Amenities: Vehicle			
Has bicycle or trisikad / pedicab	×	×	×
Has motorcycle or tricycle	×	×	×
Has car or jeep or van	×	×	×

Table A.2: List of Assets used in the wealth quintiles: 2003 and 1998

Asset Variable	National	Urban	Rural
Source of drinking water			
Uses water piped into dwelling	×	×	×
Uses water piped into yard/plot	×	×	×
Uses water from public tap/stand pipe	×	×	×
Uses water from a tube well or bore hole	×	×	×
Uses water from a protected well	×	×	×
Uses water from protected spring	×	×	×
Uses water from lake, ponds, stream, canal or rainwater	×	×	×
Uses bottled/mineral Water	×	×	×
Time to get water source			
Length of travel time (back and forth)	×	×	×
Toilet Facility			
Uses flush or pour flush toilet	×	×	×
Uses pit latrine	×	×	×
Uses bush, field or river as toilet facility or has no facility	×	×	×
Main material of the house floor			
Has natural floor (earth or sand)	×	×	×
Has floor made of wood planks	×	×	×
Has floor made of palm/bamboo	×	×	×
Has ceramic tiled floor	×	×	×
Has cemented floor	×	×	×
Household Amenities: Electricity and Appliances			
Has electricity	×	×	×
Has television	×	×	×
Has refrigerator or freezer	×	×	×
Household Amenities: Vehicle			
Has bicycle or trisikad / pedicab	×	×	×
Has motorcycle or tricycle	×	×	×
Has car or jeep or van	×	×	×

Table A.3: List of Assets used in the wealth quintiles: 1993

Asset Variable	National	Urban	Rural
Source of drinking water			
Uses water piped into yard/plot	×	×	×
Uses water from public tap/stand pipe	×	×	×
Uses water from faucet in residence	×		
Uses water from faucet not in residence	×		
Uses water from a private well	×	×	×
Uses water from a public well	×		
Uses water from an open dug well	×	×	×
Uses water from a developed spring	×	×	
Uses water from lake, ponds, stream, canal or rainwater	×	×	×
Uses bottled/mineral Water		×	×
Time to get water source			
Length of travel time (back and forth)	×	×	×
Toilet Facility			
Uses flush or pour flush toilet	×	×	×
Uses pit latrine	×	×	×
Uses bush, field or river as toilet facility or has no facility	×	×	×
Uses open privy toilet	×	×	×
Uses drop toilet		×	×
Main material of the house floor			
Has natural floor (earth or sand)	×	×	×
Has floor made of wood planks	×	×	×
Has floor made of palm/bamboo	×	×	×
Has ceramic tiled floor	×	×	×
Has cemented floor	×	×	×
Household Amenities: Electricity and Appliances			
Has electricity	×	×	×
Has television	×	×	×
Has refrigerator or freezer	×	×	×
Household Amenities: Vehicle			
Has bicycle or trisikad / pedicab	×	×	×
Has motorcycle or tricycle	×	×	×
Has car or jeep or van	×	×	×

