

# SCALING UP CHILD SURVIVAL INTERVENTIONS IN CAMBODIA

## THE COST OF NATIONAL PROGRAMME RESOURCE NEEDS



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# **Scaling Up Child Survival Interventions in Cambodia: The Cost of National Programme Resource Needs**

FINAL REPORT

19 June 2007

David Collins (BASICS)  
Elizabeth Lewis (BASICS)  
Karin Stenberg (WHO)



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The development of a national operational plan follows the Cambodia Child Survival Strategy and the WHO/UNICEF Regional Child Survival Strategy. The results presented here represent a major contribution in the costing of the scale up of the key child survival interventions in Cambodia.

The production of cost estimates included the use of available WHO tools, specifically the WHO/UNICEF cMYP Costing and Financing Tool for immunizations, and the WHO child health cost estimation tool which was used to estimate commodity costs for scaling up management of diarrhoea and pneumonia.

During the process of presenting preliminary cost results at a Ministry of Health workshop in Phnom Penh on 8 December 2006 it was agreed that the MOH Child Survival Steering Committee should take the lead in carrying this work further, with support from WHO, USAID through BASICS, and other interested partners.

David Collins, FCA, MA and Elizabeth Lewis, MBA work for Management Sciences for Health (a partner under BASICS) in Cambridge, Massachusetts, USA. They both have many years experience in planning and costing health interventions in developing countries. Karin Stenberg is a Health Economist with the Department of Child and Adolescent Health and Development, WHO in Geneva, Switzerland.

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## **Acronyms and Abbreviations**

|        |  |
|--------|--|
| ACT    | Artemisinin-based combination therapy                                  |
| ALRI   | Acute lower respiratory infection                                      |
| ANC    | Ante-natal care  |
| AOP    | Annual operational plan  |
| ARI    | Acute respiratory infection  |
| BASICS | Basic Support for Institutionalizing Child Survival (Project)          |
| BCC    | behaviour change communication   |
| BFCI   | Baby-friendly community initiative                                     |
| BFHI   | Baby-friendly hospital initiative                                      |
| CBAW   | Child Bearing Age Women  |
| CCSS   | Cambodia Child Survival Strategy                                       |
| CDC    | Communicable Disease Control (Department)                              |
| CDHS   | Cambodia Demographic and Health Survey                                 |
| CHOICE | CHOosing Interventions that are Cost Effective                         |
| CMDG   | Cambodia Millennium Development Goal                                   |
| cMYP   | Comprehensive multi-year planning (WHO/UNICEF tool)                    |
| CPA    | Complementary Package of Activities                                    |
| CS     | Child survival   |
| CSCC   | Child Survival Coordination Committee                                  |
| CSSC   | Child Survival Steering Committee                                      |
| DHS    | Demographic and Health Survey  |
| GAVI   | GAVI Alliance (formerly Global Alliance for Vaccines and Immunisation) |
| GDP    | Gross Domestic Product   |
| HC     | Health Centre  |
| HCMC   | Health Centre Management Committee                                     |
| HIS    | Health Information System  |
| HSP    | Health Sector Strategic Plan   |
| IEC    | Information, education, and communication                              |
| IMCI   | Integrated Management of Childhood Illness                             |
| IMR    | Infant mortality rate  |
| ITN    | Insecticide-treated net  |
| IYCF   | Infant and young child feeding   |
| LLIN   | Long-lasting insecticidal net  |
| M&E    | Monitoring and Evaluation  |
| MPA    | Minimum Package of Activities  |
| MCH    | Maternal and Child Health  |
| MOH    | Ministry of Health   |
| N/A    | Not available  |
| NDCP   | National Dengue Control Program  |
| NGO    | Non-governmental organization  |
| NIP    | National Immunization Programme  |
| NMCP   | National Malaria Control Programme                                     |
| NNP    | National Nutrition Programme   |

|        |  |
|--------|--|
| NRHP   | National Reproductive Health Programme                     |
| NSDP   | National Strategic Development Plan                        |
| OD     | Operational District                                       |
| ODCSCC | Operational District Child Survival Coordination Committee |
| ORS    | Oral rehydration salts                                     |
| ORT    | Oral rehydration therapy                                   |
| PCSCC  | Provincial Child Survival Coordination Committee           |
| PHD    | Provincial Health Department (or Director)                 |
| RDT    | Rapid diagnostic test (for malaria)                        |
| RGoC   | Royal Government of Cambodia                               |
| TBA    | Traditional birth attendant                                |
| TT     | Tetanus Toxoid   |
| TWGH   | Technical Working Group for Health                         |
| U5MR   | Under-5 mortality rate                                     |
| UNFPA  | United Nations Population Fund                             |
| UNICEF | United Nations Children's Fund                             |
| USAID  | United States Agency for International Development         |
| VAC    | Vitamin A capsules   |
| VHSG   | Village Health Support Group                               |
| VHV    | Village health volunteer                                   |
| VHW    | Village health worker                                      |
| WHO    | World Health Organization                                  |

## **Executive Summary**

### **Background**

Under-five mortality is high in the Kingdom of Cambodia, with 60,000 children dying every year.<sup>1</sup> The latest Cambodia Demographic and Health Survey (CDHS) in year 2005 indicates an under five mortality rate of 83, much improved from the CDHS 2000 estimate of 124.4, but still high. The infant mortality rate is estimated at 65 and the neonatal mortality rate at 28 per 1,000 live births (CDHS 2005).

Despite recent improvements in some areas of child health, such as measles and polio, child mortality remains high due to high prevalence of malnutrition and communicable diseases. Most Cambodian children are dying from a few preventable and treatable conditions. These include the following, shown in order of relative importance together with the percentage of deaths caused:

- neonatal causes (30%)
- acute respiratory infections (pneumonia 21%)
- diarrhoeal diseases (17%)
- HIV/AIDS (2%)
- measles (2%)
- injuries (2%)
- malaria (1%)

Across all of these conditions, under-nutrition represents the single most important risk factor.

The Royal Government of Cambodia, recognizing the burden of child mortality, has set targets for the child survival Cambodia Millennium Development Goals, which include:

- Reducing under-five mortality rate to 65 per 1,000 live births by 2015
- Reducing infant mortality rate to 50 per 1,000 live births by 2015
- Reducing the proportion of both under-weight and stunted children aged less than 5 years from 45% to 22% by 2015.

The Regional WHO/UNICEF Child Survival Strategy was endorsed in 2005, following which the Cambodia Child Survival Strategy (CCSS) was developed. The CCSS, which covers the years 2006 through 2015, aims to reach the above goals by achieving universal coverage of a limited package of essential evidence-based, cost-effective interventions that impact on child mortality: “few for all rather than more for few.”

Under the Cambodia Child Survival Strategy, twelve cost-effective interventions were chosen that would have the greatest impact on reducing the mortality of children under five years old. These are called "scorecard interventions", used to assess progress towards improving child survival. The interventions are: early initiation of breastfeeding, exclusive breastfeeding,

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<sup>1</sup> WHO mortality database, 2006; estimates for year 2004.

complementary feeding, Vitamin A supplementation, measles and tetanus toxoid immunization, ITNs, malaria treatment, dengue vector control, ORT, antibiotics for pneumonia and skilled birth attendance.

Action plans have been developed by the national programmes for scaling up eleven of the twelve interventions for the four years from 2007 through 2010 (at the time of the study no plan had been prepared for skilled birth attendance). The target coverage levels for these scorecard interventions in 2010 range from 60% for early initiation of breastfeeding to 95% for complementary feeding and malaria treatment. While high absolute targets above 90% coverage are clearly aspirational, some programmes may face serious challenges in even trying to realize more modest coverage targets.

The relative increase in coverage—here referred to as the “scale-up factor”—depends on the starting point as well as the target set for 2010. For example, measles immunization has the smallest increase in coverage from 2006 to 2010 in both percentage and numbers of children, mainly because the level of coverage in 2006 was already high at 84%. Meanwhile, ITN distribution has the highest increase in coverage in percentage terms because the level of coverage in 2006 was low at 20%. However, the additional numbers of children to be reached with ITNs are fairly low because malaria exists only in certain regions of Cambodia. In terms of the incremental number of children that will be reached by scaling up the scorecard interventions, ORT has the highest increase because although the initial coverage level in 2006 is fairly high at 59%, the number of children requiring management of multiple annual diarrhoea episodes is also high. The targets for some of the interventions appear rather ambitious given that the current levels of coverage are low and constraints at the service delivery level have not all been fully considered. For example, scaling up malaria treatment from 20% to 80% in four years is likely to be a challenge.

## **Results**

The purpose of this study was to develop estimates of the cost of the scaled-up scorecard interventions. Based on the action plans developed by the programmes, the interventions would require resources costing \$79.9 million from 2007 through 2010 to achieve the targeted coverage levels. This cost estimate reflects the activities and commodities identified by the national programmes for the scaled-up scorecard interventions, and represents the total cost of implementing all the necessary activities for maintaining current coverage and for increasing coverage. The costs are spread fairly evenly over the four years, ranging from \$19.0 million to \$20.8 million per year. Costs include national programme activities for all interventions, commodities for all interventions, and service delivery staffing costs for some interventions. The estimates exclude most of the costs of daily service delivery activities carried out at community level and at health facilities, including salaries of health workers and operating costs such as transport, utilities and repairs. The reason for excluding the operational costs from this study is that plans were not sufficiently developed to assess delivery costs. Moreover, costing the service delivery will require further work at district and facility levels to determine credible assumptions for projecting resource availability and need.

For the interventions that directly address the top three causes of child mortality listed above, the skilled birth attendance intervention aimed at reducing neonatal mortality could not be costed, the pneumonia treatment intervention would require \$11.1 million and the ORT intervention would require \$13.8 million. It should be noted that costs should not be compared across interventions as they do not include all service delivery costs and because the coverage targets are different.

The total of \$79.9 million includes \$38.4 million (48%) for commodities, with the highest components being ITNs (\$10.2 million), dengue vector spray materials (\$8.5 million) and ORT supplies (\$7.2 million). The balance of \$41.5 million (52%) reflects the cost of activities identified by the national programmes to support implementation (e.g., IEC, surveillance and capacity building), and, in some cases, costs to support service delivery (equipment, salaries, transport and per diems).

Of the total estimated cost of \$79.9 million, \$62.0 million is for intervention-specific activities (activities that are exclusively identified as relevant for the child survival scorecard interventions). The balance of \$17.9 million represents a scorecard interventions' portion of the cost of shared activities which was estimated at \$37.0 million in total. If the remainder of these shared costs (\$19.1 million) is not sufficiently funded under non-scorecard interventions, then the scorecard interventions will have to bear a larger burden of the shared costs - or they may not be successfully implemented.

Clearly, assumptions used in the costing on how to allocate shared costs affect the results presented here. For example, the cost of the ITN intervention is high partly because the full cost of providing households with nets has been allocated to the child survival scorecard intervention on the assumption that a full set of nets must be provided to a family to ensure that the under-5 children are protected. Similarly the cost of the dengue vector control intervention is high partly because the total cost of all the spraying has been allocated to the scorecard intervention on the assumption that a full spraying programme has to be carried out in order to protect the under-5 children.

The results of this report should be regarded as preliminary for the following reasons:

- Further work is needed on some of the programme action plans including reviewing activities and targets and analyzing for constraints, feasibility and possible cost-savings.
- The estimate of \$79.9 million excludes the cost of the skilled birth attendance intervention, which is directed at the neonatal problems that are the leading cause of child mortality in Cambodia today. This missing component needs to be incorporated in order to arrive at a cost estimate for all 12 interventions.
- The study excludes most of the costs of daily service delivery activities carried out at community level and at health facilities, as well as activities related to overall strengthening of the service delivery system. Once operational plans for delivery options have been identified, a follow-up study is recommended to assess the human resource requirements and associated costs as well as the need for other delivery inputs such as transport. For some interventions, the scaling up will require significant increases in health service delivery and health promotion activities at community and health centre level. Costs associated with the

service delivery platform are essential in order to reach the intended scorecard coverage levels.

### **Policy implications**

Given the importance of shared activities for successful implementation, the \$79.9 million should be considered as a minimum estimate, since the additional shared costs of \$19.1 million may also require funding.

Despite some of the missing components, the results presented here are indicative of the resources required by each of the national programmes in order for them to carry out the plans and reach the coverage targets as planned.

The estimated cost figures are to be compared at a later stage with the available funding to determine the financing gap. This information can then be used to advocate with the government and donors for the additional funds needed, to develop a resource mobilization strategy for child survival, and to inform a financing strategy for implementing the scorecard interventions.

Different resource mobilization strategies may need to be developed in order to obtain the full amount of funds needed for child survival. For example, some donors may only be interested in directly funding the specific programmes, which may require the development of a resource mobilization strategy for the intervention-specific funds (total \$62.0 million). Meanwhile, the Child Survival Coordination Committee (CSCC) will also need to work together with a broader base of public health advocates to ensure that the total resources required for shared activities (an additional \$37.0 million) are secured.

The process of undertaking the cost assessment has helped the national programmes to move towards activity-based and needs-based planning. Although there is further work to be done, it is envisioned that the results produced by this study can be used for initial advocacy, especially since the MOH and partners are already aware of some of the current and planned funding commitments for the programmes in years to come.

## 1. Background

### 1.1 Child health status

In recent years, child health has improved considerably in the Kingdom of Cambodia. The latest Cambodian demographic and health survey (CDHS) in 2005<sup>2</sup> indicates an under five mortality rate of 83, much improved from the CDHS 2000 estimate of 124.4, but still high. The infant mortality rate is estimated at 65, an improvement from the CDHS 2000 estimate of 95. The neonatal mortality rate reported in the CDHS 2005 is 28, compared to 37.3 per 1000 live births in the CDHS 2000.

Specific health improvements include a decline in the reported cases of measles and the declaration of Cambodia as polio-free in 2001. The reported case fatality rates for dengue have fallen during the last years of the 1990s, and the estimated national prevalence of HIV among those aged 15 to 49 years declined from 2.1 % in 2002 to 1.9% in 2003.<sup>3</sup> Despite these general health improvements, child mortality remains high due to a high prevalence of malnutrition and communicable diseases, and around 60,000 children die every year – most from a few preventable and treatable conditions. These include the following, shown in order of relative importance together with the percentage of deaths caused (WHO estimates contained in the Cambodia Child Survival Strategy [CCSS]):

- neonatal causes (30%)
- acute respiratory infections / pneumonia (21%)
- diarrhoeal diseases (17%)
- HIV/AIDS (2%)
- measles (2%)
- injuries (2%)
- malaria (1%)

Across all of these conditions, under-nutrition represents the single most important risk factor.

The Royal Government of Cambodia, recognizing the burden of child mortality, has worked in collaboration with development partners to set national Millennium Development Goals (MDG) targets and select high-impact interventions that are expected to make the greatest contributions to achieving the key targets of the child survival Cambodia Millennium Development Goals (CMDGs), which include:

- Reducing under-five mortality rate (U5MR) to 65 per 1,000 live births by 2015
- Reducing infant mortality rate (IMR) to 50 per 1,000 live births by 2015

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<sup>2</sup> National Institute of Public Health, National Institute of Statistics, and MEASURE DHS Project, *Cambodia Demographic and Health Survey (CDHS) 2005 Preliminary Report*, ORC Macro, July 2006

<sup>3</sup> For Measles, refer to Cambodia Country profile - WHO Vaccine Preventable Diseases Monitoring System 2006 Global summary (<http://www.who.int/vaccines/globalsummary/immunization/countryprofileselect.cfm>). For Dengue fever, refer to DengueNet (<http://www.who.int/denguenet>). For HIV, refer to Cambodia - Epidemiological fact sheets on HIV/AIDS and sexually transmitted infections, December 2006.

- Reducing the proportion of both under-weight and stunted children aged less than 5 years from 45% to 22% by 2015.

The Regional WHO/UNICEF Child Survival Strategy was endorsed in 2005, following which the Cambodia Child Survival Strategy was developed for the period of 2006-2015. The CCSS outlines the approach to reducing child mortality in Cambodia and achieving CMDG 4, which, as stated above, aims to reduce under-five mortality rate (U5MR) to 65 per 1,000 live births by 2015. The strategy aims to achieve universal coverage of a limited package of essential evidence-based, cost-effective interventions that impact on child mortality. Most Cambodian households have low income and achieving universal coverage of child survival interventions will reduce inequities. In contrast, provision of a comprehensive range of available high-technology expensive interventions to only the few members of the population who can afford them will not significantly impact on child mortality and will lead only to greater inequities. Therefore the aim of the CCSS is “few for all rather than more for few.”

Cost-effective interventions to counter the causes of child mortality are currently implemented through a variety of different programmes. Key preventive interventions include breastfeeding and complementary feeding counselling, growth monitoring and nutrition counselling, measles and tetanus toxoid immunization and vitamin A supplementation, insecticide-treated nets (ITNs), and malaria and dengue fever vector control. Case management of malaria with appropriate anti-malarial drugs, of childhood pneumonia with antibiotics and of diarrhoea with oral rehydration therapy (ORT) and oral rehydration salts (ORS) are important curative interventions included in Integrated Management of Childhood Illness (IMCI). Unfortunately, not all these high-impact child survival interventions are getting to those people most in need and in some cases current coverage is low. For example, according to the most recent Demographic and Health Survey, in 2005 only 60% of infants under six months of age were exclusively breastfed, although this has increased from only 11% in 2000 which is a huge improvement, and the proportion of children with fast or difficult breathing in the two weeks preceding the survey who received medical care was only 57%.

## **1.2 Service delivery and financing**

Preventive and curative health services are provided by the Ministry of Health (MOH) through a network of hospitals, health centres, and outreach services. Non-governmental organizations (NGOs) also provide preventive and curative health services and there are a small number of private for-profit health care providers. Many households use unlicensed small pharmaceutical retailers to procure medicines and to get medical advice. An increasing number of health services are operated under contracting arrangements with the government or major donors.

Health services are funded from four main sources:

- (i) Government financing through its budget
- (ii) Official international donor financing, either to support government services or to support NGO-provided health services
- (iii) International non-governmental donors, who primarily fund NGO services outside the public sector (off-budget)

- (iv) Households who make out-of-pocket payments to pay official and informal user fees in public facilities, to private providers, and to purchase medicines from medicine retailers

The user fees charged by government and private providers cover a variety of services. Some preventive child survival interventions are provided free of charge by the MOH to the population, including immunizations and the distribution of vitamin A capsules and insecticide-treated materials and their re-impregnation. However, some others are subject to fees.

In 2003, the average total expenditure on health per capita in Cambodia was \$33, similar to per capita levels in Indonesia and Viet Nam.<sup>4</sup> In that year the Government of Cambodia financed US\$6 per capita (18% of total health expenditures).<sup>5</sup> Despite government efforts to channel expenditures to the health sector, funds from external sources exceed funds from government revenues<sup>6</sup>, and out of pocket payments are high (69% of total health expenditures).<sup>3</sup>

While the general level of spending can be increased, it is not clear how much of current expenditure goes towards improving child health. An assessment of external resource flows in Cambodia (Michaud, 2005) noted that there seems to be imbalance between disease burden and external financial resources, particularly with extensive funding directed to HIV/AIDS and malaria with a fairly low disease burden, and relatively less funds going to maternal and child health where the burden is greater. In a situation where funds from external sources exceed funds from government revenues, the ability of the government to control the direction of funds towards priority strategies may be affected.

### **1.3 Challenges to implementing child health interventions**

National health programmes have achieved success in immunization, control of HIV/AIDS, increasing coverage of vitamin A supplementation and regular de-worming (CCSS 3.2.2). Each of these programmes had four elements of success: clear targets; political commitment from the Government and donors; clear attribution of responsibilities; and sufficient funding.

However, as shown in Section 1.1, the major killers of young children also include pneumonia, diarrhoea, neonatal conditions and causes of under-nutrition other than the lack of Vitamin A. In order to reduce deaths due to these causes, promotion of key family practices at community level is needed, as is access to effective case management. Delivery strategies for addressing acute respiratory infection (ARI), diarrhoea, neonatal health, and nutrition have not been given sufficient attention and resources, particularly in rural and remote areas. Serious constraints that have been identified as affecting the delivery of such interventions include limited human resources, fragmented responsibilities, insufficient funding, inadequate quality of services and problems with access to and utilization of services (CCSS S 3.2.3).

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<sup>4</sup> World Health Report 2006 *Working together for health*, WHO Geneva

<sup>5</sup> In 2003, the government of Cambodia devoted 12% of total public expenditures towards the improvement of health (World Health Report 2006 *Working together for health*, WHO Geneva)

<sup>6</sup> External Resource Flows to the Health Sector in Cambodia, Catherine Michaud, WHO, May 2005.

With regards to the four elements of success identified above, the drafting of the CCSS activity plans for each programme has clearly assisted the process of target setting, has led to increased visibility and political commitment to child survival, and has strengthened the identification of key activities and responsibilities. It is now hoped that the costing will assist in securing funding for child survival.

## 2. Introduction

### 2.1 The context for the cost study

The purpose of this study was to develop estimates of the costs of the resources identified by the national programmes as needed to achieve a nation-wide scale-up of the interventions set out in the Cambodia Child Survival Strategy. Estimated costs are based on the plans of national programmes responsible for the 12 scorecard interventions (refer to Box 2.1).

**Box 2.1: Twelve scorecard interventions outlined in the Cambodia Child Survival Strategy**

1. *Early initiation of breastfeeding*: breastfeeding initiation within one hour of delivery
2. *Exclusive breastfeeding*: only breast milk—no other food or fluids, not even water—should be given to the infant in the first 6 months of life.
3. *Complementary feeding*: from six months of age, give children good quality complementary foods, while continuing to breastfeed up to two years or longer.
4. *Vitamin A*: Vitamin A capsules are distributed routinely to children 6-59 months twice a year, and to post-partum women.
5. *Measles vaccine*: A first dose of measles vaccine is provided at 9 months of age and a second dose is provided through regular outreach activities.
6. *Tetanus Toxoid vaccine*: Two doses of tetanus toxoid vaccine for the mother during her pregnancy or five doses in her lifetime.
7. *ORT*: children with diarrhoea are managed with oral rehydration therapy with increased fluids, continued feeding, recommended home fluids and/or oral rehydration salts (ORS) solution, and zinc when available.
8. *Antibiotic for pneumonia*: Diagnosis and treatment with antibiotics is undertaken by a trained health worker.
9. *Insecticide treated nets*: in malarious areas, insecticide treated bed-nets are made available and used as a preventive intervention for malaria.
10. *Malaria treatment*: in malarious areas, treatment of falciparum malaria with artemisinin-based combination therapies (ACT) preceded by blood-sample-based diagnosis with microscopy or rapid diagnostic tests.
11. *Dengue vector control*: expand coverage of preventive interventions against dengue in order to reduce the number of breeding sites.
12. *Skilled birth attendance*: Appropriate care for the mother during pregnancy and clean delivery. This includes care for the newborn such as clean cord care and newborn temperature management.

Source: CCSS

These 12 interventions are generally recognized as being of relatively low cost and highly cost-effective.<sup>7</sup> Despite this, the CCSS acknowledges that the financial resources currently allocated to child survival interventions in Cambodia are inadequate. In order to attract the additional funding required to scale up activities as envisioned in the CCSS it is necessary to determine the cost of resources required, and to use this information to estimate the financing gap. The various studies and actions that will be necessary to secure and allocate this additional funding can be set out as follows:

1. Select the package of high-impact cost-effective interventions feasible for implementation in the national context. *Done in the CCSS.*
2. Develop detailed implementation plans for each intervention. *Partly done.*
3. Estimate the costs of scaling up the interventions. *The exercise presented here provides preliminary estimates.*
4. Review options for intervention impact and cost savings across and among the interventions. *Partly done in a recent cost effectiveness study.*
5. Collect and analyze information on current expenditures and financing commitments.
6. Determine the financing gaps.
7. Review funding flow mechanisms and select appropriate channels.
8. Advocate with the government and donors for the additional funds needed.
9. If necessary, adjust the operating plans to reflect the final amounts of financing obtained and prepare budgets accordingly.<sup>8</sup>

The first step in the above process was the development of the CCSS, including identification of the 12 Child Survival Scorecard interventions and setting national coverage targets. The second step was the development of detailed implementation or action plans for each intervention.<sup>9</sup> These set out the activities that are required to achieve the targets.

The third step is to cost the implementation plans, which was the scope of work for this study. The following objectives were generally adhered to:

- **Estimating resources** - The costing should produce realistic cost estimates for the national programmes to estimate resources needed for implementing the plans.
- **Needs-based planning** - The plans should be linked to reaching the child survival targets set, i.e. there should be a strong link between objectives, targets, activities, and costs. It was

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<sup>7</sup> In 2003, *The Lancet* published a series of articles on child survival. The titles and citations follow:

- Robert E. Black et al., “Where and why are 10 million children dying every year?”, *Lancet* 2003, 361: 2226–34;
- Gareth Jones et al., “How many child deaths can we prevent this year?”, *Lancet* 2003, 362: 65–71;
- Jennifer Bryce et al., “Reducing child mortality: can public health deliver?”, *Lancet* 2003, 362: 159–64;
- Cesar G. Victora et al., “Applying an equity lens to child health and mortality: more of the same is not enough,” *Lancet* 2003, 362: 233–41; and
- The Bellagio Study Group on Child Survival, “Knowledge into action for child survival,” *Lancet* 2003, 362: 323–27.

<sup>8</sup> Annual operational plans may need to be adjusted in case (i) Budget negotiations and approval result in a final budget envelope that is different from the initial budget request, and/or (ii) Information on achievements and progress made to date indicates that objectives, targets, and activities need to be refined.

<sup>9</sup> The terms action plan, operating plan, operational plan, activity plan, implementation plan are used interchangeably in this document. These are plans that describe and quantify the activities and resources needed to achieve each target.

agreed to ensure that the costing is needs-based in order to fully reflect the funds needed to implement activities and reach set targets. For the initial needs-based costing we assumed no budget limitations, but it is possible that the plans will need to be revised at a later stage in view of funds made available, as outlined in step 9 above.

- **Advocacy and resource mobilization** - Cost estimates are useful for informing advocacy messages and for making the investment case for child survival. Moreover, a needs-based costed plan used together with estimates of funds currently available can be used to determine the funding gap and to develop a resource mobilization strategy.
- **Budgeting** - Once funding is obtained, the CCSS implementation plans would be adjusted to match the funds available and the costs would be turned into budgets. The scorecard interventions and targets set in the CCSS would, therefore, serve as the basis for the annual operational plans and three year rolling plans by the respective MOH programmes although they may be adjusted to reflect budget constraints.

This process fits well with recent steps taken by the MOH to establish a clear link between activity planning and budgeting and to facilitate a budgeting process that is based on a detailed costing of planned activities (Cambodia MOH Planning Manual, 2003). Such cost assessments are seen as part of a long-term effort to use planning and financial information to guide programmes towards making efficient choices with limited funds available.

Operational plans and targets should be continually assessed and updated in line with the most recent evidence. Similarly, the assessment of costs and funds available should be a continuous effort and not a one-time study. It is important to institutionalize this process within the national programmes. The National Immunization Programme in Cambodia provides a good example of how the projection of sound financial estimates and transparent management of expenditure data may help programmes to secure funding.

This study related to costing the implementation plans - the third step stated above.

## **2.2 Preparation and briefings**

A costing team comprised of two BASICS consultants and one WHO staff member was assigned to conduct the study. The team was present in Cambodia for four weeks in November/December 2006 and the assignment included a 3-day introductory workshop, meeting with programme managers and others, reviewing plans and conducting the costing.

The introductory workshop was held on 14-16 November 2006 to provide preparation for the costing exercise to the MOH programmes that are responsible for implementing the 12 scorecard interventions. Participants were given an overview of costing in general and details of other costing work already carried out in Cambodia, including a summary of the findings of the cost-effectiveness study on child survival supported by WHO. The workshop included sessions on target setting, defining total and incremental expenditures, as well as an introduction to a WHO tool for estimating costs of scaling up child survival interventions. The participating programmes gave an overview of their current plans and strategies, and to what extent costing had been undertaken to date.

During the workshop, participants provided inputs on expected results from the costing work and there were discussions about what was desirable and feasible from the costing study.

Some of the expectations raised during the workshop were that the exercise would:

- streamline tools and costing methods used by MOH programmes,
- produce estimates that will enable better planning and financing.

Following the workshop, the costing team worked with the seven national programmes responsible for the 12 scorecard interventions identified in the national Child Survival Strategy.

Briefings with key members of the Child Survival Coordination Committee (CSCC) were held weekly and shortly before leaving Cambodia, a meeting was organized by the MOH to inform and familiarize MOH staff and other interested parties on progress to date. The consultants shared their initial findings and draft results, and discussions were held on next steps. It was agreed that the Child Survival Steering Committee should take the lead for carrying this work further, with support from WHO, USAID through BASICS, and other interested partners.

### **2.3 Report structure**

The remainder of the report is organized as follows:

- Section 3 sets out the high-impact interventions selected for the CCSS.
- Section 4 describes the overall methodology used for the costing.
- Sections 5 through 10 describe the method used to cost the scorecard interventions under each of the programmes and show the cost findings.
  - Section 5 covers the nutrition interventions,
  - Section 6 covers the immunization interventions,
  - Section 7 covers the malaria interventions,
  - Section 8 covers the dengue intervention,
  - Section 9 covers the interventions for diarrhoea and pneumonia, and
  - Section 10 covers the reproductive health interventions, including interventions to improve maternal and newborn care
- Section 11 discusses related costs.
- Section 12 presents a summary of the findings.
- Section 13 discusses some of the issues related to the costs.
- Section 14 summarizes the conclusions of the exercise.

### **3. The Child Survival high-impact interventions**

The twelve cost-effective high-impact “scorecard” interventions selected in the CCSS are shown in Table 3.1. The table also shows the indicators to be used for measuring progress and the baseline and target figures. Additional details on the derivation of the figures shown in the table can be found under the sections on the costing of each scorecard intervention and programme (sections 5-10).

The CCSS sets targets for nation-wide coverage, except for the malaria and dengue fever interventions which are only prevalent in certain geographical areas. Increases in coverage in this study refer both to broadening the existing package currently delivered through existing delivery mechanisms (e.g., adding nutrition counselling to current delivery at health centre [HC] level) as well as expanding coverage geographically and socio-economically to reach new communities, (e.g., immunizing slum dwellers currently not reached by National Immunisation Programme [NIP] activities).

Note that for some interventions the 2007 coverage targets on which costs were calculated differ from those in the original CCSS. An asterisk in Table 3.1 indicates when this is the case. While the 2007 targets set by the programmes for early initiation of breastfeeding, Vitamin A supplementation, and vector control are the same as in the original CCSS, all others were revised by the programmes as part of their scorecard intervention action planning. Targets were either increased or decreased during the revision process. For example, the target for complementary feeding was decreased from 95% to 85% and the target for tetanus toxoid immunization was increased from 70% to 75%. Such changes in target setting are part of the normal planning process which is a continuous cycle.

