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Supplementary webappendix

This webappendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: Acuin CS, Khor GL, Liabsuetrakul T, et al. Maternal, neonatal, and child health in southeast Asia: towards greater regional collaboration. *Lancet* 2011; published online January 25. DOI:10.1016/S0140-6736(10)62049-1.

Table 1: **Data sources**

Data Source	Country Coverage	Indicators	Estimation methods	Limitations
DHS	Cambodia, Indonesia, Philippines, Vietnam	Time trends for neonatal, infant, under-five mortality, maternal mortality; intervention coverage (vaccination, IMCI, skilled birth attendance, delivery care)	Direct sisterhood method for maternal mortality estimates; direct method for estimation of child mortality rates; estimates of intervention coverage are weighted proportions	Only 4/10 countries covered, time periods per country variable; direct sisterhood method may underestimate maternal deaths; birth transference may underestimate infant mortality
MICS	Laos, Myanmar, Thailand, Vietnam	Estimation of infant, under-five mortality rates; intervention coverage (vaccination, IMCI, skilled birth attendance, delivery care)	Indirect estimation of infant and under-five mortality rates; estimates of intervention coverage are weighted proportions	Earlier rounds of MICS subject to Only 3/10 countries covered
Inter-agency Group for Child Mortality Estimation (UNICEF and WHO)	All 10 countries	Standardized estimation of time trends in infant, under-five mortality rates, 1990-2009 for 196 countries	Linear spline regression for countries without high HIV/AIDS prevalence, Loess regression for countries with high HIV/AIDS prevalence; weights applied for country data sources	Do not address potential mortality shocks other than HIV/AIDS epidemic; Loess forecasts of mortality decline may be conservative; vital registration available for 5/10 Southeast Asia countries
Institute for Health Metrics and Evaluation; Rajaratnam et al.	All 10 countries	Standardized estimation of time trends in neonatal, infant, under-five mortality rates for 187 countries from 1970-2009 countries	Gaussian process regression of under-five mortality accounting for non-sampling error; infant and neonatal mortality modeled from under-five mortality using multilevel regression	Yields lower estimates of mortality than other methods; similar modeling approach for countries with and without high HIV prevalence; vital registration available for 5/10 Southeast Asian countries
Maternal Mortality Estimation Inter-Agency Group (WHO)	All 10 countries	Standardized estimation of time trends in maternal mortality ratio 1990-2008 for 172 countries	Direct estimation from civil registration sources; multilevel regression model for other types of data sources	Underreporting/misclassification of maternal deaths in household survey sources; did not include subnational data sources
Institute for Health Metrics and Evaluation; Hogan et al.	All 10 countries	Standardised estimation of time trends in maternal mortality ratio for 181 countries, 1980-2008	Two-step spatio-temporal regression	Underreporting/misclassification of maternal deaths in household survey sources; did not extract incidental pregnancy-related deaths; impact of HIV epidemic

				modeled directly; vital registration available for 5/10 Southeast Asian countries; Myanmar and Vietnam no national data available
CHERG:	All 10 countries	Cause of death estimation for neonatal, infant, under-fives	Direct estimation with ICD-10 codes for complete vital registration data; for countries without complete vital registration, separate multicause multinomial regression models for countries with low and high child mortality using verbal autopsy sources; separation estimation of neonatal tetanus, malaria, measles, pertussis, HIV/AIDS	Highest mortality countries of Southeast Asia do not have vital registration, estimates are modeled

Table 2: **Effect sizes LiST**

Maternal Effect estimates	AP Hemorrhage	AF	PP Hemorrhage	AF	Hypertensive diseases	AF	Sepsis Infection	AF	Abortion	AF	Obstructed Labor	AF	Ectopic	AF	Other Direct	AF	Malaria Indirect	AF	Other Indirect	AF
Periconceptual																				
D&C, anaesthesia									0.95	1										
Vacuum aspiration									0.99	1										
Medical abortion									0.99	1										
Post abortion case management basic EMOC level									0.9	1			0.3	1						
Post abortion case management comprehensive EMOC level									0.95	1			0.9	1						
Pregnancy																				
Calcium supplementation					0.23	1														
MgSO4 management of pre-eclampsia					0.59	1														
Case management of malaria (clinic)																	0.84	1		
Case management of malaria (hospital)																	0.9	1		
Tetanus toxide																			0.98	0.005
Childbirth																				
Basic emergency obstetric care (clinic)	0.2	1	0.65	1			0.5	1			0.08	1								
Comprehensive emergency obstetric care	0.8	1	0.95	1	0.99	1	0.7	1			0.99	1								
Active management of 3rd stage of labor			0.27	1																
MgSO4 management of eclampsia					0.41	1														
Antibiotics for pPRoM							0.26	0.1												
Essential care for all women and immediate essential newborn care							0.1	0.5	3											

Clean practices and immediate essential newborn care (home)							0.1	0.5												

Data from the Institute for International Programs[1] and UNICEF.[2]