Mortality estimates

Figure B.1: Under five mortality rates by island

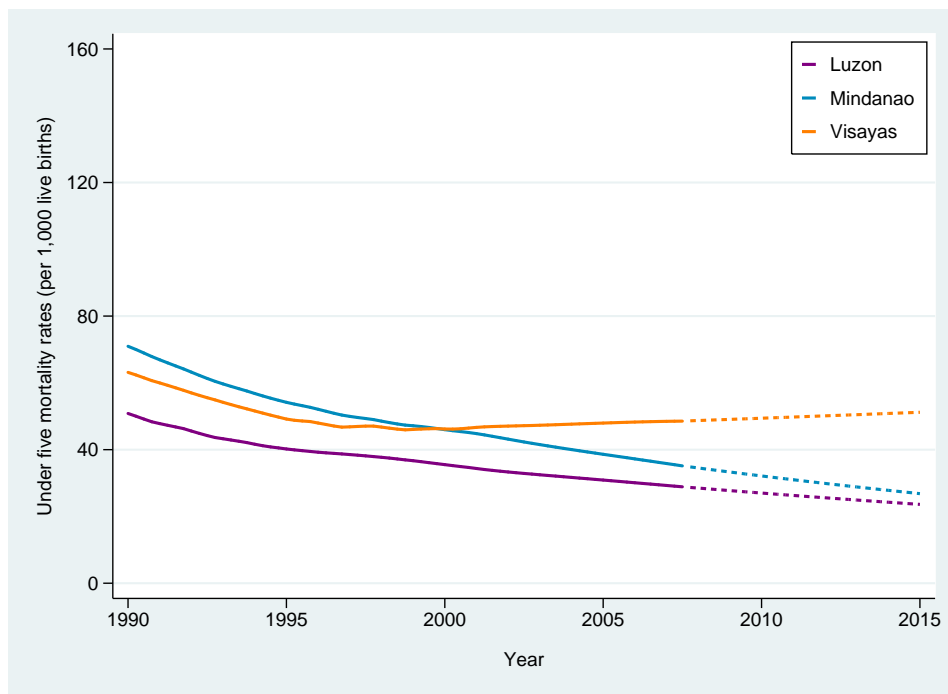


Figure B.2: Infant mortality rates by island

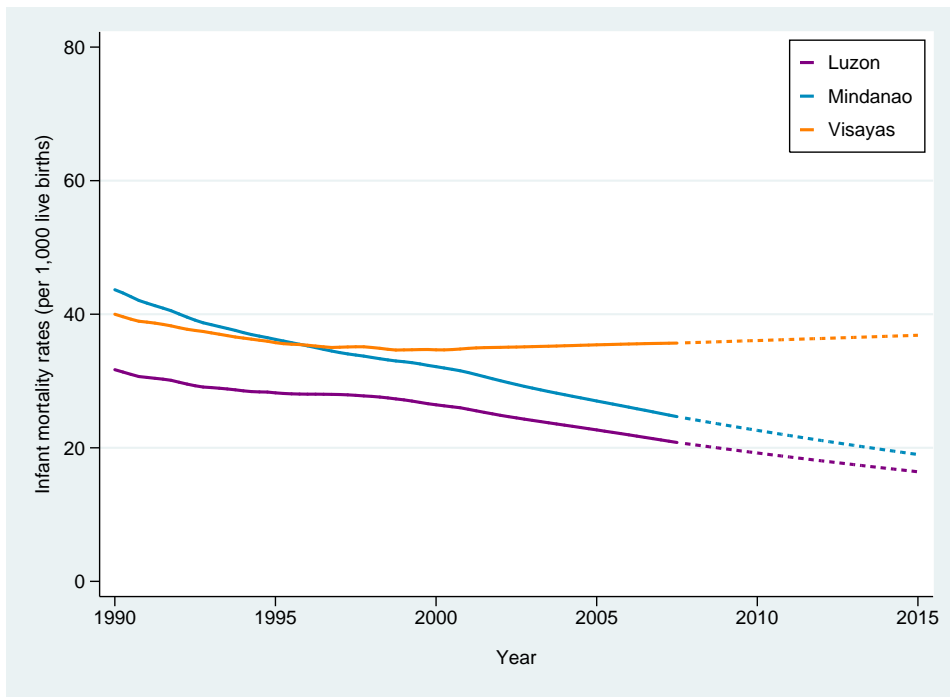


Figure B.3: Neonatal mortality rates by island

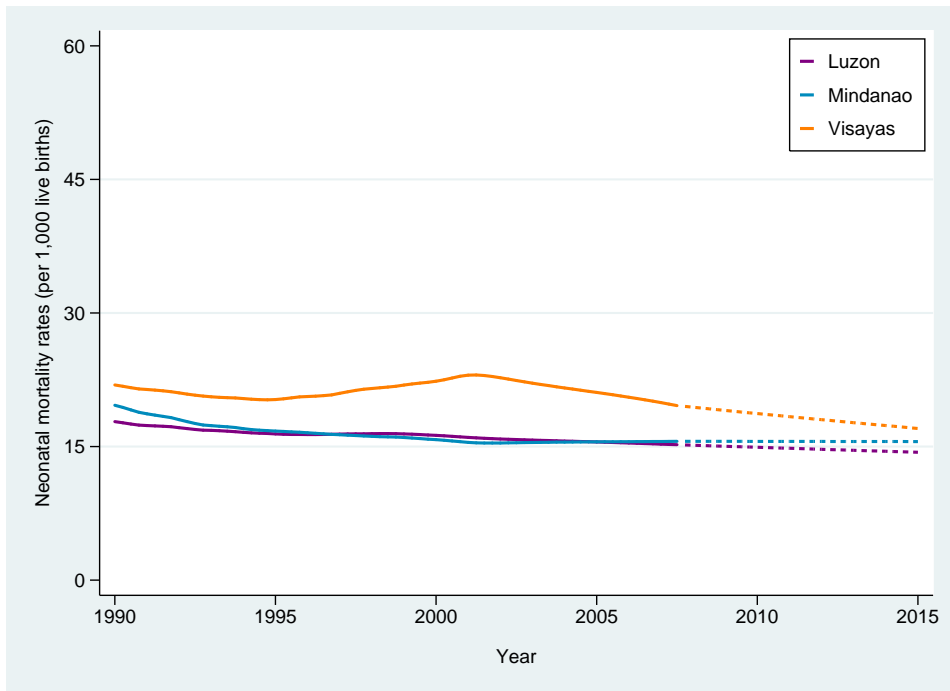


Figure B.4: Under five mortality rates for Luzon

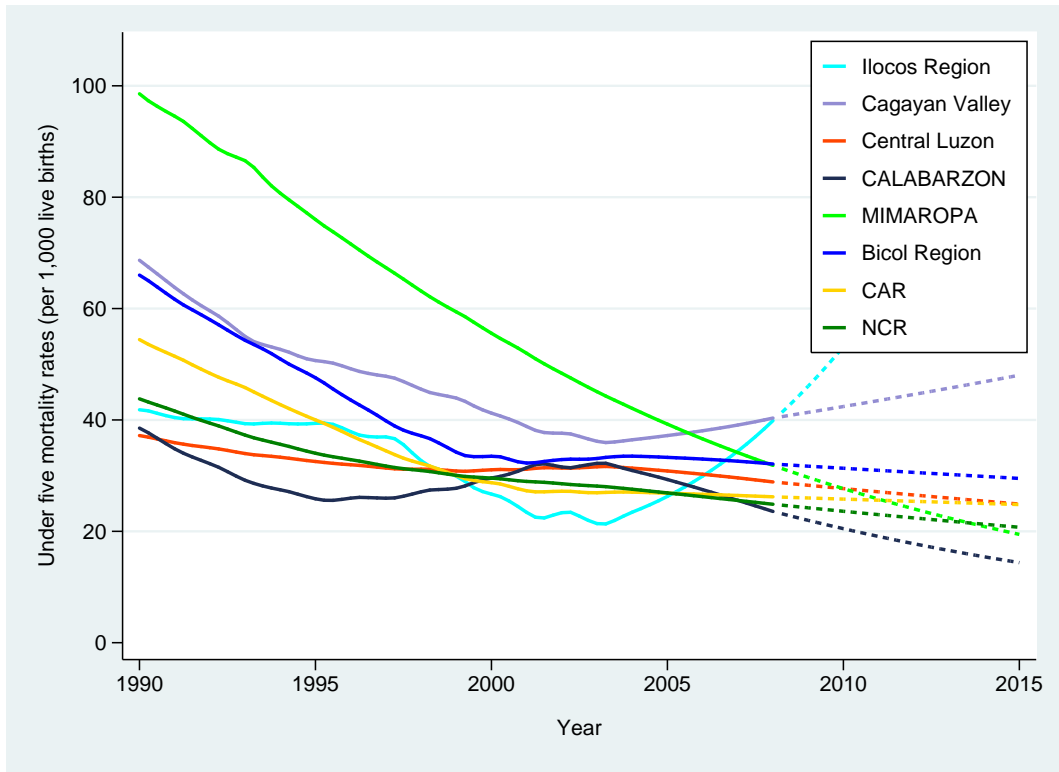


Figure B.5: Infant mortality rates for Luzon

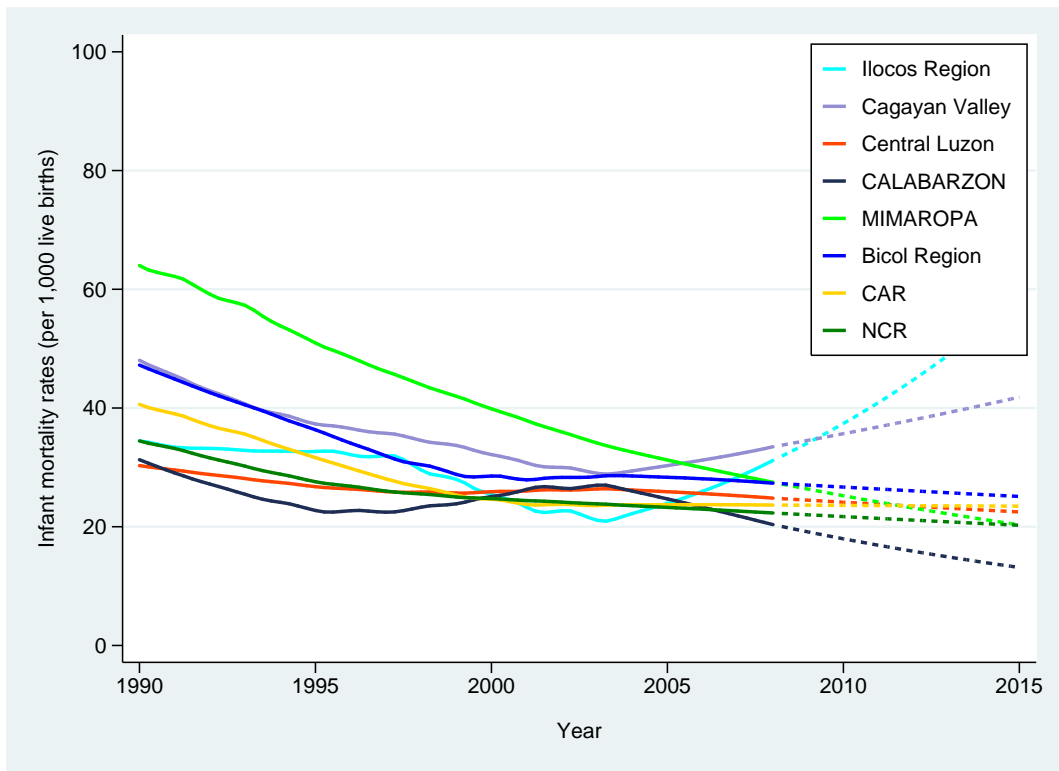


Figure B.6: Neonatal mortality rates for Luzon

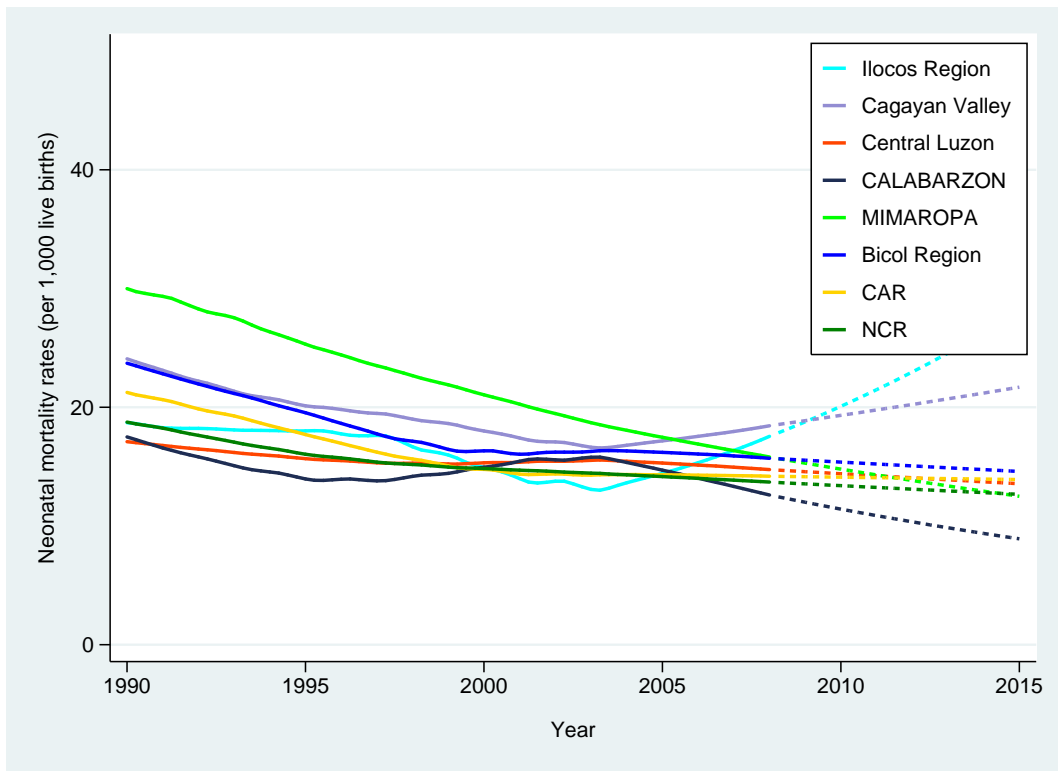


Figure B.7: Under five mortality rates for Mindanao

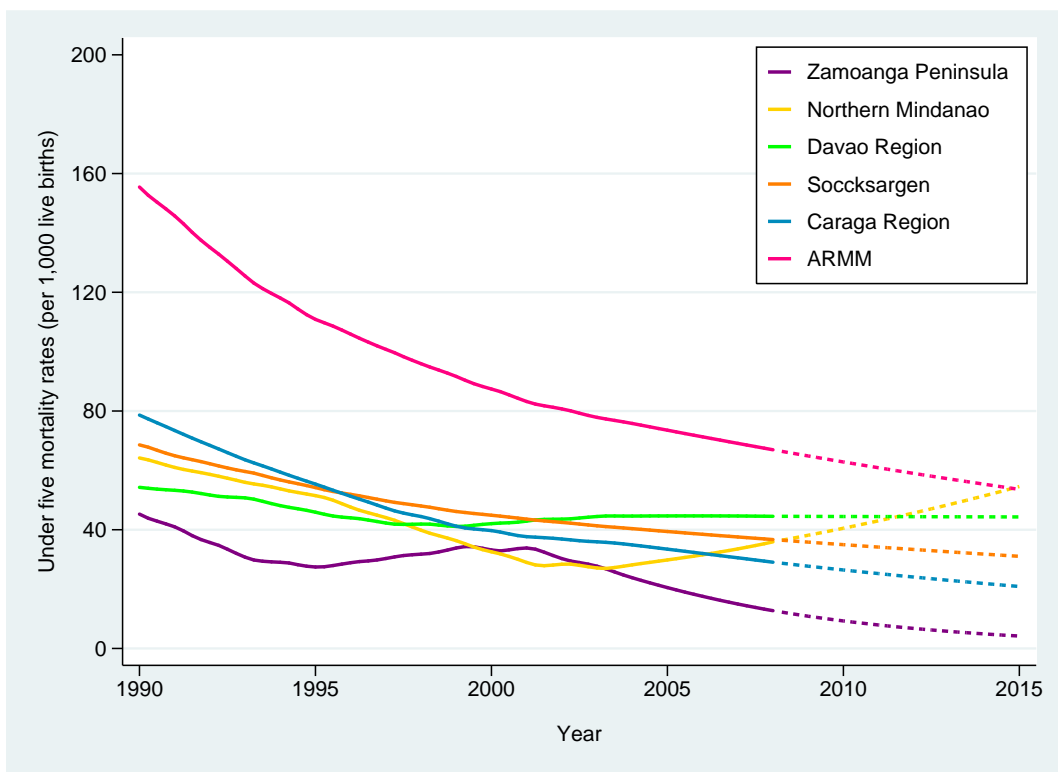


Figure B.8: Infant mortality rates for Mindanao

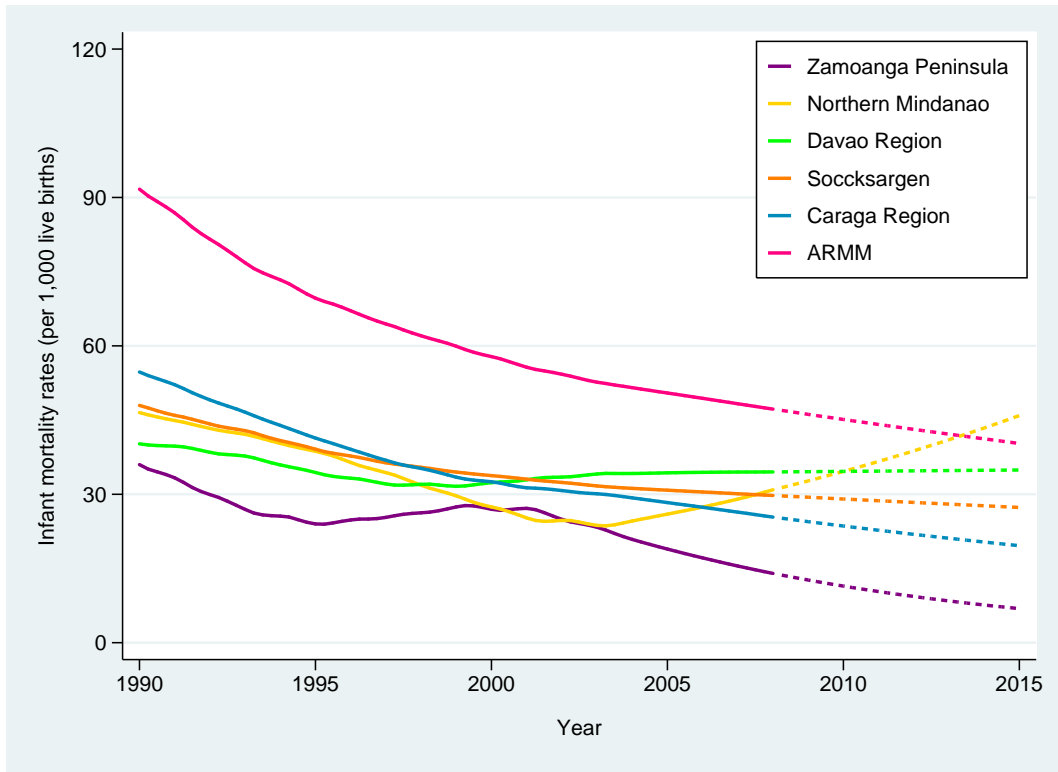


Figure B.9: Neonatal mortality rates for Mindanao

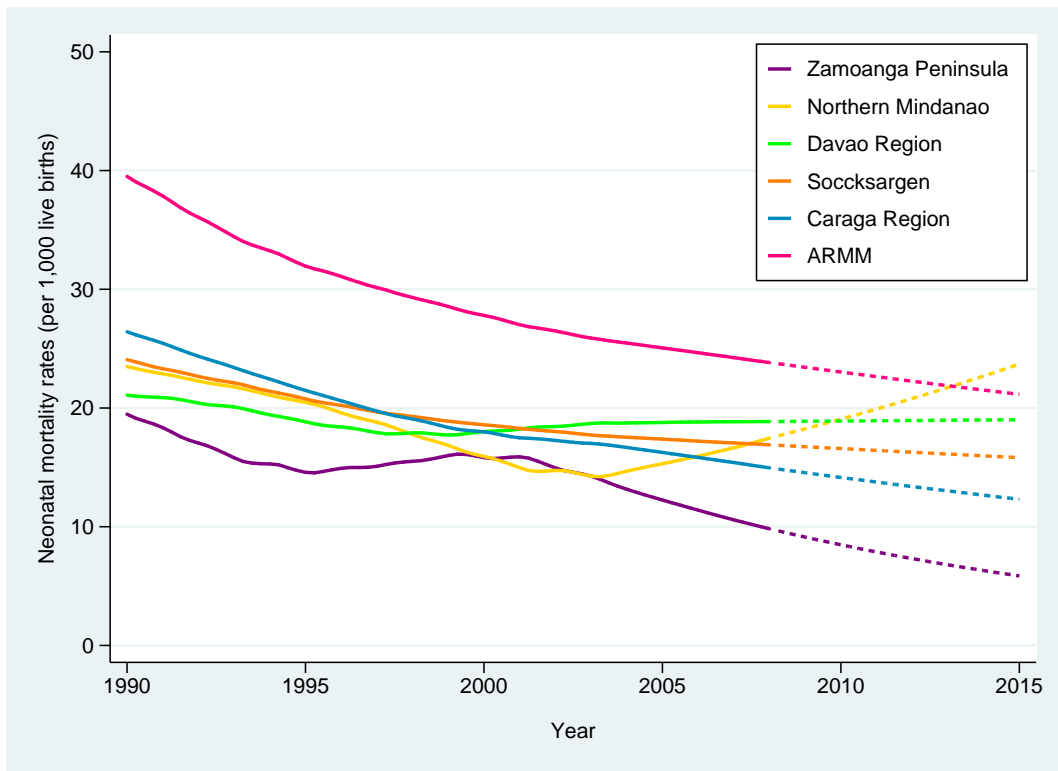


Figure B.10: Under five mortality rates for Visayas

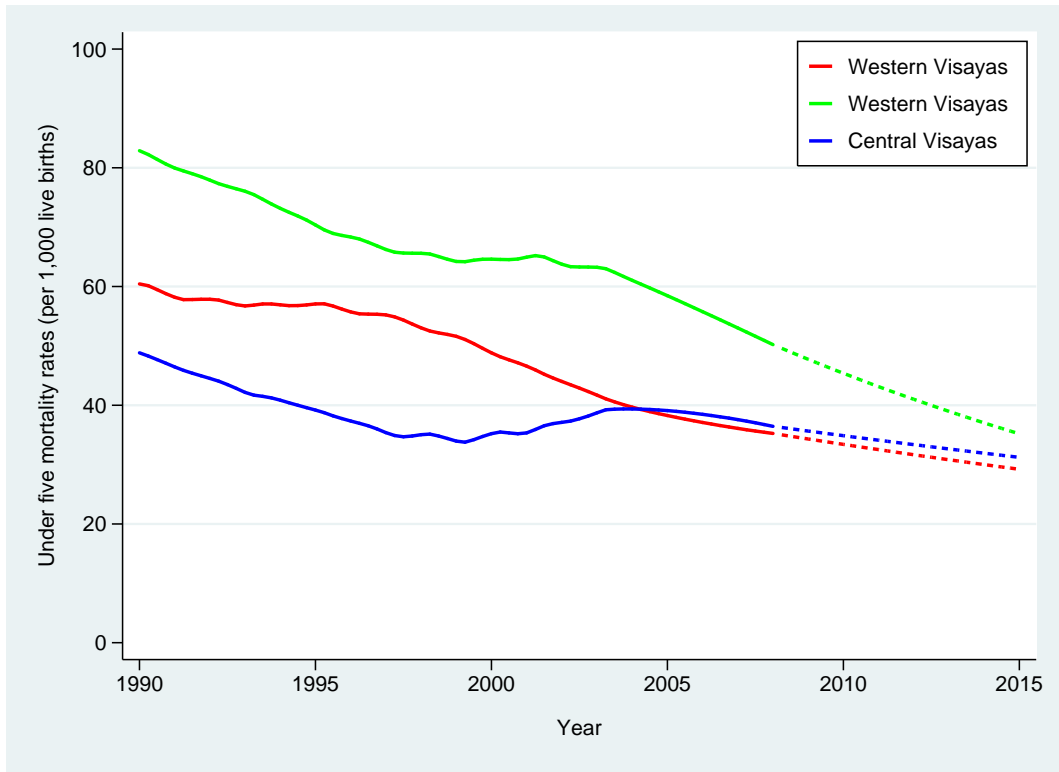


Figure B.11: Infant mortality rates for Visayas

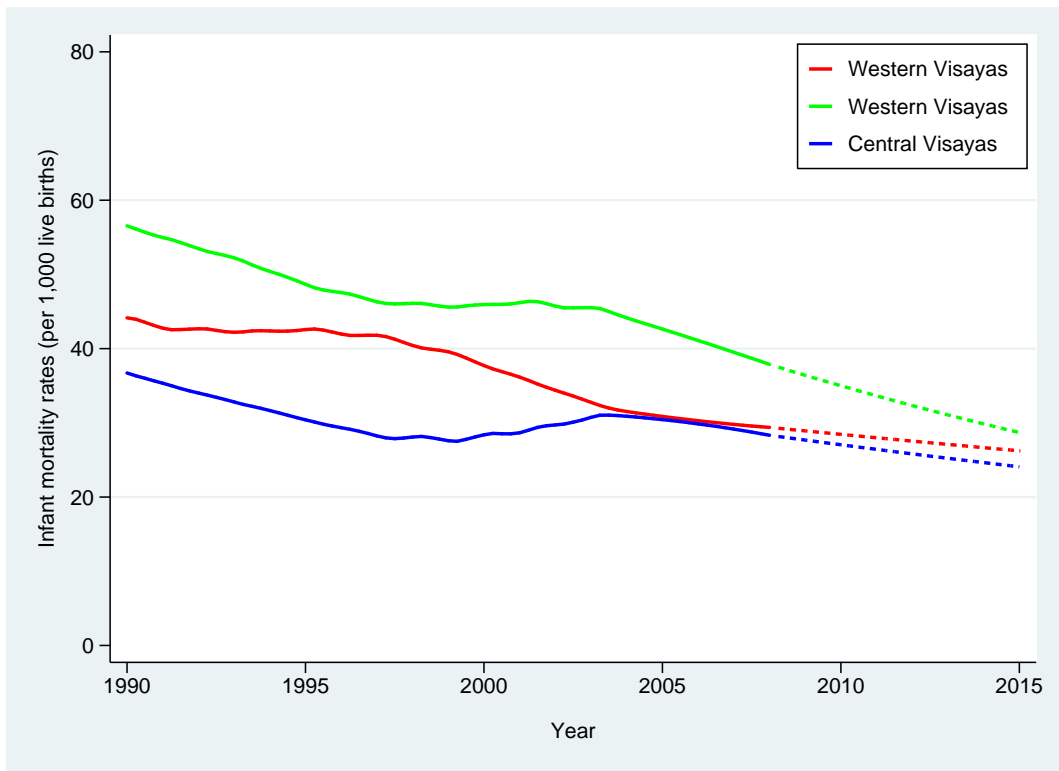
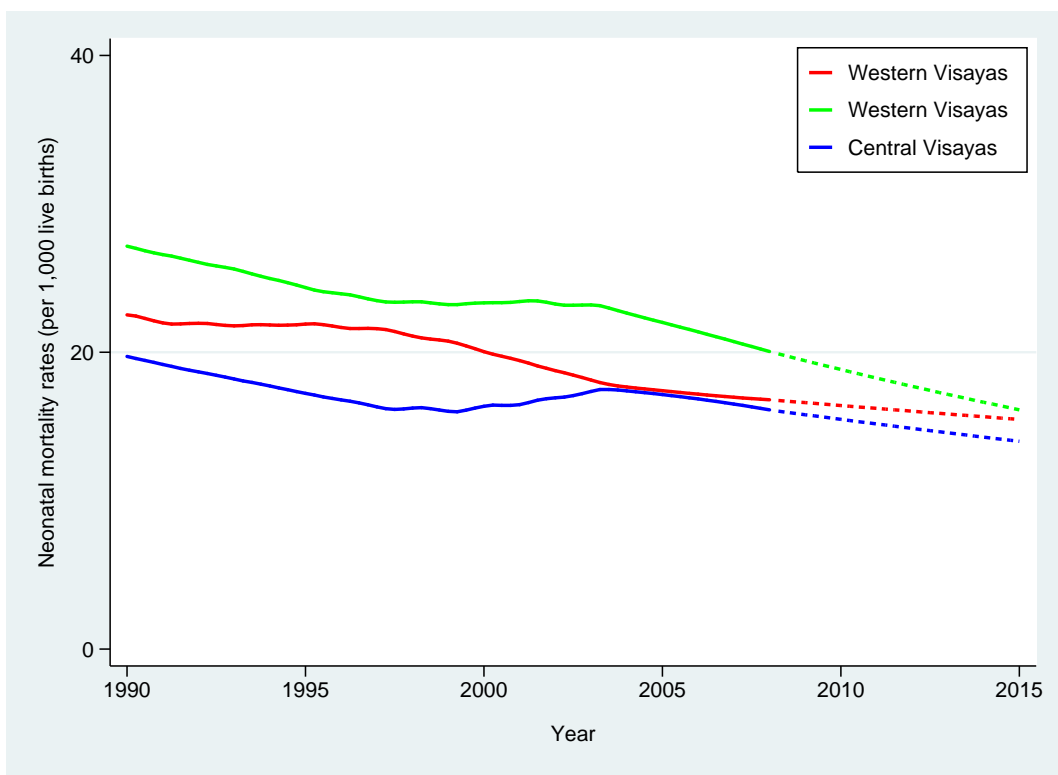


Figure B.12: Neonatal mortality rates for Visayas



Intervention coverage and inequality indices: 1998 to 2008

Table C.1: Intervention coverage and concentration indices, 1993, 1998, 2003 and 2008

Interventions	1993		1998		2003		2008	
	Coverage	C index	Coverage	C index	Coverage	C index	Coverage	C index
Pre-pregnancy								
CPR (modern methods)	24.84%	0.0992	28.21%	0.0665	33.36%	0.0492	34.05%	0.0367
Unmet need	25.95%	-0.1038	18.78%	-0.1358	17.35%	-0.1319	22.34%	-0.0526
Met need	39.97%	0.0563	47.79%	0.0358	48.87%	0.0309	50.73%	0.0234
Pregnancy								
ANC during the first trimester	52.45%	0.0788	61.48%	0.0685	52.99%	0.0728	54.04%	0.0682