Further note that the CCSS does not set targets for any years after 2007, although it does show benchmark figures for 2010 and 2015 for initiation of breastfeeding (45% and 62%), exclusive breastfeeding (34% and 40%), Vitamin A supplementation (80% and 90%) and measles vaccine (85% and 90%).<sup>10</sup> The 2010 figures shown in Table 3.1 were developed by the programmes as part of their scorecard intervention action planning.

Note that currently intervention targets are not harmonized, for example 2010 coverage target is 75% for pneumonia, 80% for malaria, and 85% for diarrhoea, even though programmatically it would be expected that coverage targets move in unison. Further work may be needed to harmonize targets for interventions with the same delivery channels.

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<sup>10</sup> Refer to CCSS, Table 5. These figures are reportedly from the National Strategic Development Plan 2006-2010.

**Table 3.1: Scorecard interventions with indicators and targets**

| Scorecard Interventions                  | Indicator  | Current coverage estimate   |                               | Coverage target used for costing (based on CCSS) |                  |
|--|--|-----------------------------|-------------------------------|--|------------------|
|  |  | CDHS 2005 <sup>a</sup>      | 2006 estimate used in costing | 2007 target                                      | 2010 target      |
| <b>Early initiation of breastfeeding</b> | Proportion of children born in the last 12 months who were breastfed within one hour of birth                    | 35% <sup>e</sup>            | 40%                           | 45%  | 60%              |
| <b>Exclusive breastfeeding</b>           | Proportion of infants under 6 months exclusively breastfed   | 60%                         | 62%                           | 65% *  | 80%              |
| <b>Complementary feeding</b>             | Proportion of breastfed infants 6-9 months receiving semi-solid food   | 82%                         | 83%                           | 85% *  | 95%              |
| <b>Vitamin A</b>                         | Proportion of children 6 to 59 months receiving one dose Vitamin A past 6 months                                 | 35%                         | 76% <sup>b</sup>              | 80%  | 85%              |
| <b>Measles vaccine</b>                   | Proportion of infants receiving dose of measles vaccine <sup>11</sup>  | 77%                         | 84%                           | 86% *  | 92%              |
| <b>Tetanus toxoid</b>                    | Percentage of pregnant women who received at least two TT doses (during pregnancy) <sup>12</sup>                 | 77%                         | 73%                           | 75% *  | 80%              |
| <b>Insecticide-treated nets (ITNs)</b>   | Proportion of children who slept under ITN previous night  | 9% <sup>f</sup><br>(3%-38%) | 20%                           | 80% *  | 80%              |
| <b>Malaria treatment</b>                 | Proportion of children living in malaria endemic areas with fever in the last 2 weeks who received anti-malarial | 62% <sup>g</sup><br>(2%)    | 31%                           | 85% *  | 95%              |
| <b>Dengue vector control</b>             | Number of positive breeding sites per 100 households surveyed  | N/A                         | 181 sites <sup>c</sup>        | 80 sites   | <10 sites        |
| <b>Oral rehydration therapy (ORT)</b>    | Proportion of children with diarrhoea in the last 2 weeks who received ORT                                       | 59%                         | 59%                           | 70% *  | 85%              |
| <b>Antibiotic for pneumonia</b>          | Proportion of children with fast or difficult breathing in the last 2 weeks who received medical care            | 57% <sup>d</sup>            | 57%                           | 62% *  | 75%              |
| <b>Skilled birth attendance</b>          | Proportion of deliveries attended by skilled birth attendant   | 42%                         | 50%                           | 55% * <sup>h</sup>                               | 70% <sup>h</sup> |

\* Indicates that coverage target differs from original CCSS.

<sup>a</sup> Cambodian Demographic and Health Survey (CDHS) 2005 Report, ORC Macro, July 2006

<sup>b</sup> The Cambodia Health Information System (CHIS) indicated 72% coverage for Vitamin A in 2005. The figure of 76% for 2006 was estimated by the NNP based on the CHIS figure and assumes an increase from 2005. The figure of 35% in the CDHS 2005 and probably reflects a different indicator from that used in the CHIS.

<sup>c</sup> The figure of 181 sites per 100 houses is the figure shown for the year 2000 in the CCSS

<sup>d</sup> Includes fever

<sup>e</sup> The CDHS 2005 figure of 35% for early initiation for breastfeeding was provided by the NNP.

<sup>f</sup> The figures for ITNs shown under the CDHS 2005 column are from the CDHS 2000 as shown in the CCSS. The rate of 9.2% is the national average. In the provinces with high malaria transmission ITN coverage ranged from 3% to 38%.

<sup>g</sup> The figures for malaria treatment under the CDHS 2005 column are from the CDHS 2000 as shown in the CCSS. The rate of 62% is the proportion of children in three provinces with malaria transmission who received any anti-malaria drug. The figure of 2% is the proportion of children who received ACT.

<sup>h</sup> Note that the Skilled birth attendance intervention could not be costed during the exercise described in this report

<sup>11</sup> These are the targets for first dose of measles vaccine.

<sup>12</sup> These are the targets for routine delivery of tetanus toxoid vaccine.

The expected impact of each of the above interventions on child mortality has been estimated at a global level and is shown in Table 3.2. Implementing the 12 scorecard interventions at the global level would result in a reduction in the preventable under-five mortality by 62-90%, according to the numbers provided in the Lancet child survival series. These numbers refer to *preventable* deaths, i.e. the percentage of all child mortality (63% according to the authors in the Lancet series) that can be prevented with universal coverage and maximum efficacy of interventions (universal coverage is defined in the Lancet series as 99% for all interventions except for exclusive breastfeeding for which the target is 90%). To get an estimate of the total reduction in child mortality, we therefore multiplied the estimates by 63% as shown in the table below.<sup>13</sup>

**Table 3.2: Potential child mortality reduction for key interventions included in CCSS cost estimate (based on Lancet child survival series)**

| Intervention                              | Potential global child mortality reduction with universal coverage of intervention (90-99%) |  |  | CCSS comparison                |
|---|---|--|--|--------------------------------|
|   | Mean global coverage increase <sup>(1)</sup>  | Reduction as % of preventable child mortality <sup>(1)</sup> | As % of total child mortality <sup>(2)</sup> | National coverage increase     |
| <b>Early initiation of breastfeeding</b>  | N/A   | N/A  | N/A  | 40 to 60%                      |
| <b>Exclusive breastfeeding</b>            | 90 to 90%   | 13%  | 8%   | 62 to 80%                      |
| <b>Complementary feeding</b>              | N/A   | 6%   | 4%   | 83 to 95%                      |
| <b>Oral Rehydration Therapy (ORT)</b>     | 20 to 99%   | 15%  | 9%   | 59 to 85%                      |
| <b>Antibiotic for Pneumonia/ARI</b>       | 40 to 99%   | 7%   | 4%   | 57 to 75%                      |
| <b>Insecticide Treated Nets</b>           | 2 to 99%  | 7%   | 4%   | 20 to 80%                      |
| <b>Malaria Treatment</b>                  | 29 to 99%   | 5%   | 3%   | 31 to 95%                      |
| <b>Vitamin A supplementation</b>          | 55 to 99%   | 2%   | 1%   | 76 to 85%                      |
| <b>Measles immunization</b>               | 68 to 99%   | 1%   | 1%   | 84 to 92%                      |
| <b>Tetanus Toxoid immunization</b>        | 49 to 99%   | 2%   | 1%   | 73 to 80%                      |
| <b>Skilled birth attendance</b>           | Not included in the costing   |  |  |                                |
| <b>Total reduction (sum of the above)</b> |   | <b>58%</b>   | <b>35%</b>                                   |                                |
| <b>Denominator</b>                        | People in need of intervention  | Preventable mortality  | Total child mortality                        | People in need of intervention |

<sup>(1)</sup> Jones et al., Lancet (2003)

<sup>(2)</sup> The reduction stated in the Lancet Child Survival series refers to the percentage of all child mortality (63%) that can feasibly be reduced at universal coverage (90-99%) and maximum efficacy of interventions. To get an estimate of the total reduction in child mortality, we therefore multiplied values in the second column by 63%.

<sup>13</sup> For example, if 100 children are dying per year, 63 of those deaths can be prevented through the interventions identified in the Lancet series. Out of these 63 preventable deaths, 13% can be prevented through exclusive breastfeeding. This means that 8 out of 100 deaths can be prevented through exclusive breastfeeding.

The impact of the interventions under the CCSS on child mortality is expected to be less than the Lancet estimates shown in Table 3.1 since 2010 coverage targets in the Cambodian operational plans are lower (60-95%) than the universal coverage percentages (90-99%) used to derive the numbers in Table 3.1. Regardless of this, targets set by the national programmes are ambitious, ranging from 60% for early initiation of breastfeeding to 95% for complementary feeding and malaria treatment.

The high impact interventions at the global level (and in the CCSS) are appropriate to combat the leading causes of child mortality in Cambodia described in Section 1.1: namely, neonatal causes (30%), pneumonia (21%), diarrhoeal disease (17%) and the underlying issue of under-nutrition.

While about one third of current causes of child mortality may be addressed by the 11 scorecard interventions costed (35% in Table 3.1), the inclusion of the skilled birth attendance intervention will increase the total proportion of lives that can be saved with successful implementation of the strategy. Note that the management of newborn conditions, which is the most significant cause of child deaths in Cambodia, is critical. Other well-known factors determining child survival include female education, water and sanitation, and economic growth, and an improvement in these factors will also contribute to improved child survival.

A recent WHO-supported study shows that the interventions selected under the CCSS are cost-effective when carried out in the Cambodian context. The study indicates that cost-effective combinations of child survival interventions include the promotion of breast-feeding, introduction of community-level skilled birth attendants, IMCI, community case management of child diseases, and neonatal attendance both at community level and facility-level, and shows how the addition and expansion of these interventions present a cost-effective and feasible approach to reducing child mortality.<sup>14</sup>

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<sup>14</sup> Louis Niessen *et al.*, “Stepwise national priority setting in child intervention programmes: sectoral cost-effectiveness analysis for Cambodia,” final draft paper (forthcoming), Institute for Health Policy and Management/ Institute for Medical Technology Assessment, Erasmus MC, Erasmus University Rotterdam, Netherlands, and World Health Organization.

## 4. General Methodology

### 4.1 Organization

The responsibilities for achieving the 12 scorecard interventions are divided among seven national MOH programmes (see Table 4.1 below). Five of the programmes have primary responsibility for their interventions. In the case of ORT and ARI, however, the responsibility is shared between the IMCI Secretariat and the NPADC.

**Table 4.1: Distribution of scorecard interventions across national programmes**

| National Programme or Department  | Interventions for which responsible   |
|---|---|
| National Nutrition Programme (NNP)  | <ul style="list-style-type: none"> <li>• Feeding               <ul style="list-style-type: none"> <li>- Early initiation of breastfeeding</li> <li>- Exclusive breastfeeding</li> <li>- Complementary feeding</li> </ul> </li> <li>• Vitamin A</li> </ul> |
| National Immunization Programme (NIP)   | <ul style="list-style-type: none"> <li>• Measles immunization</li> <li>• Tetanus Toxoid immunization for pregnant women</li> </ul>  |
| National Malaria Control Programme (NMCP)   | <ul style="list-style-type: none"> <li>• Insecticide-treated nets (ITNs)</li> <li>• Malaria treatment</li> </ul>  |
| National Dengue Control Programme (NDCP)  | <ul style="list-style-type: none"> <li>• <i>Aedes aegypti</i> vector control</li> </ul>   |
| Integrated Management of Childhood Illness (IMCI) Secretariat of the Department for Communicable Disease Control (CDC), and National Programme for ARI, Diarrhoea and Cholera (NPADC) of the Maternal and Child Health (MCH) unit | <ul style="list-style-type: none"> <li>• Oral rehydration therapy (ORT)</li> <li>• Antibiotic for pneumonia/acute respiratory infection (ARI)</li> </ul>  |
| National Reproductive Health Programme (NRHP)   | <ul style="list-style-type: none"> <li>• Skilled birth attendance<sup>15</sup></li> </ul>   |

Each programme has scorecard and non-scorecard interventions and also has shared activities that benefit more than one intervention. While the primary objective was to estimate costs for the scorecard interventions, some of the programmes asked the costing team to assess costs for non-scorecard interventions as well, to ensure that the plans would be comprehensive. It was therefore necessary to review all activities for each programme, and to cost all those that contribute directly and indirectly to the scorecard interventions.

The costing was organized by programme to enable the production of cost estimates for both scorecard and shared interventions, and to include supportive activities included in programme plans and the non-scorecard interventions as far as possible.

The activities under the scorecard interventions were grouped and costed in the following ways:

- *Intervention-specific activities and costs* - Activities that relate only to one scorecard intervention – costs allocated to the intervention;

<sup>15</sup> According to the CCSS this includes both maternal care and care of the newborn at birth.

- *Non-scorecard activities and costs* -Activities that relate to other (non-scorecard) interventions – costs were determined when requested and where possible, but these estimates were not allocated to scorecard interventions, and are not included in the total estimate presented in this report;
- *Shared activities and costs* - Activities that relate to more than one intervention, of which at least one is a scorecard intervention – the costs were shared among interventions using factors appropriate for each programme.

## **4.2 Planning process and challenges**

The Scope of Work for this costing study assumed that a Child Survival Operational Plan would have been developed based on the CCSS. When the costing study commenced in November 2006, the Operational Plan was far from complete. There was no comprehensive plan covering all the related programmes and some of the individual programme plans had not yet been completed.

The costing team, therefore, worked with programme managers, staff and advisors to review their targets and review or develop their proposed activities. In some cases the activities were already included in other plans and in other cases they were determined during the course of the costing work.

Where possible, existing plans were used as the bases for the costing work. This reduced the workload and made it easier for the programme managers to be involved. However, the different formats used resulted in some differences in the classification of activities and groupings of costs across the programmes.

For any plan to be costed, it is necessary that the objectives, activities, and required resources are clearly stated and quantified. Unfortunately, this was initially the case only for the immunization and malaria interventions, where detailed proposals had been recently prepared for submission to major donors. Moreover, in the case of immunizations, plans were changed significantly while the costing exercise was under way. With only four weeks available for the whole assignment, the assistance provided to some of the programmes to prepare or complete their plans, combined with the later completion of some plans, reduced the time available for the actual cost calculations.

In order to ensure that the plans are linked to programme targets, it is also important that the plans set yearly targets for each activity and quantify the contribution that each activity is expected to make to reaching the programme objective. The plan and costs will then reflect a needs-based approach taking into account the resources needed to reach the objectives. Such linkages are especially important for activities that focus on selected districts. Unfortunately this was not done for all activities, and without such an analysis it is not clear that the planned activities are sufficient to enable the targets to be reached.

The costing team was unable to meet with the NRHP manager until late in the costing exercise. It was then discovered that no action plan had been prepared for the reproductive health

interventions. The NRHP had developed a national strategy early in 2006 but has not prepared a strategic action plan. The NRHP has proposed to conduct the planning and costing of all its programme activities in 2007 with support from UNFPA, but does not expect to complete the costing until the end of 2007. This delay is unfortunate, given that the reproductive health interventions are critical and that other programme activities are needed to support some of the other CSSP interventions. In discussions with NRHP, the main activities were defined and some targets were set but information could not be obtained on the costs.

### **4.3 Sources**

The main sources used for the costing were the Cambodian Child Survival Strategy document and the plans and budgets of the key MOH programmes. These were supplemented by additional information provided by the programmes and by partners. The plans and budgets used included:

- The Child Survival Strategy for 2006-2015.
- The Health Sector Strategic Plan (HSP) for 2006-2010, which relates directly to the National Strategic Development Plan prepared for all areas of government.
- The draft MOH three-year rolling plans for 2007-2009 and Annual Operational Plans (AOP).
- Specific programme plans and budgets prepared to access donor funds.

All programmes are requested by the MOH and Ministry of Finance to develop Annual Operational Plans (AOPs) and three-year rolling plans, outlining objectives, activities and estimated costs. The annual operational plan makes up the first year of the programme's three year rolling plan. While the second and third year plans are less detailed, the AOP is prepared at a greater level of detail with regards to activities and budget. AOPs are prepared for each Ministry of Health department, national programme, national institute and national hospital. Each Provincial Health Department also prepares an AOP and produces a composite plan for its Operational Districts<sup>16</sup>. Each Operational District also prepares a plan for its Office and produces a composite plan for its Referral Hospitals and Health Centres. The AOPs are linked with the health sector strategic plan, to ensure that the 20 strategies of the strategic plan are reflected in annual operational plans. The AOPs are intended to be comprehensive and include national programme activities as well as those supported by non-governmental agencies, international agencies and other partners. They are intended to be developed jointly with all relevant stakeholders and include activities funded by non-governmental and international organizations.

While the AOPs provide useful information for the production of CCSS cost estimates, they mainly summarize activities carried out by the programme in terms of supporting implementation at national, PHD, OD and HC level, and they do not necessarily contain all intervention related data needed for costing, specifically with regards to actual service delivery.

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<sup>16</sup>The term "district" used in this report refers to the Operational District (OD) used for health. This is different from the general district classification used for administrative purposes by Government. There are 77 ODs compared to 185 administrative government districts.

To clarify, the AOPs do not necessarily specify clinical intervention coverage targets, where interventions are to be delivered, or by what providers.

Another limitation of the rolling plans and AOPs for the purpose of this exercise is that they are, reportedly, prepared in accordance with available funds and not on the basis of the activities needed to reach the set coverage targets. It was required however that the costing of the operational plans for the scorecard interventions should be needs-based, and linked to the scorecard targets. This meant that the operational plans needed to be further developed to include both maintaining and scaling-up ongoing activities and/or adding new activities. Potential resource constraints were sometimes considered in the costing, but the focus was on defining the costs for activities needed to implement the CCSS, with little consideration of availability of funding.

A third limitation was the absence in some cases of clear linkages between objectives, targets, activities and costs in the existing plans and budgets. These linkages are important for ensuring that the funding needs identified are sufficient to enable the targets to be reached<sup>17</sup>.

#### **4.4 Quantification of targets**

The CCSS sets targets for increased coverage. The denominator for the coverage targets is *the population in need*, which varies among interventions. For example, while children are the denominator of breastfeeding, child bearing age women are the denominator for tetanus toxoid immunizations, and dengue control interventions focus on households.

In addition, some programmes have focused elements of their plans on selected provinces or districts, for example:

- Vitamin A: the approach varies between ODs, depending on their coverage levels
- Management of ARI: different case management assumptions were used for remote and non-remote areas in the costing
- Malaria: ITNs are costed in specific geographic areas only, where there is malaria risk.

##### ***Intervention-specific coverage targets***

The targets from the scorecard were converted into numbers of persons to be reached (e.g., numbers of children breastfed or receiving Vitamin A). These numbers were used to estimate the quantities of resources needed, such as commodities. The numbers were also used to calculate scale-up factors – the increases in the numbers of persons to be reached between 2006 and 2010. The scale-up factors are based on changes in target coverage levels and estimated population growth. These factors are not directly comparable across interventions since the starting coverage levels differ considerably, but they do give some indication of the additional effort required for each intervention.

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<sup>17</sup> There was not sufficient time to work with some of the program teams on setting targets for activities and linking those targets to the overall targets for the interventions. This is important for all activities, but especially important for activities that are focused on certain districts, where targets should be set for those districts and linked to the national targets. An example would be the strengthening of Vitamin A program in districts that have low coverage.

The population figures used in setting the targets and estimating the costs were provided by the respective MOH programmes. The National Malaria Control Programme used different figures, since at-risk groups are specific to certain provinces—specifically, people who live in or close to forested areas. Similarly, the National Dengue Control Programme had a district-specific population list that it used as a basis for determining the population that lived in a high-risk area. However, wherever possible, national estimates for population growth were used.

#### ***Programme implementation support targets***

Targets were also set for programme implementation support activities, such as training of health workers, IEC at village level, etc. These targets are set by the individual programmes in their actions plans. Ideally these programme implementation support targets should be linked to the intervention-specific coverage targets, but there is limited evidence available on which to base such linkages. In most cases, ensuring that implementation support targets are set higher than the interventions coverage targets ensures that the coverage targets should be reached.

## **4.5 Tools**

The cost estimates for the immunization interventions were prepared using the WHO/UNICEF cMYP Costing and Financing Tool, which is regularly used by NIP to determine immunization costs. The WHO child health cost estimation tool was used to estimate service delivery inputs and commodity costs for scaling up management of diarrhoea and pneumonia. The costs for the malaria programme were based on spreadsheets developed by the programme for a recent Global Fund proposal. The costs for the other programmes were estimated by modifying and expanding the planning format developed by the MOH and WHO/Cambodia for the scorecard interventions and by linking this format to subsidiary plans prepared by the programmes. It was considered that this format would make it easier for the programme managers to understand and update the information since they were already familiar with it. The summary plan and costs are contained in an MS Excel workbook and can be updated as required.

In most cases the programme managers and advisors were familiar with the tools used and worked along with the costing team members in using them to determine the costs. Unfortunately, members of the Planning and Finance Departments of the MOH were unable to participate in the study due to other commitments.

## **4.6 Costing approaches used**

### ***Total costs***

According to the terms of reference for this study, the purpose was “to develop cost estimates, in collaboration with the Cambodia MOH and other partners, regarding nation-wide scaling up of the Child Survival Scorecard Interventions and the cost of implementing activities contained in the Child Survival Operating Plan”. However, the activities outlined in the Child Survival Operating Plans are *all* the activities that need to be carried out to scale up the interventions from the 2006 coverage levels to the 2010 targets and not just the additional activities required to scale

up beyond current coverage levels<sup>18</sup>. The costs related to these activities are, therefore, total costs and not just measures of the incremental resources required to implement the additional activities. In theory, these total costs could have been used to calculate the incremental costs by comparing them with the estimated actual expenditures incurred in 2006. However, the 2006 expenditure figures were not all complete and were not all considered reliable.

### ***Scale-up scenarios***

It should be noted that the original terms of reference for this study proposed estimating the cost of scaling-up to 100% coverage. However, this was not possible since the targets included in the operating plans for 2010 were less than 100% coverage. The terms of reference also included estimating the costs of achieving different lower levels of coverage. This was also not possible since the programmes did not determine activities for levels of coverage other than those expressed in their targets<sup>19</sup>.

### ***Public provider perspective***

The costing was based entirely on the activities included in the action plans developed by the programmes for the scorecard interventions. These plans focused mainly on major activities to be carried out by the public sector and the multi-lateral organizations and some non-governmental organizations (NGOs). Costs of activities carried out by private for-profit organizations were generally not explicitly included,<sup>20</sup> and costs to households seeking care—such as transport, accommodation and lost income—were not included at all. Costs that may need to be budgeted under the MOH in the future, such as patient transport from health centres to hospitals, were, however, included even if these costs are currently borne by households.<sup>21</sup>

### ***CCSS activities versus all child health activities***

Where possible, costs were developed for all programme interventions and activities so that the programme managers could see the total costs for their programmes as well as the total funds required to implement the scorecard interventions. Each programme carries out activities that extend beyond the scorecard interventions. Programme managers shared and discussed their cost estimates for each activity based on their past experience, and decided on the allocation of costs for shared activities.

### ***Ingredients approach***

An ingredients approach (Price times Quantity) was generally used, although for some activities the programmes provided lump sum estimates, such as for BCC activities and planning/review meetings.

### ***Allocation of costs***

Where activities could be identified as relating directly and uniquely to an intervention the costs were allocated fully to the intervention. When costs are shared among different interventions,

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<sup>18</sup> Note, “all activities” here refer to all activities included in the MOH plans, and not all activities required in the strictest sense, since this would include not only service delivery costs but also household level activities as well as strengthening the general health system.

<sup>19</sup> In general there is limited evidence available on how program activities are linked to intervention coverage.

<sup>20</sup> Private for-profit providers are included in some cases to the extent that providers have not been differentiated.

<sup>21</sup> For example, transport costs for referring severely ill children to hospital level, which were included in the ARI and Diarrhoea estimates.

these costs were allocated to the related interventions based on allocation factors. These allocation factors varied between the programmes and are based on information provided by the programmes. Examples of allocation factors used include:

- *Need* – ITNs are fully allocated to child survival on the basis that full coverage of ITNs across the population is needed to reach the child survival target.
- *Provision of services* – shared costs for immunizations are allocated to measles and TT based on their relative share in total number of vaccines estimated to be provided in 2007.
- *Disease burden* – 10% of total malaria treatment costs allocated to under-five malaria treatment based on population age distribution.

Where there were limited data to use as basis for allocation, shared costs were generally allocated equally across the relevant interventions<sup>22</sup>.

### ***Time period***

As noted above, the intention was to cost the activities included in the Child Survival Operational Plan for 2006-2010. However, when the costing started in November, 2006, the first year of the five years was almost over and implementation of the Operating Plan had not started. It was, therefore, decided to only cost the activities required to achieve the scale-up targets for the remaining four years of the plan (2007-2010) using 2006 as the baseline year. When possible, costs were also prepared for activities carried out in 2006 for the purpose of comparison. These 2006 estimates are a mix of budgeted expenditures (programme costs), and unit costs multiplied by the number of resources estimated to have been used for current delivery (commodities).

### ***Type of cost estimates produced***

The cost of each scorecard intervention was analyzed for each of the years in different ways:

- *Total cost* – the cost of all the activities related to the intervention;
- *Unit cost* – the total cost for each year divided by the target number of persons reached by the intervention.

Unit costs are only compared over time for each intervention. Comparisons of unit costs across interventions are not valid since the costs are incomplete and the denominator (e.g., per child or per service delivered) varies among interventions. For this reason unit costs are only shown under the section for each intervention and are not shown in section 12 summarizing the Findings.

There was insufficient time and information to prepare a detailed analysis of the costs by type of resource purchased (e.g., transport, per diem, training materials) but it would be useful to perform this analysis as a follow-up study. Note that the figures include both recurrent and capital or “one-off” costs and separating these would help to project costs more accurately after 2010<sup>23</sup>.

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<sup>22</sup> One alternative of allocating the shared costs in proportion to the direct cost of each intervention was generally not possible because the team was not able to determine all the direct costs for all the non-scorecard interventions.

<sup>23</sup> For example if the base year costs include a large cost for vehicles and the following year does not, the incremental cost could appear negative.

**Health system constraints**

There was not sufficient time to prepare a detailed cross-cutting analysis of the interventions that would help to identify any constraints such as limitations on programme staff time, interdependencies of activities and interventions, and any potential cost-savings from sharing resources.

**Currency units and inflation**

All the costs are shown in US dollars. In some cases the costs were estimated in US\$ and in others they were converted from Cambodian Riels (see the table in Annex 3 which shows the parameters used for each programme). The costs were based on 2006 prices and inflation of 2% was applied to those costs in each subsequent year. For example, if the programme estimates that \$100 is needed for a particular commodity in 2006, it is assumed that the commodity will cost 2% more in 2007, which comes to \$102. Similarly, it is assumed that in 2008 the commodity would cost another 2% more, which comes to just over \$104. Prices are therefore not shown in absolute comparative formats from one year to the next, since they refer to the estimated US\$ currency value in different years.

**Geographical variations**

The estimation of costs has not taken into account any variations in costs across geographical areas, for example, in remote areas where transport is more expensive.

**4.7 Cost components included and not included**

The activities included in the plans varied significantly from one intervention to another, which meant that the types of costs included also varied. Table 4.2 lists the types of costs and whether they are generally included or not. Further details are shown in Annex 3.

As shown in the table, service delivery costs are not generally included in the scorecard intervention costs. The exceptions are where certain elements were already included, such as in the proposal prepared to GAVI for immunizations (see details under section 6).

**Table 4.2: Cost components included and not included in the study**

| Types of costs  | In study                                  |
|---|---|
| <b>1. Patient service costs</b><br>These are costs incurred during delivery of the intervention to a person in need. The costs may be either intervention-specific or shared costs    |   |
| <b>(a) Intervention-specific costs</b> (also referred to as <i>direct costs</i> in this report)<br><i>Commodities</i><br>Drugs, vaccines, ITNs, diagnostic tests and medical supplies | Generally included                        |
| <i>Referral support</i><br>Transport from primary health care to referral care facility   | Generally excluded (exception on page 78) |

| Types of costs  | In study  |
|---|---|
| <p><i>Service delivery costs (service delivery platform)</i><br/>           Costs for consultation time are sometimes intervention-specific, and include:</p> <ul style="list-style-type: none"> <li>• salaries and per diems of health workers</li> <li>• operating costs such as transport, utilities and repairs</li> <li>• additional infrastructure (intervention-specific vehicles and equipment)</li> </ul> <p>(An example of where these can be estimated for one specific intervention is when there is a "vertical" activity such as a malaria outreach programme for ITN distribution, carried out by community health workers who receive a payment from the national malaria programme for carrying out these specific tasks.)</p>   | <p>Generally excluded (exception being NIP and malaria workers)</p> |
| <p><b>(b) Shared costs</b><br/> <i>Service delivery costs (service delivery platform)</i><br/>           Costs for inputs provided during a consultation are often shared between interventions, and include:</p> <ul style="list-style-type: none"> <li>• salaries and per diems of health workers</li> <li>• operating costs such as transport, utilities and repairs</li> <li>• additional infrastructure (programme-specific vehicles and equipment)</li> </ul> <p>(An example of where these are shared between interventions is curative care for malaria, pneumonia and diarrhoea which is done by multipurpose health workers at facility level, and these resources are shared between many different interventions provided.)</p>   | <p>Generally excluded</p>   |
| <p><b>2. Programme costs (implementation support activities)</b><br/>           Costs related to activities undertaken by the national programme. Costs are usually not directly related to patient contact, but refer to supporting the entire system of implementing quality accessible care.<br/>           Examples of activities include:</p> <ul style="list-style-type: none"> <li>• Developing intervention-specific guidelines</li> <li>• Training health workers with clinical guidelines</li> <li>• Coordination work</li> <li>• Supervision at district level, first referral care level hospitals, primary level health centres, and community health workers</li> <li>• Training staff in monitoring and evaluation</li> <li>• Formative research and development of IEC materials</li> <li>• Community mobilization activities to raise awareness through media (radio and TV time) and printed material (posters, fliers)</li> </ul> <p>* Note that programme costs can be either <b>intervention-specific/direct</b> (e.g., training health workers in diarrhoea management is only relevant for the diarrhoea management intervention) or <b>shared</b> between different interventions (e.g., general monitoring and evaluation of malaria interventions, which is shared between ITN distribution, vector control and treatment and care activities).</p> | <p>Generally included</p>   |

| Types of costs  | In study                    |
|---|-----------------------------|
| <p><b>3. Health system costs</b><br/>           Costs related to the entire health system, beyond specific programmes.<br/>           This refers to the construction of physical capital such as</p> <ul style="list-style-type: none"> <li>• buildings (e.g., hospitals, health centres, health posts)</li> <li>• human capital, including doctors and nurses.</li> <li>• vehicles</li> </ul> | Excluded from this exercise |

For some interventions, the scaling up will require significant increases in health service delivery and health promotion activities at community and health centre level. To estimate the additional resources required entails a detailed analysis of all elements of the service delivery system, which was not possible under this study. It is, therefore, recommended that this be done as a separate study.

