

Reducing maternal, newborn and child deaths in the Asia Pacific

Strategies that work



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Introduction

This year around the world there will be almost 10 million deaths of children under the age of five and 500,000 maternal deaths.

Millennium Development Goal 4 aims to reduce child deaths by two-thirds between 1990 and 2015. Millennium Development Goal 5 has the target of reducing maternal deaths by three-quarters over the same period.

Unfortunately, on present trends, most countries are unlikely to achieve either of these goals. In a recent review of MDG progress, the World Bank estimated that the world was only 32% of the way to achieving the child health goal and less than 10% of the way to achieving the goal for maternal health.¹

Table I lists the maternal and child mortality rates for developing countries in the region, the number of maternal and child deaths in the latest year and whether each country is on track or not to achieve MDGs 4 and 5. In our region, the Asia Pacific, 18 of the 29 developing countries are currently off-track to achieve Goal 4 – to reduce child deaths by two-thirds, and 23 are off-track to achieve Goal 5 – to reduce maternal deaths by three-quarters.²

Yet some developing nations have already achieved the goals seven or more years before the target date³ and there is clear evidence from a range of countries that most of the causes of child and maternal deaths can be prevented or effectively treated.

This paper summarises the interventions that have been proven to be effective in reducing maternal, newborn and child deaths in developing countries.

We then present eight case studies of low cost projects that have resulted in significant (and sometimes huge) improvements in maternal, newborn and child health in our region. These case studies cover a range of regional countries and strategies, and show how evidence based interventions can be practically applied.

The case studies show that significant improvements are possible in a wide range of social and economic environments and at low cost.

It is our hope that this paper provides both inspiration and practical ideas for those people in parliaments, government administration and in the field who can make a difference for women and children. The evidence indicates that widespread access to evidence based interventions can prevent over 350,000 maternal deaths each year and over six million child deaths.

Table I Summary of child and maternal health indicators for the region

	MDG 4 – to reduce child mortality by two-thirds	Child mortality rate per 1000 live births 2006*	No. of child deaths 2006#	Infant mortality rate per 1000 live births 2006*	MDG 5 – to reduce maternal mortality by three-quarters	Maternal mortality rate per 100,000 births 2005*	No. of maternal deaths 2005*
Cambodia	off track	82	30,914	65	off track	540	2,300
Cook Islands	off track	19	-	16	-	-	-
Fiji	off track	18	324	16	on track	210	41
Indonesia	on track	34	150,518	26	off track	420	19,000
Kiribati	off track	64	-	47	-	-	-
Laos	on track	75	11,700	59	off track	660	1,300
Marshall Islands	off track	56	-	50	-	-	-
Micronesia	off track	41	123	33	-	-	-
Myanmar	off track	104	93,288	74	off track	380	3,700
Nauru	off track	30	-	25	-	-	-
Niue	-	-	-	-	-	-	-
Palau	off track	11	-	10	-	-	-
PNG	off track	73	13,943	54	off track	470	820
Philippines	off track	32	73,440	24	on track	230	4,600
Samoa	off track	28	140	23	-	-	-
Solomon Islands	off track	73	1,095	55	on track	220	34
Timor-Leste	on track	55	2,530	47	off track	380	190
Tokelau	-	-	-	-	-	-	-
Tonga	off track	24	72	20	-	-	-
Tuvalu	off track	38	-	31	-	-	-
Vanuatu	off track	36	216	30	-	-	-
Viet Nam	on track	17	28,118	15	on track	150	2,500
Bangladesh	on track	69	276,897	52	off track	570	21,000
Bhutan	on track	70	840	63	off track	440	280
India	off track	76	2,066,820	57	off track	450	117,000
Maldives	on track	30	210	26	on track	120	12
Nepal	on track	59	46,669	46	off track	830	6,500
Pakistan	off track	97	422,726	78	off track	320	15,000
Sri Lanka	on track	13	3,835	11	on track	58	190
Total			3,224,500				194,500

Source: * UNICEF Childinfo # *State of the World's Children 2008* – information not available

EVIDENCE FOR ACTION

Pregnancy and the first years of life are critical periods for human health. Each year over 500,000 women around the world die due to complications related to pregnancy and childbirth and around ten million children under the age of five die – two million in the first day and another two million in the remainder of the first month of life.⁴

Effective, affordable and practical interventions to improve maternal, neonatal and child health (MNCH) exist, and have markedly reduced mortality where implemented on a large scale. Research indicates that low-income countries could substantially reduce the number of maternal and child deaths by implementing a limited number of cost effective interventions at specific points in time.

Maternal and child health are closely linked and the results are greatest when interventions are combined as *packages* that address the period before and during pregnancy, through birth and the neonatal stage, and then through early childhood (up to five years of age). The most effective approaches provide a *continuum of care* throughout this whole period.

The Continuum of Care applies to this period:

Pre-pregnancy → Pregnancy → Birth → Postnatal → Childhood

Coverage of effective health interventions varies greatly within and between countries and across the continuum. It is highest for interventions that can be scheduled (eg antenatal care and immunisation), but lower for interventions dependent on 24-hour service availability (such as skilled attendance at birth and care for sick newborns or children) and for behavioural and social change.

To develop and sustain effective approaches, health ministries need to prioritise the MNCH continuum of care, develop systematic approaches to planning and monitoring, train and retain sufficient health staff to provide effective services at the community and district level, reduce inequalities and actively engage communities in programs.

Available evidence indicates that universal provision of this basic continuum of care in developing countries would reduce maternal deaths by at least 74% and child deaths by at least 60%.

Maternal Health

The lifetime risk of maternal death is one in ten for women in the poorest countries, versus one in approx 20,000 in northern Europe.⁵

Maternal deaths are clustered around the intrapartum (labour, delivery and the immediate postpartum); the most common direct cause globally is obstetric haemorrhage.⁶ Major causes in Asia are: obstetric haemorrhage (30.8%); anaemia (12.8%); sepsis/infection (11.5%); obstructed labour (9.4%); hypertensive disorders (9.1%); unsafe abortions (5.7%).⁷ The risk of maternal death is affected by many factors: the frequency and spacing of births, nutrition level, stature, appropriate midwife support, and access to emergency treatment if things go wrong during the birth or soon after.

Underlying causes such as HIV and AIDS, malaria, tuberculosis and anaemia contribute to mortality risks, but evidence of their specific impacts is often limited.⁸ It is known that short maternal stature increases by 60% the need for operative delivery, which if unavailable threatens maternal survival.⁹ Therefore there is benefit in interventions that address the underlying causes of maternal deaths, such as nutritional supplementation, antiretrovirals for HIV, contraception to prevent unwanted births and intermittent preventive treatment for malaria.¹⁰ Although the definition of maternal death excludes accidents, suicide and violence, these are often linked to pregnancy. For example, in India domestic violence has been the second largest cause of deaths in pregnancy.¹¹

Whether women die from bleeding and other risks depends mainly on their gaining access to skilled and timely care, often within hours.¹² Three critical delays need to be addressed:

- recognition by women and families that care should be sought;
- accessing appropriate emergency obstetric care facilities;
- receiving effective interventions from facilities.¹³

To avert maternal deaths, the 'continuum of care' must begin before women become mothers, i.e., when they are girls or adolescents, and extend through pregnancy and birth, and into the early post birth period. Most interventions can be effectively applied at the community level by skilled community health workers but some obstetric complications require care at district level where there are better facilities and more trained staff. Therefore, it is essential that timely access to obstetric care facilities is available and not prevented by cost, lack of transport or failure to recognise the need.

The most effective and feasible model to avert maternal deaths recommended by The Lancet Maternal Survival Series steering group is a health centre-based intrapartum care strategy, also known as 'basic essential obstetric care'.¹⁴ In this model, women would routinely choose to deliver in the health centre¹⁵ with midwives as primary providers. Primary prevention of problems, where possible, should occur, but the model also includes early detection and management of complications. All basic emergency obstetric functions would be available at the health centre, such as antibiotics and uterine contracting drugs for use by midwives.¹⁶

The exceptions are blood transfusions and surgical delivery, which would require transfer to higher-level facilities.¹⁷ Success requires training of sufficient midwives, as well as removal of cost barriers to the patient.¹⁸ No randomised control trials have been conducted to determine the proportion of deaths averted, but the model has been devised using robust evidence of effectiveness in relation to individual components of the package, and their use in tandem.¹⁹

Equity is an important determinant of maternal survival, with costs for emergency care sometimes pushing poor households into destitution or preventing their access to critical health services. The evidence indicates that user fees have 'done great damage to the use and quality of maternity-care services, particularly for the poorest'.²⁰

The Countdown to 2015 group identifies the critical evidence-based components to an effective continuum of care for mothers – these are summarised in Table 2.

While there are estimates of the reduction in maternal deaths for almost all of these interventions there has not been a comprehensive assessment of the combined effect of the total continuum package. Wagstaff and Claeson²¹ estimated that maternal deaths could be reduced by 74%. This seems a realistic, conservative estimate given that almost all causes of maternal death are preventable or treatable.²² It is also supported by large-scale experience – for example the maternal mortality rate in Sri Lanka is 87% less than that in India.²³

A 74% reduction in maternal mortality globally would prevent around 370,000 of the 500,000 maternal deaths each year.