At least four ANCs	42.20%	0.1047	48.77%	0.0830	70.40%	0.0319	77.77%	0.01
ANC Components								
<i>Weighed</i>					87.84%	0.0062	91.34%	0.0060
<i>Height measured</i>					59.71%	0.0384	65.41%	0.0324
<i>Blood pressure measured</i>					90.29%	0.0041	92.86%	0.0040
<i>Urine sample taken</i>					46.70%	0.1213	54.31%	0.1081
<i>Blood sample taken</i>					37.63%	0.1436	46.62%	0.1100
<i>Informed about signs of pregnancy complications</i>					49.01%	0.0343	68.80%	0.0194
<i>Informed where to go for pregnancy complications</i>					43.57%	0.0423	65.72%	0.0230
Took complete dosage of iron tablets and syrups (180 days)					13.93%	0.2941	15.60%	0.2477
Given TT2 plus	42.29%	0.0048	37.83%	0.0059	37.27%	0.016	47.70%	0.0354
Delivery								
SBA	52.90%	0.1320	56.54%	0.1221	60.15%	0.0956	62.25%	0.0882

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Interventions	1993		1998		2003		2008	
	Coverage	C index	Coverage	C index	Coverage	C index	Coverage	C index
FBD	28.01%	0.3099	34.23%	0.2623	37.91%	0.2161	44.17%	0.1737
Home deliveries with SBA (denominator total home deliveries)	34.27%	0.1964	34.04%	0.2278	35.65%	0.1894	32.45%	0.2596
Neonatal								
Initially breastfed within 24 hours	70.93%	-0.0117	78.85%	-0.0075	81.09%	-0.0025	82.00%	-0.0030
Initially breastfed within 1 hour	41.85%	-0.0290	40.66%	-0.0291	54.47%	-0.0060	53.51%	-0.0151
Childhood								
Exclusively breastfed among children 0-5 months	27.32%	-0.1544	37.70%	-0.1161	28.14%	-0.1625	34.02%	-0.0839
Exclusively breastfed among children 6-11 months	1.75%	-0.0408	3.05%	-0.0478	2.84%	0.0292	2.63%	-0.1325
Complementary feeding for children 6-23 months	86.31%	0.0007	92.81%	-0.0001	93.43%	-0.0003	94.91%	0.0004