MOH-funded programme costs at the central, provincial and district levels, such as salaries and utilities, are not included under shared costs for all the programmes<sup>24</sup>. Additional costs for administering funds may also be required, depending on the channels selected for financing and managing funds.<sup>25</sup> Such costs have not been included in this study.

#### 4.8 Using the results of previous studies

Some previous studies on costs carried out in Cambodia were also reviewed. Their usefulness was, however, limited for this particular study which looks at intervention-specific costs. For example, the WHO supported Fabricant study (see Section 12.5) produced average costs for services at health centres and hospitals, but did not break the costs down to the intervention level. Also, that study does not specify specific commodity/resource needs (e.g., quantity of antibiotics or Vitamin A needed by year). A National Health Accounts exercise would have provided useful comparable information but has not yet been prepared for Cambodia.

#### 4.9 Presentation of costs

The costs of the scorecard interventions are shown for each programme in the following sections (5-10). The methodology used and presentation of the costs varies somewhat across the programmes, which reflects the different structures of plans and costs already developed by the programmes. The differences on methodology are shown in a table of parameters in Annex 3.

<sup>24</sup> The study by Fabricant *et al.* shows total costs for 2002 for some of the national programs but they are somewhat out of date now and there is not sufficient detail to use those figures for forward projections.

<sup>25</sup> For example, Hardeman *et al.*, *Health Policy and Planning*; 19(1): 22–32, 2004, found that the cost of the NGO managing the Health Equity Fund represented 40% of the total cost (i.e., a mark-up of 40% for administration coverage to the poor).

Resource needs are presented in the following formats:

- **Total cost** per scorecard intervention
- **Total cost** for the national programme responsible for the scorecard interventions

Furthermore, total costs per scorecard intervention/programme are broken down into:

- **Intervention-specific/direct costs** (those costs which are specific for that intervention) (see Table 4.2).
- **Shared costs** (those activities which provide overarching support to several interventions, and therefore costs are shared between interventions).

Yet another breakdown is that of commodity costs vis-à-vis *programme implementation support activities*:

- **Commodity costs** include drugs, injection supplies, lab tests, etc.
- **Programme implementation support costs** (programme costs for short) are those activities that refer to supporting the entire system of quality accessible care, such as in-service training of health workers in IMCI, and holding review and coordination meetings.

Moreover, costs are presented as:

- **Unit cost** per scorecard intervention - the cost per person reached or per service which is provided.

## 5. Nutrition intervention costs

### 5.1 Introduction

The National Nutrition Programme (NNP) has 5 programmes, which are as follows:

- Infant and Young Child Feeding Programme (IYCF)
- Vitamin A Deficiency Programme
- Anaemia Prevention and Control Programme
- Iodine Deficiency Disorders
- MPA 10 and Growth Monitoring and Growth Promotion (Minimum Package of Activities - Nutrition Module)

The first of these programmes, the IYCF, has 5 interventions:

- Promotion of early initiation of breastfeeding
- Exclusive breastfeeding promotion
- Complementary feeding promotion
- Feeding for sick children
- Care for severely malnourished children

The CCSS scorecard includes four nutrition interventions. The first three are under the IYCF programme and the fourth is the Vitamin A Deficiency Programme. The CCSS interventions and their indicators are as follows:

- *Promotion of early initiation of breastfeeding* - the proportion of children born during the last 12 months who were breastfed within one hour of birth.
- *Exclusive breastfeeding promotion* – the proportion of infants under 6 months old exclusively breastfed.
- *Complementary feeding promotion* – the proportion of breastfed infants aged 6-9 months receiving semi-solid food.
- *Vitamin A supplementation* – the proportion of children aged 6-59 months who received one dose of Vitamin A during the last 6 months.<sup>26</sup> Vitamin A supplementation is the only sub-programme under the Vitamin A Deficiency Programme.

The three feeding interventions have outcome indicators that reflect changes in behaviour expected to result from health sector activities such as communication and counselling (although the cost of counselling time is not included in the scorecard costs presented here). The Vitamin A supplementation intervention has an output indicator that relates directly to the provision of services.

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<sup>26</sup> Note that Vitamin A for post-partum women was not included in this indicator but was included under the scorecard intervention in the NNP's plan. The cost of Vitamin A capsules for post-partum women was included in the scorecard costing but the amounts are not significant.

These interventions are expected to have a significant impact on reducing child mortality (Table 3.2.) and, as noted in Section 1.1, under-nutrition is considered the single most important risk factor in child health in Cambodia.

The estimated actual coverage figures for 2006 and the targets 2007-2010 were determined by the NNP manager and staff with the help of their advisors (Table 5.1), and activities were reviewed and further developed to achieve these targets. The activities and costs can be seen in detail in the table of activities shown in Annex 4.

**Table 5.1: Targets and scale-up factors for nutrition interventions**

| SUMMARY OF SCORECARD TARGETS   | Estimated 2005 | Estimated 2006 | Target 2007 | Target 2008 | Target 2009 | Target 2010 | Scale-up factor 2006 2010 |
|--|----------------|----------------|-------------|-------------|-------------|-------------|---------------------------|
| Total children under 5 per national projections                              | 1,694,990      | 1,739,585      | 1,785,178   | 1,831,733   | 1,878,780   | 1,925,775   |                           |
| (a) Total children born (children aged 0-11 months) per national projections | 367,445        | 376,467        | 385,421     | 394,817     | 404,028     | 412,904     |                           |
| Total children under 5 per Vitamin A projections                             | 2,043,425      | 2,083,937      | 2,125,801   | 2,169,081   | 2,213,747   | 2,259,751   |                           |
| (b) Total children aged 6-11 months per Vitamin A projections                | 193,297        | 197,129        | 201,089     | 205,183     | 209,409     | 213,760     |                           |
| (c) Total children aged 12-59 months per Vitamin A projections               | 1,656,831      | 1,689,678      | 1,723,622   | 1,758,714   | 1,794,930   | 1,832,231   |                           |
| (d) Total post-partum women per Vitamin A projections                        | 386,594        | 394,258        | 402,179     | 410,367     | 418,817     | 427,520     |                           |
| Early initiation of breastfeeding - %  | 35%            | 40%            | 45%         | 50%         | 55%         | 60%         |                           |
| Early initiation of breastfeeding - number of children based on (a)          | 128,606        | 150,587        | 173,439     | 197,409     | 222,215     | 247,742     | 65%                       |
| Exclusive breastfeeding - %  | 60%            | 62%            | 65%         | 70%         | 75%         | 80%         |                           |
| Exclusive breastfeeding - number of children based on (a)                    | 220,467        | 233,410        | 250,524     | 276,372     | 303,021     | 330,323     | 42%                       |
| Complementary feeding - %  | 82%            | 83%            | 85%         | 88%         | 92%         | 95%         |                           |
| Complementary feeding - number of children based on (a)                      | 301,305        | 312,468        | 327,608     | 347,439     | 371,706     | 392,259     | 26%                       |
| Vitamin A - children - %   | 72%            | 76%            | 80%         | 82%         | 84%         | 85%         |                           |
| Vitamin A - children - number of children based on (b) plus (c)              | 1,332,092      | 1,433,974      | 1,539,769   | 1,610,396   | 1,683,645   | 1,739,092   | 21%                       |
| Vitamin A - postpartum women - %   | 49%            | 55%            | 61%         | 67%         | 73%         | 80%         |                           |
| Vitamin A - postpartum women - number of women based on (d)                  | 189,431        | 216,842        | 245,329     | 274,946     | 305,736     | 342,016     | 58%                       |

The estimated coverage figures for 2005 and 2006 are derived from different sources, as follows:

- Early initiation of breastfeeding. The CCSS shows a figure of 11% in 2000 based on the CDHS 2000. The 2005 CDHS Report reportedly shows a figure of 35%. The figure of 19% used for 2005 in the CCSS was based on a survey carried out by the BBC World Service Trust which assessed knowledge of mothers, not behaviour. The figure of 40% for 2006 was estimated by the NNP and assumes a reasonable increase from the 2005 figure of 35%.
- Exclusive breastfeeding. The CCSS shows a figure of 11% in 2000 based on the CDHS 2000 and a figure of 2% for 2003 based on the Seth Koma Follow-Up Survey (UNICEF 2003). There is no figure in the CCSS for 2005, but the 2005 CDHS shows a figure of 60% and this figure was used for 2005 in the NNP CCSS plan. The figure of 62% for 2006 was estimated by the NNP and assumes a slight increase from 2005.
- Complementary feeding. The CCSS shows a figure of 76% for 2000 based on the CDHS 2000 and a figure of 88% is shown for 2003 based on the Seth Koma Follow-Up Survey (UNICEF 2003). There is no figure in the CCSS for 2005, but the 2005 CDHS shows a figure of 82% and this figure was used in the NNP CCSS plan. The figure of 83% for 2006 was estimated by the NNP and assumes a slight increase from 2005.
- Vitamin A for children 6-59 months. The 2000 CDHS figure was 31% and the 2005 CDHS shows a figure of 35%. The 2005 figure of 72% used in the NNP CCSS plan was taken from the CCSS and was based on the Cambodia Health Information System

(CHIS). The CDHS and CHIS figures presumably reflect different indicators. The figure of 76% for 2006 was estimated by the NNP based on the CHIS figure and assumes a significant increase from 2005.

- Vitamin A for post-partum women. No figures were included in the CCSS for this intervention. The 2005 CDHS shows a figure of 27%. The figure of 49% for 2005 used in the NNP CCSS plan was estimated by the NNP and was based on the CHIS. The CDHS and CHIS figures presumably reflect different indicators. The figure of 55% for 2006 was estimated by the NNP based on the CHIS figure and assumes a significant increase from 2005.

The estimated actual coverage and targets were converted into numbers of persons served using population estimated shown in Table 5.1. Different population figures were used for the Vitamin A targets at the request of the NNP. The conversions were based on the indicator set for each intervention. For early initiation of breastfeeding, exclusive breastfeeding and complementary feeding the number of children born in the year was used as the total numbers of children in need of the intervention, and the target percentages were applied to those numbers<sup>27</sup>. For Vitamin A the number of children aged 6-59 months in each year was used as the total number of children in need and the target percentages were applied those numbers.

Scale-up factors were calculated for each of the interventions and are based on changes in target coverage levels and estimated population growth. They were calculated by taking the increase in numbers of persons served from 2006 to 2010 as a % of the 2006 numbers. The scale-up factors range from 21% for Vitamin A for children to 65% for early initiation of breastfeeding. In other words, to reach the 2010 target for Vitamin A for children will require increasing the number of children served by 21%, whereas to reach the 2010 target for early initiation of breastfeeding will require a 65% increase in the number of children covered by that indicator. These factors are not directly comparable across interventions since the starting coverage levels differ considerably, but they do give some indication of the additional effort required for each intervention.

It should be noted that the targets for the three feeding interventions are based on survey information and that measuring progress in reaching those targets would rely on further surveys. The Vitamin A intervention targets are, however, based on CHIS information and progress should be measurable using CHIS reports.

A good plan includes targets for each activity and quantifies the contribution that each activity is expected to make to the target for the related objective. This was done for certain activities, such as the provision of Vitamin A capsules, but there was not sufficient time to work with the NNP team on this for all activities. This is especially important for activities like the district strengthening of the Vitamin A supplementation, where targets should be set for the focus districts. The NNP should complete this, if possible. Such contributions should be estimated even where there is limited evidence to justify the amount, for example in the case of the contribution of BCC to improvements in breastfeeding practices.

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<sup>27</sup> In the case of complementary feeding the NNP objective is to promote complementary feeding starting at 6 months but the indicator only measures children aged 6-9 months.

## **5.2 Methodology**

The NNP had prepared several plans and these were used as the basis for preparing a summary plan and for estimating the costs. The main ones are the:

- IYCF plan, which sets out the activities for the breastfeeding and complementary feeding activities, including the Baby Friendly Hospital Initiative (BFHI) and Baby Friendly Community Initiative (BFHI), as well as the activities for sick and malnourished children. This is also supported by a more detailed malnutrition action plan.
- Vitamin A plan, which includes supporting activities by USAID (A2Z and Helen Keller International).
- MPA 10 plan which sets out the activities and priority districts for expanding and supporting the implementation of the minimum nutrition package in communities and facilities<sup>28</sup>. Planned activities include developing guidelines, training, support, supervision and monitoring.
- 3-year Rolling Plan – this was only used for reference since we were informed that the MPA 10 plan is a more current substitute for that plan.
- Central NNP strengthening plan – with training and equipment, etc., for the central NNP office.

The format developed by the MOH and WHO/Cambodia for laying out the plan was modified during the costing and expanded to show the annual targets and costs<sup>29</sup>. It was also considered that adapting the format developed by the MOH to show the costs would enable MOH to better understand and update the costs later on. The plans and costs are all contained in an MS Excel workbook and can be updated as required. An annual inflation increase of 2% was included for 2007 and subsequent years.

The focus of the planning and costing was on the four years from 2007 through 2010. Activities and costs were included for 2006 where available but are not complete and the totals for that year cannot be compared with the totals for later years.

The costs were based on activities relating to the four scorecard interventions included in the plans. The costs of activities that directly relate to the scorecard interventions were allocated fully to those interventions.

The cost of some activities for non-scorecard interventions was provided by the nutrition team. In these cases the costs were fully allocated to those interventions and included in the non-scorecard element of the NNP costing.

The costs of the remaining activities were shared across several interventions based on information provided by the NNP. In the absence of a more accurate basis<sup>30</sup>, these shared costs

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<sup>28</sup> The MPA 10 plan aims to strengthen the nutrition elements of the Minimum Package of Activities (MPA) in health centres and district hospitals. The MPA is a package of good quality basic health services which should be available to all citizens and implementing it is an important element of the Health Sector Strategic Plan 2003-2007.

<sup>29</sup> It was not considered worthwhile re-entering information into the WHO cost model especially since the only commodities are the Vitamin A capsules.

<sup>30</sup> One alternative of allocating the shared costs in proportion to the direct cost of each intervention was not possible because the team was not able to determine all the direct costs for the non-scorecard interventions.

were allocated equally across programmes and equally across interventions within programmes. Details can be seen in Annex 4 and are summarized as follows:

- The activity of Implementing the Marketing Sub-decree is related to all three of the feeding interventions and the cost has been allocated equally across the three interventions.
- The BFHI activities benefit the two breastfeeding interventions and the costs are allocated equally to each one.
- The BFCI activities relate to the two breastfeeding and the complementary feeding interventions, and these costs have been allocated equally over the three interventions.
- An activity relating to pre-service training on IYCF relates to the three feeding interventions and has been allocated equally over the three interventions.
- The MPA 10 activities relate to all five nutrition programmes and 20% (one-fifth) of these costs was allocated to each programme. The IYCF and Vitamin A Deficiency programmes were, therefore, allocated 20% of the costs each. Of the 20% allocated to the IYCF programme a further 20% (one-fifth) was then allocated to each of the five interventions under that programme. This comes to 4% of total MPA 10 cost per IYCF intervention.
- NNP management support activities relate to strengthening the central NNP and include training and workshops, office equipment, surveys and BCC. These costs were allocated to the interventions on the same basis as the MPA 10 costs. Twenty percent was allocated to the Vitamin A Deficiency intervention because it is the only sub-programme under the Vitamin A Deficiency Programme, and four percent was allocated to each of the feeding interventions.

Information was not available to estimate service delivery costs (e.g., health centre staff and transport) and NNP salary and routine operating costs and these, therefore not been included. This means that, for example, the cost of staff time for counselling on improved feeding behaviour is not included. This exercise, therefore, focused on commodity and national programme resource costs. The service delivery and NNP salary and routine operating costs should be estimated as part of a separate exercise.

The scorecard interventions included some activities for which the Reproductive Health Programme is responsible. These were not costed as part of this exercise on the assumption that they would be included in the Reproductive Health intervention costing.

## **5.3 Results**

### **5.3.1. Overview**

The total costs for the National Nutrition Programme come to \$16.5 million (Table 5.2). The table shows the total costs for the IYCF and Vitamin A programmes, the non-scorecard programmes (to the degree available), and the shared MPA 10 and NNP management support activities. The IYCF programme costs are broken out into each of the three IYCF scorecard interventions, the other (non-scorecard) IYCF interventions, and the various activities for which the costs are shared among the IYCF interventions. The MPA 10 support costs of \$6.4 million comprise the highest single component of the overall plan.

It should be noted that this total of \$16.5 million does not include all the costs of the NNP. Some of the activities for non-scorecard interventions have not been costed, for example activities related to iodine deficiency, growth monitoring and anaemia (except iron tablets). A list of interventions costed and not costed can be found in Annex 4. The \$16.5 million also does not include health centre staffing and operating costs and NNP programme salaries and operating costs. This means, for example, that the cost of counselling on feeding behaviour is not included.

As noted under the methodology the total costs for 2006 are incomplete and should not be compared to the totals for later years.

**Table 5.2: Summary of NNP costs**

| Objectives and Activities                           | Est. Exp 2006    | Est. Costs 2007  | Est. Costs 2008  | Est. Costs 2009  | Est. Costs 2010  | Total Costs 2007-10 |
|---|------------------|------------------|------------------|------------------|------------------|---------------------|
| <b>SUMMARY OF TOTAL COSTS</b>                       |                  |                  |                  |                  |                  |                     |
| Early initiation of breastfeeding - direct          | 150,000          | 153,000          | 156,060          | 159,181          | 162,365          | 630,606             |
| Exclusive breastfeeding - direct                    | 150,000          | 153,000          | 156,060          | 159,181          | 162,365          | 630,606             |
| Complementary feeding - direct                      | 80,000           | 306,000          | 312,120          | 318,362          | 324,730          | 1,261,212           |
| Other IYCF activities - direct                      | 0                | 146,600          | 125,052          | 127,553          | 130,104          | 529,309             |
| Marketing sub-decree - shared within IYCF           | 30,000           | 51,000           | 52,020           | 53,060           | 54,122           | 210,202             |
| BFHI activities - shared within IYCF                | 42,840           | 63,372           | 47,786           | 64,988           | 78,281           | 254,428             |
| BFCI activities- shared within IYCF                 | 85,860           | 199,585          | 247,418          | 328,295          | 412,309          | 1,187,607           |
| Mass media - shared within IYCF                     | 71,400           | 0                | 0                | 0                | 0                | 0                   |
| Integrate pre-service training - shared within IYCF | 5,500            | 30,000           | 2,000            | 2,000            | 2,000            | 36,000              |
| Total IYCF direct activities                        | 615,600          | 1,102,558        | 1,098,515        | 1,212,622        | 1,326,276        | 4,739,970           |
| Vitamin A - direct activities                       | 406,562          | 533,689          | 522,962          | 508,584          | 529,477          | 2,094,712           |
| Non-scorecard interventions - direct                | 352,375          | 395,247          | 437,469          | 473,474          | 511,084          | 1,817,274           |
| Total direct costs                                  | 1,374,536        | 2,031,494        | 2,058,946        | 2,194,680        | 2,366,837        | 8,651,957           |
| MPA 10 support costs                                | 625,100          | 1,251,972        | 1,375,081        | 1,751,371        | 2,050,204        | 6,428,629           |
| NNP management support                              | 228,700          | 381,633          | 332,044          | 411,908          | 315,691          | 1,441,276           |
| <b>TOTAL</b>  | <b>2,228,336</b> | <b>3,665,099</b> | <b>3,766,071</b> | <b>4,357,959</b> | <b>4,732,733</b> | <b>16,521,861</b>   |

Note that the costs of the shared activities have not yet been allocated to the intervention costs in this table. Some of these shared costs are substantial and these are described in greater detail in the following paragraphs.

The BFHI activities come to a total cost of \$0.3 million for the four years. This comprises conducting an assessment of the BFHI, increasing the number of baby-friendly hospitals (BFHs) from 6 to 20 over the four years and providing supervision and refresher training to existing BFHs. The cost of developing the 13 new BFHs is estimated at \$0.1 million for the four years based on a 2006 cost of \$7,000 per hospital, and the cost of supporting the existing BFHs is estimated at \$0.1 million based on a 2006 cost of \$2,770 per hospital.

The BFCI activities come to a total cost of \$1.2 million for the four years. This includes increasing the number of baby-friendly communities from 600 to 2,600 over the four years and providing support and supervision to existing communities. The cost of developing the 2,000 new BFCs is estimated at \$0.3 million for the four years based on a 2006 cost of \$161 per

community, and the cost of supporting the existing BFCs is estimated at \$0.8 million based on a 2006 cost of \$143 per community.

The MPA 10 activities come to a total cost of \$6.4 million over the four years. This includes increasing the number of facilities that provide the minimum nutrition package from 28 to 77 (all districts) over the four years and providing supervision and refresher training to the districts that already have the MPA 10 in place. The cost of implementing the MPA 10 in the additional 49 districts is estimated at \$2.0 million over the four years based on a 2006 cost of \$40,000 per district, and the cost of supervision and refresher training to the existing districts is estimated at \$4.4 million based on a 2006 cost of \$22,000 per district. The MPA activities include training and support for outreach and monitoring and supervision but do not include MOH staff salaries and facility operating costs.

NNP management support activities relate to strengthening the central NNP and include training and workshops, office equipment, surveys and BCC<sup>31</sup>.

It is also worth noting that an amount of \$71,400 is included in 2006 for the cost of the last 2 months of a mass media programme carried out by the BBC. This represents the last part of a three-year programme into which a total of \$2.8 million was invested. This cost is allocated equally across the three feeding interventions.

### **5.3.2. Early initiation of breastfeeding**

The total cost of the activities required during the four years from 2007 through 2010 to reach the 2010 target for early initiation of breastfeeding are estimated at \$1.5 million (Table 5.3).

This cost covers several activities, only one of which relates exclusively to early initiation of breastfeeding. This is Behavioural Change Communication (BCC) work, which is costed at \$0.6 million and which makes up approximately 40% of the total cost.

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<sup>31</sup> The NNP should review these BCC activities to make sure there is no duplication with other BCC activities included under this plan.

**Table 5.3: Cost of early initiation of breastfeeding**

| Objectives and Activities                          | Est. Exp 2006  | Est. Costs 2007 | Est. Costs 2008 | Est. Costs 2009 | Est. Costs 2010 | Total Costs 2007-10 |
|--|----------------|-----------------|-----------------|-----------------|-----------------|---------------------|
| <b>Early initiation of breastfeeding</b>           |                |                 |                 |                 |                 |                     |
| BCC - direct                                       | 150,000        | 153,000         | 156,060         | 159,181         | 162,365         | 630,606             |
| Implementing marketing sub-decree (one third)      | 10,000         | 17,000          | 17,340          | 17,687          | 18,040          | 70,067              |
| BFHI assessment (one half)                         | 0              | 12,500          | 0               | 0               | 0               | 12,500              |
| BFHI - expansion (one half)                        | 21,420         | 10,710          | 10,924          | 14,857          | 15,154          | 51,645              |
| BFHI - maintenance (one half)                      | 0              | 8,476           | 12,969          | 17,637          | 23,987          | 63,069              |
| BFCI assessment (one third)                        | 0              | 10,000          | 0               | 0               | 0               | 10,000              |
| BFCI - expansion (one third)                       | 0              | 27,336          | 27,882          | 28,440          | 29,009          | 112,667             |
| BFCI - maintenance (one third)                     | 28,620         | 29,192          | 54,589          | 80,991          | 108,426         | 273,198             |
| BBC mass media (one third)                         | 23,800         | 0               | 0               | 0               | 0               | 0                   |
| Integrate pre-service training on IYCF (one third) | 1,833          | 10,000          | 667             | 667             | 667             | 12,000              |
| MPA 10 - expansion (4%)                            | 0              | 22,375          | 15,982          | 20,777          | 19,178          | 78,312              |
| MPA 10 - maintenance (4%)                          | 25,004         | 25,504          | 39,021          | 49,278          | 62,830          | 176,633             |
| MPA 10 - manuals (4%)                              | 0              | 2,200           | 0               | 0               | 0               | 2,200               |
| Shared NNP management support costs (4%)           | 9,148          | 15,265          | 13,282          | 16,476          | 12,628          | 57,651              |
| <b>Total</b>                                       | <b>269,825</b> | <b>343,558</b>  | <b>348,716</b>  | <b>405,991</b>  | <b>452,283</b>  | <b>1,550,548</b>    |

The remaining activities are shared with other interventions and a proportion of the cost of each activity is allocated to this intervention. The allocation method is described in Section 5.2, the total costs allocated are shown in Table 5.2, and activities related to those costs are described in Section 5.3.1. Further details of the activities are shown in Annex 4.

### 5.3.3. Exclusive breastfeeding

The total cost of the activities required during the four years from 2007 through 2010 to reach the 2010 target for exclusive breastfeeding are estimated at \$1.5 million (Table 5.4). The cost of the exclusive breastfeeding intervention is the same as the cost of the early initiation of breastfeeding intervention because it was estimated that the BCC activity would cost the same and the allocation of the cost of the shared activities is the same. See Section 5.3.2 for further details of the shared activities and costs.

**Table 5.4: Exclusive breastfeeding**

| Objectives and Activities                          | Est. Exp 2006  | Est. Costs 2007 | Est. Costs 2008 | Est. Costs 2009 | Est. Costs 2010 | Total Costs 2007-10 |
|--|----------------|-----------------|-----------------|-----------------|-----------------|---------------------|
| <b>Exclusive breastfeeding</b>                     |                |                 |                 |                 |                 |                     |
| BCC - direct                                       | 150,000        | 153,000         | 156,060         | 159,181         | 162,365         | 630,606             |
| Implementing marketing sub-decree (one third)      | 10,000         | 17,000          | 17,340          | 17,687          | 18,040          | 70,067              |
| BFHI assessment (one half)                         | 0              | 12,500          | 0               | 0               | 0               | 12,500              |
| BFHI - expansion (one half)                        | 21,420         | 10,710          | 10,924          | 14,857          | 15,154          | 51,645              |
| BFHI - maintenance (one half)                      | 0              | 8,476           | 12,969          | 17,637          | 23,987          | 63,069              |
| BFCI assessment (one third)                        | 0              | 10,000          | 0               | 0               | 0               | 10,000              |
| BFCI - expansion (one third)                       | 0              | 27,336          | 27,882          | 28,440          | 29,009          | 112,667             |
| BFCI - maintenance (one third)                     | 28,620         | 29,192          | 54,589          | 80,991          | 108,426         | 273,198             |
| BBC mass media (one third)                         | 23,800         | 0               | 0               | 0               | 0               | 0                   |
| Integrate pre-service training on IYCF (one third) | 1,833          | 10,000          | 667             | 667             | 667             | 12,000              |
| MPA 10 - expansion (4%)                            | 0              | 22,375          | 15,982          | 20,777          | 19,178          | 78,312              |
| MPA 10 - maintenance (4%)                          | 25,004         | 25,504          | 39,021          | 49,278          | 62,830          | 176,633             |
| MPA 10 - manuals (4%)                              | 0              | 2,200           | 0               | 0               | 0               | 2,200               |
| Shared NNP management support costs (4%)           | 9,148          | 15,265          | 13,282          | 16,476          | 12,628          | 57,651              |
| <b>Total</b>                                       | <b>269,825</b> | <b>343,558</b>  | <b>348,716</b>  | <b>405,991</b>  | <b>452,283</b>  | <b>1,550,548</b>    |

### 5.3.4. Complementary feeding

The total cost of the activities required during the four years from 2007 through 2010 to reach the 2010 target for complementary feeding is estimated at \$2.0 million (Table 5.5).

This cost covers several activities, one of which relates only to complementary feeding. This is a Behavioural Change Communication (BCC) work, which will cost \$1.2 million (60% of the total cost).

The BFHI activities do not relate to this intervention and so none of those costs are included here. The other activities are shared and are the same as for the two breastfeeding interventions.

**Table 5.5: Complementary feeding**

| Objectives and Activities                          | Est. Exp 2006  | Est. Costs 2007 | Est. Costs 2008 | Est. Costs 2009 | Est. Costs 2010 | Total Costs 2007-10 |
|--|----------------|-----------------|-----------------|-----------------|-----------------|---------------------|
| <b>Complementary feeding</b>                       |                |                 |                 |                 |                 |                     |
| IEC/BCC  | 80,000         | 306,000         | 312,120         | 318,362         | 324,730         | 1,261,212           |
| Implementing marketing sub-decree (one third)      | 10,000         | 17,000          | 17,340          | 17,687          | 18,040          | 70,067              |
| BFCI assessment (one third)                        | 0              | 10,000          | 0               | 0               | 0               | 10,000              |
| BFCI - expansion (one third)                       | 0              | 27,336          | 27,882          | 28,440          | 29,009          | 112,667             |
| BFCI - maintenance (one third)                     | 28,620         | 29,192          | 54,589          | 80,991          | 108,426         | 273,198             |
| BBC mass media (one third)                         | 23,800         | 0               | 0               | 0               | 0               | 0                   |
| Integrate pre-service training on IYCF (one third) | 1,833          | 10,000          | 667             | 667             | 667             | 12,000              |
| MPA 10 - expansion (4%)                            | 0              | 22,375          | 15,982          | 20,777          | 19,178          | 78,312              |
| MPA 10 - maintenance (4%)                          | 25,004         | 25,504          | 39,021          | 49,278          | 62,830          | 176,633             |
| MPA 10 - manuals (4%)                              | 0              | 2,200           | 0               | 0               | 0               | 2,200               |
| Shared NNP management support costs (4%)           | 9,148          | 15,265          | 13,282          | 16,476          | 12,628          | 57,651              |
| <b>Total</b>                                       | <b>178,405</b> | <b>464,872</b>  | <b>480,883</b>  | <b>532,678</b>  | <b>575,508</b>  | <b>2,053,940</b>    |

### 5.3.5. Vitamin A

The total cost of the activities required during the four years from 2007 through 2010 to reach the 2010 target for Vitamin A supplementation is estimated at \$3.6 million (Table 5.6). This cost includes the direct activities of the Vitamin A programme and shared MPA 10 and NNP activities.

The intervention-specific activities include the provision of Vitamin A capsules, which totals \$1,017,990 over the four years. This assumes the provision of 1 capsule to a total of 686,721 children between 6 and 12 months old, 2 capsules per year to a total of 5,886,181 children from one through four years old<sup>32</sup>, and 1 capsule to 1,168,027 post-partum women. That comes to a total of 14,804,346 capsules<sup>33</sup> which was multiplied by an estimated 2006 cost per capsule of 5.2 US cents for the children under 12 months old and 6.6 US cents each for the other children and post partum mothers, and assuming 2% cost inflation in each subsequent year. Note that the costs are included in the years in accordance with the consumption needs in those years. The costs will actually be incurred when the capsules are purchased, not when they are consumed.

