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## **Methods for assessing child health interventions**

Information about the impact of interventions in reducing child mortality by cause was obtained from published research studies, systematic reviews, and recent global reviews of evidence for interventions.<sup>2,4,9</sup> The level of evidence was categorized on the basis of available evidence and delivery strategies as either strong (Level I) or medium (Level II) and no intervention was included where the evidence was variable or uncertain. In addition to the 23 effective interventions considered in the child survival series,<sup>2</sup> we also included the 16 interventions selected by the Lancet neonatal series for in-depth evaluation of their impact on outcomes.<sup>4</sup> In all 28 interventions supported by level 1 or level 2 evidence are presented by their impacts and pathway for action (Web Table 1).w1-w55 Additional recent information on strategies such as the use of community support groups and health workers (w 56), strategies for prevention of infection such as hand washing (w57), point of use water purification (w58), chlorhexidine use after childbirth (w59), kangaroo baby care (w60) and micronutrient interventions (w61, w62) was also reviewed. Other promising interventions that are yet to be scaled up in developing countries e.g. Rotavirus vaccine (w63, 64), Pneumococcal conjugate vaccine (w65, 66) and Vi typhoid vaccine (w67, 68) were also considered. A number of interventions were not considered for inclusion in the current analysis because although evidence-based, they are not currently feasible for implementation at high coverage in low-income areas. These include interventions such as nasal CPAP therapy for preterm infants (w69), probiotics for preventing and treating diarrhea (w70) and Highly active anti-retroviral therapy (w71, w72).

The current coverage data for various interventions were obtained from the recent estimates from the WHO and Unicef.<sup>7,8</sup> Relating the current coverage estimates to the 2004 mortality estimates, we estimated the potential impact of these potential interventions on child mortality using a sequential impact model as used in the Newborn and Child survival series, assuming that 90% coverage for most interventions was achieved. Although accurate country level spending information on child health and survival research for the WHO EMR countries was not available, we evaluated available data on research spending and specifically child health research from the RPC division at WHO EMR (MAR & Dr M. Afzal, personal communication 2006). Additional funding details on projects addressing child health interventions in the region were obtained from other leading UN agencies (UNICEF, UNFPA), World Bank and Ministries of Health websites. Additional data on health system

governance and government expenditures was obtained from a variety of sources including the aforementioned data sources, the Corruption Perception Indices of Transparency International,(w75) the World Bank governance indicators,(w76) and findings of the Arab Development Report.(w77) These data, where applicable, were correlated with respective health system performance and child health intervention coverage indicators in the region.

We also evaluated existing policies for child health and survival in the region from available information from Ministry of Health documents and websites. While five of these high burden EMR countries had maternal and child health programs in place, it was difficult to assess their implementation or coverage. We evaluated the relationship between the “government effectiveness”, estimated through a composite measure of responses on the quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government’s commitment to policies. The main focus of the effectiveness estimate is on “inputs” required for the government to be able to produce and implement good policies and deliver public goods(w76) with infant mortality among the 22 EMR countries. Full data on specific spending on child health were not available. However, we examined the relation between the health to military spending ratios and infant mortality in the countries with the highest burden of child deaths.

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Web Table A

Attributable mortality reduction impact and pathway for child survival interventions in countries with high mortality

Intervention	Cause of death									
	Diarrhea	Pneumonia	Measles	Malaria	HIV/AIDS	Neonatal causes of death				
						Birth asphyxia	Preterm delivery	Neonatal tetanus	Severe infections	Congenital
	Preventive interventions									
Periconceptual folic acid supplementation (w1)										4%
Effective antenatal care (w1, w2 )						9%	2%		1%	
Tetanus toxoid (w3, w 4-6)								50%		
Intermittent antimalarial preventive treatment in pregnancy (w9,w10,w7,w8, w11)									0.5 %	
Insecticide-treated materials (w12-15, w16-17)				59%						
Treatment of asymptomatic bacteriuria in pregnancy (w1)							6%			
Skilled maternal & immediate newborn care (w1, w18)						23%	4%	14%	7%	
Antenatal steroids (w47)							18%			