Table 2 Evidence based package of care required to reduce maternal mortality²⁴

Evidence based package of care	Details
Sexual and reproductive health services including family planning	<ul style="list-style-type: none"> Providing the ability to space births and also to help prevent sexually transmitted diseases such as HIV. Up to 35% of maternal deaths could be averted through better access to family planning.^{25 26} Providing adolescents with information and education about sexuality and reproduction has been shown to increase the age of sexual debut and delay the age of the first pregnancy.²⁷
Care for adolescent girls²⁸	Nutritional education and iron-folate supplements to girls aged 10-18 years in countries with high prevalence of anaemia ensures that women enter their reproductive years in good health and are likely to protect them against maternal mortality and low birth weight babies. ²⁹
Antenatal care	<ul style="list-style-type: none"> At least four visits during the pregnancy. Iron supplements – can prevent up to 23% of maternal deaths if malaria also prevented³⁰ Vitamin A supplements – critical to handling infection.³¹ Folate supplements.³² Other nutrition support including the fortification of staples - at least 20% of maternal deaths are linked to poor nutrition.³³ Breastfeeding and family planning counselling. Maternal tetanus immunisation. Preventative malaria treatment and bed nets. Birth planning and preparation. Antiretroviral drugs to prevent HIV transmission from mother to child (PMTCT).
Skilled birth attendants (doctors, midwives and nurses)	<ul style="list-style-type: none"> Early identification of complications. Clean and safe delivery practices. Birth in facility. Field responses to infections and bleeding – infection may be involved in up to 75% of maternal deaths.³⁴
Timely access to emergency obstetrics services	<p>Manage complications during labour, birth and after birth using emergency obstetric care (EMOC) principles:</p> <ul style="list-style-type: none"> Correct diagnosis of clinical needs by birth attendant. Adequately resourced district facilities and staff trained in EMOC, including adequate blood transfusion services. Effective, timely transport from home to facility and from facility to higher level care.
Postnatal and newborn care	<p>At least two postnatal visits by health staff:</p> <ul style="list-style-type: none"> First home visit within three days of home birth Second within six weeks at the clinic. <p>Main threats: bleeding, sepsis, and anaemia.</p>

Neonatal Health

Neonatal deaths (in the first four weeks of life) make up around four million or 40% of all under-five deaths. Half of these deaths occur in the first day of life, and three quarters in the first week. Neonatal mortality has risen as a proportion of child deaths since 1980 due mainly to greater success in treating the causes of post-neonatal child death.

Globally, the vast majority of deaths occur at home in low-income settings with inadequate health systems and poor care-seeking.³⁵ Substantial further reductions in child mortality will depend on improved neonatal survival. This is a particular challenge given that late neonatal and post-neonatal deaths can be reduced by public health interventions, whereas individualised clinical care is generally critical to reducing both maternal and early neonatal mortality.³⁶

Neonatal deaths are less likely to be recorded when they occur in the first hours or days of life. Data on causation are inadequate; however, Lawn et al³⁷ have used a variety of data sources to estimate the main direct causes of neonatal deaths in 2000: pre-term birth (28%), sepsis/pneumonia (26%), asphyxia complications (23%), tetanus (7%), diarrhoea (3%), other (including congenital abnormalities) (13%).

Important underlying causes of neonatal death include:

- low birthweight (<2500 gm);
- suboptimal maternal health (through the lifecycle);
- intrapartum complications (especially obstructed labour and malpresentation);
- death of the mother;
- sex-selective abortion;
- poverty (by increasing risk factors or reducing access to care);
- low health care coverage (especially home birth without skilled attendance and delayed or non-referral of sick newborns);
- civil unrest.

Darmstadt et al³⁸ assessed cost-effectiveness of packaging 16 feasible, affordable, proven interventions, specifically where home births are common and access is poor. Clear benefits were found in combined packages with a common service delivery mode across the continuum of care, rather than single interventions delivered vertically.

While antenatal interventions (such as tetanus immunization of the mother) can reduce neonatal deaths, Darmstadt et al found that at 90% coverage, both intrapartum and postnatal packages achieve two-three times greater effects on neonatal mortality compared to antenatal care.

If all packages in Table 3 were implemented at 99% coverage, an estimated 35-66% (with a midpoint of 54%) of deaths would be prevented; hence, large reductions are possible without a fully developed health system.³⁹ Greater reductions (estimated at 41-72%, with a midpoint of 59%) could be achieved by supplementing the packages with these additional/situational interventions:

- folic acid supplementation (preconception);
- malaria-intermittent treatment (antenatal);
- skilled maternal and immediate neonatal care (intrapartum);
- antenatal corticosteroids for preterm labour (intrapartum);
- antibiotics for preterm premature rupture of membranes (intrapartum).

This estimate of a 59% reduction in deaths is reinforced by Jones et al's earlier estimate using a different methodology of a likely 55% reduction.⁴⁰

It is noteworthy that Darmstadt et al estimate that significant reductions in neonatal mortality (10-50%) can be achieved through improved family and community practices alone, such as: community engagement, clean home delivery, hygienic cord care, thermal care (sometimes called kangaroo care because the child is bound to the mothers chest with skin to skin contact), breastfeeding promotion, promotion of clean delivery and referral for complications.

In summary, based on Darmstadt's midpoint estimate, universal implementation of all of the evidence based care packages would result in the prevention of around 2.4 million of the four million neonatal deaths each year.

Table 3 Evidence based package of care required to reduce neonatal mortality

Evidence based package of care	Estimated % neonatal mortality reduction due to this package*
Antenatal care: outreach visits; physical exam; screen for anaemia; tetanus toxoid; detection and treatment of syphilis and pre-eclampsia; counselling on birth plan; breastfeeding; and referral for complications.	10-20
Skilled maternal and immediate neonatal care: skilled attendant at birth; labour surveillance; encouragement of supportive companion; assistance to birth (including vacuum extraction); early detection, clinical management and referral of maternal or foetal complications (emergency obstetric care at first level); and resuscitation of the newborn baby.	10-20 5-20
Emergency obstetric care: management of complications – obstructed labour; haemorrhage; hypertension; and infection.	10-15
Extra postnatal community based care for low birth weight infants: extra home visits; support for breastfeeding; thermal and cord care; and care-seeking for illness.	20-40
Community based case management for pneumonia: diagnosis and oral antibiotics.	10-35
Emergency neonatal care: facility-based clinical care of serious illness (infections; asphyxia; prematurity; jaundice).	15-50
Family and community care practices: community support and engagement; clean home delivery; hygienic cord care; thermal care; breastfeeding promotion; promotion of clean delivery; and referral for complications.	10-50

* The range of effects is wide partly because the results come from studies in a range of environments



Anoy and his mother receiving a health check up in Pakkading Maternal and Child Health Project, Laos

Child health

Around six million children die each year after the first month of life up to the age of five. To date, post neonatal child health interventions in developing countries have been more successful than maternal or neonatal interventions.

Most deaths are attributed to just a few types of illness. Jones et al reported that the major causes of post neonatal child deaths in the 42 countries with 90% of child deaths were: diarrhoea (33%), pneumonia (32%), malaria (14%), HIV and AIDS (5%), measles (2%).⁴¹ However it should be noted that child mortality is often closely related to serious illnesses and underlying risk factors such as HIV, measles and poor nutrition, which can be a precursor for pneumonia and other infections precipitated by decreased immune responses.⁴²

Jones et al identified 23 evidence-supported interventions applicable to child health and estimated the likely reduction in mortality through their universal application. These reductions are summarised in Table 4. It should be noted that the overall estimate of a 67% reduction in post-neonatal child deaths is conservative as it excludes strategies such as improving maternal nutrition and birth spacing, and includes only those strategies available in the most resource restricted settings.

Table 4 Evidence based interventions required to reduce post-neonatal child mortality

Evidence based response	Estimated % reduction in cause specific post-neonatal child mortality ⁴³
Diarrhoea – exclusive breastfeeding and effective complementary feeding, oral rehydration therapy, zinc, vitamin A, clean water and hand washing, antibiotics.	88
Pneumonia – exclusive breastfeeding and effective complementary feeding, Hib vaccine antibiotic treatment, vitamin A and zinc.	65
Malaria – insecticide treated bed nets, local residual spraying, antimalarial drugs	91
HIV and AIDS – nevirapine and replacement feeding	48
Measles – vaccination	100
Other	-
All 23 interventions - overall effect	67 ⁴⁴

Jones et al point out that two simple interventions – exclusive breastfeeding for the first six months and oral rehydration therapy – could each prevent over 13% of total child deaths and another six interventions could each prevent at least 5% of total child deaths.⁴⁵

It is disturbing to learn that the Countdown Coverage Writing Group (2008) found very low coverage for some of the most effective child survival interventions. The median rate of exclusive breastfeeding was just 28%, case management of pneumonia was around one-third, but measles immunisation was about 80%. Many opportunities were lost to provide care as combined packages and thus increase coverage. The Integrated Management of Childhood Illness approach (IMCI) received less than one percent of all investment in maternal, neonatal and child health. Data gaps were particularly acute for childhood treatment of pneumonia.⁴⁶

Undernutrition is also a critical issue and alone causes an estimated 35% of child deaths. Experts recommend exclusive breastfeeding for the first six months of life and continued breastfeeding through at least the second year. It is estimated that non-exclusive breastfeeding for the first six months causes approximately 12% of child deaths. In Asia, only about 55% of infants are exclusively breastfed for up to two months, dropping to about 30% for two-five months. Vitamin A deficiency is linked to around 6.5% of deaths in children under five years, and zinc deficiency to around 4.4% of deaths.⁴⁷

The role of nutrition in the health and survival of mothers and children cannot be overstated. There is now sufficient evidence to recommend 24 nutrition interventions for general or situational implementation. For example, iron, folate and other micronutrients in pregnancy increase maternal haemoglobin and reduce risk of low birthweight infants. Vitamin A supplementation during pregnancy has been found to reduce all-cause mortality in six-59 months children by 24%.⁴⁸

Interventions known to be effective are often not identified in national plans, or implemented only in a few districts.⁴⁹ Despite its affordability and impact, vitamin A coverage is low in many countries, e.g., just 1% in Papua New Guinea until very recently⁵⁰ and only a minority globally practice exclusive breastfeeding.⁵¹ Unfortunately, interventions that have *not* shown nutritional benefit continue to be widely implemented. These include growth monitoring (without effective counselling and referrals), preschool feeding of children over 24 months of age, and school feeding of children aged over five years.⁵²

In summary, the evidence indicates that at least four million of the six million post-neonatal child deaths could be prevented each year through universal coverage of well-proven and cost effective interventions.