<sup>32</sup> This is greater than the total number of children protected since it assumes that the same children would generally receive capsules each year for as long as they are in the age group.

<sup>33</sup> The number of capsules for children from 1 through 4 years old was increased by 20% on the assumption that some children receive more than 2 capsules per year due to multiple delivery mechanisms.

The rest of the direct activities, which total \$1,076,723, include strengthening the programme in 10 districts that are under-performing (\$121,734) and monitoring and supervising all 77 districts (\$924,988). These costs are based on a set of activities that are complementary to the MPA 10 activities and relate to the training of community volunteers and community mobilization<sup>34</sup>.

**Table 5.6: Vitamin A**

| Objectives and Activities                        | Est. Exp 2006  | Est. Costs 2007 | Est. Costs 2008 | Est. Costs 2009 | Est. Costs 2010  | Total Costs 2007-10 |
|--|----------------|-----------------|-----------------|-----------------|------------------|---------------------|
| <b>VITAMIN A</b>                                 |                |                 |                 |                 |                  |                     |
| Commodities                                      | 208,562        | 229,268         | 245,841         | 263,444         | 279,435          | 1,017,990           |
| Other direct support activities                  | 198,000        | 304,421         | 277,121         | 245,139         | 250,042          | 1,076,723           |
| MPA 10 - expansion (20%)                         | 0              | 111,874         | 79,910          | 103,883         | 95,892           | 391,559             |
| MPA 10 - maintenance (20%)                       | 125,020        | 127,520         | 195,106         | 246,391         | 314,149          | 883,167             |
| MPA 10 - manuals (20%)                           | 0              | 11,000          | 0               | 0               | 0                | 11,000              |
| Shared NNP management support costs              | 45,740         | 76,327          | 66,409          | 82,382          | 63,138           | 288,255             |
| <b>Total direct and MPA 10 cost of Vitamin A</b> | <b>577,322</b> | <b>860,410</b>  | <b>864,387</b>  | <b>941,239</b>  | <b>1,002,656</b> | <b>3,668,693</b>    |

### 5.3.6. Total scorecard intervention costs

The total cost of the four nutrition scorecard interventions comes to \$8.8 million over the four years (Table 5.7). Note that this is the total cost of achieving the targets for those years, not just the incremental cost. In other words, it is the cost of maintaining the current levels of coverage plus the cost of expanding coverage to the target levels<sup>35</sup>. The costs cover the commodities and programme implementation support activities required for achieving the 2010 nutrition scorecard targets. They do not include health centre staffing and operating costs and NNP salary and routine operating costs.

The cost of each intervention and the related increases in coverage can be summarized as follows:

- The scaled-up intervention for early initiation of breastfeeding will reach a total of 640,426 children over the four years (an increase from 27% to 45% in coverage) and will cost an estimated \$1.5 million over the four years.
- The scaled-up intervention for exclusive breastfeeding will reach a total of 1,160,240 children over the four years (an increase from 62% to 80% in coverage) and will cost an estimated \$1.5 million over the four years.
- The scaled-up intervention for complementary feeding will reach a total of 1,439,011 children over the four years (an increase from 83% to 95% in coverage) and will cost an estimated \$2.0 million over the four years.

<sup>34</sup> The costs for these activities are based on \$3,000 for a starting a new OD and \$11,840 per year for maintaining an existing OD (costs provided by Helen Keller International (HKI) at the request of the NNP). A more comprehensive set of activities was also drawn up and costed by HKI and those costs were not used as they were deemed by the NNP to be too expensive (\$11,696 for starting a new OD and \$26,923 per year for maintaining an existing OD).

<sup>35</sup> As explained in the section on methodology (Section 4) we have not calculated incremental costs since it is likely that these figures would be inaccurate and misleading without more extensive analysis.

- The scaled-up intervention for Vitamin A supplementation will reach a total of 6,572,902<sup>36</sup> children and 1,168,027 post-partum women over the four years (increases from 76% to 85% and 55% to 80% in coverage) and will cost an estimated \$3.6 million over the four years.

These costs are not comparable with each other since they exclude the health centre costs which will vary across the interventions. For example, the feeding interventions include counselling at the facility level, but these costs are not included here. It should also be noted that Vitamin A is the only intervention that includes commodities and that has a separate (non-shared) delivery support system, the costs of which are based on a Helen Keller International model. In addition, the costs reflect different numbers of beneficiaries and different levels of coverage.

**Table 5.7: Total costs for each scorecard intervention**

| Objectives and Activities                    | Est. Exp 2006    | Est. Costs 2007  | Est. Costs 2008  | Est. Costs 2009  | Est. Costs 2010  | Total Costs 2007-10 |
|--|------------------|------------------|------------------|------------------|------------------|---------------------|
| <b>TOTAL COSTS - SCORECARD INTERVENTIONS</b> |                  |                  |                  |                  |                  |                     |
| Early initiation of breastfeeding            | 269,825          | 343,558          | 348,716          | 405,991          | 452,283          | 1,550,548           |
| Exclusive breastfeeding                      | 269,825          | 343,558          | 348,716          | 405,991          | 452,283          | 1,550,548           |
| Complementary feeding                        | 178,405          | 464,872          | 480,883          | 532,678          | 575,508          | 2,053,940           |
| Vitamin A                                    | 577,322          | 860,410          | 864,387          | 941,239          | 1,002,656        | 3,668,693           |
| <b>Total - scorecard interventions</b>       | <b>1,295,376</b> | <b>2,012,398</b> | <b>2,042,702</b> | <b>2,285,898</b> | <b>2,482,731</b> | <b>8,823,729</b>    |

The costs are a mixture of one-off or start-up costs and recurrent or maintenance costs which are identified in the plans but have not been separated in this analysis. Separating these costs would allow for a more accurate analysis of the recurrent cost implications of scaling up over time. For example, the two breastfeeding interventions include BFHI activities which include costs for creating new baby-friendly hospitals and costs for supporting and supervising existing hospitals. The costs of creating the new baby-friendly hospitals will cease after all the hospitals have been covered and will be replaced by the lower costs of support and supervision. Note that the expansion of BFHI and BFCI will need to continue after 2010 and there would be further “start-up” costs until all target hospitals and communities are covered.

It is also important to recognize that the scorecard intervention costs include shared costs, and that the share of the costs allocated to an intervention would probably not represent the cost of carrying out those activities if only that intervention is implemented. For example, of the total MPA 10 costs of \$2.0 million in 2010, an amount of \$82,000 (4%) is allocated to exclusive breastfeeding. If, however, none of the other nutrition interventions were implemented, the cost of carrying out the MPA 10 activities would be much higher than \$82,000, since most of those activities would be much more expensive to carry out by themselves. If, therefore, the number or scale of nutrition interventions or activities is reduced, the allocation of shared costs to each intervention is likely to rise. The costs shared across all interventions are for the MPA 10 activities and the NNP management support activities, which total \$7.8 million over the four

<sup>36</sup> This figure represents the total of the children covered in each of the four years. Many of these children would be repeating the Vitamin A supplementation each year and so the actual number of children covered would be much less than this figure.

years. Of these, \$2.5 million was allocated to the scorecard interventions and \$5.3 million was allocated to non-scorecard interventions<sup>37</sup>.

### 5.3.7. Unit cost per intervention

The total estimated cost for each child reached by each nutrition interventions is shown in Table 5.8. The figures are calculated by dividing the total cost shown in Table 5.7 by the target number of persons shown in Table 5.1 and represent cost per child/year (not cost per visit or service)

**Table 5.8: Unit costs for each intervention**

| Objectives and Activities                | Est. Costs<br>2007 | Est. Costs<br>2008 | Est. Costs<br>2009 | Est. Costs<br>2010 |
|--|--------------------|--------------------|--------------------|--------------------|
| <b>UNIT COST PER PERSON/INTERVENTION</b> |                    |                    |                    |                    |
| Early initiation of breastfeeding        | 1.98               | 1.77               | 1.83               | 1.83               |
| Exclusive breastfeeding                  | 1.37               | 1.26               | 1.34               | 1.37               |
| Complementary feeding                    | 1.42               | 1.38               | 1.43               | 1.47               |
| Vitamin A                                | 0.48               | 0.46               | 0.47               | 0.48               |

These figures for 2006 are not shown as they are incomplete.

Explanations of the unit costs follow:

- Early initiation of breastfeeding: the estimated unit cost for each child reached is \$1.98 in 2007, then falls to \$1.77 in 2008 and then rises to \$1.83 in 2009 and 2010. The 2007 cost is higher than the 2008 cost because several one-off activities are planned for 2007. In 2009 the unit costs increase because the costs of expanding the BFHI, BFCI and MPA 10 sites is greater than the additional coverage achieved.
- Exclusive breastfeeding: the estimated unit cost for each child reached is \$1.37 in 2007, then falls to \$1.26 in 2008 and then rises each year back to \$1.37 in 2010. The reasons are the same as for early initiation of breastfeeding.
- Complementary feeding: the estimated unit cost for each child reached is \$1.42 in 2007, then falls to \$1.38 in 2008 and then rises each year to \$1.47 in 2010. The reasons are the same as for early initiation of breastfeeding, although BFHI activities are not included under this intervention. Note that the unit cost estimates were calculated based on the numbers of children born in each year. The indicator uses children aged 6-9 months. If the intervention is also focused on older children then the unit cost would be lower.
- Vitamin A: the estimated unit cost for each child and post-partum women reached is \$0.48 in 2007, then falls to \$0.46 in 2008 and then rises each year back to \$0.48 in 2010. After 2008 the unit costs increase each year because the cost of expanding the MPA 10 sites is greater than the additional coverage achieved.

<sup>37</sup> The cost of the BFHI and BFCI activities are not included here since they are only shared among the three scorecard feeding interventions.

Valid comparisons cannot be made of the unit costs across interventions because, as stated, earlier, some service delivery costs have not been included in the costing and these are likely to vary considerably across the interventions.

### 5.3.8. Cost drivers

The activities that have the highest overall cost for the nutrition scorecard interventions are the BCC activities under the IYCF (\$2.5 million) and the share of MPA 10 activities (\$2.0 million). These two activities make up approximately 51% of the total scorecard costs and should, therefore, be given priority in terms of reviewing for possible cost savings.

**Table 5.9: Key cost drivers**

| Objectives and Activities          | Est. Exp 2006    | Est. Costs 2007  | Est. Costs 2008  | Est. Costs 2009  | Est. Costs 2010  | Total Costs 2007-10 | Cost as % of Total Cost |
|------------------------------------|------------------|------------------|------------------|------------------|------------------|---------------------|-------------------------|
| <b>SCORECARD COST DRIVERS</b>      |                  |                  |                  |                  |                  |                     |                         |
| Vitamin A commodities              | 208,562          | 229,268          | 245,841          | 263,444          | 279,435          | 1,017,990           | 12%                     |
| Vitamin A - district strengthening | 198,000          | 274,421          | 277,121          | 245,139          | 250,042          | 1,046,723           | 12%                     |
| BCC                                | 380,000          | 612,000          | 624,240          | 636,725          | 649,459          | 2,522,424           | 29%                     |
| BFHI                               | 42,840           | 63,372           | 47,786           | 64,988           | 78,281           | 254,428             | 3%                      |
| BFCI                               | 85,859           | 199,583          | 247,415          | 328,292          | 412,305          | 1,187,595           | 13%                     |
| MPA 10                             | 200,032          | 400,631          | 440,026          | 560,439          | 656,065          | 2,057,161           | 23%                     |
| NNP management support             | 73,184           | 122,123          | 106,254          | 131,811          | 101,021          | 461,208             | 5%                      |
| Other                              | 106,899          | 110,999          | 54,019           | 55,060           | 56,121           | 276,200             | 3%                      |
|                                    | <b>1,295,376</b> | <b>2,012,398</b> | <b>2,042,702</b> | <b>2,285,898</b> | <b>2,482,731</b> | <b>8,823,729</b>    | <b>100%</b>             |

## 5.4 Discussion

The NNP has less experience than some other programmes in strategic action planning and producing cost estimates for advocacy, mainly because nutrition has not been a priority programme for the large multilateral global funding organizations. This exercise has been very useful for the programme staff in terms of helping them to compile disparate activity plans into a single strategic action plan and to estimate the overall cost of implementing the plan.

The plan focuses on the four scorecard interventions but also includes sections on non-scorecard and interventions. There was not sufficient time or resources to include or cost all the activities for the non-scorecard interventions. These should be added later by the NNP team and the plan will then reflect all the activities of the NNP.

These costs estimated during this exercise represent the total commodity and programme implementation support cost of achieving the 2010 targets, and not just the incremental costs. The figures are not, however, total costs since they do not include all the service delivery costs and NNP salary and routine operating costs. If, as is likely, additional service delivery staffing will be required, this could raise costs significantly. These costs should be calculated as part of a follow-up study.

It is also important to recognize that the scorecard intervention costs include shared costs, and that the share of the costs allocated to an intervention would probably not represent the cost of carrying out those activities if only that intervention is implemented.

The NNP team should also review the feasibility of the targets and the contributions of activities to the objectives (e.g., the expected increase in service coverage for each of the ODs involved in the Vitamin A district expansion activity).

The allocation of shared costs can have a significant influence on the cost of each intervention. In this case the higher cost of the Vitamin A intervention is partly because it was allocated a higher proportion of MPA 10 and NNP Management Support costs. This was because the Vitamin A intervention represents a programme, whereas each feeding intervention is a sub-programme.

It is also important to take a look at the possibility of combining resources to be used in the activities. For example, BCC activities are included under each of the nutrition interventions and also under the NNP strengthening element of the plan. Combining elements of these BCC plans may result in cost savings. The NNP should review such activities and determine where costs can be saved.

It is also important to take a look at possible resource constraints. For example, health centre staff are involved in the BFCI, Vitamin A and MPA 10 activities, with time required for service delivery as well as training, meetings and supervision. The involvement of health centre staff will be greater in periods when activities are new, such as when BFCs are being established. It is also important to note that other programmes, such as HIV/AIDS, may have other demands on health centre staff. It is likely that additional staffing will be required, which could raise costs significantly. A review of such constraints should be done as part of the recommended follow up study of service delivery costs and the NNP team should participate in this exercise.

The targets set in the plans are probably somewhat ambitious, especially since their achievement depends partly on the strengthening of service delivery systems in general and also on support from other programmes. Nevertheless, these targets and the related costs should provide a reasonable base which can be refined and added to as needed.

## 6. Immunization Intervention Costs

### 6.1 Introduction

The overall objective of the National Immunization Programme (NIP) is to *improve child survival and health and to support the achievement of Millennium Development Goals 1 (poverty reduction) and 4 (mortality reduction) by controlling, eliminating, or eradicating all vaccine preventable diseases targeted by the National Immunization Programme.*<sup>38</sup> A Multi Year Plan for NIP was developed for 2006-2010 to improve child survival and child health. The plan supports the directions of the CCSS and other strategic documents in Cambodia, including the CMDGs.

The NIP has made significant progress in recent years, including improved coverage of vaccines, strengthening the cold chain system and raising capacity of programme staff. Still, scale-up challenges reportedly remain, including the following:

- Constraints with fixed-site delivery, including expansion to remote areas
- Difficulties in reaching hard-to reach populations e.g., migrant workers, minority groups or slum dwellers.
- A lack of sustainable financing for health workers to reach areas difficult to access.
- Lack of sustainability for social mobilization (currently there is no government budget source to finance village based social mobilization or health education)
- Limited support from government for financing emergencies or campaigns
- Late arrival of funds from the Cambodian government.

In the context of the Child Survival Scorecard two interventions fall directly under the responsibility of NIP: Measles and Tetanus Toxoid (TT) immunizations.

#### ***Coverage targets***

The estimated coverage targets for years 2007-2010 had been set by the NIP manager and staff with the help of their advisers. The targets set for routine immunization in year 2010 are 92% coverage for measles and 80% coverage for TT (Table 6.1). Targets refer to a nationwide increase in coverage. When combined with complementary delivery mechanisms (such as campaigns, measles 2<sup>nd</sup> dose and measles school check), the expected coverage will be even greater.

The scale-up factors shown in the table use the 2006 coverage figures as baselines and reflect both changes in target coverage levels and estimated population growth.

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<sup>38</sup> National Immunization Program Cambodia *Five Year Strategic Plan 2006-2010* p.4.

**Table 6.1: Targets set for coverage of NIP**

|   | 2005<br>CDHS | 2006<br>(NIP) | 2007<br>(NIP)   | 2008<br>(NIP) | 2009<br>(NIP) | 2010<br>(NIP) |
|---|--------------|---------------|-----------------|---------------|---------------|---------------|
| <b>Routine TT Vaccine</b>                 |              |               |                 |               |               |               |
| Pregnant Women                            |              | 399,891       | 407,924         | 416,229       | 424,800       | 433,628       |
| Pregnant Women Coverage Target            | 77%          | 73%           | 75%             | 78%           | 80%           | 80%           |
| Target Pregnant Women                     |              | 291,920       | 305,943         | 324,659       | 339,840       | 346,902       |
| Child Bearing Age Women (CBAW)            |              | 3,107,386     | 3,223,779       | 3,314,981     | 3,397,572     | 3,492,210     |
| CBAW Coverage Target                      | N/A          | 73%           | 75%             | 78%           | 80%           | 80%           |
| Target CBAW                               |              | 2,268,392     | 2,417,834       | 2,585,686     | 2,718,057     | 2,793,768     |
| Scale-up factor (from 2006 NIP estimate)  |              |               | <b>6%</b>       | <b>13%</b>    | <b>18%</b>    | <b>21%</b>    |
| <b>MNT campaigns Vaccine</b>              |              |               |                 |               |               |               |
| Campaign Target Population (CBAW)         |              | 223,733       | 100,000         | 0             | 0             | 0             |
| Coverage Target                           | N/A          | 95%           | 95%             | 0%            | 0%            | 0%            |
| Target CBAW                               |              | 212,546       | 95,000          | 0             | 0             | 0             |
| Scale-up factor (from 2006 NIP estimate)  |              |               | <b>&lt;100%</b> |               |               |               |
| <b>Routine Measles Vaccine (1st dose)</b> |              |               |                 |               |               |               |
| Births                                    |              |               |                 |               |               |               |
| Coverage Target                           | 77%          | 84%           | 86%             | 88%           | 90%           | 92%           |
| Target Children                           |              | 316,680       | 331,462         | 347,439       | 363,625       | 379,872       |
| Scale-up factor (from 2006 NIP estimate)  |              |               | <b>5%</b>       | <b>10%</b>    | <b>15%</b>    | <b>20%</b>    |
| <b>Measles Vaccine Campaign</b>           |              |               |                 |               |               |               |
| Campaign Target Population                |              | 0             | 1,500,000       | 0             | 0             | 0             |
| Coverage Target                           | N/A          | 0%            | 95%             | 0%            | 0%            | 0%            |
| Target Children                           |              | 0             | 1,425,000       | 0             | 0             | 0             |
| Scale-up factor (from 2006 NIP estimate)  |              |               | <b>N/A</b>      |               |               |               |
| <b>Measles 2nd Dose Vaccine</b>           |              |               |                 |               |               |               |
| Births                                    |              | 377,000       | 385,421         | 394,817       | 404,028       | 412,904       |
| Coverage Target                           | N/A          | 0%            | 0%              | 88%           | 90%           | 92%           |
| Target Children                           |              | 0             | 0               | 347,439       | 363,625       | 379,872       |
| Scale-up factor                           |              |               |                 | <b>N/A</b>    | <b>N/A</b>    | <b>N/A</b>    |
| <b>Measles School Entry Vaccine</b>       |              |               |                 |               |               |               |
| Births                                    |              | 377,000       | 385,421         | 394,817       | 404,028       | 412,904       |
| Coverage Target                           | N/A          | 0%            | 0%              | 30%           | 30%           | 30%           |
| Target Children                           |              | 0             | 0               | 118,445       | 121,208       | 123,871       |
| Scale-up factor                           |              |               |                 | <b>N/A</b>    | <b>N/A</b>    | <b>N/A</b>    |

The values used for year 2006 baseline coverage are projected coverage estimates taken from past NIP planning documents (GAVI costing). That is to say, the 2006 estimate is not based on any data collected on actual service delivery. Data available from the 2005 CDHS indicates that in 2005, 77% of pregnant women received at least one TT immunization, and that measles coverage was 77%.

In the costing, it is assumed that actual coverage in 2006 was at least as high as estimated in the NIP planning and cost projection for GAVI.<sup>39</sup> The expected increase in the number of vaccinations to be provided over the coming years varies by type of intervention, but for routine

<sup>39</sup> This assumption is relevant for measles where an increase is assumed from 77% in 2005 to 84% in 2006. For TT the assumption is less relevant since the costing is based on immunization of CBAW, not pregnant women.

TT the increase is 28% in year 2010 compared to the 2006 estimate, and 20% for routine measles immunizations during the same period.

Note that whereas routine immunization targets the total population in Cambodia, campaigns tend to focus on a smaller population (e.g., the MNTE campaign in 2007 will target 100,000 women of which 95% are expected to be reached).

## **6.2 Methodology for costing**

The cost projections presented here build upon previous work undertaken by the NIP programme to estimate resource needs. Projecting the amount of funds required for the implementation of planned activities is a process that requires continuous review and updating.<sup>40</sup> The existing estimates from past cost assessments were therefore modified in accordance with the latest recommendations for the programme, including recommended additional activities to eliminate Measles and Tetanus Toxoid in Cambodia. Only those costs relevant to the child survival scorecard interventions are presented here.

### ***Interventions***

Immunizations against Measles and Tetanus Toxoid have direct (intervention-specific) costs associated with health service delivery, i.e., the vaccine, injection equipment and the staff time required to deliver the services.

For Measles immunizations, four subcategories of the intervention were costed: Measles first dose vaccine; Measles campaigns (SIA); Measles second dose vaccine; and Measles school entry check. The three last subcategories are here presented as part of Measles elimination activities, of which the second dose and school entry check are to be introduced in Cambodia in year 2008. The CCSS costing refers to children aged under five (0-4 years). However, although measles school check would directly apply to children entering primary school, i.e. those aged 6-7 years, it is included in the estimate presented here for reasons of increasing herd immunity and the associated contribution to reducing under-five mortality.

For Maternal and Newborn Tetanus, there are two subcategories of the vaccine delivery intervention: Routine delivery of tetanus vaccine, and Elimination activities that involve population-based campaigns including twice yearly SIA campaigns and regular visits to factories with female workers. The NIP with assistance of UNICEF are registering all child bearing age women (CBAW) at village level in order to reach the targets for delivery of TT. While Table 6.1 shows targets for both CBAW and pregnant women, note that the costs presented under routine delivery refer to CBAW (which is a larger population group including pregnant women as a subcategory).

In addition, at the programme level there are indirect costs associated with delivery of the interventions, henceforth referred to as NIP programme implementation support costs

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<sup>40</sup> In addition to the incorporation of new strategies, revisions need to occur with regards to fluctuation in prices of vaccines and other goods.

(programme costs for short). These are commonly shared investments for all vaccines delivered, and include cold chain equipment, training, monitoring and surveillance.

### ***Costing tools and reference documents used***

Costs were estimated using the WHO/UNICEF Multi year planning and costing tool (cMYP). Costs for delivery of measles and TT vaccines were extracted along with estimates for shared NIP programme costs from the latest projection models run by NIP, including the cost estimate for the latest GAVI/ JICA proposal (October 2006).

In discussions it was found that some essential activities had not been included in past cost projections. The need for including in the child survival strategy these additional costs was identified from two recent activities: (i) a national meeting to review the national TT strategy, held in November 2006, and (ii) a national Measles Elimination plan drafted in November 2006. Outputs from these activities were used to further complete the costing for the Cambodia Child Survival Strategy. The additional activities for elimination of TT and Measles are not included in the cMYP tool and were therefore costed using a regular Excel spreadsheet. The following method was used:

- *Measles*: The draft Measles Elimination Strategy (including preliminary cost estimates) was reviewed by NIP and international advisers, following which the draft list of activities was finalized and the cost estimates revised and updated.
- *Tetanus Toxoid*: A meeting was held with NIP staff and international advisers to agree upon essential TT elimination activities required during 2007-2010. Once a draft list of activities had been agreed upon, costs were estimated by activity and year.

### ***Population data***

Population estimates as shown in Table 6.1 are based on estimates from Cambodia Ministry of Planning. Since data on epidemiology is limited in the Cambodian context, the use of proxy variables was necessary. One such proxy is that the cost projection uses the number of births as the target population for measles vaccine without adjusting for infant mortality. Moreover, the number of births in year N is utilized as the denominator for the coverage of measles school check in year N (who are actually from birth cohort N-4). Given population growth and death in birth cohort N-4, the use of these population data will tend to overestimate the need for vaccines.<sup>41</sup>

### ***Service delivery models***

The costing includes routine delivery and campaigns. Further, the model includes both fixed site delivery and outreach. Surveys in Cambodia indicate that about 20-30% of current vaccinations are provided at fixed site health centres and the other 70-80% are given through outreach (personal communication NIP).

While some costs in the cMYP model specifically refer to outreach activities (i.e., fuel, per diems), it is not clear how costs associated with fixed site delivery (e.g., through IMCI at health centre level) can be separated out. Although the model calculates costs for health centre staff, one cannot separate out the staff time spent on facility-based delivery of vaccines compared to outreach.

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<sup>41</sup> In order to estimate costs more accurately, the denominator should be the cohort entering primary schools in the year of costing.

### **Commodity costs**

Commodity costs were calculated using the price times quantity method. Prices include assumptions on wastage. For TT vaccine, the wastage is assumed to decrease from 53% in 2006 to 32% in 2010. For measles, the wastage factor is assumed to drop from 70% to 53% in 2010. A factor of 10% is included for wastage on injection equipment. Vitamin A costs which were included in the original estimate for measles campaigns were not included in this exercise in order not to double count any commodities expected to be included in the cost estimate produced by the NNP (section 5 of this report).

### **Human resources and salary costs**

The NIP costs include staffing costs, which is inconsistent with the other programme estimates presented in this study. The reason why staff costs are included here is because human resource costs are included in the cMYP tool, and thus they had already been calculated as part of past NIP cost projections, including the latest GAVI costing.

The *salary* cost of staff is calculated based on assumptions on the number and type of staff needed for NIP at each level of the health system (national, PHD, OD and HC). While NIP programme specific staff are needed at higher levels, at OD level and below staff are assumed to be shared between NIP and other programmes. A percentage of staff salary, reflecting the time devoted to immunization activities, is allocated to NIP. At national level, 100% of NIP salary costs are included. At PHD level, 100% of 3 full time staff and 20-25% of 3 part time staff are costed. At OD level, 3 full-time staff and 2 part time staff (10-20%) are costed, and at health facility (HC) level it is assumed that 2 nurses out of a total of 4-6 health professionals per facility spend 70% of their time on immunization and outreach.<sup>42</sup> Assumptions on time allocation towards NIP activities are based on expert opinion. In addition to salaries, salary *incentives* or "top-ups" are costed separately for NIP staff at national, PHD and OD level and are assumed to be allocated 100% to the NIP programme. A percentage of the NIP salary costs and top-ups have been allocated to measles and TT immunizations (the ratios are 12% and 27%, see explanation below). No salary top-ups are included at HC level.<sup>43</sup>

In terms of *incremental* human resources needed to scale up delivery, costs are included for some additional staff to be employed over the coming years to support NIP programme activities at national, PHD and OD level. However, no incremental increase in nurses is costed at HC level. It is therefore assumed that the existing number of nurses (1866) will have the capacity to handle the required increase in immunization coverage.<sup>44</sup>

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<sup>42</sup> During discussions it was mentioned that an estimated 15% of a midwife's time at each HC should also be included for TT costs. This was however not incorporated into the cMYP model used.

<sup>43</sup> Note a slight inconsistency in that NIP salary costs are seen as shared costs below PHD level, to be shared between NIP and other programmes. Meanwhile, the salary top-ups assumed to be required for quality performance have been fully allocated to NIP in the costing.

<sup>44</sup> This is a limitation of the method used for estimating HR need, i.e. when using a top-down allocation of staff time rather than bottom-up estimates based on the expected increase in the utilization (number of visits). Both methods have their strengths and limitations. Bottom-up estimates requires data/assumptions on the average time spent per child seen in order to produce estimates of health worker days required to scale up, which is hard to come by.

### ***Per diems***

- Per diem for HC staff are included as operational costs for routine immunization, i.e. mostly outreach activities.
- Per diems for village health workers are not included
- Per diem for national, PHD and OD and HC level are included in costs for supervision and training, as well as other activities such as meetings, M&E, etc. These costs fall under various categories, i.e. routine immunization, programme costs, as well as in the special measles and TT elimination activities.

Depending on whether the activity was specific to measles/TT or a general activity, the per diem cost was either fully or partially allocated to the numbers presented here.

### ***Shared programme costs***

Programme costs for NIP include capital investment for improving transport, advocacy and communication; monitoring and surveillance, general programme management, and incentives for staff.<sup>45</sup> Costs for programme support were estimated for 2007-2010, using the cMYP tool. Annual values were then allocated to measles and TT using the relative weight of immunizations injections given in one year as the allocation factor. NIP estimates that in year 2007, 27% and 12% of total NIP injections will be for TT and measles respectively. These weights are thus used as factors for allocating shared costs such as cold chain equipment and salary incentives.

The tables in Annex 3 and Annex 5 provide more detail on the cost components included in each category.

## **6.3 Results**

### ***Total costs***

Table 6.2 below shows total costs for measles and TT immunizations, by activity. Total costs for the scaled up delivery of the two vaccines come to \$19.1 million, on average \$4.8 million per year. The greatest investment is required in year 2007 (\$5.9 million), after which costs drop somewhat to \$4.3-4.5 million per year. The cost estimates presented here are in line with the estimates in the NIP five year strategic plan 2006-2010, but total costs in the two documents are not directly comparable since the five year strategic plan covers a much broader range of vaccines and activities.

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<sup>45</sup> Note that staff incentives are included under NIP programme costs whereas the staff salaries are included under service delivery costs.