<b>Appropriate antimalarial treatment (w15, w7, w51-w52)</b>				<b>11%</b>						
<b>Vitamin A for measles (w53)</b>			<b>3%</b>							
<b>Antiretroviral treatment of HIV/AIDS (w54-55)</b>					<b>68%</b>					

**Web Table B**  
**Interventions that may improve Child Survival in WHO EMR at health system level**

<b>Delivery Strategies</b>	<b>Interventions included</b>	<b>Current status of evidence and effectiveness research</b>	<b>Research Priorities</b>
Family and community	<ol style="list-style-type: none"> <li>1. Breastfeeding promotion</li> <li>2. Complementary feeding promotion</li> <li>3. Water &amp; Sanitation services and hygiene promotion</li> <li>4. Thermal care &amp; early breast feeding</li> <li>5. ORT promotion</li> <li>6. Community antibiotics use for pneumonia</li> </ol>	<p align="center">I</p> <p align="center">II</p> <p align="center">II</p> <p align="center">II</p> <p align="center">I</p> <p align="center">II</p>	<ol style="list-style-type: none"> <li>1. Effectiveness evaluation of these packages of care through alternative cadres of health care workers</li> <li>2. Evaluation of behavior change communication through low cost strategies e.g. community support groups and peer counseling</li> <li>3. Evaluation of conditional cash transfers and economic schemes to promote use of evidence-based commodities at household level including water purification and sanitation interventions</li> </ol>
Outreach	<ol style="list-style-type: none"> <li>1. Effective antenatal care</li> <li>2. Insecticide treated bed nets in pregnancy and childhood</li> <li>3. Intermittent Preventive Treatment for malaria in pregnancy</li> <li>4. Vitamin A supplementation (newborn and infant)</li> <li>5. Tetanus toxoid administration</li> <li>6. Periconceptual folic acid supplementation.</li> <li>7. Appropriate antimalarials</li> <li>8. Zinc treatment of diarrhea</li> </ol>	<p align="center">I</p> <p align="center">I</p> <p align="center">II</p> <p align="center">I</p> <p align="center">I</p> <p align="center">II</p> <p align="center">II</p>	<ol style="list-style-type: none"> <li>1. Research needed on delivery strategies for malaria prevention and treatment strategies, including social marketing for bed nets</li> <li>2. Determination of levels of care and protocols that can be safely adopted by community health workers including adapted community IMCI for recognition and treatment of febrile illnesses and pneumonia</li> <li>3. Reaching high risk groups for pre-conceptual nutrition interventions</li> <li>4. Reaching and treating newborn infants in domiciliary settings during the first three days of life</li> <li>5. Scaling up the use of zinc and other micronutrient supplements through community health workers</li> </ol>
Clinical or facility based interventions	<ol style="list-style-type: none"> <li>1. Complementary feeding promotion</li> <li>2. Zinc for the treatment of diarrhea</li> <li>3. Measles vaccine</li> <li>4. Hib vaccine</li> <li>5. Peri-conceptual folic acid supplementation.</li> <li>6. Antiretroviral treatment for HIV/AIDS</li> <li>7. Treatment of asymptomatic bacteriuria</li> <li>8. Antenatal steroids</li> <li>9. Skilled maternal &amp; immediate newborn care</li> <li>10. Extra care of LBW infants</li> <li>11. Emergency Obstetric &amp; Newborn Care</li> </ol>	<p align="center">II</p> <p align="center">I</p> <p align="center">I</p> <p align="center">I</p> <p align="center">I</p> <p align="center">I</p> <p align="center">II</p> <p align="center">I</p> <p align="center">I</p> <p align="center">II</p>	<ol style="list-style-type: none"> <li>1. Establishing effectiveness of integrated breastfeeding and complementary feeding promotion strategies in health system settings</li> <li>2. Developing and evaluating strategies for low cost neonatal care including thermoregulation especially for high risk infants in secondary level facilities</li> <li>3. Infection prevention strategies in facility settings to reduce health care associated infections.</li> <li>4. Appropriate strategies for cost effective short course treatment modalities for common childhood infections (e.g. severe pneumonia, typhoid, dysentery, meningitis)</li> <li>5. Effective minimal packages for high-risk maternal and newborn care</li> </ol>