Neonatal Effect estimates	Diarrhoeal diseases	AF	Tetanus	AF	Sepsis/ Pneumonia	AF	Preterm birth complications	AF	Birth asphyxia	AF	Congenital abnormalities	AF	Other neonatal deaths	AF
Periconceptual														
Folic acid supplementation or fortification											0.35	1		
Pregnancy														
Syphilis detection and treatment					0.025	1								
Tetanus toxoid			0.94	1										
Childbirth														
Antibiotics for pPRoM					0.08	1	0.12	1						
Essential care for all women and immediate essential newborn care			0.36	1	0.25	1	0.1	1	0.25	1				
Basic emergency obstetric care (clinic)			0.36	1	0.25	1	0.1	1	0.4	1				
Comprehensive emergency obstetric care			0.36	1	0.25	1	0.1	1	0.8	1				
Clean practices and immediate essential newborn care (home)			0.3	1	0.2	1								
Neonatal resuscitation (institutional)							0.1	1	0.3	1				
Neonatal resuscitation (home)							0.05	1	0.2	1				
Antenatal corticosteroids for preterm labor							0.53	1						
Preventive after birth														
Preventive postnatal care (healthy practices and illness detection)					0.31	1	0.35	1						
Curative after birth														
Oral antibiotics: case management of severe neonatal infection					0.42	1								
Injectable antibiotics: case management of severe neonatal infection					0.68	1								

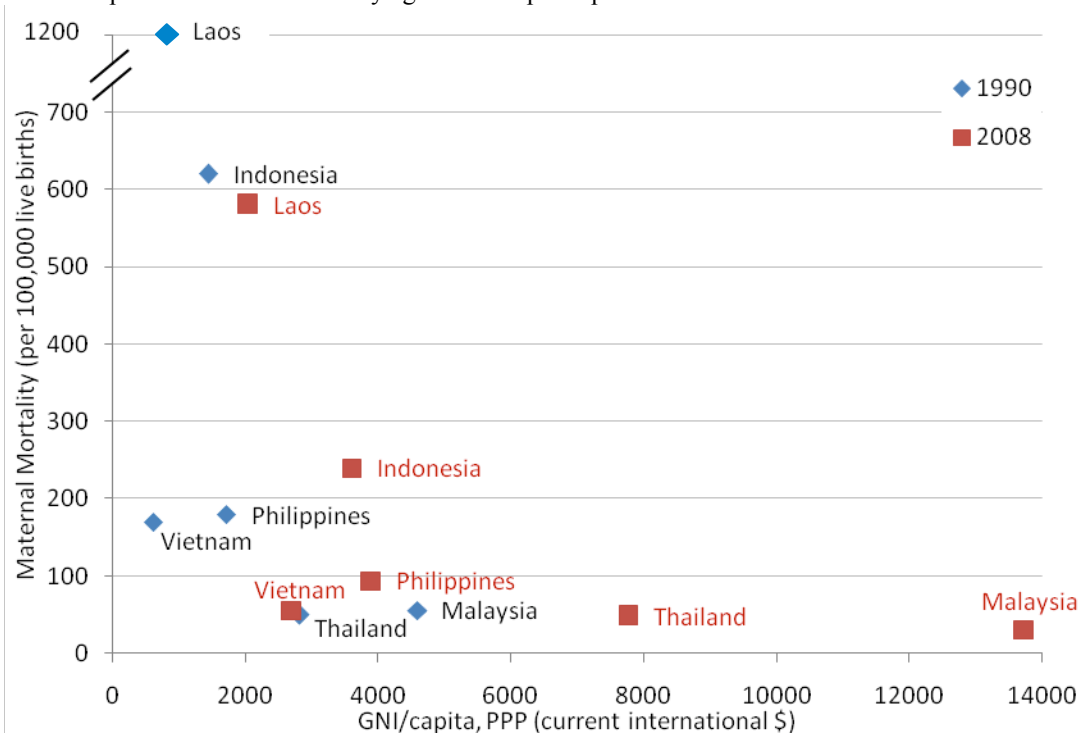
Full supportive care: case management of severe neonatal infection					0.83	1	0.28	1	0.05	1			0.1	1
ORS	0.93	1												
Kangaroo mother care							0.51	1						

Post Neonatal Effect Estimates	Diarrheal diseases	AF	Pertussis	AF	Measles	AF	Meningitis	AF	Malaria	AF	Pneumonia	AF	Other infections*	AF	Non-communicable diseases	AF	Injuries	AF
Preventive after birth																		
Use of improved water source within 30 minutes	0.17	1																
Use of water connection in the home	0.69	1																
Improved excreta disposal (latrine/toilet)	0.36	1																
Hand washing with soap	0.48	1																
Hygienic disposal of children's stools	0.2	1																
Insecticide treated materials or indoor residual spraying									0.55	1								
Vitamin A for prevention	0.32	1																
Zinc for prevention	0.15	1									0.15	1						
Vaccines																		
Rotavirus vaccine	0.74	0.4																
Hib vaccine							0.204	1			0.204	1						
Pneumococcal vaccine							0.27	1			0.27	1						
Measles vaccine					0.85	1												
DPT vaccination			0.7	1														
Curative after birth																		
ORS	0.93	1																
Antibiotics for dysentery	0.99	0.1																
Case management of pneumonia (oral antibiotics)											0.7	1						