Implementation of programs

The evidence is clear that an effective continuum of care using existing low cost interventions will prevent a majority of all the current maternal and child deaths. However, these proven and cost effective interventions are often not implemented or are implemented with insufficient attention to the local situation. For example, the provision of well equipped district comprehensive emergency obstetric units will not make much difference if mothers do not have effective transport to these services or if there are financial or other impediments to their attendance.

Therefore the development of effective health services on the ground requires not just effective clinical strategies but approaches which also take account of the local situation and which local people accept. This cannot be achieved without the active engagement of civil society.

The case studies in this report show the wide range of interventions required and also the sort of work with communities that is required to build acceptability, as well as demand for and use of services and practices. Often this requires challenging existing disadvantage, such as that suffered by the poor who often have less access to services and knowledge, and women who may enter pregnancy in sub-optimal health as a result of gender-based disadvantage.⁵³

In order to effectively implement the continuum of care, a basic foundation of effective health systems at the community and district level to provide health information and services is needed. This requires effective management and targeting, sufficient trained staff, adequate infrastructure and supplies, and effective monitoring of need and services.

It also requires countries and donors to increase support for health systems. Countdown to 2015 found significant health system deficiencies in the 68 priority countries they review. For example, 54 countries (80%) did not have the 2.5 health care professionals (doctors, nurses and midwives) per 1,000 population deemed the threshold for adequate coverage of maternal and child health interventions.⁵⁴

Programs which focus on one disease (vertical programs) are also limited in their capacity to address co-morbidities, or to meet multiple needs during the same encounter as is possible with combined programs or packages delivered through an effective basic health service. These opportunity costs are exacerbated by decentralisation of health services, a trend that is common to much of the Asia Pacific region. There needs to be better integration of vertical program funding and the expansion of health systems.

Better information is also critical. The major data gaps on maternal mortality not only make it impossible to track progress on MDG 5, but are symptomatic of widespread weaknesses in routine health information systems. Graham et al have suggested relatively cheap, innovative mechanisms to measure maternal mortality in various settings, but they emphasise the need to invest in strengthening of reporting systems. They conclude: 'Ownership of information is necessary for it to be acted upon: *what you count is what you do.*'⁵⁵



Laotian mother and children, Sayaboury province

CASE STUDIES

The eight case studies that follow are from across the Asia Pacific region. They have been selected for inclusion in this report because they have generated significant improvements in maternal, neonatal and child health and because they demonstrate a wide range of practical, low cost strategies to implement critical evidence-based interventions.

Several of the case studies are stand alone projects implemented by NGOs, however many of the lessons they offer can be applied equally to large-scale strengthening of government health systems.

The following table summarises key features from each of the studies.

Table 5 Case studies – summary of key features

	low cost	prevention	treatment	increasing demand for services	increasing access to services	improving use of existing system	improving effectiveness of existing system
1) Myanmar Nutritional Anaemia Initiative Project	✓	✓		✓			
2) Participatory women's birthing groups Makwanpur District, Nepal	✓	✓	✓	✓	✓	✓	
3) Northeast Cambodia Child Survival Program, Kratie Province	✓	✓	✓	✓		✓	
4) Pragati Child Survival Project, Uttar Pradesh, India	✓	✓		✓		✓	
5) Chiranjeevi Scheme, Gujarat, India	✓	✓	✓		✓	✓	✓
6) Improving neonatal care at Goroka Base Hospital, Papua New Guinea	✓		✓				✓
7) Sayaboury Primary Health Care Project, Sayaboury Province, Lao PDR	✓	✓	✓			✓	✓
8) Rebuilding hospital services for children in the Solomon Islands	✓		✓				✓

1) Myanmar Nutritional Anaemia Initiative Project 2004-2005

Target group

Children 6-36 months, girls 10-14, women 15-49.

Problem

Globally, undernutrition and its effects, which includes iron deficiency anaemia, is directly implicated in the deaths and disability of millions of women and children. Iron deficiency anaemia is a serious problem in Asia, where it is the major contributor to an estimated 23% of maternal mortality⁵⁶, and is associated with preterm delivery and low birth weight, impaired mental development and decreased productivity.

The causes of anaemia are multiple and complex and include dietary factors such as iron and other micronutrient deficiencies, malaria, intestinal parasites, HIV, genetic factors, geography, sex, age and stage of life. In resource poor settings where malaria and parasites are endemic, and knowledge and customs reduce access to iron rich foods which would help prevent anaemia, it has a significant impact on health and mortality.

In Myanmar previous health surveys demonstrated that the prevalence of anaemia was high among women and children. Recent studies estimate that about half the women and one in every three or four children are anaemic.⁵⁷ However, it is largely a hidden problem as symptoms are often not obvious. At the time of this project the Myanmar Department of Health's anaemia control program only targeted pregnant women, however many women do not utilise antenatal care until late in the pregnancy when provision of iron supplements may have limited effectiveness in improving haemoglobin levels before birth. Pregnant women who are anaemic at the time of birth are much more likely to die from a post partum haemorrhage than women who are not anaemic.

Because iron supplementation requires daily or weekly administration, anaemia is much more difficult to cure than, for example, Vitamin A deficiency, which requires just one dose each six months. For this reason iron fortification of common foods can be a useful strategy; however while fortification of wheat products is possible, there are technical difficulties in fortifying rice, the food staple in most of Asia.

Approach

This project was a large-scale trial to test the implementation and effectiveness of iron supplementation for children, girls and women in order to develop recommendations for a national program to reduce nutritional anaemia in Myanmar. Treatment and control areas were respectively Kungyangone (population: 105,000) and Khayan (158,000) townships in Yangon Division – areas with similar demographic and health characteristics.

At the beginning of the project samples of the target population were tested for anaemia, underweight, stunting and wasting. A subsample was tested for serum ferritin levels and asked about diet; focus groups of women were asked about knowledge of anaemia and experience of supplements. Overall, around two thirds of women and 85% of young children were anaemic. One third of women and over 40% of the young children were underweight. These figures were higher than those found in other surveys within Myanmar.

The survey found poor general nutritional status of women and children, inadequate understanding of anaemia and its serious consequences among women and health workers, and a perception that iron tablets were only needed in pregnancy. The serum ferritin results indicated that iron deficiency was an important contributor to anaemia in these areas.

Children 6-36 months, girls 10-14 and women 15-49 in the intervention region were given iron supplements during a 12-month period. The treatment approach was influenced by Myanmar-Thai experiences with the complex causation of nutritional anaemia and experience with prevention and control interventions. Emphasis was given to factors likely to influence both the success of distribution of nutritional supplements and compliance with treatment.

The treatment approach included:

- development of key anaemia prevention and control messages;
- social mobilisation activities which included meetings with local stakeholders and decision makers and training sessions for health workers, teachers and volunteers based on the information found in the baseline survey;
- development and distribution of information, education and communication materials on nutritional foods, iron supplements and other health practices, and promotional activities such as calendars for each household, posters, street banners, announcements for start of supplement taking, school and community competitions, cooking demonstrations, cartoons, bags and T-shirts for mobilisers;
- packaging and distribution of nutritional supplements to pregnant and non-pregnant women and children in homes and in adolescent girls in and out of school. Approximately 33,000 women and girls and 6,000 young children received the supplements⁵⁸;
- supplement timetables outlining when to take the iron supplements over the 12 month period;
- de-worming once during the project life - in second week of October 2004;
- monitoring activities such as visiting villages to assess adherence levels.

The control area received none of these interventions and was simply tested at the beginning and end of the study.

Results⁵⁹

A year after the start of the project, anaemia prevalence declined substantially in the treatment areas (from 60.8% to 42.1%). Underweight in women also declined, from 38.0% to 22.5%. There was no significant change in either measure in the control area. For children, the level of anaemia dropped in both areas, but the drop was larger in the treatment group. There was no significant difference in the proportion of underweight children in either area (see table).

Variable	Control		Treatment	
	Before	After	Before	After
Women 18 – 45 yrs (non pregnant)				
Anaemic %	50.1	48.0	60.8	42.1
Underweight %	32.2	31.5	38.0	22.5
Children (6 – 36 months)				
Anaemic %	82.1	69.7	87.5	64.9
Underweight %	43.9	29.9	43.5	30.6

The results also showed that:

- The distribution system for iron supplements was very effective, with almost all individuals receiving supplements on time.
- Diets improved in the target group for iron rich food and iron absorption enhancing foods.
- Women in the intervention areas were significantly more likely to recognise the signs of anaemia, and how to prevent it.

The evaluators reported a big change in people's attitudes. "When we first went to the district, health staff did not think they had a problem and wanted to focus on other problems, and by and large women did not understand what anaemia was. After the survey and advocacy work with administration, health and education, community people knew about anaemia, why it was important and wonderfully were telling us what a big problem anaemia was. At the end of the program men were asking us for the tablets."⁶⁰



Burmese women laughing about how large their appetites are now they are not anaemic

Sustainability

This project demonstrated that simple support processes can establish and maintain high levels of adherence to the nutritional supplementation program and result in a significant drop in anaemia.