	12. Antibiotics for dysentery, neonatal pneumonia & sepsis 13. Vitamin A administration for treatment 14. Antibiotics for prolonged rupture of membranes	I I I I II	

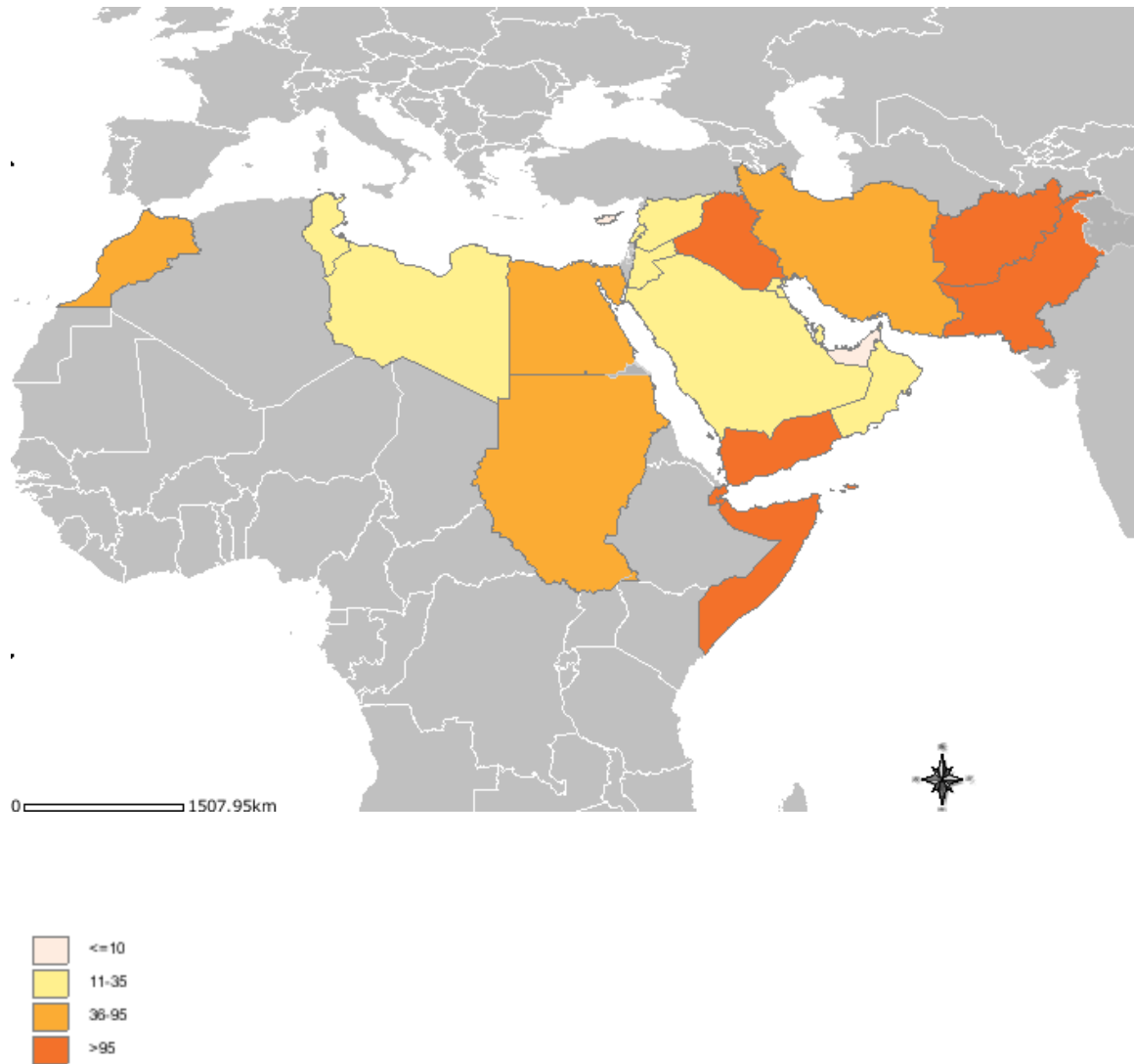
**Level of evidence**

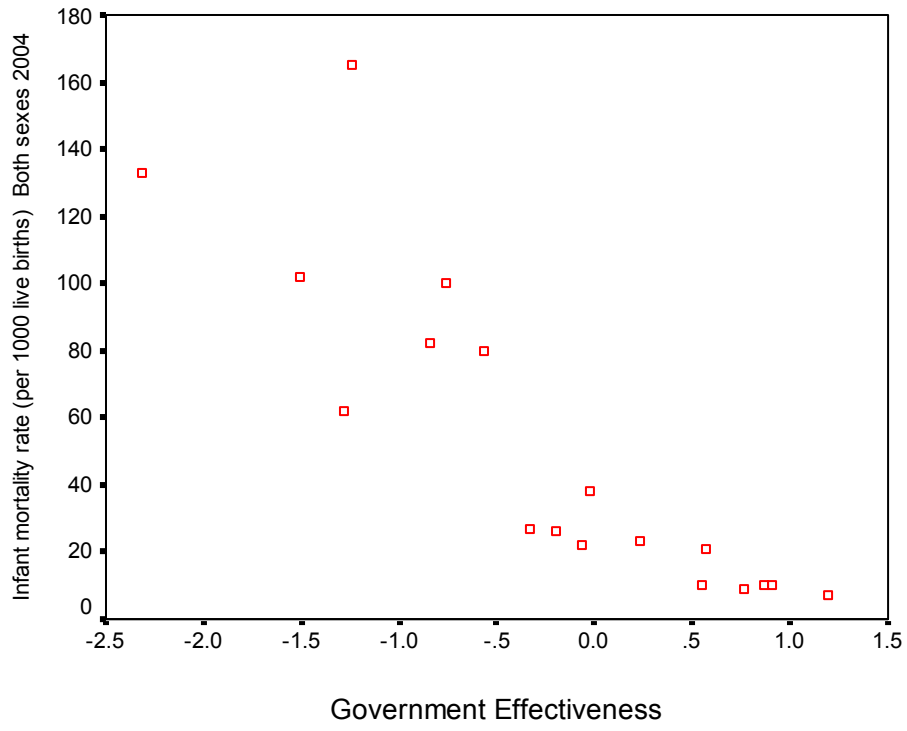