Complementary feeding and breastfeeding for children 6-23 months		0.0054	46.54%	-0.0936	47.32%	-0.0830	47.49%	-0.0960
Percentage of households with sanitary toilet facility	77.13%	0.0000	87.01%	0.0138	88.65%	0.0111	88.85%	0.0114
Percentage of children whose stools are disposed of safely					52.51%	0.0382	49.86%	0.0349
Percentage of households with Level III water source	62.38%	0.0000	80.78%	0.0231	79.25%	0.0155	63.04%	-0.0172
Percentage of households with access to drinking water (round trip) for less than 30 minutes	71.88%	0.0000	88.56%	0.0045	90.84%	0.0035	95.22%	0.0012
Given BCG vaccine	89.35%	0.0042	87.20%	0.0059	90.97%	0.0031	93.87%	0.0021
Given three dosage of DTP vaccine	78.34%	0.0119	73.41%	0.0179	79.26%	0.0145	85.73%	0.0081

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Interventions	1993		1998		2003		2008	
	Coverage	C index	Coverage	C index	Coverage	C index	Coverage	C index
Given three dosage of Hepatitis B vaccine			75.91%	0.0000	77.37%	0.0029	80.36%	0.0139
Given measles vaccine	80.43%	0.0093	68.79%	0.0180	80.06%	0.0033	84.56%	0.0084
Given three dosage of Polio vaccine	76.74%	0.0139	74.26%	0.0162	80.23%	0.0072	85.34%	0.0082
FIC	69.75%	0.0176	63.61%	0.0249	69.91%	0.0143	79.52%	0.0136
Given Vitamin A for the last six months among children 6-59 months	25.56%	0.0820	70.77%	0.0093	72.85%	0.0188	82.36%	0.0003
Children under five with cough and fever in the past two weeks who were given antibiotics							30.46%	0.0351
Seeking care for fever and cough					50.14%	0.0259	37.32%	0.0316
Children under five who had diarrhea in the past two weeks given ORS (Oral rehydration salts)	27.52%	-0.0110	43.36%	0.0075	42.23%	0.0592	46.48%	0.0633
Children under five who had diarrhea in the past two weeks given Zinc							1.49%	0.3930