Cost

The project was funded by the Myanmar Department of Health and AusAID. The cost of supplements per person was low, but the program was labour intensive.

Main lessons/features of success

Results showed that it was possible to effectively implement a continuing large-scale and reliable iron supplementation scheme and that high levels of adherence can be achieved.

The intervention was based on evidence of: the importance of anaemia in maternal and child health; the effectiveness of iron supplements in reducing anaemia; the importance of consulting with stakeholders and employing a range of educational and promotion tools when trying to implement behavioural change.

The project evaluation found that reasons for this project's success included:

- effective planning and coordination;
- adequate resources, including use of government health and education staff and community-based volunteers;
- stakeholders effectively consulted;
- a well planned communications strategy which included training of health and education staff and volunteers, and the introduction of the appropriate information, education and communication materials at key stages.

This project offers valuable lessons on how to implement an effective nutrition education and supplementation program. It also demonstrates that adherence in taking regular supplements can be achieved if support structures such as regular village home-based monitoring are well planned and coordinated and resources are available to complement the community education and information package.

2) Participatory women's birthing groups Makwanpur District, Nepal 2001-2003

Target group

Women of childbearing age, pregnant women and newborns.

Problem

In Nepal, neonatal deaths account for 44% of all deaths in children under five.⁶¹ Most perinatal and neonatal deaths occur at home⁶², and in the rural and mountainous Makwanpur District of Nepal, 90% of women give birth at home. In 2001, the national maternal mortality ratio was estimated at 539 per 100,000 live births and neonatal mortality was estimated at 39 per 1,000 live births.⁶³ In rural areas only 13% of births were attended by trained health workers.⁶⁴

Approach

Most perinatal and neonatal deaths can be avoided by improving access to antenatal care, care during delivery and care of the newborn.⁶⁵ The Makwanpur project aimed to improve women's knowledge of healthy birth and early childhood care, and to encourage appropriate use of health services through women's birth discussion groups, a mechanism which encourages women to discuss health issues in their community, builds understanding of the causes and relevant solutions and provides a trusting environment for sharing information. The project was modelled on a community-based education approach developed in Bolivia.⁶⁶

The project was implemented by Kathmandu-based Mother and Infant Research Activities (MIRA), with support from DFID, UNICEF, WHO and UNFPA.

To test the effectiveness of the approach a cluster-based randomised control trial was carried out in 24 village development committee (VDC) areas. Twelve VDCs were randomly allocated to control and 12 to intervention. The target population of women (of childbearing age) numbered 14,884 in the intervention areas and 14,047 in control areas.

At the time of the project's initiation, perinatal care was available in the district through primary health centres, health posts, sub-health posts and outreach clinics. As one of the aims of the project was to improve women's demand for and use of health services, action was taken in both control and treatment areas to remedy any weaknesses in services that were identified in the baseline survey.

In each treatment VDC a local female facilitator was recruited who convened local women's group meetings on a monthly basis over ten months. The facilitators received training on perinatal health services following a training session and manual established by the Warmi project in Bolivia. One supervisor provided assistance for every three facilitators through community visits and attending group meetings.

The main focus of women's meetings included:

- discussion of childbirth and childcare behaviours in the community, which allowed facilitators to gain a greater understanding of pregnancy and childbirth, and local beliefs and practices, especially in complicated and uncomplicated pregnancies;
- information using picture card games and other methods that addressed prevention and treatment in maternal and child health;
- development of local strategies to improve maternal and child health (MCH) related responses and behaviours, including community generated funds for maternal and infant care; a stretcher scheme to assist in transporting women in labour; production and distribution of clean delivery kits; home visits by group members to newly expectant mothers; and MCH awareness raising through a locally made film.



A Nepalese woman demonstrating 'kangaroo care'

Results⁶⁷

Overall, 37% of newly pregnant women chose to attend the women's meetings. There was evidence that the effects of the intervention spread to many others who had not attended the meetings.

Treatment areas experienced significantly lower maternal and neonatal maternity rates compared to the control areas, with 30% lower neonatal mortality and 80% lower maternal mortality (see table).

Measure	Control	Intervention
Presumptive miscarriage rate %	2.2	2.3
Neonatal mortality rate per 1,000 live births	36.9	26.2
Maternal mortality ratio per 100,000 live births	341	69
Any antenatal care %	30	55
Any iron or folic acid supplements %	27	49
Any perceived maternal illness from seven months on %	26	21
Taken to health facility in event of illness %	10	24
Institutional deliveries %	2	7
Birth attended by government health provider %	3	9
Birth attended specifically by doctor, nurse or midwife %	2	7
Birth attended by traditional birth attendant (TBA) %	4	7
Attendant washed hands %	33	68
Used a clean home delivery kit %	5	19
Used a boiled blade to cut cord %	26	54
Breastfeeding initiated within one hr %	54	62
Discarded colostrum %	42	29
Visited health facility in event of illness %	22	50

The study indicated that the knowledge gained through the women's discussion groups lead to behavioural change in home care and health seeking behaviour in regard to neonatal and maternal care.

Sustainability

Ninety-five percent of groups remained active at the end of the trial period despite no financial incentive and the opportunity costs incurred by women spending time away from home duties.

Cost

US\$3,442 per newborn life saved – this cost calculation excludes the maternal lives also saved.

Main lessons/features of success

While international evidence strongly supports the value of access to emergency obstetric care to reduce maternal and neonatal deaths⁶⁸, this project indicates that – in the absence of ready access – increased knowledge and support at the community level can also make a significant difference because of their effect on nutrition, clean birthing practices, improved care of neonates and willingness and readiness to use emergency services. Darmstadt et al⁶⁹ argue that family and community care interventions, such as clean home delivery, hygienic cord cutting and breastfeeding promotion can reduce child mortality by 10-50%⁷⁰ depending on the situation.

The project management team believes that with political will and adequate funding, the project could be easily scaled up and replicated in other districts or countries either by government, NGOs or both.

3) Northeast Cambodia Child Survival Program, Kratie Province 2000-2004

Target group

Pregnant women, mothers, neonates and children.

Problem

Cambodia is one of the poorest countries in Southeast Asia, with high maternal and child mortality rates, and is not on track to achieve the child and maternal mortality MDGs.

Approach

The goal of the Northeast Cambodia Child Survival Program (NCCSP) was to reduce morbidity and mortality of children under five years of age in the Chhlong district through promotion of healthier behaviours and encouraging use of existing health services by mothers of young children. The Chhlong Operational District of Kratie Province has 101 villages with 130,000 people; 17,200 under five children and their mothers were the target of the project.⁷¹

Village Health Volunteers (VHVs), which included traditional birth attendants (TBAs), and their supervisors from health centres were trained to be the main promoters of change. The program focussed on breastfeeding promotion, immunisation, nutrition and micronutrition and management of diarrhoeal diseases and was delivered during visits to households and group health education meetings.

Participatory methods used to select VHVs in Chhlong district meant those chosen were already key community leaders, which lent credibility to the behaviour change messages communicated throughout the project. Feedback from the VHVs was also used to improve services.

The Integrated Management of Childhood Illness approach (IMCI) was implemented in the health centres. The project also sought to maximise coordination with other projects in the area, such as the provision of bed nets and reproductive health services.

The project was funded by USAID and implemented by Partners for Development in cooperation with the Cambodian Ministry of Health.

Results

The table below summarises findings in key indicators at baseline and final evaluation. The end-line evaluation found substantial improvements across most indicators.

	Baseline 2001-02	Final evaluation 2004
Child mortality rate ⁷² per 1,000 live births	85	26
Maternal deaths ⁷³	26 (2003)	6 (2004)
Use of antenatal services %	21	57
Births attended by a qualified midwife %	19	25
Mothers who received correct number of tetanus vaccines during last pregnancy %	15	67
Mothers who initiated breastfeeding within one hour of delivery %	2	73
Children exclusively breastfed first six months %	12	78
Mothers who know which foods contain Vitamin A %	9	91
Households using iodised salt %	1	41
Children with diarrhoea in the last two weeks given oral rehydration salts (ORS) %	15	81
Mothers who describe correct management of diarrhoea (fluids, feeding, referral) %	42	97
Children ages 12-23 months fully immunised %	17	79

Sustainability

The participatory approach of the NCCSP design has been repeated in other subsequent programs (most recently, the USAID funded BASICS).

Cost

Total budget was US\$1 million over four years or approximately US\$2/person/year.

Main lessons/features of success

International experts do not recommend the use of VHV and TBAs, as used in NCCSP, to reduce maternal mortality in the absence of comprehensive emergency obstetric care, partly because of difficulties in providing them with sufficient skills and ongoing supervision.⁷⁴ However, in this case VHV and TBAs fostered community mobilisation, which has been shown to positively impact on maternal, neonatal and child health.⁷⁵ As well, Perks et al hypothesised that observed MMR reductions in another project in Laos may have been attributable to regular VHV and TBA training and supervision combined with referral networks to district hospitals able to provide basic emergency obstetric care.⁷⁶

Group education was found to be effective due to its 'peer to peer' component: exchanging experiences, sharing information, feedback and addressing rumours which might affect health beliefs. Group discussions served to exchange success stories and empower mothers to resist pressure from elders to maintain customary sub-optimal practices.

Household visits, although time consuming, were effective for different target groups: mothers with sick children, mothers with handicapped children and situations where specific health messages could cause embarrassment when openly discussed.