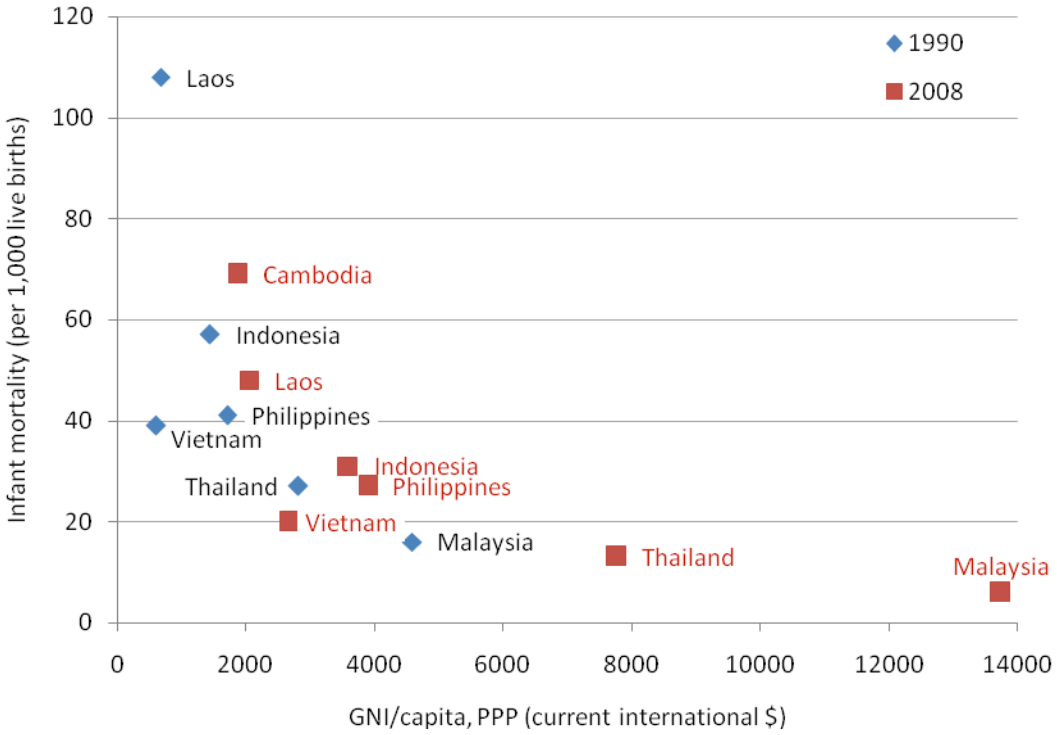
Antimalarials									0.84	1								
Vitamin A for measles treatment					0.62	1												
Zinc for treatment	0.23	1																

Webfigure 1: **Mortality reductions with GNI per capita**
Mortality data from UN MDG Reports;[3,4] GNI per capita from the World Bank.[5]

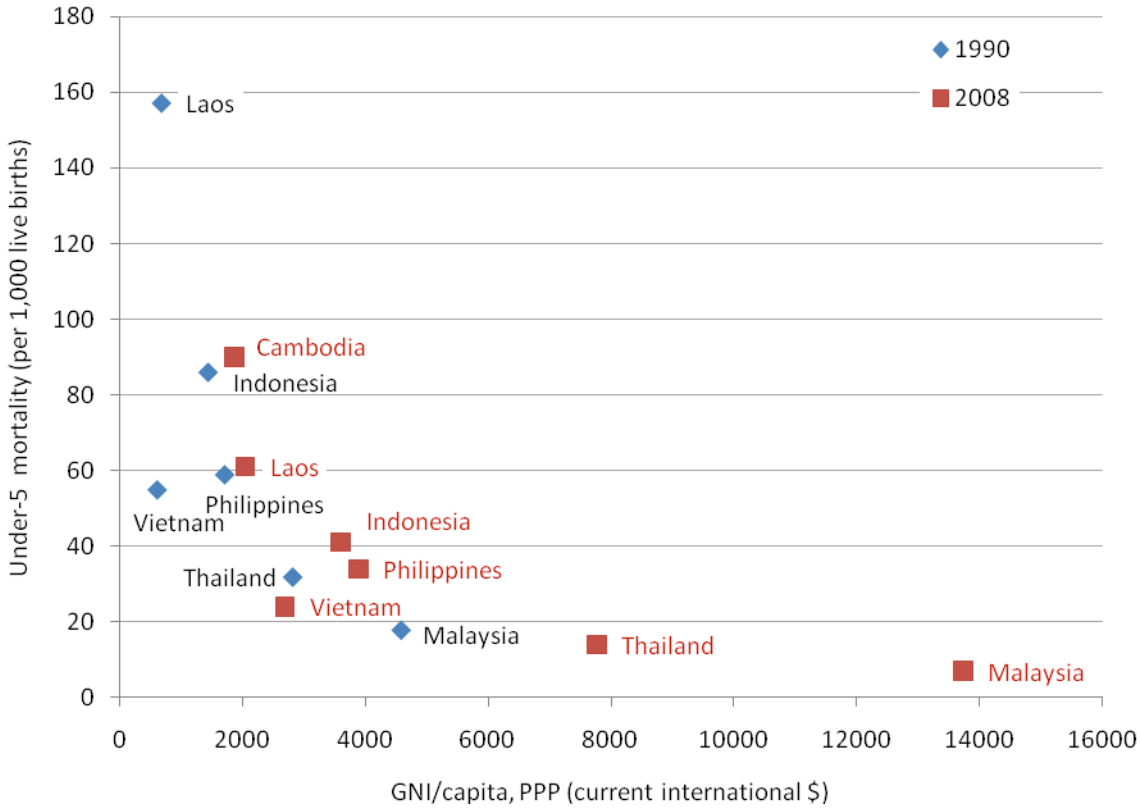
A. Scatterplot of maternal mortality against GNI per capita in 1990 and 2008