**Table 6.2: Total costs by year and intervention category**

|                                      | 2007  | 2008               | 2009               | 2010               | Total 2007-2010    |                     |
|--------------------------------------|---|--------------------|--------------------|--------------------|--------------------|---------------------|
| <b>1 Measles</b>                     |   |                    |                    |                    |                    |                     |
| <b>1A INTERVENTION-SPECIFIC COST</b> |   |                    |                    |                    |                    |                     |
|                                      | <b>Routine immunization</b>                           |                    |                    |                    |                    |                     |
| 1a.1                                 | Commodities - Measles 1st dose                        | \$224,094          | \$209,079          | \$197,805          | \$199,170          | \$830,148           |
| 1a.2                                 | Service delivery costs (12%)                          | \$490,175          | \$522,360          | \$498,529          | \$473,795          | \$1,984,858         |
|                                      | Subtotal routine Measles                              | \$714,268          | \$731,440          | \$696,334          | \$672,964          | \$2,815,007         |
|                                      | <b>Measles elimination</b>                            |                    |                    |                    |                    |                     |
| 1a.3                                 | Commodities - Measles Vaccine Campaign                | \$418,364          | \$0                | \$0                | \$0                | \$418,364           |
| 1a.4                                 | Commodities - Measles 2nd Dose Vaccine                | \$0                | \$208,073          | \$196,869          | \$198,233          | \$603,174           |
| 1a.5                                 | Commodities - Measles School Entry Vaccine            | \$0                | \$69,367           | \$64,198           | \$63,247           | \$196,812           |
| 1a.6                                 | Activities to eliminate measles                       | \$1,729,650        | \$667,078          | \$729,299          | \$686,560          | \$3,812,587         |
|                                      | Subtotal Measles elimination                          | \$2,148,014        | \$944,518          | \$990,366          | \$948,039          | \$5,030,938         |
|                                      | Subtotal Measles specific costs                       | \$2,862,282        | \$1,675,958        | \$1,686,700        | \$1,621,004        | \$7,845,944         |
| <b>1B SHARED NIP PROGRAM COST</b>    |   |                    |                    |                    |                    |                     |
| 1b.1                                 | Capital investment for improving transport (12%)      | \$12,485           | \$14,263           | \$12,989           | \$34,447           | \$74,184            |
| 1b.2                                 | Advocacy and communication (12%)                      | \$34,957           | \$35,657           | \$36,370           | \$37,097           | \$144,081           |
| 1b.3                                 | Monitoring and disease surveillance (12%)             | \$13,733           | \$17,828           | \$18,185           | \$18,549           | \$68,295            |
| 1b.4                                 | Programme management (12%)                            | \$24,345           | \$24,832           | \$25,329           | \$25,835           | \$100,342           |
| 1b.5                                 | Incentives for NIP staff (12%)                        | \$32,534           | \$33,185           | \$33,848           | \$34,525           | \$134,092           |
|                                      | Subtotal shared NIP cost for measles                  | \$118,055          | \$125,764          | \$126,721          | \$150,454          | \$520,994           |
|                                      | Subtotal measles                                      | \$2,980,337        | \$1,801,723        | \$1,813,421        | \$1,771,458        | \$8,366,938         |
| <b>2 Tetanus</b>                     |   |                    |                    |                    |                    |                     |
| <b>2A INTERVENTION-SPECIFIC COST</b> |   |                    |                    |                    |                    |                     |
|                                      | <b>Routine immunization</b>                           |                    |                    |                    |                    |                     |
| 2a.1                                 | Vaccine commodities                                   | \$991,200          | \$974,976          | \$980,194          | \$983,176          | \$3,929,547         |
| 2a.2                                 | Service delivery costs (27%)                          | \$1,102,893        | \$1,175,311        | \$1,121,689        | \$1,066,038        | \$4,465,932         |
|                                      | Subtotal routine TT                                   | \$2,094,094        | \$2,150,287        | \$2,101,883        | \$2,049,214        | \$8,395,478         |
|                                      | <b>Tetanus elimination</b>                            |                    |                    |                    |                    |                     |
| 2a.3                                 | MNTE campaign vaccine commodity cost                  | \$43,578           | \$0                | \$0                | \$0                | \$43,578            |
| 2a.4                                 | Activities to eliminate maternal and neonatal tetanus | \$479,095          | \$229,928          | \$282,281          | \$141,799          | \$1,133,104         |
|                                      | Subtotal TT elimination                               | \$522,673          | \$229,928          | \$282,281          | \$141,799          | \$1,176,682         |
|                                      | Subtotal TT specific costs                            | \$2,616,767        | \$2,380,215        | \$2,384,165        | \$2,191,013        | \$9,572,160         |
| <b>2B SHARED PROGRAM COST</b>        |   |                    |                    |                    |                    |                     |
| 2b.1                                 | Capital investment for improving transport (27%)      | \$28,091           | \$32,091           | \$29,226           | \$77,506           | \$166,914           |
| 2b.2                                 | Advocacy and communication (27%)                      | \$78,654           | \$80,227           | \$81,832           | \$83,469           | \$324,182           |
| 2b.3                                 | Monitoring and disease surveillance (27%)             | \$30,900           | \$40,114           | \$40,916           | \$41,734           | \$153,664           |
| 2b.4                                 | Programme management (27%)                            | \$54,777           | \$55,873           | \$56,990           | \$58,130           | \$225,770           |
| 2b.5                                 | Incentives for NIP staff (27%)                        | \$73,201           | \$74,665           | \$76,159           | \$77,682           | \$301,707           |
|                                      | Subtotal shared NIP cost for TT                       | \$265,623          | \$282,970          | \$285,122          | \$338,521          | \$1,172,236         |
|                                      | Subtotal TT   | \$2,882,390        | \$2,663,185        | \$2,669,287        | \$2,529,534        | \$10,744,396        |
|                                      | <b>Grand Total</b>                                    | <b>\$5,862,727</b> | <b>\$4,464,908</b> | <b>\$4,482,708</b> | <b>\$4,300,992</b> | <b>\$19,111,334</b> |

Total costs are here presented as the sum of intervention-specific cost (routine plus special elimination efforts) and shared NIP programme costs. As mentioned, routine activities and shared programme costs were calculated using the WHO/UNICEF cMYP tool. However, apart from injection equipment and vaccines, the tool calculates all costs as shared NIP costs for *all* vaccines. This makes it difficult to separate out the costs specific to measles and TT. Thus, the intervention-specific service delivery costs (category 1.a.2 and 2.a.2 in Table 6.2) were initially calculated as a total for all vaccines after which proportions of these costs were allocated to routine delivery (27% and 12%, see explanation above).

Special activities (i.e. beyond routine delivery) to eliminate measles and TT constitute 60% of all measles costs and 11% of all TT costs. Greater detail on the elimination activities included and

their estimated costs, can be found in the table in Annex 5. Note that these costs include both service delivery costs (e.g., per diem and transport) and implementation support activities (e.g., training and IEC).

Total costs for measles are highest in 2007 at \$3 million, then dropping to \$1.8 million in subsequent years. The reason for the high estimate in 2007 is the measles campaign which requires an estimated \$0.4 million in commodities and approximately \$1.1 million in service delivery costs. Most other estimated costs are level throughout the four years.

TT immunization costs are highest in 2007 at \$2.9 million, with annual \$2.6 million required in subsequent years. The high costs in 2007 are caused by the MNTE campaign and supporting elimination activities.

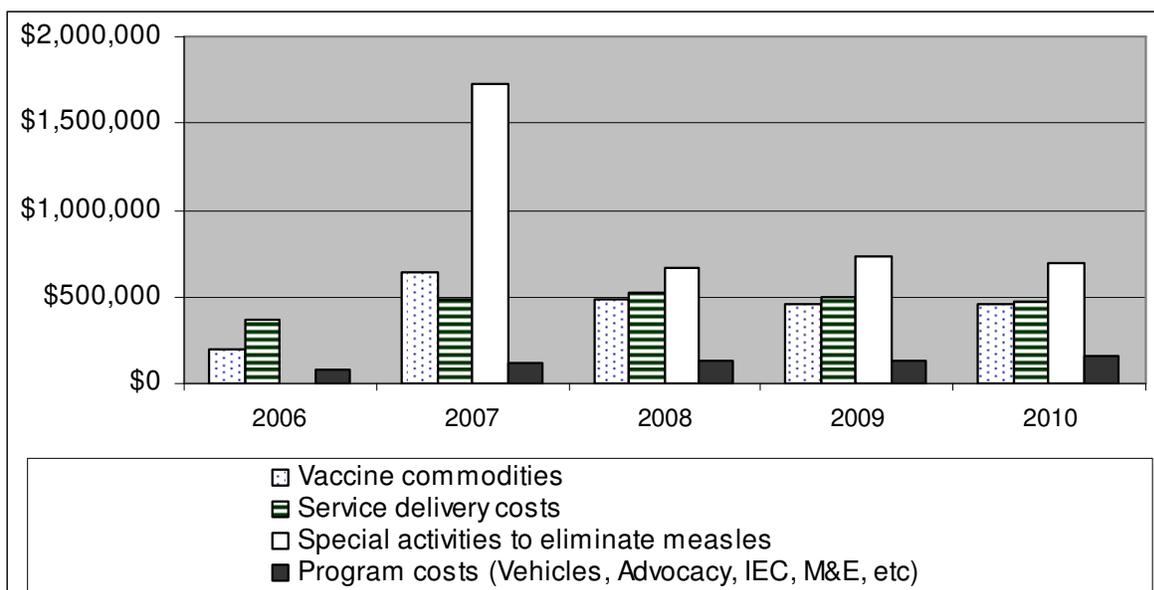
Note that there is not an obvious correlation between an increase in commodity costs and an increase in service delivery costs for routine immunizations. The reason for this is that shared costs are allocated to TT and Measles based on a fixed percentage (27%, 12%). It would be more accurate to use a fluctuating annual percentage that corresponds to the share of TT/measles vaccinations compared to the total estimated vaccinations by year. However, at this stage no such varying proportion could be calculated. Given that other immunizations are expected to increase in the future,<sup>46</sup> the use of these fixed percentages may overestimate costs, especially for TT, since measles immunizations are expected to increase.

Figure 6.1 shows the estimated total costs for measles using the figures from Table 6.2. The newly identified elimination activities will require substantial additional funds that have not yet been secured by the NIP. Commodity costs will also increase significantly over the next four years.

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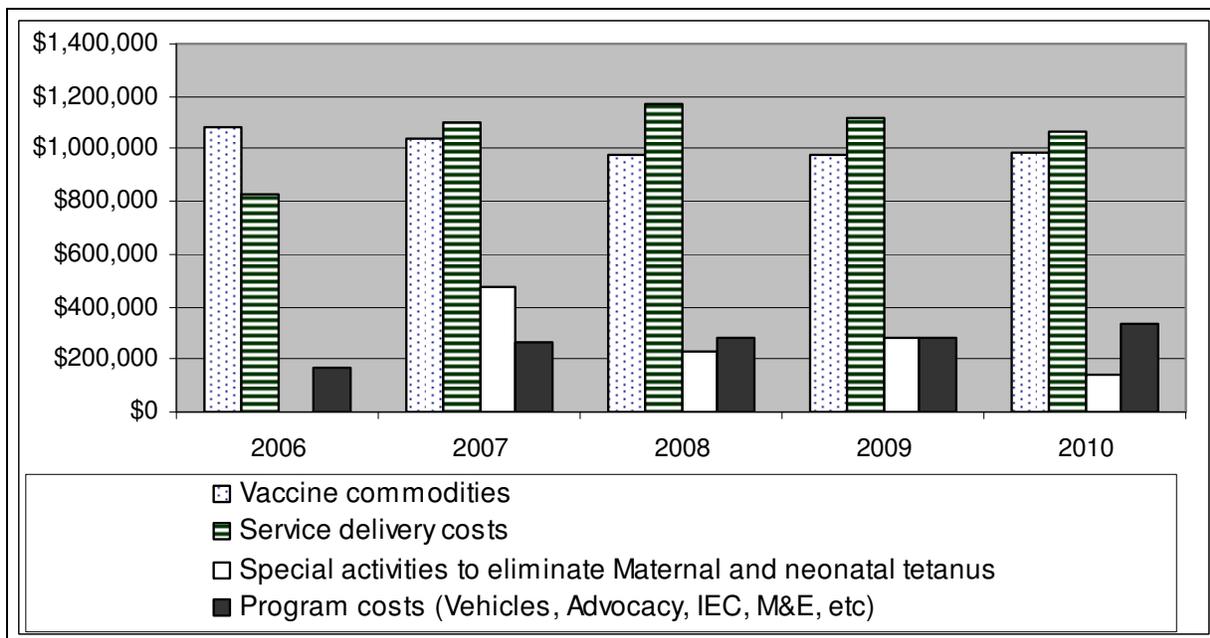
<sup>46</sup> Additional measles activities are being scaled up, including second dose and school check. At the same time there are plans to scale up delivery of Hepatitis B, and NIP is currently evaluating whether new vaccines such as HiB and JE should be made available universally.

**Figure 6.1: Total estimated costs for Measles vaccinations**



The numbers from Table 6.2 are shown as a graph in Figure 6.2 to demonstrate that the cost driver for Tetanus Toxoid immunizations is the routine delivery.

**Figure 6.2: Total estimated costs for Tetanus Toxoid vaccinations**



**Unit costs**

Table 6.3 presents unit costs per immunization event, and per child or woman immunized. In reality unit costs will differ between the various delivery mechanisms, i.e. the unit cost per child immunized against measles through routine delivery will differ from the unit cost for a school check. Here we do not have access to detailed data regarding the allocation of costs to one method or the other, which is why the unit costs are presented as an aggregate measure for each vaccine. The unit cost per measles immunization event ranges by year from \$1.70-\$2.22 (average \$2.01), and for TT from \$0.91-\$1.15 (average \$1.02). One reason for the variation in unit cost by year is that the shared NIP costs allocated to each intervention are not directly related to the number of TT and measles immunizations provided. Another reason why unit costs for measles are low in 2007 is that campaigns are a cost-effective way of immunizing children. Note however that from a broader child survival perspective, campaigns may not be cost-effective since they are often focused on a single antigen, which implies missed opportunities for other child health services.

We also calculated the cost per child or woman fully immunized. We assumed that the average number of doses required to be fully immunized is two (2) for measles and three (3) for TT, which is why the average cost per fully immunized child/woman is \$3.05/\$4.03.

**Table 6.3: Unit cost per immunization event**

|  | 2007        | 2008        | 2009        | 2010        | Average 2007-2010 |
|--|-------------|-------------|-------------|-------------|-------------------|
| Subtotal measles cost                          | \$2,980,337 | \$1,801,723 | \$1,813,421 | \$1,771,458 |                   |
| Total number of measles immunization events    | 1,756,462   | 813,323     | 848,459     | 883,615     |                   |
| Unit cost per measles immunization event       | \$1.70      | \$2.22      | \$2.14      | \$2.00      | \$2.01            |
| Assumed number of doses required per child (*) | 2           | 2           | 2           | 2           |                   |
| Unit cost per child fully immunized            | \$3.39      | \$4.43      | \$4.27      | \$4.01      | \$4.03            |
| Subtotal TT cost                               | \$2,882,390 | \$2,663,185 | \$2,669,287 | \$2,529,534 |                   |
| Total number of TT immunization events         | 2,512,834   | 2,585,686   | 2,718,057   | 2,793,768   |                   |
| Unit cost per TT immunization event            | \$1.15      | \$1.03      | \$0.98      | \$0.91      | \$1.02            |
| Assumed number of doses required per woman     | 3           | 3           | 3           | 3           |                   |
| Unit cost per woman fully immunized (**)       | \$3.44      | \$3.09      | \$2.95      | \$2.72      | \$3.05            |

(\*) We assumed two doses per child due to the introduction of Measles 2<sup>nd</sup> dose through outreach, fixed site delivery or school check.

(\*\*) We assumed three doses per woman equates full immunization coverage.

Table 6.4 provides a rudimentary breakdown of costs into cost classification categories. Note that a complete breakdown of total costs by type of input (staff salary, vaccine, per diem, etc.) is not possible at this stage due to the range of different methods<sup>47</sup> used to assess costs.

**Table 6.4: Classification of costs by input and activity**

| <b>Cost classification category</b> | <b>Total estimated costs 2007-2010</b> | <b>Share (%)</b> |
|-------------------------------------|--|------------------|
| Commodities                         | \$6,021,624                            | 32%              |
| Service delivery                    | \$9,716,162                            | 51%              |
| Salary / incentive                  | \$435,799                              | 2%               |
| Training / capacity building        | \$17,340                               | 0%               |
| Supervision/Management              | \$279,148                              | 1%               |
| IEC                                 | \$733,472                              | 4%               |
| Strengthening M&E                   | \$864,472                              | 5%               |
| Meeting/workshop                    | \$481,661                              | 3%               |
| Capital investment                  | \$561,656                              | 3%               |
| <b>Total</b>                        | <b>\$19,111,334</b>                    | <b>100%</b>      |

The results presented here for measles and TT are to be interpreted as rough estimates and should be presented together with total NIP costs. The allocation assumptions for shared NIP activities (12%, 27%) clearly affect the results, and taking only a proportion of the shared costs presents a distorted picture of the cost of scale-up. Funding one-third of the activities would obviously not allow the NIP to reach its targets. Total funds needed for shared NIP programme activities are shown in Table 6.5. The additional \$12.7 million needed over the coming four years to support shared NIP activities whose costs are not included in the child survival costing is a minimum estimate based on information extracted from the cMYP tool. These estimates have not been extensively reviewed by the programme and may be an underestimate.<sup>48</sup>

<sup>47</sup> While the cMYP tool to a large extent uses a bottom-up detailed approach and this method was used to assess costs for routine immunization activities, in general for the TT and measles elimination activities lump-sum estimates were provided per activity. A breakdown of lump sum estimates into specific inputs has not been undertaken.

<sup>48</sup> Excel file for the NIP GAVI October 2006 cost proposal.

**Table 6.5. Total funds needed for scorecard interventions, including total funds for shared activities**

|  |   | 2007        | 2008        | 2009        | 2010        | Total 2007-10 |
|--|---|-------------|-------------|-------------|-------------|---------------|
| <b>Measles and TT (costs included in Child Survival costing)</b>     |   |             |             |             |             |               |
| (a)  | Subtotal measles intervention-specific costs  | \$2,862,282 | \$1,675,958 | \$1,686,700 | \$1,621,004 | \$7,845,944   |
| (b)  | Subtotal TT specific intervention-costs   | \$2,616,767 | \$2,380,215 | \$2,384,165 | \$2,191,013 | \$9,572,160   |
| (c)  | NIP shared programme costs allocated to TT and measles (39%)                        | \$383,678   | \$408,734   | \$411,843   | \$488,975   | \$1,693,230   |
| <b>Other NIP activities (not included in Child Survival costing)</b> |   |             |             |             |             |               |
| (d)  | Additional funds needed to support service delivery (61%)                           | \$2,491,722 | \$2,655,332 | \$2,534,187 | \$2,408,457 | \$10,089,697  |
| (e)  | Additional funds needed for NIP shared programme implementation support costs (61%) |             | \$639,302   | \$644,165   | \$764,807   | \$2,648,385   |
| (f) = (d)+(e)  | Total additional funds needed for shared activities                                 | \$3,091,833 | \$3,294,635 | \$3,178,351 | \$3,173,263 | \$12,738,083  |
| (g) = (a)+(b)+(c)  | <b>Grand Total for measles and TT (incl. 39% of shared cost)</b>                    | \$5,862,727 | \$4,464,908 | \$4,482,708 | \$4,300,992 | \$19,111,334  |
| (h) = (g)+(f)  | <b>Grand Total for measles and TT including 100% of shared cost</b>                 | \$8,954,561 | \$7,759,542 | \$7,661,059 | \$7,474,255 | \$31,849,417  |

## 6.4 Discussion

### *Impact on child survival*

Maintaining coverage of important vaccines is essential to child survival. According to estimates presented in the *Lancet* child survival series, a further scale-up of TT and Measles vaccine to 99% coverage could bring about 2% reduction in child mortality.<sup>49</sup> However, as underlined in the NIP five year strategic plan, the impact of immunizations also depends on other factors outside the NIP's control, such as general health system improvements and socioeconomic factors.

### *Implications for policy and programming*

The NIP has substantial experience in producing cost estimates and using such results for advocacy, planning and fund raising. Still, the CCSS costing exercise demonstrates the usefulness of undertaking further resource needs assessments specific to child survival. For example, additional activities to eliminate measles and TT, deemed essential for child survival but absent from past cost projections, were discussed and costed during the course of producing

<sup>49</sup> 1% Measles vaccine and 2% Tetanus Toxoid multiplied by two thirds reduction in child mortality.

this draft report. Figures 6.1 and 6.2 show that the newly identified elimination activities will require substantial additional funds that have not yet been secured by the NIP. Some donors have committed to funding these activities (for example, UNICEF has agreed to support TT campaign activities) but more funds will be needed.

While draft results have been produced, they require further discussions among NIP and partners regarding the basis for the costing and to what extent there may be overlaps between different activities and cost categories. The table in Annex 5 clarifies the cost components included and draws attention to possible double counting. More work is required by NIP and partners to assess the costs in each category and to address potential overlaps.

As mentioned, about 80% of immunizations occur through outreach activities, while the remaining 20% take place at facility level (fixed site). The costing highlights key financing needs for the programme, such as per diem for outreach activities. A recent change in government policy to include per diems for trips under 10 km as well as for trips over 10 km was not taken into account in estimating the costs. This means that financing for activities requiring per diems may need to increase. NIP outreach activities are currently mainly supported by donor funds. In terms of sustainability, the per diem policy is clearly a relevant issue for safeguarding the financial means to scale-up in the future.

### ***Implications for health system strengthening***

Given that immunizations may be more structured along a vertical programme approach than other scorecard interventions included in this study, achievement of target coverage may depend less on strengthening the general health system compared to some other interventions. Nevertheless, scale-up does not occur in a vacuum and is dependent both on general health service availability and on activities by other programmes such as IMCI. For example, about 20% of immunization delivery occurs at HC level and the costing assumes that existing nurses will have the capacity to handle the required increase in immunization coverage, and that no additional recruitment will be required. This assumption should be further assessed as part of future efforts to assess the capacity of the service delivery platform in Cambodia. Moreover, the assumption that clinics are functional may not be the case, particularly in rural areas. Another issue is per diems for village health workers; this has not been included in the costing and may be an additional activity to be considered by NIP.

### ***Public/NGO delivery and the role of the private sector:***

The NIP five year strategic plan highlights the importance of the private sector in reaching immunization targets.<sup>50 51</sup> Regarding delivery costs, note that the cMYP model assumes that services are delivered by public provider or NGO (private not for profit), and uses the same costs regardless of provider coverage while in reality it may be that costs differ. However in Cambodia

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<sup>50</sup> Research has shown that the private sector plays a substantial role in immunization (NIP Five Year Strategic Plan page 21).

<sup>51</sup> For example, at the moment the NIP is testing private sector support for administration of TT vaccine and hepatitis B vaccine at 15 major private clinics. Operational costs for managing a public / private collaboration are estimated at \$30,000 per year (excluding costs of vaccine and logistics, but including costs for IEC, consultations/trainings with private sector managers and supervision of the private sector by the public). Such costs for collaboration have not been included in the estimates presented here..

TT and measles vaccinations are currently not widely provided by the private sector and so the impact of this assumption is limited.

## 7. Malaria Intervention Costs

### 7.1 Introduction

In Cambodia, malaria continues to be a leading cause of morbidity and mortality and is the leading cause of hospital mortality.<sup>52</sup> The goal of the National Malaria Control Programme (NMCP) is “[T]o reduce malaria related mortality by 50% and morbidity by 30%, among the general population in the Kingdom of Cambodia within five years through the implementation of a comprehensive national malaria strategy.”<sup>53</sup> The Global Fund Round 6 proposal dovetails well with the overarching goal of the Strategic Master Plan; it contains four broad objectives that the NMCP has identified, all of which will contribute to achieving the NMCP goal:

1. Halt the development and prevent the spread of anti-malarial drugs resistance.
2. Improve access to and utilization of effective diagnosis and treatment for malaria.
3. Improve access to and utilization of effective malaria prevention measures.
4. Strengthen the management of the national malaria control effort especially at operational levels.<sup>54</sup>

In the context of the child survival scorecard, two interventions apply to malaria: **Insecticide-treated nets (ITNs)** and **Malaria treatment**. The corresponding Annual Operational Plan (AOP) objectives for 2007 are:

- *For ITNs:* Improve access to malaria-specific preventive measures employing an effective community based approach
- *For malaria treatment:* Increase access to early diagnosis and treatment for malaria for all the people through a three-pronged approach

The NMCP is well-placed to move forward in the achievement of its objectives. It has received funding from Rounds 2 and 4 of Global Fund awards, as well as from other funding sources, to supplement the Ministry of Health and other national funding resources. Nevertheless, the NMCP faces a number of challenges, including the following:

- The high-risk areas tend to be more remote and/or rural, presenting a distribution challenge when considering drugs and ITNs.
- Although a high proportion of children sleep under bed nets, the percentage drops substantially when considering only ITNs; that is, many children are sleeping under nets that have not been treated with an insecticide.
- Some of the people in high-risk areas are migrant workers or are in transit, making it more difficult to reach them (i.e., they are not living in settled communities).
- The NMCP faces several issues related to pharmaceuticals, including unlicensed drug sellers; fake and substandard quality drugs; irrational use of drugs; and availability of appropriate treatment.
- Non-adherence of patients to recommended treatment (ACT).

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<sup>52</sup> According to Global Fund Round 6 proposal, July 2006, p. 25.

<sup>53</sup> *Strategic Master Plan for National Malaria Control Program 2006-2010*, Ministry of Health, June 2005, p. 18.

<sup>54</sup> *Ibid.*, pp. 44-48.

- Lack of availability of drugs in both public and private sectors, sometimes, reportedly, due to quantification and ordering issues.
- In some areas, anecdotal evidence suggests that people are using ITNs as fishing nets, not as bed nets.

Each scorecard intervention has annual targets which were set by the NMCP (Table 7.1).

For ITNs, the estimated baseline for 2006 is that 20% of children under the age of 5 in high-risk areas slept under an ITN during the night. This assumes no change from the figure of 20% shown in the CCSS for 2004, which was based on the Cambodia National Malaria Baseline Survey of 2004. The NMCP aims to reach a target of 80% in 2007 and maintain that level through 2010<sup>55</sup>.

For malaria treatment, the estimated baseline for 2006 was 31% of children receiving appropriate treatment. This assumes no change from the figure of 31% shown in the CCSS for 2004, which was also based on the Cambodia National Malaria Baseline Survey of 2004. The NMCP aims to reach a target of 85% in 2007 and to increase it further to 95% by 2010<sup>56 57</sup>.

While the ITN target is regional (high risk areas only), the treatment target refers to national level coverage.

Note that the 2006 estimate for current coverage of malaria treatment for under-fives does not refer to ACT, which is the correct treatment/recommendation. The coverage for this was 2% in the CDHS 2000 according to the CCSS.

**Table 7.1: Targets and scale-up factors**

|  | 2006 (base)    | 2007           | 2008           | 2009           | 2010           |
|--|----------------|----------------|----------------|----------------|----------------|
| Total estimated population   | 1,644,938      | 1,677,983      | 1,712,146      | 1,747,403      | 1,783,715      |
| <i>Estimated % of population age 0-4</i>                           | 12.4%          | 12.4%          | 12.5%          | 12.6%          | 12.6%          |
| <b>Total estimated population age 0-4</b>                          | <b>203,223</b> | <b>208,549</b> | <b>213,988</b> | <b>219,484</b> | <b>224,974</b> |
| <b>ITN Scorecard Interventions</b>                                 |                |                |                |                |                |
| <i>Target % sleeping under ITNs the previous night</i>             | 20%            | 80%            | 80%            | 80%            | 80%            |
| <b>Number of children under 5 sleeping under ITNs</b>              | 40,645         | 166,839        | 171,190        | 175,587        | 179,979        |
| <b>Scale-up factor for ITNs (% change from 2006 to 2010):</b>      |                |                |                |                | <b>343%</b>    |
| <b>Malaria Treatment Scorecard Interventions</b>                   |                |                |                |                |                |
| <i>Target % receiving appropriate treatment</i>                    | 31%            | 85%            | 95%            | 95%            | 95%            |
| <b>Number of children under 5 receiving appropriate treatment</b>  | 62,999         | 177,267        | 203,289        | 208,510        | 213,725        |
| <b>Scale-up factor for treatment (% change from 2006 to 2010):</b> |                |                |                |                | <b>239%</b>    |

<sup>55</sup> This appears to be lower than the general target for ITNs in the Global Fund proposal which was 95% for Year 4 (currently assumed to be 2010).

<sup>56</sup> The targets and indicators shown in the Global Fund proposal are somewhat different, but it should be noted that the Year 4 target (currently assumed to be 2010) for the % of malaria cases treated within 48 hours of onset of fever is 70% in the proposal, compared with above figure of 95%.

<sup>57</sup> The targets and indicators shown in the Global Fund proposal are somewhat different, but it should be noted that the Year 4 target (currently assumed to be 2010) for the % of malaria cases treated within 48 hours of onset of fever is 70% in the proposal, compared with above figure of 95%.

The estimated baseline coverage and targets were converted into numbers of children using population estimates from the Global Fund proposal. These figures were used to calculate scale-up factors, taking the 2010 figure as a percentage of the 2006 figure. The scale-up factors reflect both changes in target coverage levels and estimated population growth.

The estimated number of children under 5 sleeping under ITNs in 2006 was 40,645 (20% of the total number of children under 5 in high risk areas). By 2010, to reach the 80% target, roughly 180,000 children should be sleeping under ITNs. The scale-up factor in the case of ITNs is, therefore, 343%. This is a substantial increase in coverage and is, in fact, supposed to be achieved in 2007 since the target for that year is also 80%.

The estimated number of children under 5 receiving anti-malarial drugs was 63,000 in 2006. To reach the 2010 target of 95%, roughly 214,000 under-five children will have to be treated. Based on these figures the scale-up factor is 239%. Most of this substantial increase is expected in 2007 with the increase to 177,000 children. Again, note that the 2006 estimate for current coverage of malaria treatment for under-fives does not refer to ACT - but to any anti-malarial drug.

## **7.2 Methodology**

The costing team built upon work that the NMCP had already done, beginning with the Strategic Master Plan and the Global Fund Round 6 proposal, as well as the 2007-2009 Rolling Plan. The NMCP used templates provided by the Global Fund and in addition created a detailed spreadsheet to show cost elements by Service Delivery Area (SDA)<sup>58</sup> (areas of work). The costing team used this detailed spreadsheet as the primary source of detailed cost data. Since the Global Fund Round 6 proposal was needs-based and fairly comprehensive, the only additional costs included were those of conventional ITNs (the proposal included the cost for long-life ITNs but not for conventional ITNs). The team took the child survival scorecard intervention planning framework (spreadsheet) and adapted it to include the specific SDAs of the Global Fund Round 6 proposal. The Global Fund proposal covers a five-year period. For the purposes of the costing it was assumed that the first four years of the proposal match with 2007-2010.

Most of the costs included under the NMCP plans are based on an ingredients approach (price times quantity). The few exceptions, calculated as bulk estimates, relate to activities with small costs.