I = Well established evidence from large effectiveness studies and systematic reviews

II = Strong

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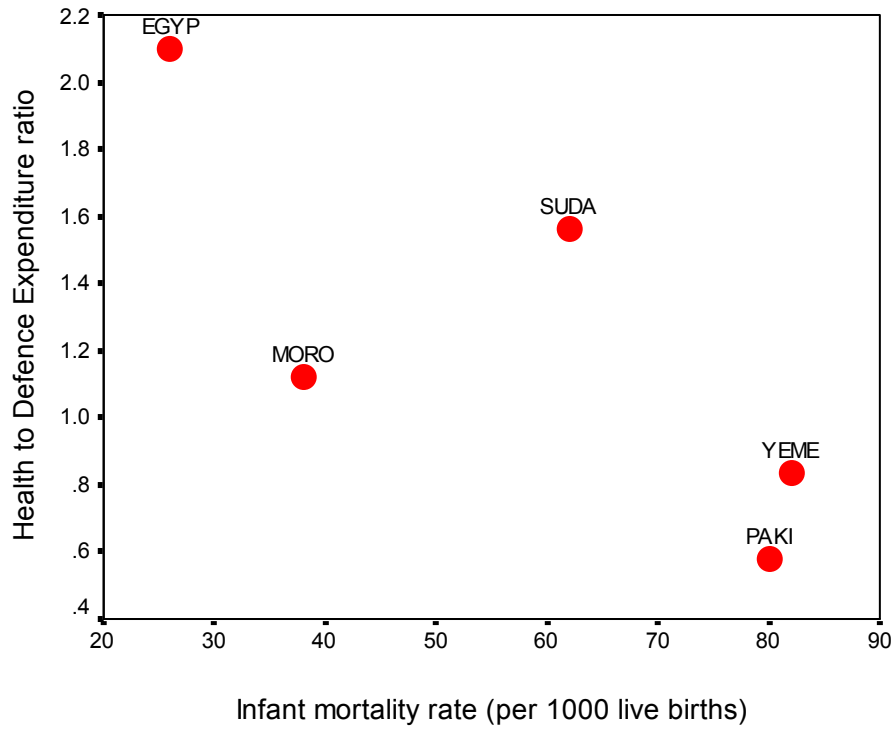
**Fig A Map of child mortality in EMR region**