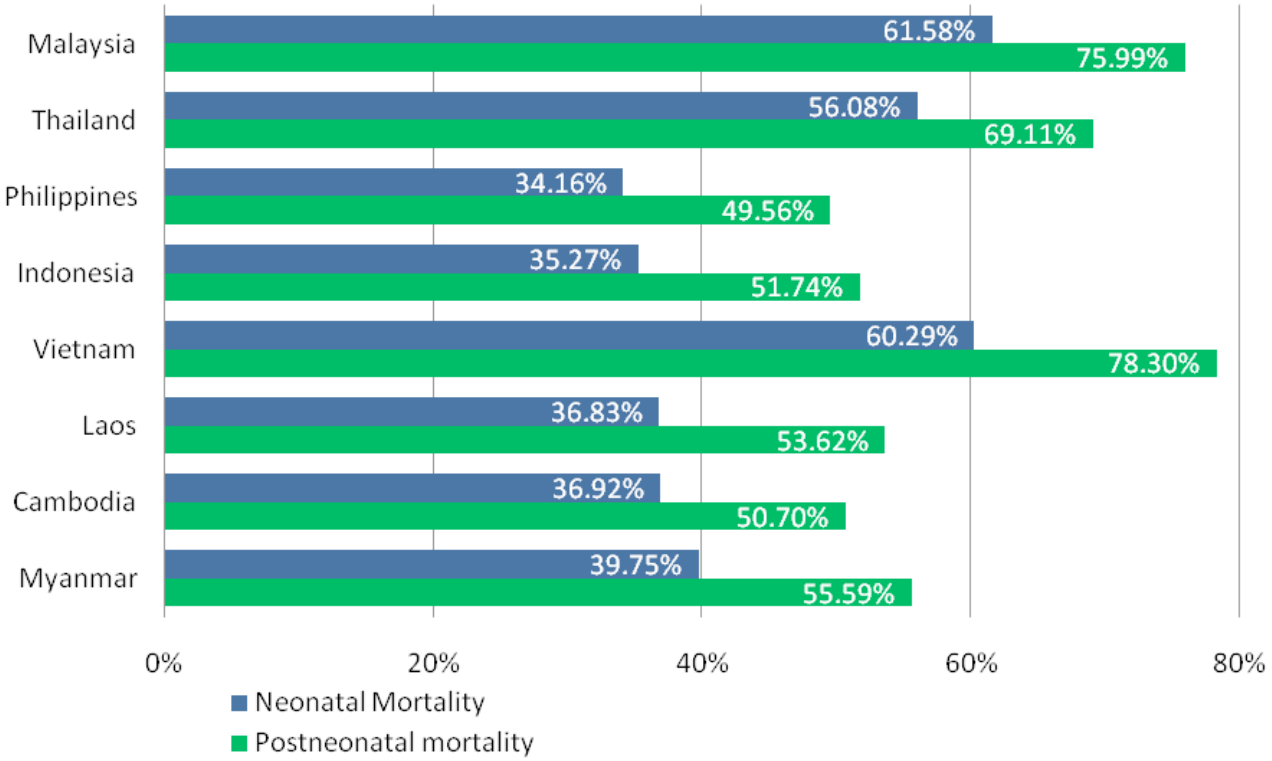
B. Scatterplot of infant mortality against GNI per capita in 1990 and 2008



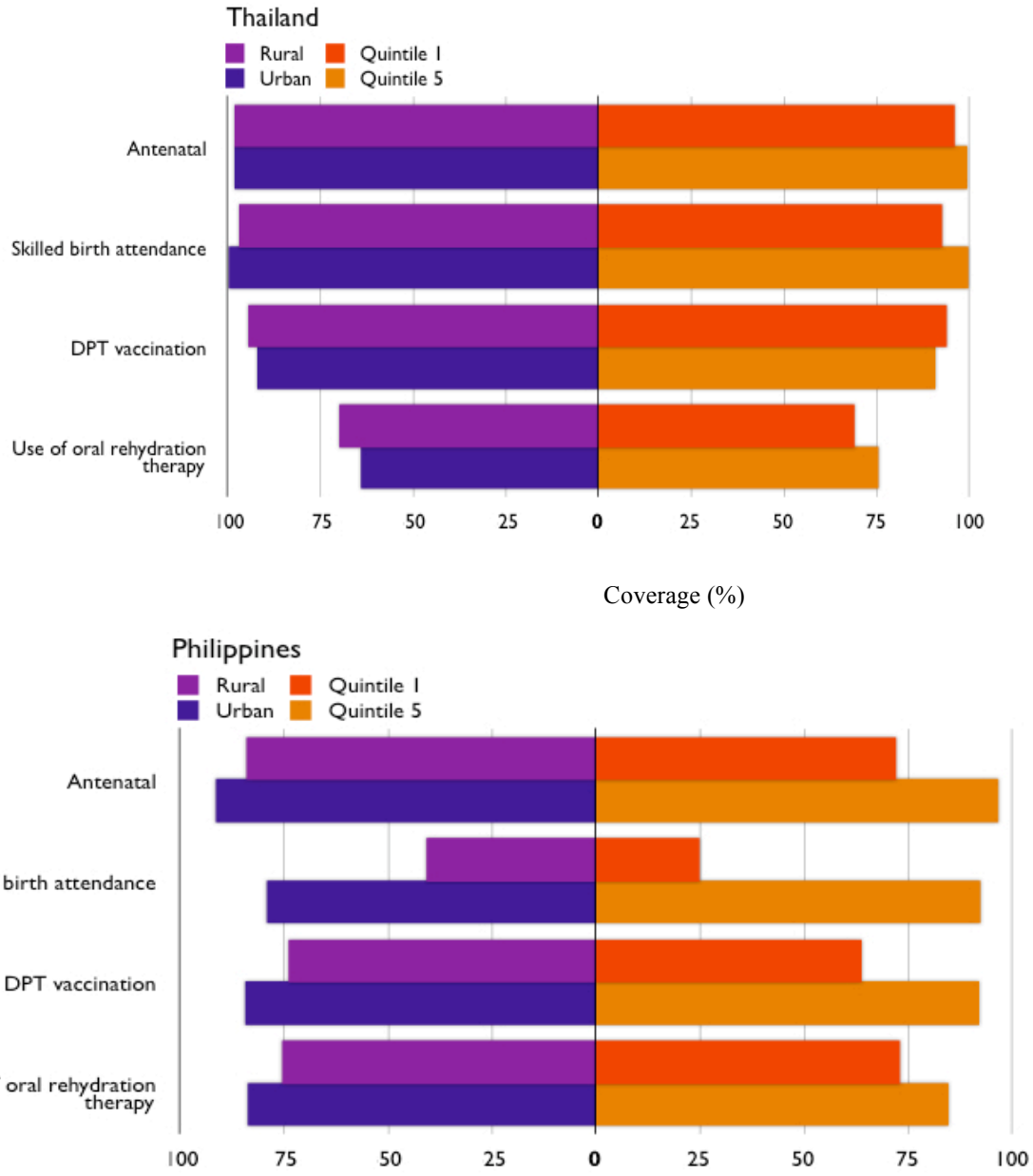
C. Scatterplot of under-5 mortality against GNI per capita in 1990 and 2008