Figure C.1: Coverage of selected interventions by wealth, rural, 2008

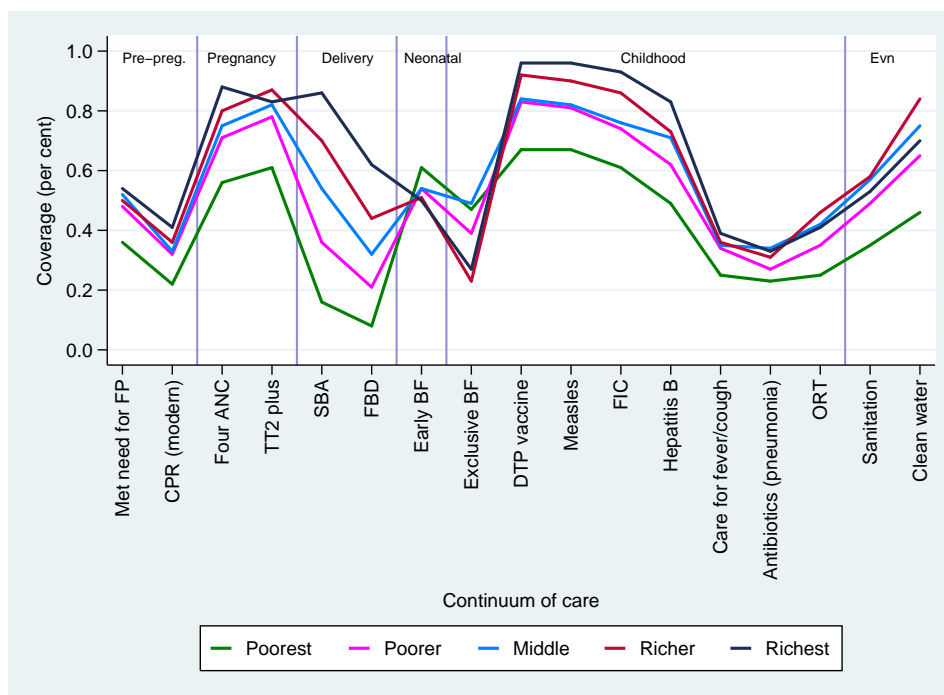
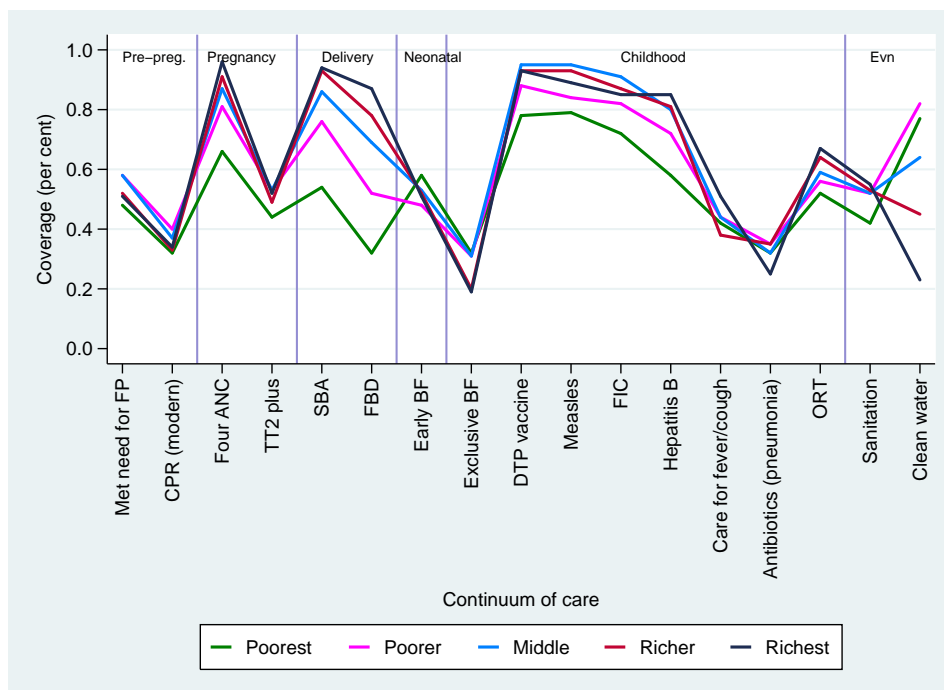


Figure C.2: Coverage of selected interventions by wealth, urban, 2008



Concentration indices for interventions by region

Table D.1: Pre-pregnancy phase: concentration indices by region, 2008

Region	CPR (modern)	Unmet need	Met need
I – Ilocos Region	0.0311	-0.0113	0.0042
II – Cagayan Valley	0.0232	-0.0863	0.0056
III – Central Luzon	0.0293	-0.0431	0.0134
IVA – Calabarzon	0.2273	-0.0074	0.1517
IVB – Mimaropa	0.0062	0.0141	0.0087
V – Bicol Region	0.1627	-0.1004	0.0626
VI – Western Visayas	0.0546	-0.0310	0.0094
VII – Central Visayas	0.0085	-0.0041	0.0027
VIII – Eastern Visayas	0.0939	-0.1109	0.0468
IX – Zamboanga Peninsula	0.0353	-0.0157	0.0368
X – Northern Mindanao	0.0283	0.0298	0.0155
XI – Davao Peninsula	0.0246	-0.0138	0.0095
XII – Central Mindanao	0.0063	-0.0708	0.0238
XIII – CARAGA	0.0244	0.0054	0.0073
National Capital Region	0.0085	-0.0514	0.0068
Cordillera Admin Region	0.0342	-0.0663	0.0071
ARMM	0.1498	-0.0831	0.0912

Table D.2: Pregnancy phase: concentration indices by region, 2008

Region	1st trimester ANC	4 ANC's plus	Weight	Height	Blood pressure	Urine	Blood sample	Informed sign (1)	Informed provider (2)	IFA (3)	Given TT2 plus
I – Ilocos Region	0.1016	0.0297	0.0050	0.0422	0.0014	0.1000	0.1001	0.0363	0.0437	0.3878	0.0317
II – Cagayan Valley	0.0597	0.0413	0.0010	0.0534	0.0016	0.1088	0.1029	0.0094	0.0124	0.3184	0.0281
III – Central Luzon	0.049	0.0224	0.0006	0.0295	0.0001	0.0304	0.0460	0.0178	0.0229	0.2755	0.0194
IVA – Calabarzon	0.0448	0.0182	0.0007	0.0106	0.0002	0.0395	0.0675	0.0139	0.0197	0.2918	0.0001
IVB – Mimaropa	0.0542	0.0420	0.0203	0.0643	0.0116	0.1471	0.1662	0.0403	0.0413	0.3298	0.0431
V – Bicol Region	0.0899	0.0209	0.0099	0.0420	0.0029	0.2496	0.2676	0.0282	0.0319	0.5165	0.0150
VI – Western Visayas	0.0258	0.0132	0.0016	0.0058	0.0008	0.0681	0.0764	0.0039	0.0049	0.1711	0.0194
VII – Central Visayas	0.0577	0.0076	0.0005	0.0343	0.0010	0.2447	0.2217	0.0095	0.0072	0.2004	0.0415
VIII – Eastern Visayas	0.1080	0.0369	0.0056	0.0166	0.0019	0.1279	0.2232	0.0172	0.0202	0.3549	0.0600
IX – Zamboanga Peninsula	0.0491	0.0255	0.0128	0.0505	0.0097	0.3734	0.3529	0.0152	0.0211	0.3248	0.0635
X – Northern Mindanao	0.0763	0.0152	0.0014	0.0176	0.0006	0.1226	0.1472	0.0149	0.0257	0.2446	0.0246
XI – Davao Peninsula	0.0162	0.0038	0.0021	0.0278	0.0010	0.0556	0.0319	0.0176	0.0192	0.3952	0.0077
XII – Central Mindanao	0.0470	0.0117	0.0033	0.0215	0.0019	0.2097	0.2088	0.0184	0.0337	0.0797	0.0498
XIII – CARAGA	0.0815	0.0116	0.000	0.0254	0.0003	0.0270	0.0296	0.0007	0.0018	0.1396	0.0095
National Capital Region	0.0346	0.0072	0.000	0.0030	0.0002	0.0070	0.0116	0.0087	0.0137	0.0809	0.0144
Cordillera Admin Region	0.0709	0.0732	0.0002	0.0230	0.0017	0.0734	0.0879	0.0082	0.0028	0.4108	0.0278
ARMM	0.1308	0.0743	0.1556	0.2056	0.1521	0.355	0.2916	0.1075	0.1176	0.4210	0.2891

Notes: (1) Informed about signs of pregnancy complications

(2) Informed where to go for pregnancy complication

(3) Took complete dosage of iron tablets and syrups

Table D.3: Delivery and neonatal phase: concentration indices by region, 2008

Region	SBA	Home delivery by SBA	FBD	BF in 24hours	BF in 1 hour
I – Ilocos Region	0.0176	0.0441	0.1359	-0.0007	0.0038
II – Cagayan Valley	0.0794	0.1438	0.1636	-0.0005	-0.0284
III – Central Luzon	0.0133	0.0438	0.0692	-0.0104	-0.0229
V – Bicol Region	0.1274	0.1925	0.2374	-0.0032	0.0080
VI – Western Visayas	0.0846	0.1929	0.1487	-0.0044	-0.027
VII – Central Visayas	0.0588	0.1451	0.1380	0.0008	0.0032
VIII – Eastern Visayas	0.1693	0.1692	0.2570	0.0038	0.0006
IX – Zamboanga Peninsula	0.2444	0.3800	0.3213	-0.0133	-0.0867
X – Northern Mindanao	0.1508	0.2466	0.2539	-0.0023	-0.0095
XI – Davao Peninsula	0.1424	0.0653	0.2344	-0.0028	-0.0103
XII – Central Mindanao	0.1829	0.3257	0.2067	-0.0035	-0.0185
XIII – CARAGA	0.0917	0.0891	0.2196	-0.0010	-0.0211
National Capital Region	0.0092	0.0646	0.0407	0.0010	-0.0007
Cordillera Admin Region	0.0417	0.0321	0.1131	-0.0001	-0.0277
IVA – Calabarzon	0.0385	0.1203	0.1195	-0.0075	0.0384
IVB – Mimaropa	0.1920	0.3360	0.2505	-0.0013	0.0343
ARMM	0.4546	0.6632	0.4624	-0.0040	-0.0262

