

**Extended Data for *Development and application of a hybrid implementation research framework to understand success in reducing under-5 mortality in Rwanda***

**Extended Data Table 1a. Under-5 mortality-specific evidence-based interventions (EBIs) targeting leading causes of death in children under 5 in low- and middle-income countries**

<b>Cause of death</b>	<b>Evidence-based interventions</b>	
Lower respiratory infections	Antibiotic treatment	
	Vaccination: PCV	
	Vaccination: Hib	
	Community-based management	
	Facility-based management	
Diarrheal diseases	Oral rehydration therapy	
	Zinc supplementation	
	Vaccination: Rotavirus	
	Community-based management	
	Facility-based management	
Malaria	Antimalarial combination therapy	
	Rapid diagnostic testing	
	Insecticide-treated nets	
	Indoor residual spray	
	Intermittent preventative therapy for high-risk groups	
	Community-based management	
	Facility-based management	
Measles	Vaccination: Measles	
	Vitamin A supplementation (prior to vaccination)	
Malnutrition	Exclusive breastfeeding for 6 months	
	Continued breastfeeding and complementary feeding after 6 months	
	Vitamin A supplementation	
	Management of severe acute malnutrition (ready-to-use food, rehydration, antibiotics)	
HIV	Antiretroviral treatment for infants and children	
	HIV testing of children born to HIV+ mothers	
	Prevention of mother-to-child transmission (PMTCT)	Early diagnosis of pregnant women (or pre-pregnancy)
		PMTCT treatment for mothers* and post-partum to exposed infants
		Elective C-section for untreated HIV+ mothers**; replacement feeding**
		Antiretroviral treatment for mother for life as prevention (started in 2012)
Exclusive breast feeding		
Meningitis	Vaccination: PCV meningococcal	
	Vaccination: Hib	
	Vaccination: Meningococcal	
	Antibiotic treatment	
	Chemoprophylaxis during acute outbreaks	
	Vaccination: Tetanus	

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Other vaccine preventable diseases	Vaccination: Diphtheria
	Vaccination: Pertussis
	Vaccination: Polio

*\* now incorporated into treatment for all \*\*No longer recommended for women on antiretroviral therapy with suppressed VL*

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**Extended Data Table 1b. Neonatal mortality-specific evidence-based interventions (EBIs) targeting leading causes of death in low- and middle-income countries between 2000-2015**

Period of risk	Evidence-based intervention	
Preconception	Folic acid supplementation	
Antenatal	Tetanus vaccination	
	Malaria prevention and treatment	Intermittent presumptive treatment
		ITNs
	Iodine supplementation (in endemic iodine deficient settings)	
	4 or more antenatal visits (ANC4)	
	Prevention and treatment of preeclampsia and eclampsia	Calcium supplementation
		Low-dose aspirin for high-risk women
		Antihypertensive treatment for severe hypertension
Magnesium sulfate		
	Early delivery	
Intrapartum	Antibiotics for PPROM	
	Corticosteroids for preterm labor	
	C-section for breech or obstructed labor	
	Active management of delivery (including partograph)	
	Clean delivery practices (incl. clean cord-cutting)	
	Trained birth attendant	
	Facility-based delivery	
	Basic emergency obstetric and newborn care (BEmONC)	
	Comprehensive emergency obstetric and newborn care (CEmONC)	
	Timely transport for higher level care for mother	
Postnatal	Newborn resuscitation	
	Immediate breastfeeding	
	Prevention and management of hypothermia	Immediate drying and wrapping
		Delayed bathing
		Skin-to-skin
		Baby warming
	Kangaroo care for LBW/prematurity	
	Timely transport for higher level care for mother	
	Post-partum visits to identify danger signs and provide active referral	
	Antibiotics for suspected or confirmed infection	
Surfactant therapy for RDS and prematurity		

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	Neonatal intensive care units (equipped, trained staff, standards and protocols established and followed)
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**Extended Data Table 2: Main contextual factors identified as facilitators or barriers to the implementation of health system-delivered U5M targeted EBIs in Rwanda**

	<b>Contextual Factor</b>	<b>Rwanda</b>
<b>Global level</b>	Donor funding priorities and availability	+
	Climate change	-
<b>National/ Subnational level</b>	National priority for health (including U5M)	+
	Leadership and governance and a culture of accountability	+
	Financial commitment to the health sector	+/-
	In-country research capacity	+
	Geography	+
	WASH	+
	Culture of donor and partner coordination	+
	Community health system and structure	+
	Health systems strength and strengthening	+
	Culture and capacity of data use	+
<b>Community /Individual level</b>	Culture and beliefs	+
	Socioeconomic status	+
	Female empowerment status	+
	Reproductive rights	+
	Stunting	-
<b>Key</b>	(+)= facilitating contextual factor (-)= hindering contextual factor (+/-)= both a facilitating and hindering contextual factor	

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**Extended Data Figure 1. Mapping of change in neonatal and under-5 mortality in Rwanda between 2000-2015** (Source: S Hay et al, Institute for Health Metrics and Evaluation)