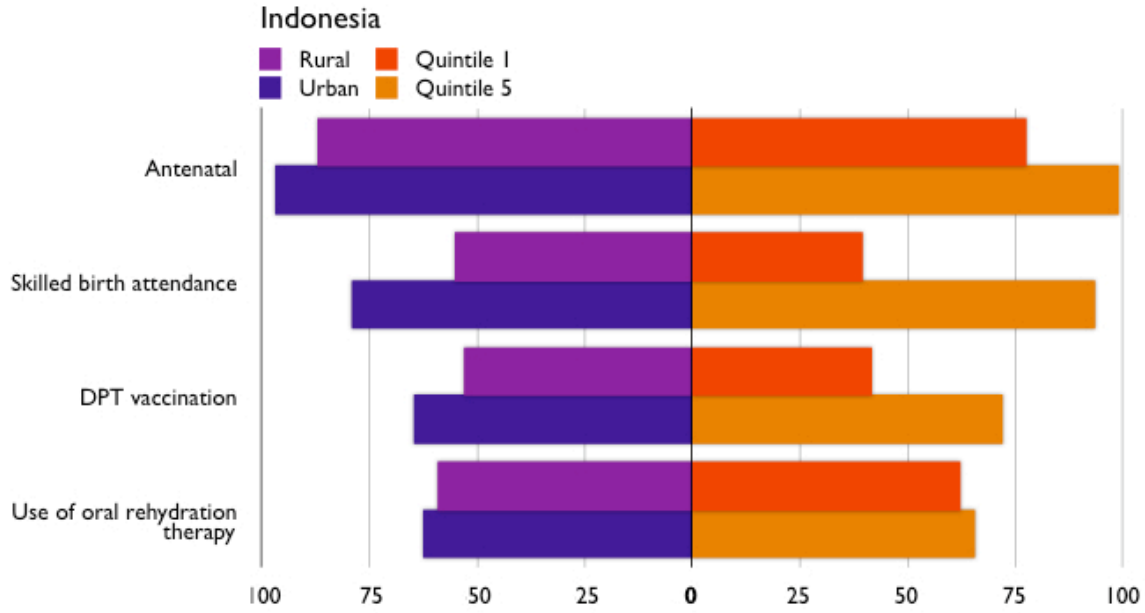


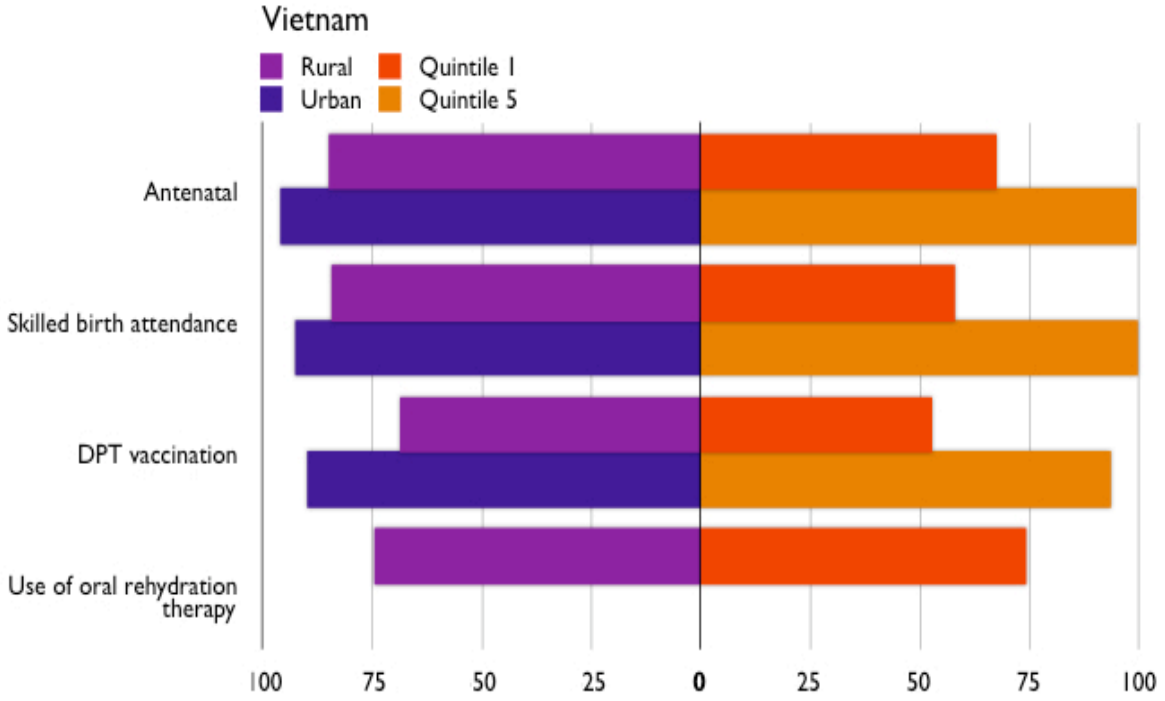
Webfigure 2: **Neonatal and postneonatal mortality rate reductions (1990–2008)**
Data from Rajaratnam et al.[6]