Notes: (1) Initiated breastfeeding within 24 hours of delivery

(2) Initiated breastfeeding within 1 hours of delivery

Table D.4: Childhood phase: concentration indices by region, 2008

Region	Exclusive BF (0 – 5mths)	Exclusive BF (6 – 12mths)	Complementary feeding (6 – 23mths)	BF and com- plementary feeding (6 – 23mths)	Sanitation	Stools safely disposed	Level III water source	Drinking water
I – Ilocos Region	-0.1680	0.2143	-0.0003	-0.0358	0.0004	0.0458	-0.0334	0.0000
II – Cagayan Valley	-0.0529	0.3049	-0.001	-0.0103	0.0041	0.0093	-0.0142	0.0001
III – Central Luzon	-0.3680	<i>n.d.</i>	0.000	-0.1101	0.0013	0.0063	-0.0270	0.0000
V – Bicol Region	-0.0224	-0.4134	0.0004	-0.0241	0.0213	0.0952	0.0389	0.0045
VI – Western Visayas	-0.1229	<i>n.d.</i>	-0.0001	-0.0734	0.0333	0.0440	-0.0006	0.0022
VII – Central Visayas	-0.0063	<i>n.d.</i>	0.000	-0.0655	0.0446	0.0287	-0.0551	0.0022
VIII – Eastern Visayas	-0.0560	-0.8131	-0.0006	-0.0338	0.0877	0.0870	-0.0023	0.0004
IX – Zamboanga Peninsula	-0.3344	<i>n.d.</i>	-0.0006	-0.1072	0.0238	0.1095	0.0485	0.0006
X – Northern Mindanao	-0.0679	-0.1882	0.0005	-0.0315	0.0056	0.0211	0.0089	0.0027
XI – Davao Peninsula	0.0135	0.2284	-0.0014	-0.1529	0.0034	0.0098	0.0688	0.0026
XII – Central Mindanao	-0.0387	-0.3897	0.0005	-0.0490	0.0073	0.0015	0.0085	0.0007
XIII – CARAGA	-0.4473	0.1027	0.0037	-0.0278	0.0105	0.0101	-0.0047	0.0008
National Capital Region	0.0014	<i>n.d.</i>	-0.0001	-0.2252	0.0003	0.0404	-0.1267	0.0003
Cordillera Admin Region	-0.1478	<i>n.d.</i>	0.000	-0.0006	0.0023	0.0443	-0.0339	-0.0010
IVA – Calabarzon	0.0286	-0.3857	0.0003	-0.0504	0.0010	0.0538	-0.0304	0.0006
IVB – Mimaropa	-0.1386	-0.5646	0.0028	-0.0342	0.0420	0.0833	0.0172	0.0016
ARMM	0.0926	0.2134	0.0008	-0.0610	0.2521	0.1702	0.1046	0.0195

Table D.5: Childhood phase: concentration indices by region, 2008

Region	BCG	3 DTPs	3 Hep-B	Measles	3 Polio	FIC	Vitamin A (*)
I – Ilocos Region	0.0009	0.0175	0.0190	0.0146	0.0171	0.0298	0.0070
II – Cagayan Valley	0.0006	0.0064	0.0131	0.0025	0.0043	0.0059	0.0099
III – Central Luzon	0.0006	0.0084	0.0113	0.0047	0.0050	0.0155	0.0023
V – Bicol Region	0.0018	0.0041	0.0130	0.0048	0.0057	0.0093	0.0127
VI – Western Visayas	0.0014	0.0022	0.0051	0.0038	0.0022	0.0038	0.0035
VII – Central Visayas	0.0000	0.0024	0.0037	0.0018	0.0023	0.0063	0.0076
VIII – Eastern Visayas	0.0027	0.0086	0.0113	0.0074	0.0060	0.0094	0.0140
IX – Zamboanga Peninsula	0.0064	0.0071	0.0184	0.0120	0.0071	0.0116	0.0298
X – Northern Mindanao	0.0050	0.0030	0.0184	0.0064	0.0022	0.0063	0.0184
XI – Davao Peninsula	0.0010	0.0060	0.0018	0.0045	0.0082	0.0088	-0.0005
XII – Central Mindanao	0.0019	0.0130	0.0191	0.0161	0.0127	0.0249	0.0140
XIII – CARAGA	<i>n.d.</i>	-0.0011	-0.0018	0.0007	-0.0020	-0.0019	0.0024
National Capital Region	0.0001	0.0056	0.0130	0.0042	0.0069	0.0053	-0.0009
Cordillera Admin Region	0.0002	0.0009	0.0027	0.0001	0.0032	0.0032	0.0157
IVA – Calabarzon	0.0003	0.005	0.0122	0.0038	0.0055	0.0084	-0.0112
IVB – Mimaropa	0.0071	0.0127	0.0217	0.0180	0.0210	0.0277	0.0117
ARMM	0.0433	0.1131	0.1695	0.1103	0.1406	0.2443	0.0596

Notes: (*) Vitamin A for the last six months among children 6-59 months

Table D.6: Childhood phase: concentration indices by region, 2008

Region	Antibiotics (1)	Fever/cough care (2)	ORT (3)	Zinc (4)
I – Ilocos Region	0.0604	0.0936	0.0066	0.1212
II – Cagayan Valley	0.0944	0.0861	0.2562	0.9516
III – Central Luzon	0.0136	-0.0173	0.0390	<i>n.d.</i>
V – Bicol Region	0.1325	0.0585	0.0418	<i>n.d.</i>
VI – Western Visayas	0.1317	-0.0259	0.0824	<i>n.d.</i>
VII – Central Visayas	0.0008	-0.0235	-0.0061	<i>n.d.</i>
VIII – Eastern Visayas	0.1302	0.1638	0.0473	<i>n.d.</i>
IX – Zamboanga Peninsula	0.1273	0.0636	-0.0516	<i>n.d.</i>
X – Northern Mindanao	0.0393	0.0753	0.2577	<i>n.d.</i>
XI – Davao Peninsula	-0.0096	0.0800	0.2582	<i>n.d.</i>
XII – Central Mindanao	0.0337	0.0344	0.0645	0.5544
XIII – CARAGA	0.0094	0.0094	-0.0986	0.1290
National Capital Region	0.0179	0.0160	-0.0159	-0.5627
Cordillera Admin Region	0.2160	0.0725	0.0000	<i>n.d.</i>
IVA – Calabarzon	-0.0485	0.0720	0.0287	0.5522
IVB – Mimaropa	0.0122	0.0003	0.1287	<i>n.d.</i>
ARMM	0.1085	0.0940	0.4089	<i>n.d.</i>

Notes: (1) Children under 5 years of age with cough and fever in the past two weeks who were given antibiotics

(2) Children under 5 years of age with cough and fever in the past two weeks who were given some medical attention (seeking care)

(3) Children under 5 years of age who had diarrhea in the past two weeks given ORT

(4) Children under 5 years of age who had diarrhea in the past two weeks given Zinc

Decomposition analysis of mortality: regression and marginal effects

Table E.1: Regression results: neonatal death (DHS 2008)

Covariates	Coefficient	z-stat	dy/dx	z
Constant	-1.24740	-2.82		
Age of mother	0.00322	0.35	0.00009	0.35
Mother's education				
Primary	-0.82524***	-3.41	-0.03996	-2.01
Secondary	-0.53628**	-2.26	-0.03225	-1.58
Higher	-0.70986***	-2.65	-0.03743	-1.83
Married	-0.29302*	-1.61	-0.00861	-1.60
Region				
I – Ilocos Region	-0.11137	-0.34	-0.00268	-0.35
II – Cagayan Valley	0.19573	0.65	0.00653	0.60
III – Central Luzon	0.21247	0.80	0.00722	0.78
V – Bicol Region	-0.20291	-0.64	-0.00444	-0.66
VI – Western Visayas	0.23678	1.00	0.00826	1.00
VII – Central Visayas	0.17394	0.68	0.00567	0.67
VIII – Eastern Visayas	0.23419	0.89	0.00815	0.85
IX – Zamboanga Peninsula				
X – Northern Mindanao	-0.08246	-0.26	-0.00205	-0.26
XI – Davao Peninsula	-0.02641	-0.08	-0.0007	-0.08
XII – Soccsksargen	-0.37719	-1.00	-0.00692	-1.10
XIII – CARAGA	-0.18956	-0.61	-0.00421	-0.63
National Capital Region	0.19024	0.67	0.00631	0.65
Cordillera Admin Region	0.33849	1.19	0.01316	1.05
CALABARZON	-0.54361	-1.36	-0.00848	-1.45
MIMAROPA	0.05483	0.19	0.00157	0.19
Rural	0.13360	1.01	0.00392	1.00
Multiple births	0.92019***	3.04	0.02703	2.85
Female child	-0.17050	-1.41	-0.00501	-1.42
Ever had terminated pregnancy	0.21814	1.77	0.00641	1.75
TT2 plus	-0.27164**	-2.17	-0.00798	-2.08
Complicated birth	0.20043*	1.69	0.00589	1.63
FBD	-0.29809**	-2.30	-0.00876	-2.15
Early breastfeeding (1 hour)	-0.41452***	-3.52	-0.01218	-3.12
N	4473			
Wald χ (30)	88.62			
Prob > χ	0.00			
Pseudo R^2	0.1119			
Log pseudo Likelihood	-262.3304			

Table E.2: Regression results: under five death (NDHS 2008)