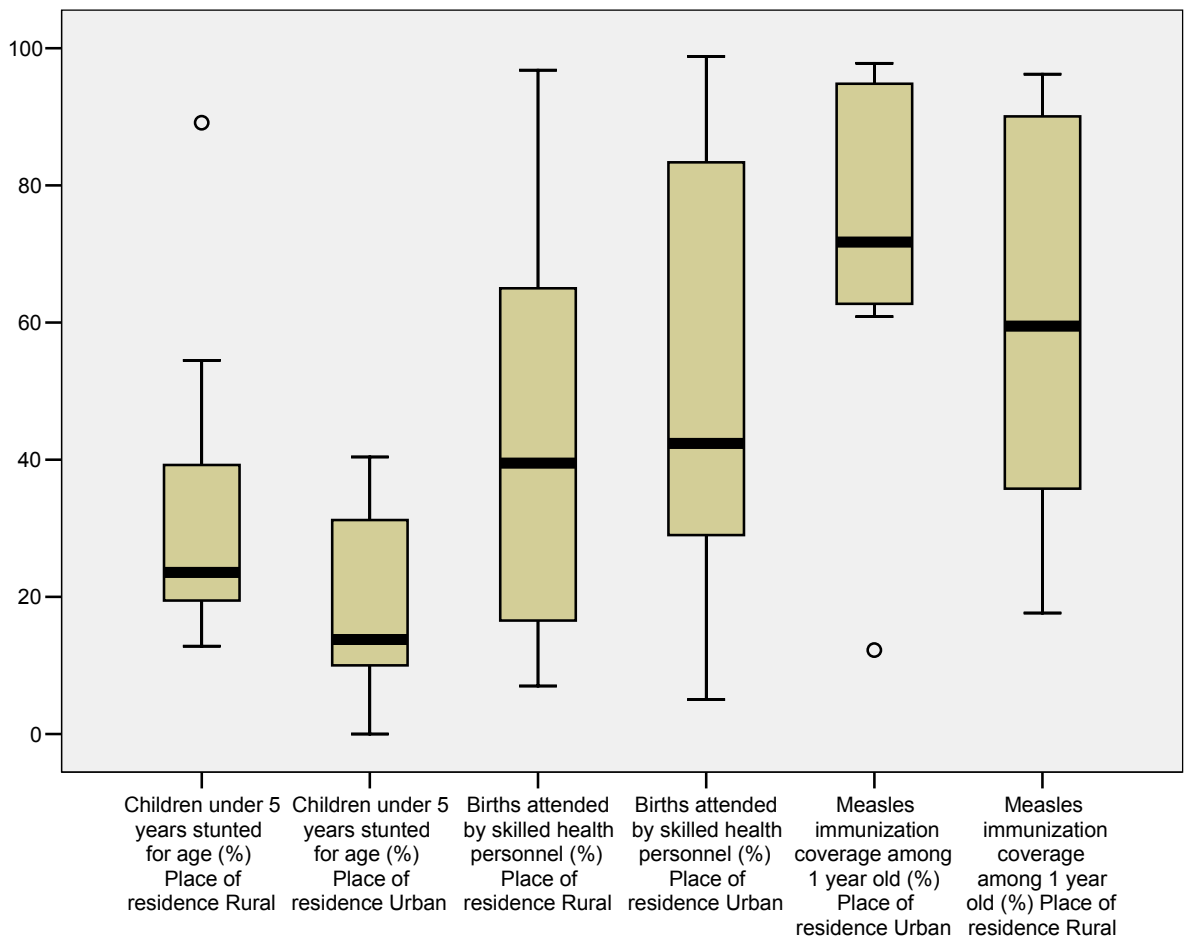


**Web Figure B**  
**Relationship of government effectiveness and infant mortality rates in EMR countries**





**Web Figure C**  
**Health to defense expenditure ratio and infant mortality in the EMR countries with the highest numbers of child deaths**



**Figure D:- Differentials among interventions coverage between rural and urban populations in EMR region**