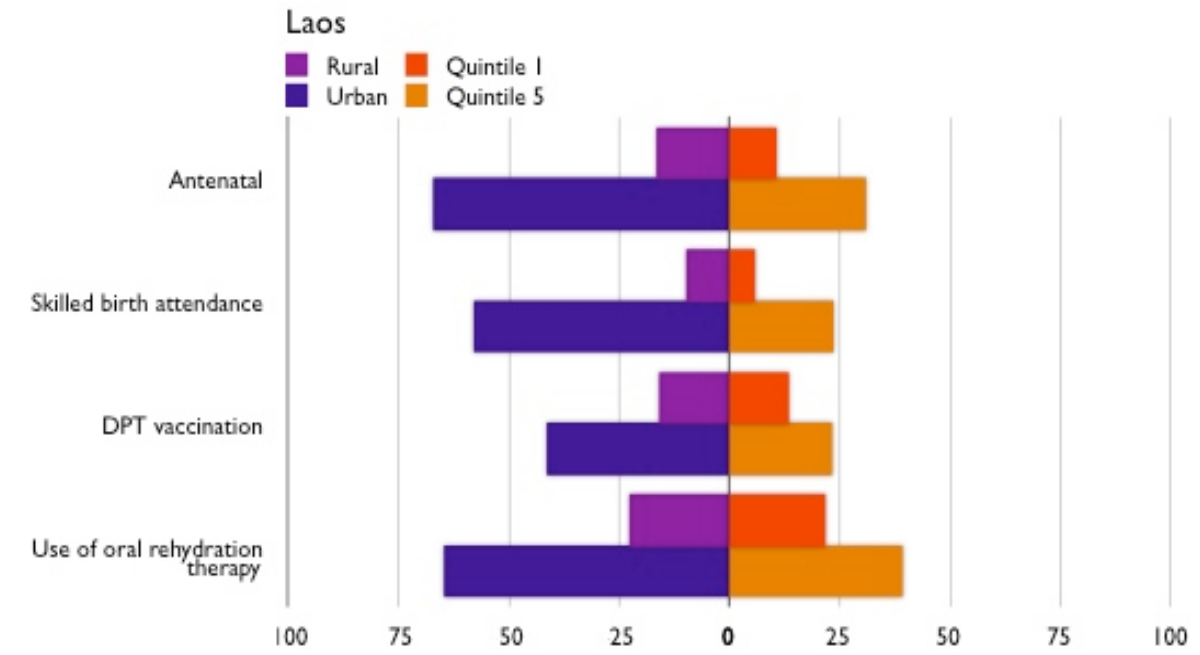


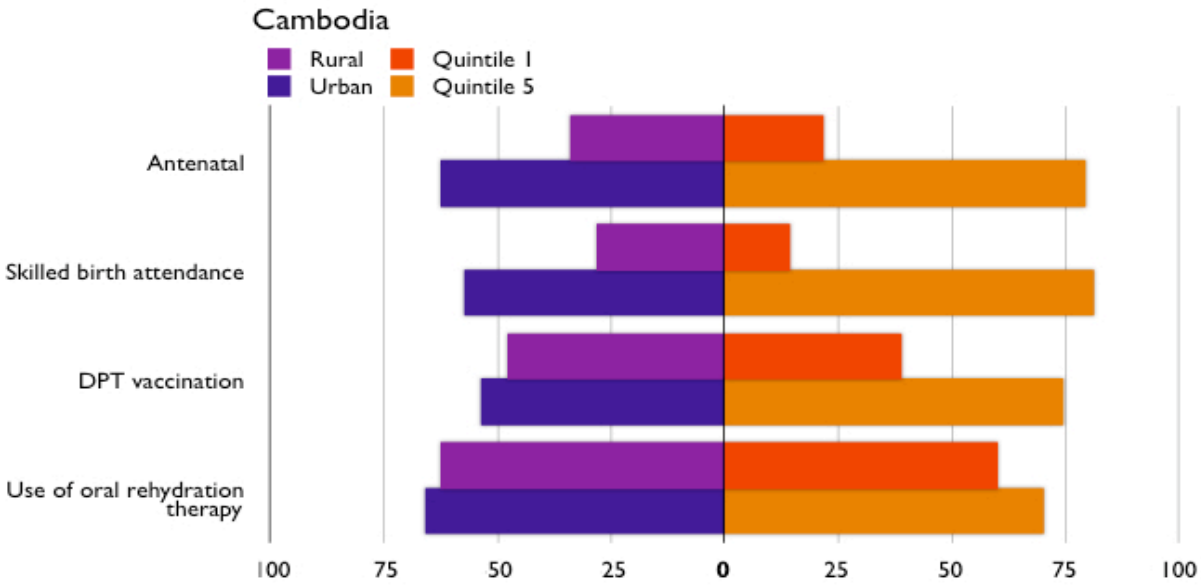
Webfigure 3: **Inequities in MNCH intervention coverage (%) in selected southeast Asia countries**
Data from Gwatkin D et al[7–10] and UNICEF.[11] *Antenatal refers to antenatal care visits.




Indonesia
Rural
Urban
Quintile 1
Quintile 5
Antenatal
Skilled birth attendance
DPT vaccination
Use of oral rehydration therapy