The combination of health education and messages on radio and television reinforced those given by the VHV, and served to increase their credibility and status in this role. Nearly all mothers had heard the messages from the VHV and from the radio. In addition, real life, observable examples of healthy mothers and babies motivated young mothers to adapt their practices.

Evaluation of the project showed:

- VHV and TBAs can be highly effective as change agents for early initiation of breastfeeding. Training of VHV and TBAs is an essential element when breastfeeding practices are being addressed.
- Community-based immunisation promotion was highly effective. Even without support of immunisation outreach activities, immunisation coverage increased considerably by motivating mothers, and this approach is likely to be effective for other interventions.
- Increased knowledge of mothers about micro-nutrition. The use of VHV meant that direct observation and monitoring of impact on micro-nutrition was an effective way of monitoring progress.
- The use of VHV's monthly reports based on data collected during household visits and community outreach activities also assisted and supplemented the Health Management Information System (HMIS). As indicated by the Countdown Coverage Writing Group, data gaps in relation to neonatal and child mortality and causation and coverage of proven interventions present real challenges for identifying and targeting programs. The use of VHV to collect such information enabled action to be taken in response to identified need; it also enabled ongoing monitoring of activities.
- In villages where the VHV were supported by health centre staff, community mobilisation was most effective.



Monitoring child health in Cambodia

4) Pragati Child Survival Project, Uttar Pradesh, India 2003-2007

Target group

Pregnant women, recent mothers and children under five.

Problem

With a population of 166 million, the state of Uttar Pradesh (UP) is one of India's most populous. The state also has one of India's highest fertility rates with women on average giving birth to 3.8 children. UP also has some of India's highest rates of maternal and child mortality.

UP has weak family planning and overall maternal and child health (MCH) indicators compared with the Indian average. The three project areas – Ballia, Lalitpur and Moradabad – are located in areas with the weakest indicators in the state.⁷⁷

Approach

The project's goal was to use 'timed counselling' to encourage the use of effective family planning and MCH approaches and services using the 'continuum of care' model. It was designed to ensure that counselling messages were appropriately targeted to pregnant women, recent mothers and children at particular stages to encourage the use of four key interventions: immunisation, family planning, maternal and infant nutrition and vitamin A supplementation.

The Pragati project was funded by USAID and delivered through World Vision India, local NGOs and the Government of India Health Services in Ballia, Lalitpur and Moradabad. The project was based on a smaller child survival project in Ballia district, the Ballia Rural Integrated Child Survival Project (BRICS), delivered by World Vision India with local NGOs. Project beneficiaries included approximately 300,000 children and 700,000 women across the three districts.

Messages were simple, consistent and focused on immediate behaviour change. Project volunteers (who were skilled and knowledgeable providers) delivered the messages/counselling sessions through home visits, offering a private environment suitable for open discussion.

Other strategies used in the project included:

- building capacity and strengthening linkages between three partners: the Integrated Child Development Services Scheme, government health services and NGOs;
- scaling-up early registration of pregnant women and couples eligible for family planning services;
- creation of an enabling environment for *Anganwadi* workers (the village-level workers operating crèches under the Integrated Child Development Services Scheme) to extend their skills and roles.



The Pragati project at work

Community volunteers identified women in early pregnancy, and over seven scheduled visits - three during pregnancy, one visit after childbirth, and three visits during infancy – delivered messages on the themes mentioned above, followed up on previously delivered messages and documented services utilised (such as immunisation) and changes in behaviour.

The community volunteers used formatted registers to identify and track cohorts of women in the same months of pregnancy, and subsequently, birth cohorts of infants and their mothers for up to three years.

Results⁷⁸

Mothers' use of contraception, vitamin A supplementation and timely initiation of semi-solid foods to children improved

during the project period. The project also achieved modest success in increasing coverage of pregnant women with tetanus toxoid and reducing drop out among children between the first and third doses of diphtheria, whooping cough and tetanus vaccines.

There were also improvements in overall child immunisation coverage in two of the three areas. The exception was in Moradabad district, which was explained by increased public resources being invested into the polio program, undermining implementation of the routine immunisation program.

The evaluation was unable to determine whether the low levels of exclusive breastfeeding at the final survey were due to errors in measurement or were an accurate representation. It was suggested to evaluators that high female employment restricted exclusive breastfeeding; however, this did not appear to be supported by the employment data.

All figures are %	Ballia		Lalitpur		Moradabad	
	Baseline	Final	Baseline	Final	Baseline	Final
Proportion of mothers of children aged 0-23 months who do not want another child in the next two years or are not sure using a modern contraceptive method	12	27	9	34	17	27
Proportion of mothers of children 0-23 months who report having discussed family planning with their spouse	47	69	39	84	78	38
Proportion of mothers of children 0-23 months who received two or more tetanus toxoid doses when pregnant with youngest child	79	79	68	91	59	68
Proportion of children aged 0-5 months who were exclusively breastfed in the 24 hours preceding the survey	66	31	23	48	57	28
Proportion of children aged 6-9 months who were given breast milk and semi-solid foods in the 24 hours preceding the survey	38	82	15	66	35	61
Proportion of children aged 12-23 months who are fully immunised	33	53	30	50	33	26
Proportion of children aged 12-23 months who received one dose of vitamin A supplement in the six months preceding the survey	8	89	3	100	2	99

Sustainability

The timed and targeted counselling approach and its tools have been mainstreamed into the nutrition and education strategy of the Integrated Child Development Services (ICDS) for Uttar Pradesh and scaled up to 70 districts, potentially benefiting 106,000 healthcare workers in the public system and 166 million people. This achievement is attributed to the project's logic, clear rationale and straightforward delivery, as well as technical support from the Pragati project team.

Cost

US\$2.5 million over four years or approximately US\$.60 per mother or child per year.

Main lessons/features of success

The Pragati project used a combination of proven effective approaches to achieve improved MCH outcomes. As noted by Darmstadt et al, there is clear and significant potential for child health gains in combining packages with a common mode of service delivery,⁷⁹ particularly when this is attempted through a continuum of care, with modes of outreach, family-based care and family-community care.

Undernutrition is a significant child health problem in India, which is home to nearly half the world's undernourished children. The Pragati project addressed under-nutrition at various stages of the life cycle. Firstly, women were encouraged to consume one extra meal a day during their pregnancy. Although maternal nutrition is not a primary factor in mortality risk, nutritional supplements are effective in addressing the underlying causes of maternal mortality, such as anaemia.⁸⁰ In addition, vitamin A supplementation during pregnancy, as carried out in the Pragati project, was shown in some studies to reduce all-cause mortality in children aged 6-59 months by 24%.⁸¹ Exclusive breastfeeding for the first six months of life and effective complementary feeding practices after this are other effective nutrition interventions encouraged by the Pragati project.⁸²

The scale-up across Uttar Pradesh is based not only on the project's success, but also advocacy by staff and the support of a high level bureaucratic 'champion'. One of the strengths of the Pragati project was its effectiveness in complementing and increasing the effective use of government health services.⁸³

5) Chiranjeevi Scheme, Gujarat, India 2005-2006

Target group

Pregnant women, women during childbirth and newborns.

Problem

South Asia accounts for 35% of all maternal deaths globally⁸⁴ with India accounting for 26% of the total maternal death burden.⁸⁵ As most maternal deaths occur during labour, delivery or the first 24 hours postpartum, and the leading cause of death is haemorrhage, the internationally recommended intervention is one where women routinely choose to deliver in health facilities.⁸⁶ Only 31% of births in rural India and 69% of births in urban India were at health facilities during 2005-06 according to the National Family Health Survey III.

Like the rest of India, Gujarat state has high maternal and infant mortality rates, with most births taking place at home and attended by unskilled individuals. Poor and remote regions have reduced access to health facilities. The maternal mortality rate in the state was 389 per 100,000 live births in 2003. Gujarat also lacks qualified staff in the public sector to provide emergency obstetric care, with high costs associated with accessing such care from the private sector. In 2001, 65% of medical doctor posts in community health centres and 30% in district hospitals were vacant. Among the total registered doctors in the state, three-quarters were working in the private sector.⁸⁷

Approach

The Department of Health and Family Welfare of the Government of Gujarat funded and implemented the Chiranjeevi Scheme in five pilot districts with the objective of increasing institutional deliveries and addressing issues of access by providing financial support to the poorest families. The project targeted women from the poorest families (classified as Below Poverty Line) in five of the most remote districts of the state having the highest maternal mortality. These five districts had a population of 10.5 million of which 43% lived below the poverty line. The scheme allowed eligible families to access private doctors during pregnancy and delivery without the need for cash and covered all direct and indirect costs of accessing facility-based care.

The key features of the project included:

- Arrangement with private providers to improve access of the poor to health facilities in recognition of the shortage of public providers and large number of private providers.
- Vouchers given to families below the poverty line to access health facilities for delivery services free of charge. The package included one pre-delivery visit to the doctor and one free investigative procedure. Vouchers covered direct and indirect costs associated with institutional delivery, such as transport and wage loss for an accompanying person.
- Creation of a network of private providers of maternity services and agreement by the government to reimburse providers at a fixed rate for each delivery.
- Strengthening of management capacity of district staff to administer and supervise the project.
- Identified private providers given an advance and reimbursed regularly at agreed rates. This ensured their participation in the scheme as there were no delays in payment.
- Active community promotion of the scheme to encourage women to use private facilities for delivery.

Results⁸⁸

Institutional deliveries increased from 38% at baseline to 59% during the pilot. Almost 32,000 deliveries were conducted in private facilities during the pilot. During the first ten months of the scheme only six maternal and 13 infant deaths were reported.