Covariates	Coefficien	z-stat	dy/dx	z
Constant	-0.031	-0.09		
Age of mother	0.000	0.01	0.000	0.01
Mother's education				
Primary	-0.291	-1.27	-0.018	-1.10
Secondary	-0.349	-1.52	-0.021	-1.25
Higher	-0.866* * *	-3.27	-0.038	-2.30
Married	-0.224	-1.42	-0.009	-1.43
Region				
I – Ilocos Region	-0.664**	-2.22	-0.031	-2.38
II – Cagayan Valley	-0.014	-0.07	-0.001	-0.07
III – Central Luzon	-0.454**	-2.00	-0.024	-1.90
V – Bicol Region	-0.098	-0.47	-0.006	-0.47
VI – Western Visayas	0.033	0.16	0.002	0.16
VII – Central Visayas	-0.188	-0.84	-0.012	-0.84
VIII – Eastern Visayas	-0.142	-0.60	-0.009	-0.61
IX – Zamboanga Peninsula	-0.876* * *	-3.70	-0.037	-3.19
X – Northern Mindanao	-0.419	-1.49	-0.023	-1.58
XI – Davao Peninsula	-0.231	-0.88	-0.014	-0.91
XII – Soccsksargen	-0.513*	-1.86	-0.026	-1.96
XIII – CARAGA	-0.433*	-1.66	-0.023	-1.70
National Capital Region	-0.632**	-2.38	-0.030	-2.39
Cordillera Admin Region	-0.193	-0.72	-0.012	-0.74
CALABARZON	-1.157* * *	-4.64	-0.041	-3.71
MIMAROPA	-0.207	-0.85	-0.013	-0.87
Rural	0.063	0.60	0.003	0.60
Multiple births	0.485*	1.66	0.020	1.66
Female child	-0.098	-1.07	-0.004	-1.07
Birth interval < 3 years	0.396* * *	4.14	0.017	3.97
Ever breastfed	-1.707* * *	-17.43	-0.071	-12.31
Safe sanitary toilet	-0.089	-0.77	-0.004	-0.77
N	5957			
Wald χ (30)	385.43			
Prob > χ	0.00			
Pseudo R^2	0.3373			
Log pseudo Likelihood	-461.64912			

APPENDIX F

**Decomposition analysis of interventions:
regression and marginal effects**

Table F.1: Decomposition in inequality in facility-based delivery (NDHS 2008)

Covariates	Coefficient	z-stat	dy/d	z	Elasticity	C index	Contribution	% Contribution
Constant	-1.808***	-2.94						
Age of mother at birth	-0.027	-0.94	0.009***	5.31	0.5484	-0.0013	-0.001	-0.41
Age of mother at birth squared	0.001**	2.14						
Head's wife	-0.328***	-5.83	-0.094***	-5.88	-0.1474	-0.0308	0.005	2.62
Partner's age	0.007	1.55	0.002	1.55	0.1514	-0.0066	0.000	0.00
Birth order	-0.139***	-8.22	-0.040***	-8.42	-0.2743	-0.1234	0.034	19.49
Pregnancy wanted	0.085*	1.87	0.024*	1.87	0.0352	0.006	0.000	0.12
PhilHealth covered	0.341***	7.02	0.098***	7.11	0.0808	0.1524	0.012	7.08
Mother's education								
Primary	-0.068	-0.31	-0.020	-0.31	-0.0109	-0.3123	0.000	0.00
Secondary	0.320	1.5	0.098	1.56	0.1066	0.0052	0.000	0.00
Higher	0.753***	3.44	0.237***	3.62	0.1390	0.3181	0.044	25.45
Partner's education								
Primary	0.793*	1.78	0.195**	2.29	0.1327	-0.2779	-0.037	-21.24
Secondary	1.086**	2.43	0.285***	3.32	0.2687	0.0242	0.006	3.74
Higher	1.378***	3.08	0.378***	4.33	0.2261	0.3329	0.075	43.34
Rural	-0.372***	-6.17	-0.107***	-6.33	-0.1238	-0.1153	0.014	8.22
Region								
I - Ilocos Region	0.365	1.38	0.101	1.43	0.0106	0.1754	0.000	0.00
II - Cagayan Valley	0.066	0.25	0.017	0.26	0.0013	-0.0853	0.000	0.00
III - Central Luzon	0.865***	3.50	0.252***	3.85	0.0564	0.1859	0.010	6.04
V - Bicol Region	0.488***	1.94	0.137**	2.06	0.0206	-0.1799	-0.004	-2.13
IV (A) - CALABARZON	0.536*	2.16	0.151**	2.31	0.0437	0.2738	0.012	6.88
IV (B) - MIMAROPA	0.360**	1.32	0.099	1.36	0.0074	-0.2917	0.000	0.00
VI - Western Visayas	0.641**	2.53	0.183***	2.71	0.0295	-0.1853	-0.005	-3.15
VII - Central Visayas	0.742	3.00	0.214***	3.27	0.0350	-0.0307	-0.001	-0.62
VIII - Eastern Visayas	0.639	2.33	0.183**	2.45	0.0184	-0.2837	-0.005	-3.01
IX - Western Mindanao	0.167	0.62	0.045	0.64	0.0041	-0.2543	0.000	0.00
X - Northern Mindanao	0.209	0.78	0.056	0.80	0.0056	-0.1743	0.000	0.00
XI - Southern Mindanao	0.604	2.26	0.172**	2.38	0.0181	-0.1300	-0.002	-1.35
XII - Central Mindanao	0.181***	0.70	0.048	0.72	0.0042	-0.2267	0.000	0.00
XIII - CARAGA	0.327***	1.26	0.090	1.31	0.0058	-0.1884	0.000	0.00
National Capital Region	0.896**	3.52	0.261***	3.80	0.0840	0.3426	0.029	16.58
Cordillera Admin Region	0.746	2.72	0.215***	2.88	0.0080	0.0232	0.000	0.11
Residual							-0.0135	-7.75
Number of obs (N)	6,152							
Wald $\chi(30)$	1,088.50							
Prob > χ	0.00							
Pseudo R^2	0.26							
Log pseudo Likelihood	-3,077.20							

Table F.2: Decomposition in inequality in tetanus toxoid 2 plus (NDHS 2008)

Covariates	Coefficient	z-stat	dy/d	z	Elasticity	C index	Contribution	% Contribution
Constant	0.388	0.96						
Rural	0.002	0.04	0.001	0.04	0.0009	-0.1153	0.000	0.00%
Age of mother at time of birth	-0.078***	-3.09	-0.006***	-2.93	-0.3280	-0.0013	0.000	1.21%
Age of mother at time of birth squared	0.001***	2.64						
Head's wife	-0.071	-1.38	-0.026	-1.38	-0.0383	-0.0308	0.000	0.00%
Partner's age	0.003	0.79	0.001	0.79	0.0853	-0.0066	0.000	0.00%
Birth order	-0.094***	-6.19	-0.035***	-6.29	-0.2240	-0.1234	0.028	78.08%
Pregnancy wanted	0.159***	3.63	0.059***	3.64	0.0788	0.0060	0.000	1.33%
PhilHealth covered	0.049	1.05	0.018	1.05	0.0141	0.1524	0.000	0.00%
Mother's education								
Primary	0.257	1.43	0.092	1.49	0.0469	-0.3123	0.000	0.00%
Secondary	0.466**	2.56	0.170***	2.73	0.1710	0.0052	0.001	2.53%
Higher	0.482**	2.58	0.176***	2.74	0.0955	0.3181	0.030	85.76%
Region								
I - Ilocos Region	0.425**	2.50	0.151**	2.57	0.0147	0.1754	0.003	7.29%
II - Cagayan Valley	0.750***	4.44	0.274***	4.71	0.0191	-0.0853	-0.002	-4.59%
III - Central Luzon	0.550***	3.43	0.198***	3.61	0.0411	0.1859	0.008	21.58%
IV (A) - CALABARZON	0.431***	2.76	0.153***	2.89	0.0409	0.2738	0.011	31.62%
IV (B) - MIMAROPA	0.757***	4.86	0.276***	5.23	0.0191	-0.2917	-0.006	-15.70%
V - Bicol Region	0.504***	3.07	0.181***	3.20	0.0251	-0.1799	-0.005	-12.75%
VI - Western Visayas	0.504***	3.08	0.181***	3.22	0.0269	-0.1853	-0.005	-14.07%
VII - Central Visayas	0.627***	3.88	0.227***	4.11	0.0344	-0.0307	-0.001	-2.98%
VIII - Eastern Visayas	0.464*	2.72	0.166*	2.80	0.0155	-0.2837	-0.004	-12.42%
IX - Western Mindanao	0.573***	3.24	0.207***	3.36	0.0178	-0.2543	-0.005	-12.77%
X - Northern Mindanao	0.313***	1.81	0.109***	1.85	0.0101	-0.1743	-0.002	-5.00%
XI - Southern Mindanao	0.619	3.84	0.224*	4.06	0.0218	-0.1300	-0.003	-8.01%
XII - Central Mindanao	0.629***	3.84	0.228***	4.05	0.0184	-0.2267	-0.004	-11.79%
XIII - CARAGA	0.289	1.63	0.100	1.66	0.0060	-0.1884	-0.001	-3.18%
National Capital Region	0.539***	3.51	0.194***	3.74	0.0578	0.3426	0.020	55.89%
Cordillera Admin Region	0.242***	1.36	0.083***	1.37	0.0029	0.0232	0.000	0.00%
Residual							-0.029	-82.02%
Number of obs (N)	4,397							
Wald $\chi^2(30)$	274.80							
Prob > χ^2	0.00							
Pseudo R^2	0.06							
Log pseudo Likelihood	-2,831.08							

Table F.3: Decomposition in inequality in breastfeeding within 1 hour (NDHS 2008)