100
75
50
25
0
25
50
75
100

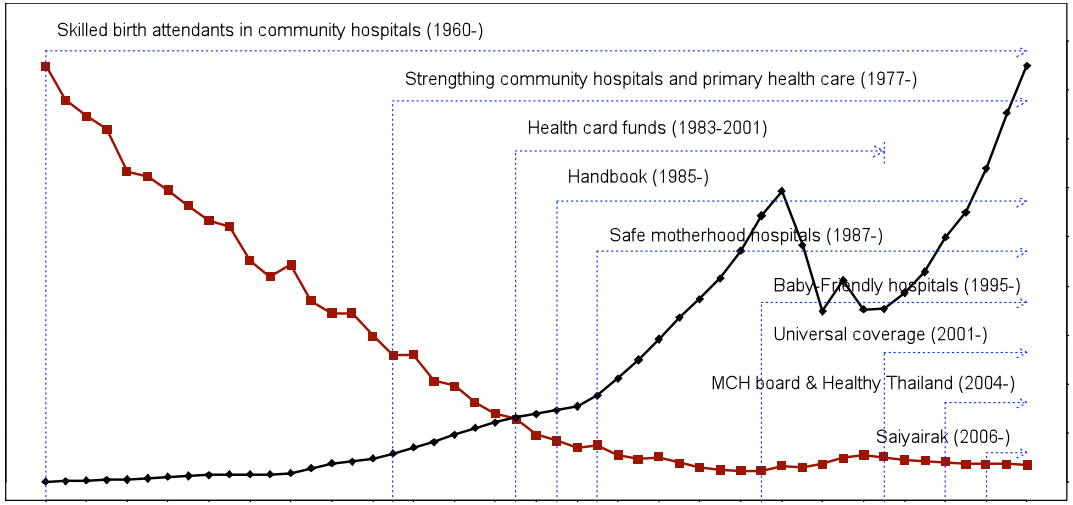

Vietnam
Rural
Urban
Quintile 1
Quintile 5
Antenatal
Skilled birth attendance
DPT vaccination
Use of oral rehydration therapy
100
75
50
25
0
25
50
75
100


Laos
Rural
Urban
Quintile 1
Quintile 5
Antenatal
Skilled birth attendance
DPT vaccination
Use of oral rehydration therapy
100
75
50
25
0
25
50
75
100