The bases used for allocating the costs are as follows:

1. *Full intervention cost included:* Only three of the areas of work (SDAs 15, 17 and 18) relate directly and uniquely to scorecard interventions, and these all relate to the

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<sup>58</sup> The Service Delivery Areas cover several main categories: Prompt effective anti-malarial treatment (SDAs 6-13); IEC/BCC (SDAs 3, 14, and 18); Insecticide-treated nets (SDAs 15-17); Other/drug resistance (SDAs 1, 2, and 5); Monitoring, evaluation, and operational research (SDAs 4 and 22); Coordination and partnership development (SDAs 20 and 21); and Management capacity building (SDA 19).

provision and re-treatment of nets for households and a related IEC/BCC campaign. Hammock nets are excluded as they are for adult migrant workers. The cost of all the nets for households are allocated to the scorecard intervention on the assumption that a full set of nets must be provided to a family to ensure that the under-5 children are protected.

2. *Partial intervention cost included:* Nine other areas of work (SDAs 6 through 14) relate to treatment. These relate both to under-5 children, older children and adults. The cost of malaria drugs (ACT) for under-5 children is allocated 100% to the treatment scorecard intervention. The cost of the drugs for older children and adults is allocated 100% to the treatment non-scorecard intervention. The remaining activities under these SDAs are shared and include diagnostic tests and training. Ten percent of these shared costs were allocated to the scorecard intervention (treatment of children) and ninety percent were allocated to other (non-scorecard) interventions, based on the population distribution of persons coming to facilities seeking malaria treatment..
3. *No intervention cost included:* Six other work areas are for non-scorecard interventions. SDAs 1 through 5 relate to halting the development and spread of anti-malarial drug resistance, and SDA 16 relates to hammock nets for adult migrant workers. The costs of these were allocated 100% to the non-scorecard interventions.
4. *Partial programme cost included:* The four remaining SDAs (SDAs 19, 20, 21 and 22) are for management strengthening, coordination and monitoring and evaluation. There are also an additional four work areas that are not classified as SDAs, which are for human resources, infrastructure, training and procurement. These management costs are shared equally across the 18 SDAs. The 3 ITN SDAs were allocated a total of 3/18 (16.7%) of these costs. The 6 non-scorecard SDAs, were allocated a total of 6/18 (33.3%) of these costs. The 9 treatment SDAs were allocated a total of 9/18 (50%) of these costs. Of the costs allocated to the 9 treatment SDAs, 10% was allocated to the treatment scorecard intervention and 90% to the treatment non-scorecard interventions (in accordance with bullet 2 above).

A table showing the areas of work and cost allocations can be found in Annex 9.

The total number of household nets required for the four years is based on the need to cover a total of 1.6 million persons at risk<sup>59</sup>. This includes the purchase of 670,000 long life nets and 880,500 conventional nets as well as the re-treatment of 585,420 conventional nets. These calculations assume that a long-life net will last for four years, a conventional net will last for 2 years, and 60% of the conventional nets will be re-treated in their second year. Based on an estimate of 2 persons per net, 800,000 household nets need to be in place each year. The projected number of nets in place are 717,620 (90% coverage) in 2007, 858,300 (107%) in 2008, 970,000 (121%) in 2009 and 890,000 (111%) in 2010. The apparent over-estimate of the numbers of nets from 2008 onwards may not be an issue given that population growth and damage or misuse of nets may not have been taken into account. In addition, the NMCP plans to monitor the long-life nets since it is unclear if they will remain effective for four years. However, it is not clear how these targets match with the CCSS targets for children under 5 of 80% coverage from 2008 through 2010. Annexes 7 and 8 show the projected coverage of household nets and the procurement numbers and costs.

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<sup>59</sup> The calculation for each year is based on 1.6 million persons and does not, therefore, appear to take into account population growth.

As noted above, the cost of all the nets for households are allocated to the scorecard intervention on the assumption that a full set of nets must be provided to a family to ensure that the under-5 children are protected.

The total numbers of children to be treated and quantities and costs of drugs and tests for each year are shown in Annex 9. The treatment targets were estimated from the CCSS targets and the quantities and costs of drugs and tests were extracted from the Global Fund proposal. The team was not able to ascertain how the quantities of drugs and tests relates to the treatment targets or whether those quantities are based on procurement or usage needs. The anti-malarial drugs in the proposal are ACT.

### **7.3 Results**

#### ***Total costs.***

The total estimated cost of all NMCP activities over the years 2007-2010 is \$31.4 million (Table 7.2). On an annual basis, the costs range from \$9.3 million in 2007 to \$6.1 million in 2010. The reason for the projected decrease in 2010 is that fewer conventional nets are required in that year because the large numbers of long-life nets were bought in earlier years and are still in use.

These costs include the scorecard interventions and the other interventions of the malaria programme as noted above. However, they do not appear to include all the MOH-funded salaries and normal running costs of the central NMCP unit and do not include a share of the MOH-funded salaries for MOH staff involved in malaria treatment activities at the hospital and health centre levels. The ITN intervention costs do, however, include salaries for persons involved in the distribution.

The first two lines of Table 7.2 show the direct scorecard interventions and costs. The second section shows the non-scorecard interventions and costs. The third section shows supporting/shared activity costs. The last line shows the total cost for the NMCP.

**Table 7.2: Total NMCP costs**

| Overall summary:   | Est. Costs<br>2007 | Est. Costs<br>2008 | Est. Costs<br>2009 | Est. Costs<br>2010 | Total<br>Estimated<br>Costs |
|--|--------------------|--------------------|--------------------|--------------------|-----------------------------|
| <b>CHILD SURVIVAL SCORECARD INTERVENTIONS</b>                      |                    |                    |                    |                    |                             |
| ITNs (Objective 3.0 except hammock nets)                           | \$3,708,884        | \$2,855,472        | \$3,105,232        | \$2,175,720        | \$11,845,308                |
| Treatment (Objective 2.0)  | \$87,495           | \$88,131           | \$87,458           | \$60,140           | \$323,224                   |
| <b>NON-SCORECARD INTERVENTIONS</b>                                 |                    |                    |                    |                    |                             |
| <b>Total</b>   | <b>\$2,696,872</b> | <b>\$2,343,186</b> | <b>\$2,667,718</b> | <b>\$1,734,401</b> | <b>\$9,442,178</b>          |
| NMCP Objective 1.0 (drug resistance)                               | \$640,820          | \$467,119          | \$506,413          | \$423,795          | \$2,038,147                 |
| NMCP Objective 2.0 (drugs and tests for older children and adults) | \$1,759,099        | \$1,728,081        | \$1,710,397        | \$956,866          | \$6,154,443                 |
| NMCP Objective 3.0 (hammock nets only)                             | \$296,954          | \$147,986          | \$450,908          | \$353,740          | \$1,249,588                 |
| <b>SHARED ACTIVITIES</b>   |                    |                    |                    |                    |                             |
| NMCP Objective 2.0   | \$924,245          | \$654,581          | \$786,751          | \$682,030          | \$3,047,607                 |
| NMCP Objective 4.0 (program management, etc.)                      | \$1,901,658        | \$1,425,745        | \$1,974,732        | \$1,423,541        | \$6,725,675                 |
| <b>GRAND TOTAL ESTIMATED COST FOR NMCP</b>                         |                    |                    |                    |                    |                             |
|  | <b>\$9,319,153</b> | <b>\$7,367,115</b> | <b>\$8,621,891</b> | <b>\$6,075,833</b> | <b>\$31,383,992</b>         |

The total cost of the ITN scorecard intervention for the four years comes to \$12,966,253 and the total cost of the treatment scorecard intervention comes to \$964,269 (Table 7.3).

The table shows the allocation of the shared costs to the scorecard and non-scorecard interventions. These costs are then added to the direct scorecard costs to get the total scorecard costs. The total non-scorecard costs are also shown as well as the total NMCP costs.

**Table 7.3: Scorecard costs**

| Overall summary:  | Est. Costs<br>2007 | Est. Costs<br>2008 | Est. Costs<br>2009 | Est. Costs<br>2010 | Total<br>Estimated<br>Costs |
|---|--------------------|--------------------|--------------------|--------------------|-----------------------------|
| <b>ALLOCATION OF SUPPORTING/ SHARED COSTS:</b>            |                    |                    |                    |                    |                             |
| <b>NMCP Objective 2.0</b>                                 | <b>\$924,245</b>   | <b>\$654,581</b>   | <b>\$786,751</b>   | <b>\$682,030</b>   | <b>\$3,047,607</b>          |
| Allocation to treatment scorecard SDAs (10%)              | \$92,424           | \$65,458           | \$78,675           | \$68,203           | \$304,761                   |
| Allocation to treatment non-scorecard SDAs (90%)          | \$831,820          | \$589,123          | \$708,076          | \$613,827          | \$2,742,846                 |
| <b>NMCP Objective 4.0</b>                                 | <b>\$1,901,658</b> | <b>\$1,425,745</b> | <b>\$1,974,732</b> | <b>\$1,423,541</b> | <b>\$6,725,675</b>          |
| Allocation to ITN scorecard SDAs (3/18 of direct SDAs)    | \$316,943          | \$237,624          | \$329,122          | \$237,257          | \$1,120,946                 |
| Allocation to non-CS scorecard SDAs (6/18 of direct SDAs) | \$633,886          | \$475,248          | \$658,244          | \$474,514          | \$2,241,892                 |
| Allocation to shared treatment SDAs (9/18 of direct SDAs) | \$950,829          | \$712,872          | \$987,366          | \$711,771          | \$3,362,838                 |
| <b>COST SUMMARY FOR CS SCORECARD INTERVENTIONS</b>        |                    |                    |                    |                    |                             |
| Direct scorecard intervention cost for ITNs:              | \$3,708,884        | \$2,855,472        | \$3,105,232        | \$2,175,720        | \$11,845,308                |
| Plus allocated Objective 4.0 costs                        | \$316,943          | \$237,624          | \$329,122          | \$237,257          | \$1,120,946                 |
| <b>Subtotal for ITN intervention:</b>                     | <b>\$4,025,827</b> | <b>\$3,093,096</b> | <b>\$3,434,354</b> | <b>\$2,412,977</b> | <b>\$12,966,253</b>         |
| Direct scorecard intervention cost for <b>treatment:</b>  | \$87,495           | \$88,131           | \$87,458           | \$60,140           | \$323,224                   |
| Plus 10% of shared Objective 2.0 costs                    | \$92,424           | \$65,458           | \$78,675           | \$68,203           | \$304,761                   |
| Plus 10% of allocated Objective 4.0 costs                 | \$95,083           | \$71,287           | \$98,737           | \$71,177           | \$336,284                   |
| <b>Subtotal for treatment intervention:</b>               | <b>\$275,002</b>   | <b>\$224,876</b>   | <b>\$264,870</b>   | <b>\$199,520</b>   | <b>\$964,269</b>            |
| <b>Total cost for CS Scorecard Interventions</b>          | <b>\$4,300,829</b> | <b>\$3,317,972</b> | <b>\$3,699,224</b> | <b>\$2,612,497</b> | <b>\$13,930,522</b>         |
| <b>Total cost for non-CS Scorecard</b>                    | <b>\$5,018,324</b> | <b>\$4,049,142</b> | <b>\$4,922,667</b> | <b>\$3,463,336</b> | <b>\$17,453,470</b>         |
| <b>TOTAL COST FOR NMCP</b>                                | <b>\$9,319,153</b> | <b>\$7,367,115</b> | <b>\$8,621,891</b> | <b>\$6,075,833</b> | <b>\$31,383,992</b>         |

The scorecard treatment costs include the cost of rectal suppositories (for use if the child is vomiting or otherwise unable to take pills orally). This particular form of treatment is apparently

no longer recommended but the costs are still included here pending confirmation. However the total cost for rectal suppositories over the four years for children under 5 is only \$18,479, which is not material.

### Unit costs

As stated under the methodology, the cost of all the nets for households were allocated to the scorecard intervention on the assumption that a full set of nets must be provided to a family to ensure that the under-5 children are protected. On this basis the unit cost per child is \$24.13 in 2007, \$18.07 in 2008, \$19.56 in 2009 and \$13.41 in 2010 (Table 7.4). This covers all the costs of the nets, distribution and programme support. Variations in unit costs are mainly due to differences in the numbers of nets distributed from one year to the next. Comparisons of the unit costs across the years are not very useful because the costs are incurred in one year but the protection is spread over several years (four in the case of long-life nets)<sup>60</sup>.

The unit cost per child for antimalarial treatment comes to \$1.55 in 2007, \$1.11 in 2008, \$1.27 in 2009 and \$0.93 in 2010. The costs are higher in 2007 and 2009 due to increased training and campaign activities in those years, as well as higher infrastructure and human resource costs. It should be noted that treatment costs do not include health centre staff salaries or running costs.

Note that the unit costs are not directly comparable across the two interventions as the costs are not full costs and the types of interventions are quite different.

**Table 7.4: Unit costs**

| <b>Unit costs:</b>                             | <b>2007</b> | <b>2008</b> | <b>2009</b> | <b>2010</b> |
|--|-------------|-------------|-------------|-------------|
| <b>ITNs</b>                                    |             |             |             |             |
| Total cost                                     | \$4,025,827 | \$3,093,096 | \$3,434,354 | \$2,412,977 |
| Number of children under 5 sleeping under ITNs | 166,839     | 171,190     | 175,587     | 179,979     |
| Unit cost                                      | \$24.13     | \$18.07     | \$19.56     | \$13.41     |
| <b>Treatment</b>                               |             |             |             |             |
| Total cost                                     | \$275,002   | \$224,876   | \$264,870   | \$199,520   |
| Number of children under 5 treated             | 177,267     | 203,289     | 208,510     | 213,725     |
| Unit cost                                      | \$1.55      | \$1.11      | \$1.27      | \$0.93      |

The main cost drivers for the **ITN scorecard intervention** are procurement and distribution, and training regarding use of the nets. The cost of the long-life and conventional nets amounts to a total of \$10.2 million (78% of the \$13.0 million estimated total cost for the intervention). The remainder of the costs for the ITN intervention includes re-treatment of conventional nets and IEC/BCC. For the **treatment scorecard intervention**, the main cost driver is the shared cost of rapid diagnostic tests (RDTs), estimated to be \$0.2 million (roughly 25% of the total cost of \$0.9 million for the intervention).

## 7.4 Discussion

The targeted increases in coverage for the two malaria interventions appear to be quite ambitious. ITN coverage is targeted to increase from 20% in 2006 to 80% in 2010, with all of that increase occurring in 2007. Malaria treatment coverage is targeted to increase from 31% in

<sup>60</sup> A more accurate way to compare unit costs would be to spread the cost of the nets over the useful lives of the nets.

2006 to 85% in 2007 and a further increase to 95% in 2008. These targets should be reviewed carefully.

Unit costs will vary between different delivery mechanisms. For example, in many countries community level anti-malarial treatment is seen as a lower-cost strategy than facility-based treatment. However in this exercise the different cost implications of different delivery mechanisms was not considered.

It is worth noting that the cost estimates include some capital costs, such as building construction, purchase of vehicles, and specialized equipment. Recurrent costs for maintaining equipment have also been included.

Note that the actual costs for reaching children with these interventions may be significantly higher than the projected costs, depending upon the actual life of the ITNs and the accuracy of the estimates of quantities of malaria drugs and tests needed.

## 8. National Dengue Control Programme (NDCP) Costing

### 8.1 Introduction

In Cambodia, the number of cases of dengue has been growing over the past several years, unlike some other diseases that are being brought under control. Given this situation, the National Dengue Control Programme's (NDCP) overall objective is "To reduce burden of disease associated with dengue hemorrhagic fever (DHF)/dengue shock syndrome (DSS) particularly children under 15 years of age and ensure that the case-fatality rate is less than 1% and morbidity rate less than 1 per 1000."<sup>61</sup> Under the overall objective, the NDCP has identified the following specific objectives for 2007:

1. Strengthen dengue programme management and capacity building
2. Improve disease surveillance through the existing Health Information System (HIS) and increase serology/virology surveillance at selected target provinces
3. Reduce Case Fatality Rate (CFR) through promoting and improving the quality of clinical diagnosis and case management
4. Reduce dengue incidence in the high-risk provinces through early outbreak intervention at the target areas
5. Strengthen operational research on new and alternative vector control measures
6. Foster intra- and inter-sectoral collaboration and coordination for sustainable prevention and control of dengue fever<sup>62</sup>

In the context of the child survival scorecard, only one intervention relates specifically to dengue: ***Aedes aegypti* vector control**. The corresponding Annual Operational Plan (AOP) objective for 2007 is to **expand coverage of preventive interventions against dengue**.

The NDCP has many challenges in its fight against dengue, including the following:

- Dengue cannot be eliminated completely, because it is spread by mosquitoes that are unlikely to be fully eradicated.
- Traditionally, the dengue problem has been greater in urban areas than in rural areas, so that the potential exists for more rapid transmission and higher numbers of people affected in a small geographic area. Additionally, with increasing urbanization, the potential for a greater disease burden exists.
- The *Aedes aegypti* mosquito is active primarily during the day, not at night; thus, a strategy such as insecticide-treated bed nets will not address the problem.
- In Cambodia, families have traditionally kept drinking water in jars outside the house. Even in areas where drinking water is now available from a tap, people still often use the jars. These jars are the most common breeding site for the *Aedes aegypti* mosquito.
- There are four different serotypes of the virus. If someone becomes ill with one serotype, he or she has immunity only for that serotype. If the individual subsequently gets bitten by a mosquito carrying another serotype of the virus, he or she has an increased risk of developing

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<sup>61</sup> From presentation by Ngan Chantha, MD, MPH, entitled "Current Dengue Situation in the Kingdom of Cambodia," November 2, 2006.

<sup>62</sup> National Dengue Control Program, *Priority Program for Year 2007* (Excel spreadsheet file)

dengue hemorrhagic fever (DHF), which is much more serious. In short, instead of exposure leading to immunity, it may actually increase the risk of severe illness in future.

- Although a lot of work has gone into developing a vaccine, it is not expected to be ready in the near future.
- The published literature is inconsistent with regard to cost-effective interventions to address dengue.

One thing is clear: without vector control, outbreaks will occur. Evidence suggests that larviciding has prevented outbreaks from occurring in certain geographic areas, but in recent years the NDCP has not been able to carry out larviciding as widely as it has wished, given funding constraints.

In meetings with the BASICS/WHO costing team, the NDCP team identified a number of important issues:

- One is **how to “think big” for scale-up** when prior planning has been constrained by lack of funds. The dengue programme has not received sufficient funding in the past several years to carry out all of the vector control activities that would be necessary to reduce the number of positive breeding sites to anywhere close to the 2010 target. Annual plans are based more on estimated availability of funds than on need, and it was a challenge sometimes for the NDCP members to shift to needs-based planning.
- Another constraint is that **donor support is projected to decrease after 2007**; two major funding sources have not renewed support past 2007 as at the time of the writing this report.
- There is a **lack of transparency** regarding amount and availability of government funding. Even as late as December 2006, the NDCP was not sure how much Ministry of Health (MOH) funding it would receive in calendar year 2007.
- Another problem is **delayed funding**. At times, even though funds have been allocated in the budget, they are not received by NDCP in a timely way. This hampers activities and achievement of objectives; it is impossible to carry out a larviciding campaign if funds are not available to transport the larvicides, pay the temporary workers, etc.

According to the CCSS, there were approximately 181 positive breeding sites (water jars and other sources of standing water) per 100 households in dengue-affected areas in 2000. The NDCP has assumed that the situation has not changed since 2000 and has therefore used the same figure for 2006. The target for 2010 is to reduce this number to fewer than 10 positive breeding sites per 100 households (Table 8.1). By following a tiered approach—beginning with high-risk districts in priority provinces and then expanding to other high-risk areas, the NDCP hopes to see a dramatic reduction in positive breeding sites. Following this strategy, the estimated intermediate targets of positive breeding sites per 100 households are as follows: for 2007, 80 sites; for 2008, 32 sites; and for 2009, 11 sites.

The high-risk population that can be covered in 2007 is estimated at 4.3 million in 5 provinces. Adding the high-risk population in other provinces together with population growth brings the total population to be covered to 6.6 million in 2008 and 7.7 million in 2009. Further population growth in 2010 brings the total population to be covered to 7.8 million (51% of the projected total population of Cambodia). Using an assumed average of approximately 5.1 persons per household, the numbers of households targeted rise from 860,529 in 2007 to 1,539,837 in 2010.

Based on the same population figures and using an estimate that 12.5% of the total population is made up of children under five produces targets that range from 544,747 in 2007 to 991,589 children in 2010. It should be noted that these figures mean that roughly one person in eight is under five and that, on average, there are only approximately 6 children in every 10 households.

The reason for the change in the targets between 2006 and 2007 without a corresponding significant increase in number of households reached is that the 2007 projection includes *complete* larviciding activities (application of larvicide twice during the high-transmission season, plus adequate spraying for outbreaks), whereas this scope was not possible in 2006. This means that the same number of households will be reached with more intense and effective interventions, which will cause the number of positive breeding sites to drop dramatically.

In later years, the further decreases in the number of positive breeding sites are linked to the expanded reach of the vector control activities. In 2008 the number of households to be covered increases to 87% of those at high risk and in 2009 and 2010 the number reaches 100%.<sup>63</sup>

**Table 8.1: Targets and scale-up factors**

|                                  | 2006      | 2007      | 2008      | 2009      | 2010      |
|----------------------------------|-----------|-----------|-----------|-----------|-----------|
| SUMMARY                          |           |           |           |           |           |
| Households - at risk total       | 1,431,649 | 1,460,396 | 1,490,130 | 1,520,818 | 1,552,421 |
| Households - low risk            | 11,606    | 11,837    | 12,079    | 12,327    | 12,584    |
| Households - high risk           | 1,420,043 | 1,448,559 | 1,478,051 | 1,508,491 | 1,539,837 |
| Households treated               | 843,586   | 860,529   | 1,295,220 | 1,508,491 | 1,539,837 |
| Provinces included               | 5         | 5         | 15        | 20        | 20        |
| Provinces excluded (low risk)    | 4         | 4         | 4         | 4         | 4         |
| High-risk Households treated %   | 59%       | 59%       | 88%       | 100%      | 100%      |
| Positive breeding sites          | 2,591,285 | 1,171,812 | 482,309   | 173,161   | 176,761   |
| Positive sites per 100 HH        | 181       | 80.24     | 32.37     | 11.39     | 11.39     |
| Average population per household | 5.1       | 5.1       | 5.1       | 5.1       | 5.1       |
| Population at high risk          | 7,250,187 | 7,395,834 | 7,546,406 | 7,701,807 | 7,861,856 |
| Population protected             | 4,296,712 | 4,383,028 | 6,593,556 | 7,701,807 | 7,861,856 |
| Children under 5 %               | 12.35%    | 12.43%    | 12.50%    | 12.56%    | 12.61%    |
| Children under 5 at high risk    | 895,720   | 919,195   | 943,166   | 967,391   | 991,589   |
| Children under 5 protected       | 530,834   | 544,747   | 824,077   | 967,391   | 991,589   |
| Children under 5 protected %     | 59%       | 59%       | 87%       | 100%      | 100%      |
| Avg children per household       | 0.63      | 0.63      | 0.64      | 0.64      | 0.64      |
| Scaleup factor - households      |           | 2%        | 54%       | 79%       | 83%       |
| Scale-up factor - children       |           | 3%        | 55%       | 82%       | 87%       |

As with other programmes, a “scale-up factor” was calculated for the dengue vector control intervention. It was calculated by determining the increase between the 2006 and 2010 coverage figures as a percentage of the 2006 figure. The scale-up factor in the case of dengue vector control is 83%. In other words, to reach the 2010 target for vector control of **fewer than 10 positive breeding sites per 100 households** in high-risk areas, the NDCCP will have to reach 83% more households than those targeted in 2006. This translates into an increase of 87% in the

<sup>63</sup> The link between the numbers of positive breeding sites per 100 houses and the number of households to be covered is unclear. If the number of positive breeding sites is only measured for the districts covered by the programme then it is a quality indicator and the number of households to be covered is a separate coverage indicator.

number of children covered, the variance being due to differences in population projections and areas targeted. The scale-up factors for children covered reflect both changes in target coverage levels and estimated population growth.

## **8.2 Methodology**

The costing team helped the NDCP to further develop an existing plans based on work that the NDCP had already done, beginning with the NDCP Priority Programme for Year 2007 and the 2007-2009 Rolling Plan. The team took the child survival scorecard intervention planning framework (spreadsheet) and adapted it to include the elements of the NDCP annual and rolling plans.

The following assumptions were made in terms of the resources required and their costs.

- Population growth would be roughly at the country-wide rate in the 1998-2020 population projections shared with the team.
- Specifically for dengue, there would be a transition from exclusive larviciding with temephos (brand name Abate) to alternate methods of vector control, including:
  - pyriproxifen, which prevents mosquito larvae from completing their growth cycle to adulthood
  - guppy fish (two fish in a 400-liter water jar can eat up to 100 larvae per day)
  - insecticide-treated jar lids
- Wherever possible, the cost estimates for scale-up were built from the bottom up; that is, specific activities were identified and the necessary inputs to achieve those activities were defined.
- Four of the six NDCP priority objectives support vector control directly; one supports curative care and treatment; and one (programme management and capacity building) supports the programme as a whole. In the absence of a more accurate basis for allocating the programme management costs across the five direct objectives, they were shared equally.
- All the dengue control costs are allocated to the under-five children, even though dengue control is aimed at all children under the age of fifteen. This approach has been taken because the full set of control measures has to be implemented in order for the under-five children to be covered and the full cost of those activities must be incurred in order for the child survival intervention to be achieved.

## **8.3 Results**

### ***Total costs***

The total estimated cost over the years 2007-2010 for the National Dengue Control Programme is \$13.9 million (Table 8.2). On an annual basis, the costs range from \$2.9 million in 2007 to a peak of \$3.9 million in 2009, then a slight decrease to \$3.4 million in 2010. The costs are much higher in 2007 than in 2006 because the dengue programme was under-funded in 2006 and was not able to carry out comprehensive vector control activities in all of the high-risk areas. The reason for the projected decrease in 2010 is that more households will be using alternate forms of vector control. For instance, switching from temephos to pyriproxifen saves significant sums of

money, since one application of pyriproxifen lasts for the entire peak transmission season, whereas temephos must be applied twice during the peak transmission season.

Of the total of \$13.9 million, roughly \$13.1 million is for the direct child survival scorecard intervention and for a corresponding share of the allocated programme costs (4/5, or 80%, of supporting/shared costs, because 4 of 5 direct priority objectives relate to vector control). The remaining cost of \$0.8 million is for the other NDCP priority objective: treatment of dengue cases. Note that these figures are the total cost of achieving the targets for those years, not just the incremental costs.

The total NDCP costs of \$13.9 million do **not** include the MOH-funded salaries and normal running costs of the central NDCP unit and do not include a share of the MOH-funded salaries for MOH staff involved in dengue prevention or treatment activities at the provincial, district, hospital and health centre levels. The costs do, however, include payments to temporary workers involved in the spraying programme. The table in Annex 10 shows all the activities under the programme.

**Table 8.2: Total costs for scaled up NDCP activities**

| Overall summary:   | Baseline:<br>Est. Costs<br>2006 | Est. Costs<br>2007 | Est. Costs<br>2008 | Est. Costs<br>2009 | Est. Costs<br>2010 | Total<br>Estimated<br>Costs |
|--|---------------------------------|--------------------|--------------------|--------------------|--------------------|-----------------------------|
| <b>Child survival scorecard intervention and objective:</b>  |                                 |                    |                    |                    |                    |                             |
| <b>Scorecard Intervention: <i>Aedes aegypti</i> vector control</b>   |                                 |                    |                    |                    |                    |                             |
| <i>Scorecard Objective: Expand coverage of preventive interventions against dengue</i>   |                                 |                    |                    |                    |                    |                             |
| <b>NDCP Objectives that contribute directly (NDCP 2, 4, 5, and 6):</b>   | <b>\$694,000</b>                | <b>\$2,621,302</b> | <b>\$3,376,661</b> | <b>\$3,655,107</b> | <b>\$3,180,501</b> | <b>\$12,833,570</b>         |
| Commodities - larvicide  | \$400,000                       | \$1,548,952        | \$2,331,396        | \$2,538,790        | \$2,078,780        | \$8,497,919                 |
| Other  | \$294,000                       | \$1,072,350        | \$1,045,265        | \$1,116,316        | \$1,101,721        | \$4,335,651                 |
| <b>Non-Scorecard interventions:</b>  |                                 |                    |                    |                    |                    |                             |
| NDCP Objective 3: To reduce Case Fatality Rate through promoting and improving the quality of clinical diagnosis and case management | \$10,820                        | \$173,173          | \$176,636          | \$180,169          | \$183,773          | \$713,751                   |
| <b>Supporting/shared activities:</b>   |                                 |                    |                    |                    |                    |                             |
| NDCP Objective 1: To strengthen Dengue Program Management and Capacity Building  | \$21,700                        | \$119,385          | \$80,239           | \$81,109           | \$81,998           | \$362,731                   |
| <b>GRAND TOTAL ESTIMATED COST FOR NDCP</b>   | <b>\$726,520</b>                | <b>\$2,913,860</b> | <b>\$3,633,536</b> | <b>\$3,916,385</b> | <b>\$3,446,272</b> | <b>\$13,910,052</b>         |
| <b>COST SUMMARY FOR CS SCORECARD INTERVENTIONS</b>   |                                 |                    |                    |                    |                    |                             |
| Direct scorecard intervention cost:  | \$694,000                       | \$2,621,302        | \$3,376,661        | \$3,655,107        | \$3,180,501        | \$12,833,570                |
| Plus share of supporting/shared activities (80%, or 4/5 of NDCP objectives)  | \$17,360                        | \$95,508           | \$64,191           | \$64,888           | \$65,598           | \$290,185                   |
| <b>Total CS Scorecard Intervention Cost</b>  | <b>\$711,360</b>                | <b>\$2,716,810</b> | <b>\$3,440,851</b> | <b>\$3,719,994</b> | <b>\$3,246,099</b> | <b>\$13,123,755</b>         |
| <b>Non-CS Scorecard Intervention Cost</b>  | <b>\$15,160</b>                 | <b>\$197,050</b>   | <b>\$192,684</b>   | <b>\$196,391</b>   | <b>\$200,172</b>   | <b>\$786,297</b>            |

It is worth noting that some of the costs in 2007 include major equipment expenditure, such as the purchase of vehicles and spraying machines. The cost for their maintenance and repair is

included in 2008-2010 projections. It should also be noted that cost of rapid dengue tests, estimated at \$22,500 in 2007, has been excluded from the above figures at the request of the NDCP, because it is not certain that the activity would be realized due to unreliability of the tests.