Surveys indicate that the scheme was well targeted - around 80% of the deliveries of below poverty line women were covered under the scheme, and 94% of those who benefited from the scheme earned less than US\$1 a day.

Eighty-two percent of beneficiaries indicated that they had been informed about the scheme through community health workers. This suggests that community health workers can be effectively used to build health promoting behaviour and as an effective link with health facilities.

Importantly, the utilisation of private providers in the target districts did not come at the cost of public healthcare use. Data from the Gujarat Health Department for the period of the project shows no decline in the use of government facilities.

Sustainability

The scheme has now been scaled up across the state and is being supported by the national government. The scheme did not create a new structure, it helped to significantly improve access to existing health providers.

Cost

Cost per delivery was US\$40.

Main lessons/features of success

The Lancet Maternal Survival Series steering group recommends a health centre-based package targeting the intrapartum period as the most effective approach to reduce maternal mortality.⁸⁹ International evidence highlights the fact that since the majority of maternal deaths occur during labour, delivery or 24 hours post partum⁹⁰, maternal mortality cannot be addressed without addressing the three critical delays: deciding to seek care, accessing appropriate care and receiving effective interventions.⁹¹ This intervention adopted the recommended strategy, as its approach was to increase access to institutional care during delivery and to address the delays in accessing and receiving care.

This intervention appeared to successfully address the financial barriers to access to institutional care that have been identified in the literature, as eligible women under the scheme did not have to pay to receive the care and had also been paid in advance for transportation and other opportunity costs of delivering in a health facility. International evidence has found that time spent looking for money can delay the decision to seek care and reduce timely access.⁹²

This scheme is also consistent with international evidence that equity is an important determinant of maternal survival; costs for emergency care often push households into destitution and prevent access to care.⁹³ Poorest households face the highest barriers to access care and the highest mortality as a result. This project is an important example of effective use of existing systems to improve access to health services for the poor.



Three generations of Indian women

6) Improving neonatal care at Goroka Base Hospital, Papua New Guinea 1997-2000

Target group

Newborns

Problem

The under-five child mortality rate in Papua New Guinea (PNG) was 100 per 1,000 live births in 1996.⁹⁴ As found elsewhere, neonatal mortality made up a large component of these deaths - both in the community and in hospital. It has been estimated that in the Eastern Highlands Province, where the Goroka Hospital is based, 36% of infant deaths occurred in the neonatal period, with 21% occurring within the first week.⁹⁵ Between 1995 and 1997, mortality among neonates admitted to the special care nursery at the provincial public Goroka Hospital was 18%, with two-thirds of very low birthweight babies (1–1.5 kg) dying.

There was no established protocol for treatment of low birthweight babies and the clinical practices for care and treatment were poor, with no monitoring for apnoea (breathing interruptions) and no trained nurses in neonatal care.

Approach

To address this high rate of neonatal mortality, a protocol on Minimal Standards for Neonatal Care was developed and introduced at the Goroka Hospital in December 1997. These standards were based on evidence of effective approaches.

The intervention included:

- introduction of a protocol for treatment of low birthweight babies;
- training of nurses in specific neonatal problems;
- increased clinical supervision;
- a weekly mortality audit;
- pulse oximetry and a protocol for oxygen administration.

The project was undertaken by staff of the Goroka Hospital with support from the PNG Department of Health. There was no external funding.



A Papua New Guinean baby comfortable in a bilum

Results⁹⁶

A review was conducted for the 30-month period before the intervention (July 1995-December 1997) and the 30-month period post intervention (January 1998-June 2000) using the admission book used to record admissions and deaths. A parallel prospective audit was also conducted for the period April 1998-March 2000 to check data quality.

This review indicated that neonatal mortality was 41% lower during the intervention period, after adjusting for the higher number of neonates weighing less than 1.5 kg in the pre-intervention period. It is estimated that 82 neonatal deaths were avoided during the post-intervention period.

The highest reduction in mortality was among low birthweight babies (1000g–1499g).

Important factors identified as contributing to this outcome were the introduction of apnoea monitors and the substantial investment in training and supervision of hospital staff.

Sustainability

The gains from this intervention were achieved by small modifications with existing staff and within an existing structure and therefore had the benefits of being sustained as a practice and strengthening the health system beyond the life of the project and funding.

Based on the evaluation, the Paediatrics Society of PNG and the National Department of Health endorsed the Minimal Standards for Neonatal Care in hospitals in PNG to use as a guide across all hospitals in PNG.

Cost

Low cost - US\$445 per life saved.

Main lessons/features of success

This project showed that with a relatively small intervention in clinical care practices substantial results can be achieved in reducing neonatal deaths. This significant impact on neonatal survival was achieved without requiring a major investment in equipment or staffing.

The changes were based on international evidence of effective neonatal interventions and on the use of appropriate strategies and technology within this particular setting.

It is now acknowledged globally, that without improvements in neonatal survival, substantial reductions in child mortality cannot be achieved. This intervention is also consistent with international recommendations that clinical care is critical to reducing early neonatal mortality⁹⁷ and strengthening of clinical services is instrumental in preventing newborn deaths.⁹⁸

One of the positive features of this project was that it was not a vertical program dependent on external funding but was integrated into the existing infrastructure and health system. It is also important to note that it was not a single intervention but a package of interventions. This is consistent with international evidence of greater results when interventions are combined as *packages* rather than as single interventions.⁹⁹

A further benefit of this intervention is the audit of practice that it introduced. Data gaps are substantial in relation to neonatal and child mortality and causation¹⁰⁰ and regular monitoring and reporting are an essential part of good management and, therefore, better child survival.¹⁰¹

7) Sayaboury Primary Health Care Project, Sayaboury Province, Lao PDR 1992 – ongoing

Target group

Improving primary health care (PHC) for all through health system strengthening - with a significant focus on maternal, neonatal and child health.

Problem

In Laos about 86% of women give birth at home and about 40% of children under five are underweight and 40% are stunted. Although breastfeeding is nearly universal, colostrum (the first and highly nutritious milk) is often withheld for cultural reasons and replaced by water, rice or other foods. Few infants are exclusively breastfed to six months, and it is common for children to be given no fruits or vegetables until 2-3 years. The main causes of maternal and child morbidity and mortality are linked closely to undernutrition.¹⁰² Sayaboury Province is remote and mountainous, and its population of about 320,000 includes 33 ethnic minorities. It is one of the least developed provinces in a country with development indicators that are among the lowest in the world. At the project's outset, Sayaboury had poorly trained health staff, low use of services, virtually no health facilities outside of provincial and district hospitals, little access to clean water or sanitation, difficult communications and transportation and widespread food insecurity.¹⁰³

Approach

The Sayaboury PHC project has been managed by the Provincial Department of Health and Save the Children Australia with most of its funding from AusAID. This long-term project was implemented through consecutive three-year phases that gradually expanded content and geographic reach throughout the province. It is currently fully funded by Save the Children, Australia.

Main phases of the project:

I (1991–94) - Building provincial management and training skills, training district teams and dispensary staff, village health volunteers (VHVs) and traditional birth attendants (TBAs), and facility-construction (fixed and mobile MCH clinics) and equipment.

II (1995–97) - Expansion into new districts and integration of primary healthcare at all levels, including: quality referral systems; development of revolving drug fund; health information systems; monitoring framework; supervision system; work planning and professional development.

III (1998–2001) - Expansion to remote districts, construction of dispensaries (partly with co-funding from another donor), increasing access to first-line services; baseline survey with 600 households at outset and end of phase.

IV (2001–2004) - Province-wide adoption of Integrated Management of Childhood Illnesses approach (IMCI) with training for all districts, study tours, clinical placements in capital and Thailand, postgraduate training and evaluation.

V (2006–present) - Consolidating achievements to date and strengthening local management of the activities to ensure benefits are sustained beyond the life of the project. This includes a replication of the project in Luang Prabang Province.

Other special features include strong management tools and strategies to enhance sustainability. Dispensary staff make quarterly visits to each village to supervise TBAs and VHVs and collect record forms. For zones without dispensaries, district mobile teams make six-monthly visits to each village to screen educational videos, provide clinical services, antenatal care, growth monitoring and family planning, and offer on-the-job training and supervision to TBAs and VHVs. Most drugs are provided at just over cost through local revolving drug funds.

Results¹⁰⁴

The project is credited with significant improvements in one of Laos' poorest provinces. These gains exceeded reduction rate targets set by the MDGs.

Results in 2003 - 12 years after commencement	Sayaboury	Laos
Maternal mortality per 100,000 live births	110	530
Child mortality per 1,000 births	29	107
Crude birth rate per 1,000	23	34
Life expectancy (yrs)	63	55



Pregnancy monitoring in Sayaboury province

Ninety-four percent of the population in Sayaboury is now within five kilometres of a fixed health facility, and there has been complete district-level training in IMCI down to dispensary level. Purpose-built MCH centres at district hospitals have led to a large increase in births attended by a trained health worker. The placement of female health staff at dispensaries has improved MCH service utilisation rates. Retention of health staff has increased. Trained VHVs and TBAs have been placed in virtually every village, and supported with regular supervision and refresher training. This has led to a large decrease in cases of neonatal tetanus and improved health behaviours, especially infant feeding.

The evaluation found improvements in health indicators were consistent with observed improvements in program coverage and health-seeking behaviours. For example:

- there is now a culture of 'continuous learning' for all levels of the health system, using current international 'best practice' approaches to training;
- between 1996 and 2003 health facility utilisation tripled;
- use of modern contraceptives was more than double the national average;
- impregnated bed nets were used in 73% of households in 2003, vs 24% nationally;
- there have been significant increases in correct knowledge about use and mixing of oral rehydration salts;
- median age of giving complementary foods rose from 2.8 months in 1999 to 4.8 months in 2004;
- rates of exclusive breastfeeding at four months increased from 28% in 1999 to 66% in 2004.