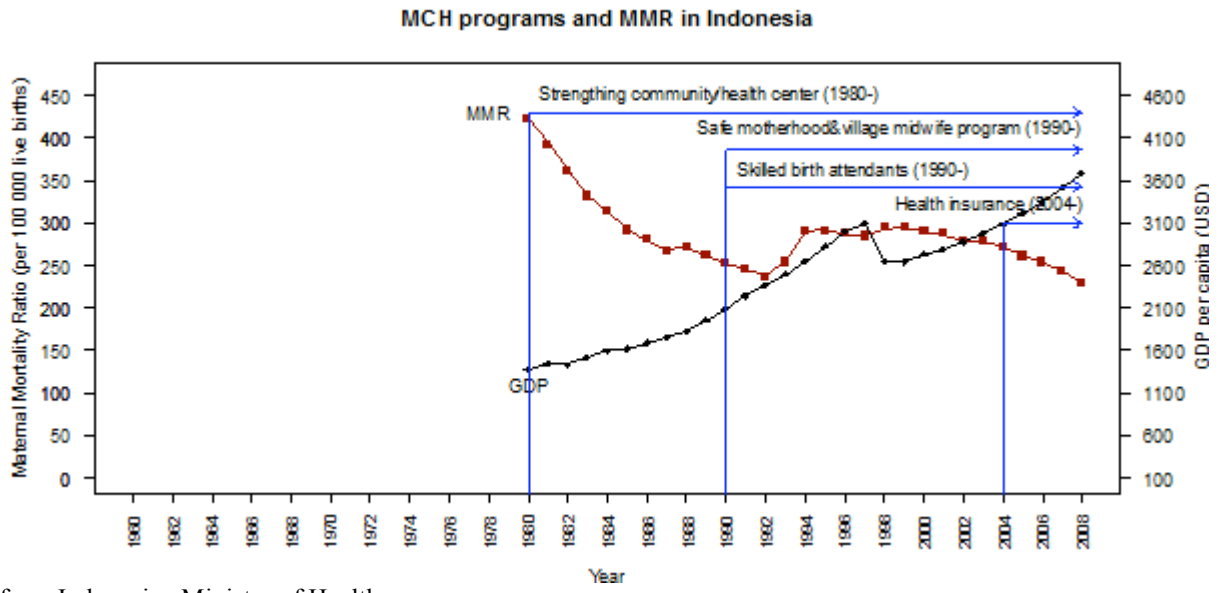

Cambodia
Rural
Urban
Quintile 1
Quintile 5
Antenatal
Skilled birth attendance
DPT vaccination
Use of oral rehydration therapy
100
75
50
25
0
25
50
75
100

Webfigure 4: **Trends in maternal mortality and maternal, neonatal, and child health programmes in Thailand, by GDP (1960– 2008)**

Data from Thailand Ministry of Health. MMR=maternal mortality rate. GDP=gross domestic product.



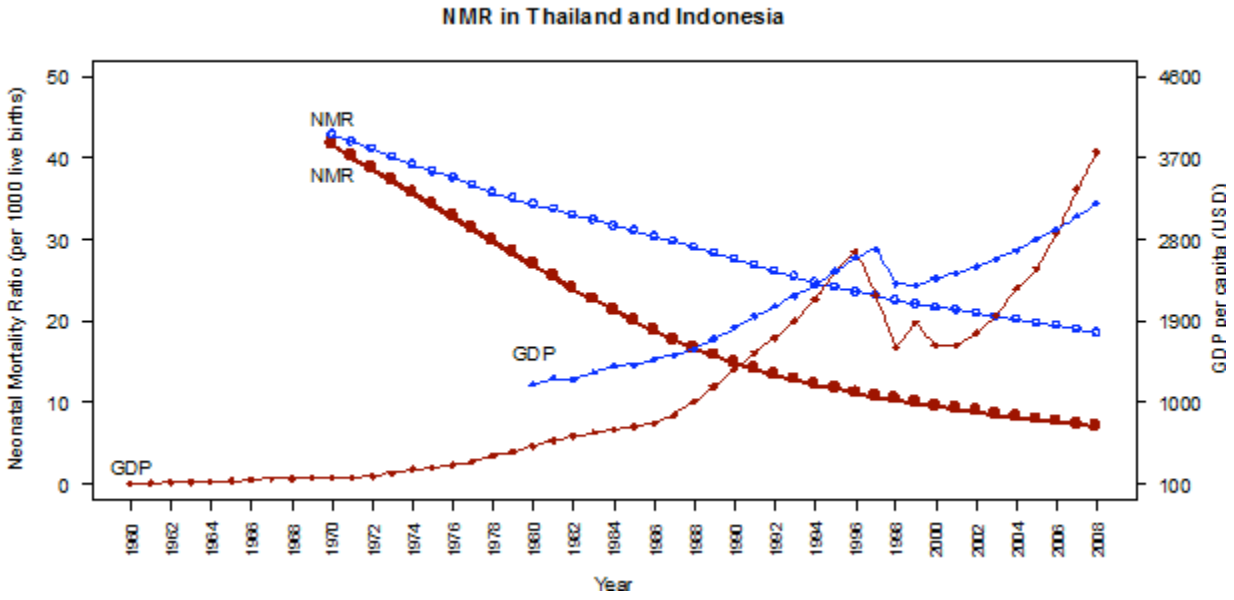
Webfigure 5: **Trends in maternal mortality and safe motherhood programmes in Indonesia, by GDP (1960–2008)**



Data from Indonesian Ministry of Health.

Webfigure 6: **Neonatal mortality reductions in Thailand (red) and Indonesia (blue) by GDP (1960–2008)**

Data from Thailand and Indonesian Ministries of Health. NMR=neonatal mortality rate. GDP=gross domestic product.



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5 World Bank. World Development Indicators database. http://siteresources.worldbank.org/DATASTATISTICS/Resources/GNIPC.pdf (accessed Sept 27, 2010).

6 Rajaratnam J, Marcus J, Flaxman A, et al. Neonatal, postnatal, childhood, and under-5-mortality for 187 countries, 1970–2010: a systematic analysis of progress towards Millennium Development Goal 4. *Lancet* 2010; **375:**1988–2007.

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8 Gwatkin D, Rutstein S, Johnson K, Suliman E, Wagstaff A, Amouzou A. Socio- economic differences in health, nutrition, and population in Indonesia. Washington, DC: The World Bank, 2007.

9 Gwatkin D, Rutstein S, Johnson K, Suliman E, Wagstaff A, Amouzou A. Socio- economic differences in health, nutrition, and population in the Philippines. Washington, DC: The World Bank, 2007.

10 Gwatkin D, Rutstein S, Johnson K, Suliman E, Wagstaff A, Amouzou A. Socio- economic differences in health, nutrition, and population in Vietnam. Washington, DC: The World Bank, 2007.

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