**Total costs**

The unit cost per household starts out at \$3.16 in 2007 and falls each year to \$2.11 in 2010 (Table 8.3). The unit cost per child under five follows the same pattern, starting out at \$4.99 in 2007 and then falling each year to \$3.27 in 2010. We calculated the unit costs by dividing the total costs by the estimated number of households and under-5 children in the target areas. The unit costs are higher in 2007, partly because they include procurement of equipment (vehicles, spraying machines, centrifuges, etc.), and partly because in later years more households are projected to use alternate forms of vector control that are cheaper than the twice-yearly application of temephos. The average cost over the four years is \$2.52 per household and \$3.94 per child under five.

**Table 8.3: Unit costs**

|                                | 2007        | 2008        | 2009        | 2010        | Average cost<br>2007-10 |
|--------------------------------|-------------|-------------|-------------|-------------|-------------------------|
| <b>Unit costs:</b>             |             |             |             |             |                         |
| Total cost                     | \$2,716,810 | \$3,440,851 | \$3,719,994 | \$3,246,099 |                         |
| Number of households           | 860,529     | 1,295,220   | 1,508,491   | 1,539,837   |                         |
| Number of children under 5     | 544,747     | 824,077     | 967,391     | 991,589     |                         |
| Average cost per household     | \$3.16      | \$2.66      | \$2.47      | \$2.11      | \$2.52                  |
| Average cost per child under 5 | \$4.99      | \$4.18      | \$3.85      | \$3.27      | \$3.94                  |

The main cost driver is the cost of larvicide: \$8.5 million over the four years, plus another \$1.3 million in labour costs for temporary workers to go house to house to carry out the larviciding campaigns. Of all the other activities in the plan, none exceeds \$0.5 million over the four years, and most are well under \$0.1 million. See Annex 10 for the details of the costs broken down by activity.

**8.4 Discussion**

The NDCP has less experience than some of the other national programmes in strategic action planning and costing, mainly because dengue control has not been a priority programme for the large multilateral global funding organizations. The costing exercise has been useful for the programme in terms of compiling disparate activity plans into a single strategic action plan and estimating the overall cost of implementing the plan.

The yearly projected expenditures for 2007-2010 (ranging between \$2.9 million and \$3.9 million) represents a significant investment in dengue control required for the scorecard targets to be achieved. According to the NDCP, in order to reduce the growing threat of dengue fever—as the population grows, and as urbanization increases—it will be increasingly important to dedicate resources to vector control activities. Some of the alternatives to temephos application have shown early promise, but more research is needed, and the NDCP plans to carry out IEC to

make people aware of these other methods, and more importantly, to encourage them to *use* the methods.

These costs estimated during this exercise represent the total cost of achieving the 2010 targets, and not just the incremental costs. Service delivery costs are part of the programme costs and are therefore included. NDCP salaries are not, however, included and should be calculated as part of the proposed follow-up study.

The targets set in the plans may be somewhat ambitious but the targets and related costs should provide a reasonable base which can be refined and added to as needed.

Although the plan and costs have been reviewed by the NDCP team, it is recommended that the team further review the following areas:

- The feasibility of targets based on current status and ability of the system to absorb resources and expand.
- The contributions of activities to the objectives
- Areas where costs could be saved with special focus on the high cost activities and resources
- Any additional activities that may be needed to reach the targets set.

## 9. Management of Diarrhoea and Pneumonia/ARI

### 9.1 Introduction

Control of diarrhoea, cholera and acute respiratory infections in Cambodia is steered by the MOH Communicable Disease Control Department (CDC) and the National Programme for ARI, Diarrhoea and Cholera (NPADC). The two programmes thus share the responsibility for two child survival scorecard interventions: management of diarrhoea/oral rehydration therapy and management of ARI/antibiotics for pneumonia. While no other specific health interventions fall under the command of these two programs, they both play a key role in promoting integrated approaches to child survival, including support to IMCI training and IEC activities to encourage key community practices. Resource estimates for child survival as presented here refer to the intervention-specific costs for management of ARI and diarrhoea, and also include other activities implemented by CDC and NPADC related to strengthening the implementation of the entire package of child survival activities. Given that CDC and NPADC lie under different MOH programs and consequently have separate budgets, the cost estimates are produced and presented separately.

Diarrhoea and pneumonia are estimated to account for about 40% of under-five mortality in Cambodia. As noted in the *Lancet* series for child survival (2003), ORT, curative zinc and antibiotics for dysentery are effective interventions to reduce child deaths caused by diarrhoea. Moreover, diarrhoea can be prevented by key practices such as breastfeeding, good complementary feeding, and preventive distribution of zinc and Vitamin A. The costs presented in this section mostly cover the curative care since the preventive interventions lie under the responsibility of other MOH programs and are included elsewhere in this report (except preventive zinc which is not included under the CCSS scorecard interventions).

Moreover for pneumonia, good nutrition practices have a preventive effect. The pneumonia costs shown here refer to ARI case management (including antibiotics for pneumonia), but the contribution of other programs towards reducing pneumonia deaths is recognized, including nutrition interventions and the future role of a Hib vaccine for pneumonia prevention.

Targets for scaling up the delivery of the curative interventions were set for each year 2007-2010, as shown in Table 9.1 below. The ARI intervention reflects provision of care by a health worker. For management of diarrhoea, ORT can be provided at home which means that not all children with diarrhoea need to see a health provider. In order to estimate provider costs for managing diarrhoea, additional targets were set by the programmes for the proportion of diarrhoea episodes that require medical attention by a health worker (estimated at 40%, see Table 9.3).

Scale-up factors were computed by converting the 2006 and 2010 targets into numbers of children managed and then calculating the expected increase as a percentage. The scale-up factors reflect both changes in target coverage levels and estimated population growth. The scale-up factor for ARI is 46% and for diarrhoea the increase corresponds to a 61% boost over 2006 targets (see Table 9.1).

**Table 9.1: Diarrhoea and ARI interventions - implementation targets for the CCSS cost estimate**

| Intervention                   | Indicator   | Current coverage |           | Coverage Targets |           |           |           |
|--------------------------------|---|------------------|-----------|------------------|-----------|-----------|-----------|
|                                |   | CDHS 2000        | CDHS 2005 | 2007             | 2008      | 2009      | 2010      |
| <b>Management of Diarrhoea</b> |   |                  |           |                  |           |           |           |
| Oral Rehydration Therapy (ORT) | Proportion of children with diarrhoea in the last 2 weeks who received ORT                            | 74%              | 59%       | 75.0%            | 79.0%     | 82.0%     | 85.0%     |
|                                | Total number of children with ORT coverage (1)  |                  | 1,017,657 | 1,338,884        | 1,447,069 | 1,540,600 | 1,636,909 |
|                                | Scale-up factor (2006-2010)   |                  |           |                  |           |           | 161%      |
| <b>Management of Pneumonia</b> |   |                  |           |                  |           |           |           |
| Antibiotic for Pneumonia       | Proportion of children with fast or difficult breathing in the last 2 weeks who received medical care | 35%              | 57% (2)   | 61.5%            | 66.0%     | 70.5%     | 75%       |
|                                | Total number of children with coverage  |                  | 991,563   | 1,097,884        | 1,208,944 | 1,324,540 | 1,444,331 |
|                                | Scale-up factor (2006-2010)   |                  |           |                  |           |           | 146%      |

- (1) Note that the ORT coverage indicator refers to children treated anywhere, i.e. both those treated at home and those treated in a facility. For the costing we assumed that 40% of children who have diarrhoea are treated in facilities, but the coverage refers to all children receiving ORT. The indicator for ARI coverage however is a facility-based indicator.
- (2) The CDHS 2005 estimate includes fever

## 9.2 Methodology for estimating costs

The AOP and the 3 year rolling plan provide a basis for activities planned for the time period of interest (2007-2010). However, it was noted that these plans reflect expected funding available rather than total needs. Efforts were therefore taken to upgrade the plans to correspond to needs-based targets and activities. As a consequence, activities and targets presented here differ somewhat from what is in the rolling plans.

### *Methodology for estimating direct costs for delivery of ARI and Diarrhoea interventions*

The section below describes the assumptions used to estimate costs for delivering the direct health services to children. The relevant calculations for costing diarrhoea and ARI interventions were copied from the WHO tool for child health costs, adapted to the Cambodian context, and pasted into the CCSS MS Excel workbook for ARI and diarrhoea. In the future the workbook can be updated by CDC and NPADC staff as required. The cost estimates reflect what resources need to be made available in the public sector (and other providers) in order to provide the relevant services as envisioned in the target setting process.

The resources required to deliver ARI and diarrhoea interventions to a child include a range of inputs, such as drugs, diagnostic tests and staff time. The intervention-specific costs presented here include **only** two types of inputs:

- commodity costs (drugs, supplies and diagnostic tests), and
- costs for referral of severe illness.

At provider level, staff salary costs are not included due to:

- challenges involved with estimating the amount of health worker time needed and the cost per visit, and
- concerns that human resource requirements are better estimated as part of a general assessment of the service delivery platform for the entire health system, i.e. in a follow-up study.

Further note that care at home (not by a provider) has not been costed.

Assumptions used in the costing are shown in tables 9.2 and 9.3. Resource estimates are based on MOH guidelines for commodities and supplies required for delivery, including the updated IMCI (2006) treatment guidelines for drug doses and duration for treatment of ARI/Pneumonia and diarrhoea.<sup>64</sup> Commodity cost estimates are built bottom-up using the price and quantity of each commodity required. For drug dosages, a 10 kg child was used to calculate average values. Prices were provided from MOH or taken from the MSH website<sup>65</sup> when local estimates were not available. For MSH prices, median reference prices were used, and a 20% mark-up was added. Waste and leakage rates for drugs and supplies were incorporated and ranged from 5-30 percent.

Note that the ORT coverage indicator refers to children treated anywhere, i.e. both those treated at home and those treated in a facility. For the costing we assumed that 40% of children who have diarrhoea are treated in facilities, i.e. either health centres or hospitals - and these are the costs included for ORT (i.e. costs for treatment at home are not included). However, the coverage refers to *all* children – both those at home and at a facility. For ARI this is not an issue since the indicator for ARI coverage is a facility-based indicator.

While all children that are severely ill with either diarrhoea (5%) or pneumonia (14%) will need to be referred, it was estimated that 40% of those need assistance with referral to hospital.<sup>66</sup> A rough cost estimate of US\$2 per child referred was used. This is assumed to cover transport costs, including ambulances. Given limited data available on the need for referral and the associated costs, these estimates were arbitrarily chosen.

For each level of severity, proportional delivery targets were set for public/NGO/private provider. For example, 60% of pneumonia cases are assumed to seek care at public providers. The costing presented here includes all provider based care, whether private or public provider.

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<sup>64</sup> Note that treatment guidelines may divert from current practice for various reasons. For example, health workers may over-prescribe antibiotics for pneumonia, or prescribe other drugs than those recommended by MOH policy due to stock-outs, patient requests or personal gain.

<sup>65</sup> The *International Drug Price Indicator Guide* can be found at the following website:  
<http://erc.msh.org/dmpguide/>

<sup>66</sup> See tables 9.3 and 9.4. 5% of diarrhoea episodes need IV; of which 40% are assumed to need referral. Similarly, 14% of ARI episodes are severe and 40% of these are estimated to need referral.

**Table 9.2: Acute Respiratory Infection - case management assumptions**

| Aspect  | Assumptions used  |
|---|---|
| Under-five population in need of any ARI care           | Total population under five multiplied by the incidence of ARI. For the costing we assumed a constant incidence of 5 ARI episodes per child per year during the period 2007-2010. <sup>67</sup>   |
| Population in need of care by a health worker           | Based on evidence in the literature, we assume that 0.29 ARI episodes per year can be classified as ALRI/pneumonia and will require medical attention by a health worker. <sup>68</sup>   |
| Population that will seek care by a health worker       | Regarding care-seeking for ARI, we assume that out of all ARI cases seen at facility level, 30% are pneumonia/ALRI and 70% can be classified as not pneumonia/cough/cold. <sup>69</sup><br>This implies that for every ALRI case managed in a facility setting another 2.33 (non-pneumonia) cases will seek and require treatment. This results in 0.97 visits per child year $((2.33*0.29) + 0.29 = 0.97)$   |
| The number of ARI episodes for which costs are included | Following the row above, medical attention by a health worker will happen for 0.97 ARI episodes per child per year. Of these only 0.29 episodes are ALRI and will be managed according to guidelines for non-severe, severe and very severe pneumonia (see proportions below). The other 0.68 episodes are cough/cold but will still be seen by a health worker and treated as cough/cold (costs include e.g., paracetamol). It is assumed that the remaining 4.03 ARI episodes per child/year are not tended to by a health worker and no provider-related costs are therefore included for these cases. |
| Assumptions on ALRI severity                            | Evidence from the literature <sup>70</sup> allows the use of the following assumptions: <ul style="list-style-type: none"> <li>• 86% of ALRI is classified as non-severe pneumonia</li> <li>• 12% of ALRI is severe pneumonia, and</li> <li>• 2% of ALRI is very severe pneumonia</li> </ul> These are the proportions used to assess what treatment is needed for the pneumonia cases managed (0.29 episodes per child year).  |
| Assumptions on level of delivery                        | <ul style="list-style-type: none"> <li>• Cough/cold - managed at HC except in remote areas where 80% managed at community level (VHVs) and 20% at HC level</li> <li>• Non-severe pneumonia- managed at HC except in remote areas where 80% managed at community level (VHVs) and 20% at HC level</li> <li>• Severe pneumonia - managed at hospital level</li> <li>• Very severe pneumonia - managed at hospital level</li> </ul>  |
| Provider assumptions <sup>71</sup>                      | For each level of severity, proportional delivery targets were set for public/NGO/private provider. For example, 60% of pneumonia cases are assumed to seek care at public providers. The costing presented here includes all provider based care, whether private or public provider.  |

<sup>67</sup> The two-week period prevalence data from the CDHS 2000 indicate on average 5.1 episodes a year. This is comparable to incidence estimates from other developing and developed countries which range from 4.3 to 7.5 episodes of ARI per child per year.

<sup>68</sup> Informal consultation on Epidemiologic Estimates for Child Health, 2001, WHO/CAH.

<sup>69</sup> Acute Respiratory Infections in children under five years in Cambodia: current implementation strategies Delivery modalities and system constraints, 2004, WHO Cambodia.

<sup>70</sup> Hadi, A (2003) gives the following proportions of severity of pneumonia cases in a community setting: 86% non-severe, 12% severe, and 2% very severe. Similar proportions are reported by Mehnaz A et al. (1997).

| Aspect                                      | Assumptions used  |
|---|---|
| Assumptions for geographically remote areas | The remote areas include malaria endemic areas (400 villages) <sup>72 73</sup> as well as other remote areas (200 villages) with a total of some 300,000 population. Different assumptions were made for provider level in remote and non-remote areas, but this does not impact on the case management cost calculated and shown here. |
| Inputs                                      | Inputs (commodities and number of out-patient visits and in-patient days) required for each ARI classification (cough/cold; non-severe ALRI, severe ALRI, and very severe ALRI) were identified along with prices for each input.   |

**Table 9.3: Diarrhoea - case management assumptions**

| Aspect  | Assumptions used  |
|---|---|
| Under-five population in need of any diarrhoea care | Total population under five multiplied by the incidence of diarrhoea. For the costing we assumed a constant incidence of 3 diarrhoea episodes per child per year during the period 2007-2010  |
| Population in need of care by health worker         | Based on available literature, we assume that 40% of diarrhoea episodes will require medical attention by a health worker. <sup>74</sup> This implies that medical attention by a health worker is required for 1.2 episodes per child per year.  |
| Population that will seek care                      | Assume that those 40% of children in need will seek care while the remaining 60% of episodes are treated at home.   |
| Number of episodes for which costs are included     | Costs only included for the 40% requiring care, i.e. 1.2 episodes per child per year. Those 60% of children that are treated at home may also be in need of ORS/ORT but the costs are not included here. <sup>75</sup>  |
| Assumptions on diarrhoea severity                   | Out of the 40% of diarrhoea episodes that are seen by a health worker, 35% need ORT only and 5% need ORT and IV.  |
| Assumptions for geographically remote areas         | There is no difference in cost assumptions between remote and non-remote areas.   |
| Assumptions on level of delivery                    | <ul style="list-style-type: none"> <li>• Need ORT, do not need medical attention ( 60% of all under-fives ). These are managed at home (no costs included)</li> <li>• Need ORT, need medical attention (35% of all under-fives). These are managed at HC level</li> <li>• Need IV/referral (5% of all under-fives). 60% of these cases are managed at HC level ;and 40% at hospital.</li> </ul> |
| Provider assumptions                                | For each level of severity, proportional delivery targets were set for public/NGO/private provider.   |

<sup>71</sup> This was done so that the projected increase in care needed at public facilities can be estimated. This is a function of the methodology used in the WHO MDG cost estimation tool for child health.

<sup>72</sup> There are currently 800 malaria health village workers available in 400 communities in Cambodia (Global Fund Round VI proposal, page 46).

<sup>73</sup> Note the possible discrepancy with malaria estimate of population in endemic areas: 1.6 million.

<sup>74</sup> Victoria CG et al., "Reducing deaths from diarrhoea through oral rehydration therapy" Bull World Health Organ. 2000, 78(10):1246-1255.

<sup>75</sup> In this exercise, costs are estimated from a provider perspective.

| Aspect | Assumptions used  |
|--------|---|
| Inputs | Inputs (commodities and visits) required for each diarrhoea classification were identified along with prices. Costs include management of cholera and antibiotics for dysentery Note that zinc was included as an input during management of diarrhoea. |

**Methodology for estimating shared programme costs**

The approach taken was to keep the AOP structure and identify which activities in the AOP directly contribute to the management of ARI and diarrhoea, and/or general child survival, and to revise the cost estimates by year. Costs are allocated either as shared costs (50% to ARI; 50% to Diarrhoea) or to Diarrhoea only. The other interventions covered by the programme (such as cholera among adults) form a small part of the disease burden and hence programme costs can be fully allocated to the two child survival interventions. Note that while some of the shared costs relate to general child survival, here they are fully allocated to ARI and diarrhoea. Those activities in the AOP that are not related to the scorecard interventions have been excluded from the child survival costing. Table 9.4 provides an overview.

A few points to note:

- Some of the activities described in Table 9.4 could overlap, e.g., CDC 1.1 and NPADC 1.1, and/or CDC 2.2 and NPADC 3.1. This is a reflection of the fact that the two programmes fall under separate structures of the MOH. There is currently ongoing collaboration between CDC and NPADC, and it is recommended that this be further strengthened.
- Further, activities do not necessarily correspond to the stated objective. For example, for NPADC 2.1 the objective title is related to ARI but the activities includes supervision of ORT corners, which is why costs are shared between the two interventions.
- Efforts were taken to ensure that planning would be ambitious yet realistic. For example in the case of referral level training (under CDC goal 3.4), targets for training staff were set on the basis of the number of training facilities that would be available over the coming years.

**Table 9.4: AOP Goals and Activities included in, and excluded from, the CS costing**

| <b>Goal / Key Area of Work</b>                            | <b>Objective</b>  | <b>Key activities</b>   | <b>CS costing category</b>  |
|---|---|---|---|
| <b>CDC Goal 1: Health Services Delivery</b>               | 1. Control outbreak of emerging and resurging diseases  | Field work  | Excluded from the costing   |
|   | 2. Strengthen management of childhood illness for under five children   | Capacity building in clinical management for staff at OD and HC level (11 day IMCI course)  | Included (shared costs)   |
|   | Strengthen cross-countries emerging and resurging diseases control  | Training staff, maintaining quarantine and procedures at border check points  | Excluded from the costing   |
| <b>CDC Goal 2: Behaviour Change Communication</b>         | 1. Raise public awareness on updated situation of potential threat of emerging diseases and Strengthen legislation              | Information and coordination of disease surveillance  | Excluded from the costing   |
|   | 2. Improve awareness and practices of family and community toward child care and care seeking behaviour                         | Training community volunteers to promote selected key family practices; conduct monthly health education sessions at village level                  | Included (shared costs)   |
| <b>CDC Goal 3: Quality Improvement</b>                    | 1. Strengthen disease surveillance and outbreak response  | Training staff, monitoring and supervision to strengthen alert system   | Excluded from the costing   |
|   | 2. Improve and strengthen IMCI implementation   | Planning workshops, annual reviews and supervision at OD and HC level   | Included (shared costs)   |
|   | 3. Capacity building in case management and counselling for ARI and Diarrhoea diseases for health centre staff                  | Facilitator training; IMCI training at HC level; capital investment (vehicles) and running costs for monitoring and supervision of trained HC staff | Included (shared costs)   |
|   | 4. Quality Improvement on Emergency Triage Assessment and Treatment (ETAT) for selected referral hospitals                      | Training referral level staff; supervision and monitoring, workshops to evaluate quality improvement process  | Included (shared costs)   |
|   | 5. Monitoring and evaluation of IMCI/Child Survival implementation  | Health Facility survey and Household Surveys  | Included (shared costs)   |
| <b>CDC Goal 4: Human Resource Development</b>             | 1. Build Human Resources for Long Term Quality Assurance  | Capacity building in Master degree for IMCI implementation  | Included (shared costs)   |
|   |   | <i>Performance incentives for CDC/IMCI staff at central, PHD and OD levels (top-up salaries) were added</i>   | <i>This is an additional activity costed - not included in the original AOP</i> |
|   | 2. Capacity building for key trainers in health professional training institutions for IMCI Pre-service education               | Clinical courses for key trainers; orientation sessions for high level decision makers  | Included (shared costs)   |
| <b>NPADC Key Area of Work 1: Health Services Delivery</b> | 1. Increase treatment and care for children under 5 years of age with Acute Respiratory Infections (ARI) and Diarrhoeal Disease | IMCI training courses;  | Included (shared costs)   |
|   |   | Surveillance Training Course on outbreak response (Cholera/ Dysentery)  | Included (diarrhoea only)   |

| Goal / Key Area of Work   | Objective  | Key activities  | CS costing category       |
|---|--|---|---------------------------|
| <b>NPADC Key Area of Work 2: Quality Improvement</b>            | 1. Strengthen treatment and care services for children under 5 years of age with Acute Respiratory Infections  | Supervision of ORT Corner and correct use of antibiotic for pneumonia | Included (shared costs)   |
|   | 2. Strengthen Cholera outbreak respond and provide timely reports  | Cholera outbreak response at peripheral level                         | Included (diarrhoea only) |
| <b>NPADC Key Area of Work 3: Behaviour Change Communication</b> | 1. Increase the knowledge of the mother having children under 5 years regarding ARI, diarrhoea and cholera prevention and appropriate treatment seeking behaviour. | Mass media interventions, demand side interventions and IEC           | Included (shared costs)   |

### 9.3 Results

#### *Total costs*

Table 9.5 shows commodity costs for management of ARI and diarrhoea as well as costs for activities carried out by CDC and NPADC to improve management of sick children (including ARI and diarrhoea), general child health and child survival. Costs were originally estimated in 2006 US\$ per year and then multiplied by inflation factors to arrive at year-specific estimates. Estimated annual costs range from US \$5.3 million (2007) to US \$7.2 million (2010). Of the total \$24.9 million, 21% and 29% are commodity-specific costs for ARI and diarrhoea respectively and 4% relate to referral support. 47% constitute the shared programme costs, of which NPADC accounts for 3%. Costs for NPADC are level throughout the years 2007-2010 with only a slight increase due to 2% inflation, because investment needs are estimated to be constant throughout the years 2006-2010.

**Table 9.5: Total costs for ARI and Diarrhoea interventions for child survival \***

| <b>SUMMARY OF TOTAL COSTS</b>                                  |                      |                        |                        |                        |                        |                            |
|--|----------------------|------------------------|------------------------|------------------------|------------------------|----------------------------|
| <b>Objectives and Activities</b>                               | <b>Est. Exp 2006</b> | <b>Est. Costs 2007</b> | <b>Est. Costs 2008</b> | <b>Est. Costs 2009</b> | <b>Est. Costs 2010</b> | <b>Total Costs 2007-10</b> |
| <b>DIRECT COSTS FOR CHILD SURVIVAL SCORECARD INTERVENTIONS</b> |                      |                        |                        |                        |                        |                            |
| Antibiotic for Pneumonia                                       |                      | \$1 105 691            | \$1 241 890            | \$1 387 849            | \$1 543 634            | <b>\$5 279 064</b>         |
| Commodity costs  |                      | \$1 069 318            | \$1 201 038            | \$1 342 195            | \$1 492 855            | \$5 105 406                |
| Referral   |                      | \$36 372               | \$40 853               | \$45 654               | \$50 779               | \$173 659                  |
| Diarrhoea / Oral Rehydration Therapy                           |                      | \$1 733 349            | \$1 910 877            | \$2 075 073            | \$2 248 890            | <b>\$7 968 190</b>         |
| Commodity costs  |                      | \$1 569 470            | \$1 730 213            | \$1 878 886            | \$2 036 269            | \$7 214 838                |
| Referral   |                      | \$163 879              | \$180 664              | \$196 188              | \$212 621              | \$753 352                  |
| <b>Sub total direct intervention cost</b>                      |                      | <b>\$2 839 040</b>     | <b>\$3 152 767</b>     | <b>\$3 462 923</b>     | <b>\$3 792 524</b>     | <b>\$13 247 254</b>        |
| <b>SHARED PROGRAM COSTS</b>                                    |                      |                        |                        |                        |                        |                            |
| <b>CDC</b>   |                      |                        |                        |                        |                        |                            |
| <b>CDC Goal 1: Health Services Delivery</b>                    |                      |                        |                        |                        |                        |                            |
| Obj 2: Strengthen IMCI   | \$259 440            | \$424 655              | \$519 777              | \$636 207              | \$778 718              | <b>\$2 359 357</b>         |
| <b>CDC Goal 2: Behavior Change Communication</b>               |                      |                        |                        |                        |                        |                            |
| Obj 2: Improve family and community practices                  | \$294 014            | \$1 441 947            | \$1 544 482            | \$1 875 017            | \$2 114 071            | <b>\$6 975 517</b>         |
| <b>CDC Goal 3: Quality Improvement</b>                         |                      |                        |                        |                        |                        |                            |
| Obj 2: Improve IMCI implementation                             | \$143 600            | \$173 512              | \$204 563              | \$236 787              | \$269 179              | <b>\$884 042</b>           |
| Obj 3: Capacity ARI and Diarrhea management                    | \$45 380             | \$5 488                | \$5 597                | \$5 709                | \$5 823                | <b>\$22 618</b>            |
| Obj 4: Quality Improvement referral hospitals                  | \$84 242             | \$81 559               | \$83 190               | \$99 881               | \$101 879              | <b>\$366 509</b>           |
| Obj 5: Monitoring and evaluation of IMCI/Child Survival        | \$47 800             | \$79 356               | \$0                    | \$82 562               | \$0                    | <b>\$161 918</b>           |
| <b>CDC Goal 4: Human Resource Development</b>                  |                      |                        |                        |                        |                        |                            |
| Obj 1: Human Resources   | \$0                  | \$60 156               | \$44 580               | \$49 171               | \$32 278               | <b>\$186 185</b>           |
| Obj 2: Capacity building for IMCI Preservice Education         | \$43 900             | \$44 778               | \$16 161               | \$16 484               | \$16 814               | <b>\$94 237</b>            |
| <b>Sub total CDC program cost</b>                              | <b>\$918 376</b>     | <b>\$2 311 450</b>     | <b>\$2 418 351</b>     | <b>\$3 001 819</b>     | <b>\$3 318 761</b>     | <b>\$11 050 382</b>        |
| <b>NPADC</b>   |                      |                        |                        |                        |                        |                            |
| <b>NPADC Key Area of Work 1: Health Services Delivery</b>      |                      |                        |                        |                        |                        |                            |
| Obj 1: Increase ARI and Diarrhea treatment and care            | \$67 347             | \$68 694               | \$70 068               | \$71 469               | \$72 899               | <b>\$283 130</b>           |
| <b>NPADC Key Area of Work 2: Quality Improvement</b>           |                      |                        |                        |                        |                        |                            |
| Obj 1: Strengthen ARI treatment and care                       | \$18 189             | \$18 553               | \$18 924               | \$19 303               | \$19 689               | <b>\$76 468</b>            |
| Obj 2: Strengthen Cholera outbreak response                    | \$9 474              | \$9 663                | \$9 856                | \$10 053               | \$10 255               | <b>\$39 827</b>            |
| <b>NPADC Key Area of Work 3: Behavior Change Communication</b> |                      |                        |                        |                        |                        |                            |
| Obj 1: Knowledge and treatment seeking behavior.               | \$53 659             | \$54 732               | \$55 826               | \$56 943               | \$58 082               | <b>\$225 583</b>           |
| <b>Sub total NPADC program cost</b>                            | <b>\$148 668</b>     | <b>\$151 642</b>       | <b>\$154 675</b>       | <b>\$157 768</b>       | <b>\$160 924</b>       | <b>\$625 008</b>           |
| <b>Grand total</b>   |                      | <b>\$5 302 132</b>     | <b>\$5 725 793</b>     | <b>\$6 622 510</b>     | <b>\$7 272 209</b>     | <b>\$24 922 644</b>        |

\* Costs for each year are presented in the currency of that year, i.e. in year 2007: 2007 US\$; in year 2008: 2008 US\$, etc.

CDC and NPADC activities are rarely aimed only at improving management of ARI or diarrhoea, but tend to focus on an integrated approach towards child health and child survival. For this reason, shared programme costs are presented in Table 9.5 as total entities, without allocation to one intervention or the other.

Table 9.6 provides an estimate of how programme costs were allocated specifically towards ARI and diarrhoea. A 50%/50% allocation ratio has been used for all CDC and NPADC programme activities except those identified as pertaining to diarrhoea only (see Table 9.4). The 50%/50% estimate was arbitrarily chosen since it is not possible to identify to what extent each shared activity contributes to either intervention. Note that the total estimates shown in Table 9.5 are

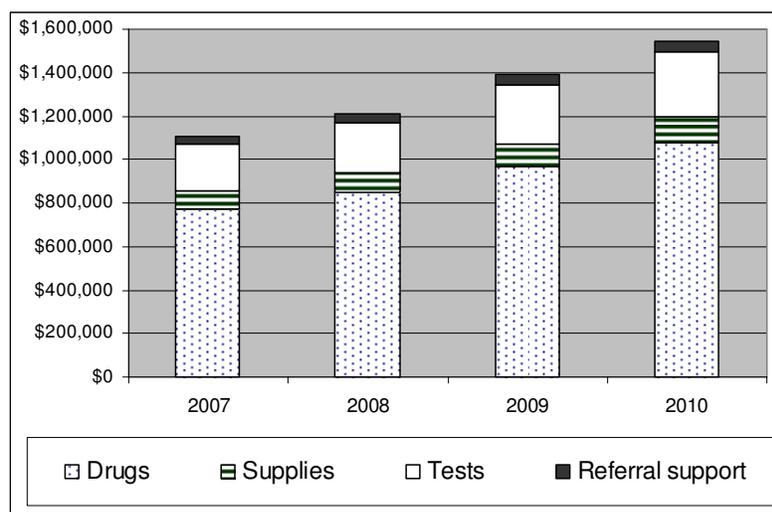
more useful for planning since shared activities need to be carried out in their entirety in order for any one intervention to be successful.