Sustainability

At the core of the project's sustainability is its emphasis on strengthening the existing government health system, building staff skills and morale and basing changes on proven approaches. It is also likely that the commitment, long-term involvement and cooperative approach of the implementing staff, both local and expatriate, have been critical.

Save the Children has also introduced other development projects in Sayaboury Province, including: teacher training, water and sanitation, agriculture, micro-finance and HIV and AIDS treatment.¹⁰⁵ The potential contribution of projects addressing some of the underlying influences on MCH have not been assessed; however, it is likely that these activities have contributed to these health improvements.

With robust evidence of effectiveness, this PHC model has been expanded into neighbouring Luang Prabang Province, with rapid results in improving utilisation rates and decreasing the number of malnourished children. As well, a manual on the project has been developed to enable its replication.

Cost

The project has been highly cost effective, with an overall cost of about US\$4 million, or about \$1/person/year over 12 years. Clinical services are largely supported through revenues from revolving drug funds. A 2003 study found recurrent costs of maintaining the program at current levels would be US\$41,000, or less than 13 cents/person/year.¹⁰⁶

Main lessons/features of success

The external evaluation of Phase IV called the project 'probably the most effective provincial health program in the Lao PDR'.¹⁰⁷

Toole's 2004 evaluation explicitly cites the evidence base in explaining both the content and impact of the project. For example, it has adopted the internationally renowned Bamako model for the revolving drug fund, implemented IMCI, provided supervision and refresher training of health workers (which improves retention¹⁰⁸), and provided community education about oral rehydration therapy, six-month exclusive breastfeeding and appropriate complementary feeding.¹⁰⁹ The development of information systems and quality indicators, as well as household baseline surveys, also reflect international good practice that enables assessment of progress and gaps.¹¹⁰ The project was also seen to benefit from long-term stability of senior staff, both local and expatriate.

The project included individual programs that, according to the most recent international reviews, have not been shown to be effective as typically implemented: growth monitoring for child survival¹¹¹, and using VHVs and TBAs to reduce MMR in the absence of comprehensive emergency obstetric care.¹¹² However, these programs may have contributed to improved health because they were not implemented vertically; each was a component of a combined package, an approach strongly recommended by experts because of proven synergistic impacts on MCH. In this project, growth monitoring was accompanied by nutrition education by VHVs, and served as an opportunity to bring mothers and children together for sharing and learning, and for other advice to be provided by health workers. Perks et al¹¹³ speculate that observed MMR reductions may be attributable to regular VHV and TBA training and supervision, along with referral networks to district hospitals able to provide basic emergency obstetric care and uptake of contraception at double the national rates.

Laos, like many other countries, has devolved budget and planning responsibility to district level, which created a receptive environment. The mainly horizontal focus of the project has worked extremely well to strengthen district-level programs. In their case study report Perks et al argue that donors should align programs with national priorities to strengthen their implementation and that other Lao provinces would benefit if the central government adopts the district-level management tools used in this project.¹¹⁴ At national level, Save the Children Australia is actively advocating for successes and lessons learned from the PHC project to be taken up in policy through its membership in the Sector Working Group and national task forces charged with developing the MCH/EPI (Expanded Program of Immunisation) Core Package and National Strategy.¹¹⁵

8) Rebuilding hospital services for children in the Solomon Islands 2003 - current

Target group

Community and hospital-based children.

Problem

In 2003, the Solomon Islands emerged from five years of civil conflict with severe social and economic deterioration. Much of the publicly owned health infrastructure, including primary and referral level health facilities, was disrupted or severely affected. Local paediatricians in the Solomons were concerned about the quality of health services for children.

Approach

In 2002, paediatricians from the Solomon Islands expressed interest in a plan to rebuild and improve the quality of child health services, particularly in small hospitals in remote provinces. The paediatricians initiated discussion with officials from the World Health Organization (WHO), Solomon Islands Ministry of Health (MoH) and the Centre for International Child Health (CICH) at the University of Melbourne to undertake an assessment and review as a foundation for a Solomon Islands Child Health Plan.¹¹⁶

The steps in developing the plan included:

- review of recently published Solomon Islands health data;
- systematic assessment of paediatric care and child health services in small provincial and district hospitals using a modified WHO assessment tool¹¹⁷ - the assessment included a pre-visit questionnaire; on-site assessment of representative hospitals; observation of clinical care for children in the hospitals and outpatient clinics and a comprehensive clinical audit;
- systematic observations of four provincial hospitals and the National Referral Hospital (NRH) in Honiara;
- investigating the perspectives of hospital administrators and clinical staff regarding major child health problems in their provinces and limitation affecting the hospital's capacity for providing quality care.

This process revealed key limitations in the Solomon Islands' capacity to respond to child health needs, including clinical care, human resources, health financing, referral systems, and staff training. It also identified specific constraints such as the very small number of paediatricians, inadequate numbers of doctors and child health nurses, and incomplete case fatality data in most hospitals.

The main causes of hospital admissions identified for children (aged 1-60 months) were malaria, acute respiratory infections, skin infections, diarrhoeal disease, tuberculosis, trauma and bone/joint infections.

The assessment and planning project was funded by the Solomons Ministry of Health and Medical Services, WHO and CICH.

Results¹¹⁸

The assessment and its findings presented to the MoH in 2003 documented the need for a range of initiatives that were consequently initiated by the MoH, including:

- revision and reintroduction of standard treatment and hospital guidelines;
- clinical improvements through the introduction of courses focusing on areas of need;
- introduction of a national system to report on child mortality.

Training courses included the WHO Hospital Care for Children guidelines. These guidelines, which support an extension of IMCI to district level hospitals, enable a more systematic approach to clinical diagnosis, care and treatment for common and serious childhood illnesses for use by healthcare staff (including those of a non-medical background) to improve clinical practice, especially in remote settings.

In 2004, the MOH established a child mortality reporting system that allowed for the collation of systematic data to enable assessment of child mortality data against the Child Health Plan. The system was piloted in Honiara then extended to all provinces in 2006.

In 2005, the Solomon Islands paediatricians started a provincial hospital visits program through which paediatricians worked with nurses in rural provinces to systematically improve their skills through additional training and "working side by side". This training also includes a distance education component on CD for rural nurses.

A main outcome of the assessment was the development and establishment of the Solomon Islands Child Health Plan (2005 – 2010), which included an 'essential package' of interventions established by the UNICEF Regional Child Health Strategy. The plan establishes the framework that brought together all relevant national child health activities and provides a platform for monitoring and measurement against evidence for effectiveness. It also included the establishment of a Child Health Secretariat within MOH responsible for oversight of the plan's activities.

In 2007, the Solomon Islands' first national Child Health Summit met to discuss the Child Health Plan and mechanisms for scaling up across all provinces. At the summit, healthcare staff from national and provincial levels discussed technical components, reviewed availability of technical resources, developed a strategy for resource allocation and training, and established a system for monitoring and data collection.

Sustainability

The assessment project is a good example of how a local initiative, adequately funded and technically advised, can lead to the production of rigorous and evidence-based approaches to data collection, that in turn provide a strong basis for future programmatic interventions.



Neonatal health training in the Solomon Islands

Cost

Dollar figures are not available however this is a low cost investment which significantly improves the effectiveness of existing resources.

Main lessons/features of success

This project exemplifies the potential for major system improvement arising from concern and action by a small number of individuals. It is credited with greatly increasing the level of cooperation of a number of key players.

The assessment also demonstrates what can be achieved in child health programming relevant for a post-conflict and low-income island nation through use of appropriate data gathering methods. It also provides an example of the range of outputs that follow a well-informed assessment process and the value such an assessment contributes to the identification, development and delivery of child health initiatives.

The activities also provide a successful example of the potential synergies and benefits from collaboration across institutions. The collaboration in this case involved provincial healthcare workers, local paediatricians, MoH bureaucrats, WHO staff and technical experts from international universities, who pooled their collective resources and skills to develop a range of initiatives that focused on local needs but were grounded in evidence.