Covariates	Coefficient	z-stat	dy/d	z	Elasticity	C index	Contribution	% Contribution
Constant	0.352*	1.76						
Rural	0.028	0.52	0.010	0.52	0.0094	-0.1207	0.000	0.00%
Age of mother at time of birth	-0.009**	-2.04	-0.003**	-2.05	-0.1696	-0.0025	0.000	-1.43%
Head's wife	0.145***	2.79	0.053***	2.80	0.0650	-0.0344	-0.002	7.58%
Worked for the last 12 months	-0.060	-1.45	-0.022	-1.46	-0.0205	0.0283	0.000	0.00%
Female	0.056	1.36	0.021	1.36	0.0179	0.0058	0.000	0.00%
Birth Order	0.033**	2.32	0.012**	2.33	0.0685	-0.1235	-0.008	28.68%
Pregnancy wanted	0.016	0.35	0.006	0.35	0.0064	0.0102	0.000	0.00%
Delivered through C-section	-0.496***	-6.81	-0.183***	-6.94	-0.0380	0.3849	-0.015	49.58%
Visited by an FP worker	0.106**	2.18	0.039**	2.19	0.0143	-0.0781	-0.001	3.79%
Mother's education								
Primary	-0.325**	-2.38	-0.115**	-2.50	-0.0482	-0.3289	0.016	-53.82%
Secondary	-0.352**	-2.58	-0.125***	-2.73	-0.1084	-0.0013	0.000	-0.47%
Higher	-0.515***	-3.59	-0.186***	-3.83	-0.0928	0.3006	-0.028	94.59%
Region								
I - Ilocos Region	0.262*	1.83	0.101*	1.84	0.0087	0.1923	0.002	-5.68%
II - Cagayan Valley	0.425***	3.06	0.162***	3.09	0.0091	-0.0894	-0.001	2.76%
III - Central Luzon	-0.273**	-2.14	-0.103**	-2.12	-0.0190	0.1737	-0.003	11.21%
IV (A) - CALABARZON	0.093*	0.70	0.036*	0.70	0.0086	0.2616	0.000	0.00%
IV (B) - MIMAROPA	-0.027***	-0.19	-0.010***	-0.19	-0.0006	-0.2910	0.000	0.00%
V - Bicol Region	0.248***	1.76	0.096***	1.77	0.0106	-0.1818	-0.002	6.53%
VI - Western Visayas	0.449*	3.10	0.171*	3.14	0.0219	-0.1742	-0.004	12.93%
VII - Central Visayas	0.691	5.08	0.255	5.17	0.0330	-0.0308	-0.001	3.45%
VIII - Eastern Visayas	0.267***	1.89	0.103***	1.90	0.0080	-0.2929	-0.002	7.92%
IX - Western Mindanao	-0.053***	-0.38	-0.020***	-0.38	-0.0015	-0.2382	0.000	0.00%
X - Northern Mindanao	0.768***	4.90	0.280***	5.14	0.0219	-0.1870	-0.004	13.88%
XI - Southern Mindanao	0.381***	2.69	0.146**	2.71	0.0129	-0.1507	-0.002	6.61%
XII - Central Mindanao	0.452**	3.15	0.172**	3.20	0.0121	-0.2533	-0.003	10.42%
XIII - CARAGA	0.293**	2.03	0.113	2.04	0.0055	-0.2020	-0.001	3.80%
National Capital Region	0.268**	2.05	0.103	2.06	0.0281	0.3174	0.009	-30.25%
Cordillera Admin Region	0.388	2.17	0.148	2.21	0.0042	-0.0130	0.000	0.19%
Residual							0.0213	-72.26%
Number of obs (N)	4,707							
Wald $\chi(30)$	281.63							
Prob > χ	0.00							
Pseudo R^2	0.06							
Log pseudo Likelihood	-3,021.07							

Table F.4: Decomposition in inequality in treatment for colds and fever (NDHS 2008)

Covariates	Coefficient	z-stat	dy/d	z	Elasticity	C index	Contribution	% Contribution
Constant	-0.112	-0.32						
Female	-0.020	-0.33	-0.007	-0.33	-0.0092	0.0007	0.000	0.00%
Age in months	-0.016***	-2.23	-0.002***	-3.43	-0.1983	-0.0045	0.001	2.04%
Age in months squared	0.000	1.47						
Age of mother	-0.010*	-1.89	-0.004*	-1.90	-0.2873	-0.0015	0.000	0.97%
Head's wife	0.071	0.95	0.026	0.95	0.0482	-0.0308	0.000	0.00%
Birth interval < 3years	-0.130**	-2.07	-0.047**	-2.08	-0.0561	-0.0716	0.004	9.28%
PhilHealth covered	0.150**	2.02	0.055**	2.03	0.0534	0.1524	0.008	18.81%
Mother's education								
Primary	0.119	0.47	0.042	0.48	0.0275	-0.3123	0.000	0.00%
Secondary	0.153	0.61	0.054	0.63	0.0697	0.0052	0.000	0.00%
Higher	0.264	1.03	0.095	1.07	0.0661	0.3181	0.000	0.00%
Rural	-0.190**	-2.55	-0.069**	-2.57	-0.0951	-0.1153	0.011	25.35%
Region								
I - Ilocos Region	0.009	0.04	0.003	0.04	0.0004	0.1754	0.000	0.00%
II - Cagayan Valley	0.512*	1.93	0.189*	1.93	0.0168	-0.0853	-0.001	-3.31%
III - Central Luzon	0.325	1.57	0.117	1.62	0.0310	0.1859	0.000	0.00%
IV (A) - CALABARZON	0.139***	0.64	0.048***	0.64	0.0164	0.2738	0.000	0.00%
IV (B) - MIMAROPA	0.043	0.19	0.014	0.19	0.0013	-0.2917	0.000	0.00%
V - Bicol Region	0.547	2.73	0.203	2.89	0.0360	-0.1799	-0.006	-14.95%
VI - Western Visayas	0.314	1.48	0.113	1.52	0.0214	-0.1853	0.000	0.00%
VII - Central Visayas	0.207	0.96	0.073	0.97	0.0140	-0.0307	0.000	0.00%
VIII - Eastern Visayas	0.114	0.53	0.039	0.54	0.0047	-0.2837	0.000	0.00%
IX - Western Mindanao	0.196	0.91	0.069	0.92	0.0075	-0.2543	0.000	0.00%
X - Northern Mindanao	0.139	0.67	0.048	0.68	0.0057	-0.1743	0.000	0.00%
XI - Southern Mindanao	0.128	0.59	0.044	0.60	0.0055	-0.1300	0.000	0.00%
XII - Central Mindanao	0.263**	1.25	0.093**	1.28	0.0096	-0.2267	0.000	0.00%
XIII - CARAGA	0.041	0.19	0.014	0.19	0.0010	-0.1884	0.000	0.00%
National Capital Region	0.459	2.21	0.168	2.31	0.0641	0.3426	0.022	50.71%
Cordillera Admin Region	0.350	1.51	0.126	1.53	0.0055	0.0232	0.000	0.00%
Residual							0.0048	11.10%
Number of obs (N)	2,110							
Wald $\chi(30)$	85.07							
Prob > χ	0.00							
Pseudo R^2	0.03							
Log pseudo Likelihood	-1,288.15							

Table F.5: Decomposition in inequality in ORT (NDHS 2008)

Covariates	Coefficient	z-stat	dy/d	z	Elasticity	C index	Contribution	% Contribution
Constant	-1.746***	-2.74						
Rural	-0.210	-1.49	-0.074	-1.50	-0.0650	-0.1153	0.000	0.00%
Female	-0.086	-0.76	-0.031	-0.76	-0.0247	0.0007	0.000	0.00%
Age in months	0.023	1.51	0.002	0.85	0.0799	-0.0045	0.000	0.00%
Age in months squared	0.000	-1.54						
Age of mother	-0.013	-1.31	-0.005	-1.31	-0.2328	-0.0015	0.000	0.00%
Mother currently working	0.123	1.05	0.043	1.06	0.0292	0.0453	0.000	0.00%
Number of children < 5years	0.028	0.38	0.010	0.38	0.0304	-0.0493	0.000	0.00%
Mother's education								
Primary	0.255	0.58	0.092	0.58	0.0383	-0.3123	0.000	0.00%
Secondary	0.226	0.50	0.081	0.50	0.0666	0.0052	0.000	0.00%
Higher	0.314	0.69	0.113	0.69	0.0498	0.3181	0.000	0.00%
Mother knows ORT	1.469***	5.27	0.521***	5.74	0.8141	0.0026	0.002	10.26%
Region								
I - Ilocos Region	0.505	1.25	0.186	1.27	0.0148	0.1754	0.000	0.00%
II - Cagayan Valley	0.213	0.54	0.078	0.54	0.0044	-0.0853	0.000	0.00%
III - Central Luzon	0.436	1.36	0.161	1.38	0.0271	0.1859	0.000	0.00%
IV (A) - CALABARZON	0.655**	1.98	0.239**	2.03	0.0520	0.2738	0.014	69.17%
IV (B) - MIMAROPA	0.543	1.49	0.200	1.52	0.0112	-0.2917	0.000	0.00%
V - Bicol Region	0.829**	2.07	0.297**	2.20	0.0336	-0.1799	-0.006	-29.39%
VI - Western Visayas	0.407	1.29	0.150	1.31	0.0182	-0.1853	0.000	0.00%
VII - Central Visayas	0.858	2.2	0.306	2.32	0.0377	-0.0307	-0.001	-5.63%
VIII - Eastern Visayas	0.421	1.08	0.155	1.09	0.0118	-0.2837	0.000	0.00%
IX - Western Mindanao	0.360	1.01	0.133	1.02	0.0093	-0.2543	0.000	0.00%
X - Northern Mindanao	0.236	0.51	0.087	0.51	0.0066	-0.1743	0.000	0.00%
XI - Southern Mindanao	0.098**	0.22	0.036**	0.22	0.0028	-0.1300	0.000	0.00%
XII - Central Mindanao	0.283*	0.82	0.104*	0.83	0.0069	-0.2267	0.000	0.00%
XIII - CARAGA	0.807	2.51	0.290	2.58	0.0515	0.3426	0.018	85.78%
National Capital Region	0.579**	1.71	0.212**	1.74	0.0056	0.0232	0.000	0.00%
Cordillera Admin Region	0.550	1.01	0.202	1.04	0.0140	-0.1884	-0.003	-12.85%
Residual							-0.0036	-17.34%
Number of obs	560							
Wald $\chi^2(30)$	52.80							
Prob > χ^2_2	0.00							
Pseudo R^2	0.10							
Log pseudo Likelihood	-346.80							