Notes

- ¹ World Bank 2008 *Global Monitoring Report* pp 19-22.
- ² We consider a country to be on track for Goal 4 if its recent annual rate of change (in the period 2000 to 2006) is equal to or greater (+/- 0.2 percentage points) than the annual rate of change required to meet the Goal in the remaining years to 2015. For Goal 5, as there is no comparable and reliable maternal mortality data over time, we have defined a country as off track if its MMR is very high or high using the Countdown to 2015 definition or if the lack of an effective monitoring system means that the MMR is unknown. Data comes from the UN Millennium Indicators database.
- ³ Countries that have already achieved Goal 4 include Thailand, Turkey, Peru and Vietnam, Goal 5 include Turkey, China, Sri Lanka and Mexico.
- ⁴ UNICEF 2008 *State of the World's Children 2008* p4.
- ⁵ WHO et al 2007 *Maternal Mortality in 2005*.
- ⁶ Ronsmans C and Graham W 2006 "Maternal mortality: who, when, where, and why" *Lancet* (368): 1189-200.
- ⁷ Khan K et al 2006 WHO analysis of causes of maternal death: a systematic review *Lancet* (367): 1066-1074.
- ⁸ Ronsmans C and Graham W 2006 "Maternal mortality: who, when, where, and why" *Lancet* (368): 1189-200.
- ⁹ Black et al 2008 "Maternal and child undernutrition: global and regional exposures and health consequences" *Lancet* (371): 243-60.
- ¹⁰ Bhutta Z et al 2008 "What works? Interventions for maternal and child undernutrition and survival" *Lancet* (371): 417-40 and Countdown Coverage Writing Group 2008 "Countdown to 2015 for maternal, newborn, and child survival: the 2008 report on tracking intervention coverage" *Lancet* (371): 1247-58.
- ¹¹ Ronsmans C and Graham W 2006 "Maternal mortality: who, when, where, and why" *Lancet* (368): 1189-200.
- ¹² Ibid.
- ¹³ McCarthy J and Maine D 1992 "A framework for analysing the determinants of maternal mortality" *Studies in Family Planning* (23) no.1: 23 - 33.
- ¹⁴ Campbell O and Graham W 2006 "Strategies for reducing maternal mortality: getting on with what works" *Lancet* (368): 1284-99.
- ¹⁵ Campbell and Graham point out that births attended by skilled attendants in the mother's home are an effective approach used in a number of countries, however this approach can be more staff intensive and can limit ready access to emergency obstetric care when needed.
- ¹⁶ Costello A et al "An alternative strategy to reduce maternal mortality" *Lancet* (368): 1477-9.
- ¹⁷ Campbell O and Graham W 2006 "Strategies for reducing maternal mortality: getting on with what works" *Lancet* (368): 1284-99.
- ¹⁸ Filippi V et al 2006 "Maternal health in poor countries: the broader context and a call for action" *Lancet* (368): 1535-41.
- ¹⁹ Campbell O and Graham W 2006 "Strategies for reducing maternal mortality: getting on with what works" *Lancet* (368): 1284-99.
- ²⁰ Filippi V et al 2006 "Maternal health in poor countries: the broader context and a call for action" *Lancet* (368): 1535-41.
- ²¹ Wagstaff A and Claeson M 2004 *The Millennium Development Goals for Health: Rising to the Challenge* p6.
- ²² Campbell O and Graham W 2006 "Strategies for reducing maternal mortality: getting on with what works" *Lancet* (368): 1284-99.
- ²³ WHO et al 2007 *Maternal Mortality in 2005*.
- ²⁴ Countdown to 2015 2008 *Tracking Progress in Maternal, Newborn and Child Survival: the 2008 report* and other sources as detailed in the table.
- ²⁵ DFID 2004 *Maternal Health strategy reducing maternal deaths: evidence and action* p9.
- ²⁶ Bernstein S et al 2008 "Sexual and reproductive health: completing the continuum" *Lancet* (372): 1225-6.
- ²⁷ Bearinger L et al 2007 "Global perspectives on the sexual and reproductive health of adolescents: patterns, prevention, and potential" *Lancet* (369):1220-1231.
- ²⁸ A more extensive care continuum advocated by some authors includes adolescent health support. For example see Kerber K et al 2007 "Continuum of care for maternal, newborn, and child health: from slogan to service delivery" *Lancet* (370):1358-69.
- ²⁹ WHO-SEAR 2006 *Adolescent Nutrition: A Review of the Situation in Selected South-East Asian Countries* pp 47-50.
- ³⁰ Black R et al 2008 "Maternal and child undernutrition: global and regional exposures and health consequences" *Lancet* (371): 243-260.
- ³¹ West K et al "Double blind, cluster randomised trial of low dose supplementation with vitamin A or beta carotene on mortality related to pregnancy in Nepal" *BMJ* 1999; 318: 570-75.
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- ³³ Black R et al 2008 "Maternal and child undernutrition: global and regional exposures and health consequences" *Lancet* (371) : 243-260.
- ³⁴ Costello A et al "An alternative strategy to reduce maternal mortality" *Lancet* (368) p1477-9.
- ³⁵ Darmstadt G et al 2005 "Evidence-based, cost-effective interventions: how many newborn babies can we save?" *Lancet* (365): 977-88.
- ³⁶ Lawn J et al 2005 "4 million neonatal deaths: when, where, why?" *Lancet* (365): 891-900. However as shown by some of the case studies in this paper simple approaches to improve nutrition, support mothers, increase birth attendant skills and resources and provide appropriate neonatal responses such as kangaroo care can make a significant contribution.
- ³⁷ Lawn J et al 2005 "4 million neonatal deaths: when, where, why?" *Lancet* (365): 891-900.
- ³⁸ Darmstadt G et al 2005 "Evidence-based, cost-effective interventions: how many newborn babies can we save?" *Lancet* (365): 977-88.
- ³⁹ Ibid.
- ⁴⁰ Jones G et al 2003 "How many child deaths can we prevent this year?" *Lancet* (362): 65-71.
- ⁴¹ Ibid – Table 3, neonatal deaths deducted from totals.
- ⁴² Jones G et al 2003 "How many child deaths can we prevent this year?" *Lancet* (362): 65-71.
- ⁴³ Ibid – reductions based on application of the 23 interventions that Jones et al indicated had adequate evidence to support their use.
- ⁴⁴ Jones et al estimated a 55% reduction in neonatal deaths and a 67% reduction in post-neonatal child deaths summing to a 63% reduction in all under-5 deaths.
- ⁴⁵ Jones G et al 2003 "How many child deaths can we prevent this year?" *Lancet* (362): 65-71.
- ⁴⁶ Countdown Coverage Writing Group 2008 "Countdown to 2015 for maternal, newborn, and child survival: the 2008 report on tracking intervention coverage" *Lancet* (371): 1247-58.
- ⁴⁷ Black R et al 2008 "Maternal and child undernutrition: global and regional exposures and health consequences" *Lancet* (371) : 243-260.
- ⁴⁸ Bhutta Z et al 2008 "What works? Interventions for maternal and child undernutrition and survival" *Lancet* (371): 417-40.
- ⁴⁹ Bryce J et al 2006 "Countdown to 2015: tracking intervention coverage for child survival" *Lancet* (368): 1067-76.
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- ⁵² Bryce J et al 2006 "Countdown to 2015: tracking intervention coverage for child survival" *Lancet* (368): 1067-76.
- ⁵³ UNESCAP, ADB & UNDP 2008 *A Future within Reach: Regional Partnerships for the Millennium Development Goals in Asia and the Pacific* Asia Pacific MDG Study Series.
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- ⁵⁵ Graham W et al 2008 "Measuring maternal mortality: An overview of opportunities and options for developing countries" *BMC Medicine*, 6:12 doi:10.1186/1741-7015-6-12.
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- ⁵⁷ National Nutrition Centre, Myanmar 2001 *A study on hemoglobin status and food practices of Myanmar women*.
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- ⁵⁹ Dignan C et al 2005 *Myanmar Nutritional Anaemia Initiative Project: Evaluation*.
- ⁶⁰ Personal correspondence with Cecily Dignan, lead author of the project evaluation, 4 August 2008.
- ⁶¹ http://www.who.int/whosis/mort/profiles/mort_searo_npl_nepal.pdf.
- ⁶² Manandhar D et al 2004 "Effect of a participatory intervention with women's groups on birth outcomes in Nepal: cluster-randomised controlled trial" *Lancet* (364):970-979.
- ⁶³ This figure, quoted by Manandhar comes from Pradhan A et al 1997 *Nepal Family Health Survey 1996*. This figure varies considerably from those outlined in Countdown to 2015: Maternal, Newborn and Child Survival - Nepal, (http://www.countdown2015mnch.org/documents/countryprofiles/nepal_20080312.pdf), where MMR for Nepal is quoted as 830 per 100,000 live births.
- ⁶⁴ Ministry of Health and Population Nepal 2002 *Nepal demographic and health survey 2001*.
- ⁶⁵ Darmstadt G et al 2005 "Evidence-based, cost-effective interventions: how many newborn babies can we save?" *Lancet* (365): 977-88.
- ⁶⁶ Gonzales et al 1998 *Scaling up the Warmi Project: Lessons learnt – Mobilising Bolivian communities around reproductive health* Save the Children Federation Inc, (<http://www.coregroup.org/resources/Saveboli.pdf>).
- ⁶⁷ Manandhar D et al 2004 "Effect of a participatory intervention with women's groups on birth outcomes in Nepal: cluster-randomised controlled trial" *Lancet* (364): 970-979.
- ⁶⁸ Bhutta Z et al 2008 "What works? Interventions for maternal and child undernutrition and survival" *Lancet* (371): 417-40.
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- ⁷³ The evaluation did not try to estimate the maternal mortality rate.
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- ⁷⁷ World Vision India 2008 *Pragati Child Survival Project: Final Evaluation*.
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- ⁷⁹ Darmstadt G et al 2005 "Evidence-based, cost-effective interventions: how many newborn babies can we save?" *Lancet* (365): 977-88.
- ⁸⁰ Bhutta Z et al 2008 "What works? Interventions for maternal and child undernutrition and survival" *Lancet* (371): 417-40.
- ⁸¹ Ibid.
- ⁸² Jones G et al 2003 "How many child deaths can we prevent this year?" *Lancet* (362): 65-71.
- ⁸³ Although the evaluation also found that World Vision should have handed project responsibility to partners earlier.
- ⁸⁴ WHO et al 2007 *Maternal Mortality in 2005*.
- ⁸⁵ Bhat R et al 2006 *Maternal Health Financing – Issues and Options, A study of Chiranjeevi Yojana in Gujarat* Working Paper No. 2006-06-03 Indian Institute of Management, Ahmedabad.
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- ¹⁰¹ Bryce J et al 2006 "Countdown to 2015: tracking intervention coverage for child survival" *Lancet* (368): 1067-76.
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The Nossal Institute for Global Health, The University of Melbourne
Internet: www.ni.unimelb.edu.au

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