**Table 9.6: Allocating a proportion of CDC and NPADC shared costs to improve child survival to ARI and Diarrhoea**

|                                    | 2007               | 2008               | 2009               | 2010               | Total 2007-2010     |
|------------------------------------|--------------------|--------------------|--------------------|--------------------|---------------------|
| Direct costs for ARI               | \$1 105 691        | \$1 241 890        | \$1 387 849        | \$1 543 634        | \$5 279 064         |
| CDC costs allocated to ARI         | \$1 155 725        | \$1 209 176        | \$1 500 909        | \$1 659 381        | \$5 525 191         |
| NPADC costs allocated to ARI       | \$65 013           | \$66 313           | \$67 640           | \$68 992           | \$267 958           |
| <b>TOTAL ARI</b>                   | <b>\$2 326 429</b> | <b>\$2 517 379</b> | <b>\$2 956 399</b> | <b>\$3 272 007</b> | <b>\$11 072 214</b> |
| Direct costs for diarrhoea         | \$1 733 349        | \$1 910 877        | \$2 075 073        | \$2 248 890        | \$7 968 190         |
| CDC costs allocated to diarrhoea   | \$1 155 725        | \$1 209 176        | \$1 500 909        | \$1 659 381        | \$5 525 191         |
| NPADC costs allocated to diarrhoea | \$86 629           | \$88 361           | \$90 129           | \$91 931           | \$357 050           |
| <b>TOTAL DIARRHOEA</b>             | <b>\$2 975 703</b> | <b>\$3 208 414</b> | <b>\$3 666 111</b> | <b>\$4 000 202</b> | <b>\$13 850 431</b> |

Figures 9.1 and 9.2 show a breakdown of the total intervention-specific costs shown in Table 9.5. Drugs (70%) and diagnostic tests (19%) make up a large part of costs for pneumonia, whereas for diarrhoea case management, the cost drivers are drugs (64%) and supplies (20%).

**Figure 9.1: Delivering pneumonia case management: commodity costs and referral support**



Note that estimates presented here are not to be interpreted as total resources required to implement the interventions, one reason being that service delivery costs for staff time and transport are not included. Moreover, the costs do not include the MOH-funded salaries and normal running costs of the central CDC and NPADC units and do not include a share of the MOH-funded salaries and related operating costs for MOH staff involved in relevant activities at the provincial, district, hospital and health centre levels.

The costs are a mixture of capital and recurrent costs which are identified in the plans but have not been separated in this analysis. Separating these costs would allow for a more accurate analysis of the recurrent cost implications of scaling up over time.

**Figure 9.2: Delivering diarrhoea case management: Commodity costs and referral support**

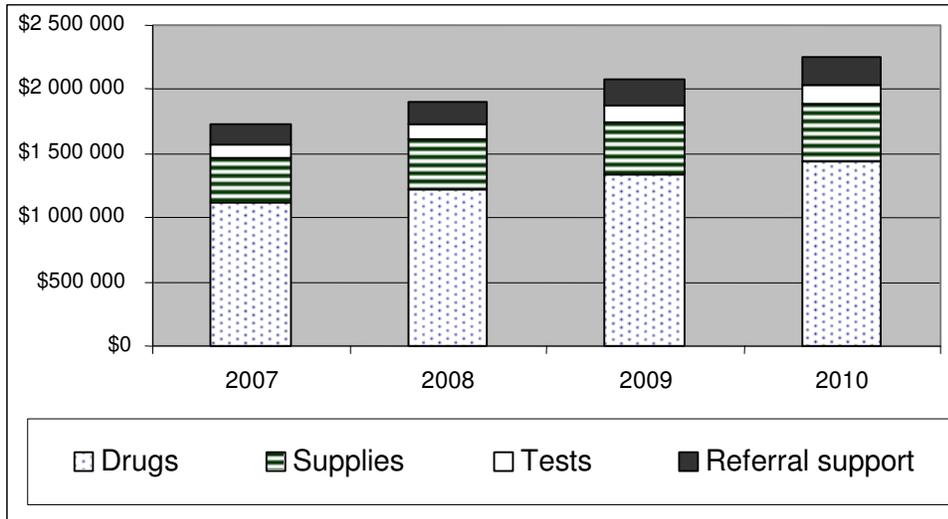


Table 9.7 below provides further detail on how each component impacts on the final costs, by input type and severity classification. The main cost drivers for pneumonia are drugs and diagnostic tests required for the severe and very severe cases. Note that costs for management of diarrhoea include zinc tablets, which contributes to 51% of drug costs and 33% of total costs presented here.

**Table 9.7: The contribution of different cost components to the intervention-specific costs****Table 9.7 a: Case management of ARI/ Pneumonia - cost of drugs, supplies, diagnostics and referral**

| <i>Classification</i>               | <i>Cost component</i> | <i>Main assumptions</i>   | <i>Share of total costs</i> |
|-------------------------------------|-----------------------|---|-----------------------------|
| <b><i>Cough/Cold</i></b>            | Total costs           |   | 0.5%                        |
|                                     | Drugs                 | Paracetamol   | 0.5%                        |
|                                     | Supplies              | None included   | 0.0%                        |
| <b><i>Non-Severe pneumonia</i></b>  | Total costs           |   | 24.8%                       |
|                                     | Drugs                 | Cotrimoxazole for 80% of children in this category; Amoxicillin, and paracetamol for 30% of children                        | 24.8%                       |
|                                     | Supplies              | None included   | 0.0%                        |
| <b><i>Severe pneumonia</i></b>      | Total costs           |   | 55.4%                       |
|                                     | Drugs                 | Amoxicillin, IV and oral, for all children. Salbutamol, for 30% and oxygen for 20% of children                              | 38.0%                       |
|                                     | Supplies              | IV Kit, nasal aspirator and oxygen tubing   | 4.0%                        |
|                                     | Tests                 | One Chest X-Ray per child   | 10.6%                       |
|                                     | Referral support      | Transport for referral for 40% of children in this category   | 2.8%                        |
| <b><i>Very Severe pneumonia</i></b> | Total costs           |   | 19.2%                       |
|                                     | Drugs                 | Amoxicillin, IV and oral, for all children. Gentamycin and oxygen for all children. Salbutamol (50%) and Prednisolone (20%) | 6.5%                        |
|                                     | Supplies              |   | 3.4%                        |
|                                     | Tests                 | 2 blood tests; and 1,5 X-rays per child   | 8.8%                        |
|                                     | Referral support      | Transport for referral for 40% of children in this category   | 0.5%                        |

**Table 9.7 b: Case management of Diarrhoea / ORT - cost of drugs, supplies, diagnostics and referral**

| <b>Classification</b>                          | <b>Cost component</b> | <b>Main assumptions</b>   | <b>Share of total costs</b> |
|--|-----------------------|---|-----------------------------|
| <b>Need ORT, do not need medical attention</b> | Total costs           |   | 0.0%                        |
|  | Drugs                 | No cost included for home-based treatment   | 0.0%                        |
|  | Supplies              |   | 0.0%                        |
| <b>Need ORT, need medical attention</b>        | Total costs           |   | 51.9%                       |
|  | Drugs                 | Zinc and ORS for all children; Other drugs such as Cotrimoxazole costed for 3-10% of children in this category                              | 51.9%                       |
|  | Supplies              | No cost included  | 0.0%                        |
| <b>Need IV/referral</b>                        | Total costs           |   | 48.1%                       |
|  | Drugs                 | Zinc, ORS and Electrolyte solution included for all children; Other drugs such as metronidazole costed for 10% of children in this category | 12.3%                       |
|  | Supplies              | IV kit and printed information materials  | 20.1%                       |
|  | Tests                 | 2 stool tests per child   | 6.2%                        |
|  | Referral support      | Transport for referral for 40% of children in this category   | 9.5%                        |

As noted above in section 9.2, the child survival costing uses the format of AOP, with activities and cost estimates adjusted to correspond to perceived needs rather the expected funds available. Annex (12) provides an overview of how the CCSS estimate compares with the original AOP estimate.

The greatest divergence between the CCSS estimate and the original AOP estimate is for CDC Goal 2 objective 2 which aims at improving family and community practices. Compared to the original AOP estimates, the needs-based CCSS costing includes much more ambitious *quantitative targets* in terms of the number of villages covered, as well as more *intensive activities* with *higher costs*, including considerable per diem costs at HC and VHV level required to sustain training and health promotion activities. The costs for CDC goal 2 objective 2 represent 63% of total CDC programme costs calculated for child survival. The cost driver here is training of community volunteers which represents 45% of the costs for this objective.<sup>76</sup> Remaining costs arise from conducting monthly health education sessions with target groups at village level (32%) training of trainers (10%), and supervision (12%).

<sup>76</sup> Note that costs for VHV training may be overestimated. The expense is based on the assumption that HC staff train VHVs on a monthly basis year round, with each course covering 20 VHVs at a monthly cost of \$270. This gives a cost of \$270\*12=\$3240 per health facility or per 20 VHVs. This cost data was provided by CDC.

**Figure 9.3: Projection of funds for key CDC objectives 2007-2010**

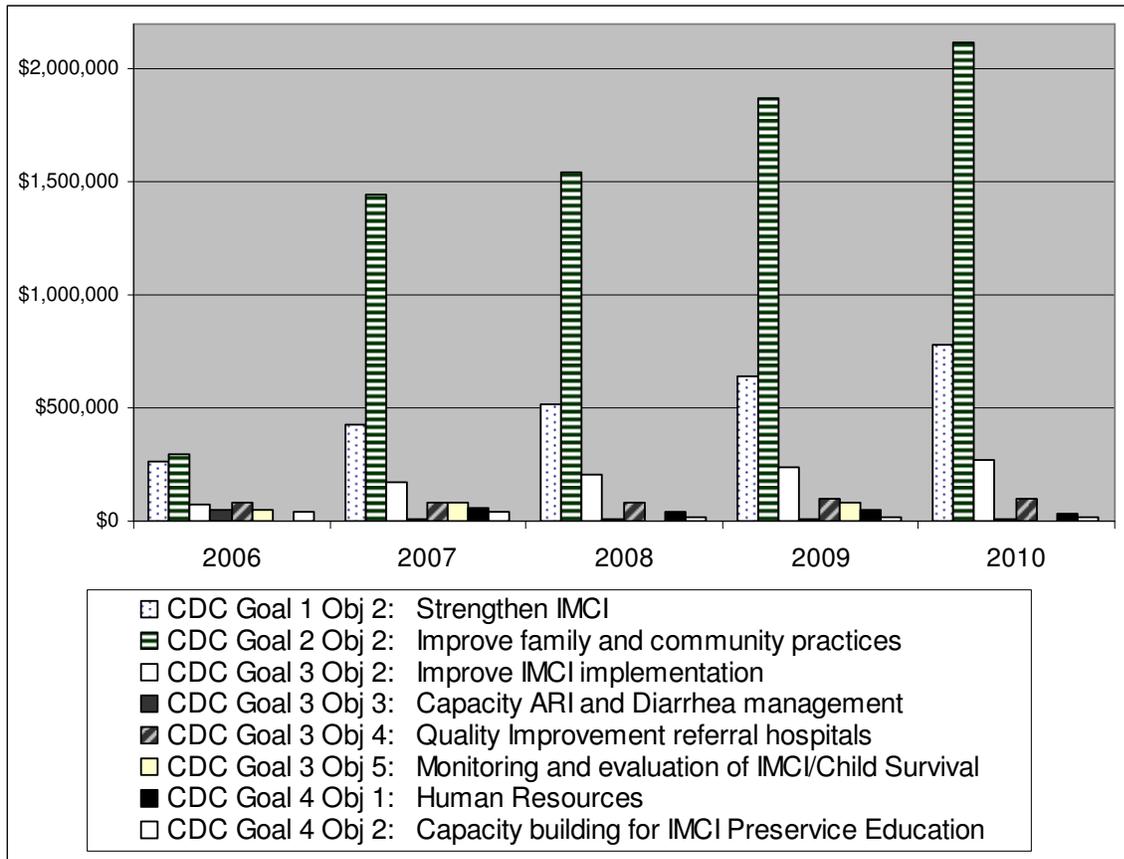


Figure 9.3 illustrates the projected increase in funds per CDC objective in years 2007-2010. – same numbers as shown in Table 9.5. After Goal 2 objective 2, the second most costly objective is Goal 1 Objective 2, which involves strengthening IMCI implementation at health facility level, with 59% of costs for training, 25% for training materials, and 16% for supervision. Table 9.8 provides a breakdown of the shared programme costs from Table 9.5 – this time broken down by major activities. The table illustrates that CDC and NPADC activities largely focus on training and capacity building (58% of total).

**Table 9.8: Major programme activities and their costs**

|   | CDC                 | (%)         | NPADC            | (%)         | As % of total<br>(CDC+NPADC)   |
|---|---------------------|-------------|------------------|-------------|--------------------------------|
| Training - CDC/NPADC programme staff      | \$99,066            | 1%          | \$0              | 0%          | 1%                             |
| Training Hospital clinical staff          | \$194,984           | 2%          | \$0              | 0%          | 2%                             |
| Training HC clinical staff                | \$1,982,338         | 18%         | \$283,130        | 45%         | 19%                            |
| Training VHVs                             | \$3,934,775         | 36%         | \$0              | 0%          | 34%                            |
| Strengthen pre-service training           | \$94,237            | 1%          | \$0              | 0%          | 1%                             |
| Strengthen supervision                    | \$1,948,562         | 18%         | \$76,468         | 12%         | 17%                            |
| Performance incentives to programme staff | \$103,353           | 1%          | \$0              | 0%          | 1%                             |
| Strengthen M&E                            | \$145,326           | 1%          | \$39,827         | 6%          | 2%                             |
| IEC activities                            | \$2,227,825         | 20%         | \$225,583        | 36%         | 21%                            |
| Capital equipment                         | \$50,448            | 0%          | \$0              | 0%          | 0%                             |
| Meetings and workshops                    | \$269,468           | 2%          | \$0              | 0%          | 2%                             |
| <b>Total</b>                              | <b>\$11,050,382</b> | <b>100%</b> | <b>\$625,008</b> | <b>100%</b> | <b>100%<br/>(\$11,675,390)</b> |

Note that a great part of the costs arise from per diems which would in reality fall under the management of OD level administration, and not under CDC central administration.

Table 9.9 below shows the cost of those CDC objectives **not** included in the Child Survival costing. (refer to Table 9.2 for descriptions of each objective). The total amount for 2007-2010, adjusted for inflation, is US\$ 3 million, compared to the US\$11 million included for CDC activities with direct impact on the child survival scorecard interventions. The total amount estimated by CDC for programme activities 2007-2010 is thus US\$14 million; and for NPADC the amount is US\$0.6 million.

**Table: 9.9: Total cost of CDC and NPADC objectives, including activities not included in the CCSS costing**

|  | 2006      | 2007        | 2008        | 2009 (1)    | 2010 (1)    | Sum 2007-2010 |
|--|-----------|-------------|-------------|-------------|-------------|---------------|
| <b>CDC</b>   |           |             |             |             |             |               |
| Total programme implementation support costs included in CCSS costing (as per Table 9.5)       | \$918 376 | \$2 311 450 | \$2 418 351 | \$3 001 819 | \$3 318 761 | \$11 050 382  |
| Total programme costs <i>not</i> included in CCSS costing                                      | \$467 406 | \$750 430   | \$728 876   | \$762 100   | \$777 342   | \$3 018 748   |
| CDC goal 1 obj 1   | \$67 200  | \$84 995    | \$81 101    | \$85 576    | \$87 287    | \$338 959     |
| CDC goal 1 obj 3   | \$74 628  | \$94 389    | \$90 066    | \$95 035    | \$96 936    | \$376 426     |
| CDC goal 2 obj 1   | \$169 629 | \$214 547   | \$204 719   | \$216 014   | \$220 334   | \$855 614     |
| CDC goal 3 obj 1   | \$155 949 | \$197 244   | \$188 209   | \$198 593   | \$202 565   | \$786 612     |
| CDC goal 4 obj 1 (partially included)  | \$0       | \$159 255   | \$164 780   | \$166 882   | \$170 220   | \$661 138     |
| <b>NPADC</b>   |           |             |             |             |             |               |
| Total NPADC programme implementation support costs included in CCSS costing (as per Table 9.5) | \$148 668 | \$151 642   | \$154 675   | \$157 768   | \$160 924   | \$625 008     |
| Total NPADC programme costs not included in CCSS costing                                       | \$0       | \$0         | \$0         | \$0         | \$0         | \$0           |

|  | 2006      | 2007        | 2008        | 2009 (1)    | 2010 (1)    | Sum 2007-2010 |
|--|-----------|-------------|-------------|-------------|-------------|---------------|
| <b>Total (CDC + NPADC)</b>   |           |             |             |             |             |               |
| Total programme implementation support costs included in CCSS costing (as per Table 9.5) |           | \$5,134,299 | \$5,510,275 | \$6,416,406 | \$7,046,438 | \$24,107,419  |
| Total shared programme costs not included in CCSS costing                                | \$467 406 | \$750 430   | \$728 876   | \$762 100   | \$777 342   | \$3 018 748   |

(1) CDC estimates are taken from the CDC 3 year rolling plan 2006-2008, and adjusted for 2% inflation. Numbers for 2009 and 2010 are based on the average value for years 2007 and 2008.

### **Unit cost per intervention**

Tables 9.11. and 9.12 show how the total number of episodes managed increases over time as the coverage is scale up. Similarly, while the number of disease episodes per child/year is assumed to remain constant over time, the number of *managed* episodes per child increase with coverage. For ARI the number of *managed* episodes increases from 0.59 to 0.73. For Diarrhoea the number of episodes *managed* increases from 2.09 to 2.49.<sup>77</sup>

Three unit cost measures are shown, as explained below:

#### **Antibiotic for pneumonia / Diarrhoea:**

Intervention-specific unit costs were calculated for:

- *Unit cost per child under five in the population* - this is the total direct cost for the interventions divided by the total under-five population. The cost per under-five in the population increases as coverage is scaled up.
- *Unit cost per child under five covered* - this is the total direct cost for the interventions, divided by the under-five population covered by the intervention i.e. managed at home or in a facility.
- *Unit cost - cost per episode managed* - this refers to cases for which case management was costed in this exercise. The reader is asked to keep in mind that unit costs for the scorecard interventions only include commodities and referral, and excludes overheads and salary costs.

The above three unit cost measures were calculated both for the direct inputs (commodities and referral) and as a total, including the programme costs. The average cost per ARI episode managed is \$2.25 and for diarrhoea the average is \$0.78 per episode managed.<sup>78</sup> Please note that these are not complete unit costs, as they only relate to the resources included in the costing.

<sup>77</sup> This measure is a combination of epidemiology (episodes per child per year) and coverage. It is helpful for programme managers to assess how the expected increase in coverage will affect the resources needed to manage illness at facility level.

<sup>78</sup> Note that the unit costs per diarrhoea episode managed is calculated by dividing the total cost of managing all children **outside** the home (no home treatment costs included), divided by the **total** number of episodes managed, inside and outside the home. The assumption that treatment at home is free biases the unit costs downwards. If we instead divide total costs for management (e.g., \$2,931,434 in 2007) by the number of child episodes *for which there is a cost incurred in the model* (i.e. 3,914,066 times 40% as per assumptions in Table 9.3), then the average cost per episode managed in 2007 becomes \$1.87 and the average for 2007-2010 \$1.94. This difference applies only to diarrhoea because we assume that some episodes are treated without financial cost in the home (for ARI the average cost remains the same).

The unit costs are not comparable across the two interventions as the costs are not full costs and the types of interventions are quite different.

**Table 9.11: Unit cost by intervention: Acute Respiratory Infection**

|   | 2007        | 2008        | 2009        | 2010        |
|---|-------------|-------------|-------------|-------------|
| Total number of under-fives                         | 1,785,178   | 1,831,733   | 1,878,780   | 1,925,775   |
| <b>Direct cost</b>                                  |             |             |             |             |
| Coverage  | 62%         | 66%         | 71%         | 75%         |
| Total number of children with coverage              | 1,097,884   | 1,208,944   | 1,324,540   | 1,444,331   |
| Number of ARI episodes managed (0.97/cy)            | 1,061,288   | 1,168,646   | 1,280,389   | 1,396,187   |
| Number of ARI episodes managed per child under five | 0.59        | 0.64        | 0.68        | 0.73        |
| Total cost for pneumonia management / ARI           | \$1,105,691 | \$1,241,890 | \$1,387,849 | \$1,543,634 |
| Direct cost per child under five in the population  | \$0.62      | \$0.68      | \$0.74      | \$0.80      |
| Direct cost per child under five covered            | \$1.01      | \$1.03      | \$1.05      | \$1.07      |
| Direct cost per ARI episode managed (unit cost)     | \$1.04      | \$1.06      | \$1.08      | \$1.11      |
| <b>Shared Program cost</b>                          |             |             |             |             |
| CDC and NPADC cost allocated to ARI                 | \$1,220,738 | \$1,275,489 | \$1,568,549 | \$1,728,373 |
| <b>Total cost</b>                                   |             |             |             |             |
| Direct + shared cost                                | \$2,326,429 | \$2,517,379 | \$2,956,399 | \$3,272,007 |
| Total cost per child under five in the population   | \$1.30      | \$1.37      | \$1.57      | \$1.70      |
| Total cost per child under five covered             | \$2.12      | \$2.08      | \$2.23      | \$2.27      |
| Total cost per ARI episode managed (unit cost)      | \$2.19      | \$2.15      | \$2.31      | \$2.34      |

**Table 9.12: Unit cost by intervention: Diarrhoea / Oral Rehydration Therapy**

|   | 2007        | 2008        | 2009        | 2010        |
|---|-------------|-------------|-------------|-------------|
| Total number of under-fives   | 1 785 178   | 1 831 733   | 1 878 780   | 1 925 775   |
| <b>Diarrhea / Oral Rehydration Therapy</b>                          |             |             |             |             |
| <b>Direct cost</b>  |             |             |             |             |
| Coverage  | 75%         | 79%         | 82%         | 85%         |
| Total number of children with coverage                              | 1 338 884   | 1 447 069   | 1 540 600   | 1 636 909   |
| Scale-up factor (2006-2010)   |             |             |             | 161%        |
| Number of diarrhea episodes managed                                 | 4 016 651   | 4 341 207   | 4 621 799   | 4 910 726   |
| Number of diarrhea episodes managed per child under five            | 2,19        | 2,31        | 2,40        | 2,49        |
| Number of diarrhea episodes managed by health worker                | 1 606 660   | 1 736 483   | 1 848 720   | 1 964 291   |
| Total cost for diarrhoea management /ORT (commodities and referral) | \$1 689 080 | \$1 862 310 | \$2 023 111 | \$2 194 010 |
| Direct cost per child under five in the population                  | \$0.95      | \$1.02      | \$1.08      | \$1.14      |
| Direct cost per child under five reached                            | \$1.26      | \$1.29      | \$1.31      | \$1.34      |
| Direct cost per Diarrhea episode managed (unit cost)                | \$0.42      | \$0.43      | \$0.44      | \$0.45      |
| <b>Shared Program cost</b>  |             |             |             |             |
| CDC and NPADC cost allocated to Diarrhoea                           | \$1 242 354 | \$1 297 537 | \$1 591 038 | \$1 751 312 |
| <b>Total cost</b>   |             |             |             |             |
| Direct + shared cost  | \$2 931 434 | \$3 159 848 | \$3 614 149 | \$3 945 322 |
| Total cost per child under five in the population                   | \$1.64      | \$1.73      | \$1.92      | \$2.05      |
| Total cost per child under five reached                             | \$2.19      | \$2.18      | \$2.35      | \$2.41      |
| Total cost per Diarrhoea episode managed (unit cost)                | \$0.73      | \$0.73      | \$0.78      | \$0.80      |

## 9.4 Discussion

### *Impact on child survival*

The resource estimates presented in this section refer to intervention-specific costs for management of ARI and Diarrhoea, but also include other activities implemented by CDC and

NPADC related to strengthening implementation of the entire package of child survival activities. Here we allocated CDC and NPADC programme costs fully to diarrhoea and ARI although in theory they could also be allocated to other scorecard interventions such as e.g., nutrition and immunization, supported through IMCI activities.

According to estimates presented in the *Lancet* child survival series, the impact of scaling up antibiotics for pneumonia, and scaling up ORT+zinc for management of diarrhoea to 99% coverage could be 16% reduction in child mortality.<sup>79</sup> Country-specific targets for 2010 for these interventions range from 40% for zinc to 75% for pneumonia management and 85% for ORT (Table 9.1).<sup>80</sup> Scaling up delivery to these coverage levels will result in less impact than the numbers presented in the *Lancet* series, but will still make a significant contribution to child health in Cambodia and set the path for further improvements in the future. Scaling up delivery strategies such as IMCI will also benefit other interventions and impact on other causes of mortality and morbidity.

As with other programmes involved in this costing, CDC and NPADC activities have not always been quantified in ways that give us assurance that they are sufficient to reach all children under five in the country. However, for activities such as training at HC and VHV level the costs are based on reaching 100% coverage of every OD and village community by 2010, which should ideally reflect strengthening delivery of health services to reach all children under five with key interventions.

### ***Implications for policy and programming***

It has been recognized that in order to achieve increases in coverage, action must take place both at OD, facility and village level. For curative care, the 2006 Cambodia Health Facility Survey shows that training health workers has substantial impact on the quality of care received by children. Therefore the emphasis on training at all levels (Table 9.9) is clearly justified. The plans presented here convey a desire to also increase health promotion activities at community level. Community based delivery is seen in the operational plan as a cost-effective approach to manage sick children that are not severely ill, and to improve referral of children that need health worker attention at HC or hospital level. The direct involvement of the CDC central level programme in supporting the implementation of such activities at OD level may however be limited due to decentralized autonomy of planning. Unless these activities are included in AOPs at PHD and OD level, the idea of moving from ambitious plans at central level to concrete action at OD, HC and village level will not be realized.

Planning and costing must be realistic yet ambitious, and it is difficult to strike the right note. Here targets have been set ambitiously, since CDC and NPADC programme staff and partners agree that the CCSS targets will not be met unless investments at programme level are considerably raised, and the estimates should provide a reasonable base which can be refined and added to as needed. Increases from current 5-10% coverage of activities to 2010 targets of 90-

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<sup>79</sup> 15% ORT, 4% zinc and 6% Antibiotics for pneumonia multiplied by two thirds reduction in child mortality.

<sup>80</sup> Note that the 40% target for zinc was set for this exercise but is not part of the official targets in the CCSS.

100% may not be realistic, however, particularly when their success will also depend on other actors in the health system.<sup>81</sup>

The interdependency between MOH programs is recognized, and in the same way that IMCI training under CDC and NPADC will impact on the effective delivery of immunizations, nutrition counselling and anti-malarial drugs, the successful implementation of activities by other programs such as Reproductive Health and the National Centre for Health Promotion will have an impact on the successful delivery of the activities proposed here to support specific child survival scorecard interventions. Areas of collaboration need to be looked into, to promote integration and less "verticalisation". The role of the programs versus other partners such as UNICEF and/or international NGOs in carrying out the planned activities also requires further discussion.

Although the plan and costs have been reviewed by the CDC and NPADC team, it is recommended that the team further review the following areas:

- The feasibility of targets based on current status and ability of the system to absorb resources and expand.
- The role of different actors in delivering the services, i.e. private/NGO providers versus public providers; intervention delivery at community level versus HC level.
- The contributions of programme activities to the expected coverage outcomes
- Areas where costs could be saved with special focus on the high cost activities and resources
- Any additional activities that may be needed to reach the targets set.
- The impact on staff time of training, supervision and capacity building activities planned at HC and community level. With increased involvement of health centre staff in child survival as well as other scaling up activities, it is possible that additional staffing will be required, which could raise costs significantly. Since these activities make up the bulk of the CDC and NPADC costs, these constraints need to be carefully examined.

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<sup>81</sup> Such increases are envisioned for community based activities, as shown in Figure 9.3 for CDC Goal 2 objective 2 *Improve family and community practices*.

## **10. Reproductive Health interventions**

The National Reproductive Health Programme (NRHP) has the following components according to its national strategy (National Strategy for Reproductive and Sexual Health in Cambodia - 2006-2010):

- Maternal and newborn care
- Adolescent reproductive and sexual health
- Family planning
- Reproductive tract infections (RTIs)
- Gender
- Commodity security
- Emerging issues and initiatives

The goal of the strategy is to “attain a better quality of life for all Cambodians by improving the RSH status of women, men, and adolescents through effective and appropriate health programmes”. The targets for the end of 2010 include the following:

- MMR reduced from 437 to less than 243/100,000 (CMDG, NSDP)
- IMR reduced from 95 to less than 60/1,000 (CMDG, NSDP)

As noted in Section 1.1, neonatal problems cause an estimated 30% of child deaths in Cambodia.

The NRHP is responsible for one CCSS scorecard intervention which is “skilled birth attendance”. The CCSS describes this as the provision of skilled birth attendance during pregnancy, delivery and the immediate post-partum. It also sets out a package of newborn interventions that should be implemented at three levels (see Table 10.1):

- Level 1 - community/home by (a) a midwife or (b) a TBA,
- Level 2 – MPA/health centre
- Level 3 – CPA/referral hospital

**Table 10.1: Newborn Interventions**

| <b>Intervention</b>                                     | <b>Level</b> |
|---|--------------|
| Clean delivery  | 1, 2, 3      |
| Clean cord care   | 1, 2, 3      |
| Newborn resuscitation                                   | 2, 3         |
| Newborn temperature management                          | 1, 2, 3      |
| Initiation of breastfeeding within one hour of delivery | 1, 2, 3      |
| Weighing the baby to assess for low birth-weight        | 2, 3         |
| Kangaroo mother care for low birth-weight babies        | 1, 2, 3      |
| Detection and referral of neonatal infections           | 1, 2, 3      |
| Management of neonatal infections                       | 2, 3         |
| Hepatitis B within 24 hours                             | 1a), 2, 3    |
| Antibiotics for premature rupture of membranes          | 3            |
| Corticosteroids for preterm labour                      | 3            |

The indicator for this intervention is the number of deliveries attended by a skilled birth attendant. The CCSS shows an estimated coverage for this indicator of 32% from the CDHS 2000, an estimated actual figure for 2005 of 34%, and a target of 60% for 2007.

Table 10.2 shows the targets and activities provided by the NRHP for their child survival action plan. The CDHS 2005 showed a figure of 43.8% for the number of deliveries attended by a skilled birth attendant (higher than the estimate of 34% showed in the CCSS). The NRHP estimated the actual coverage for 2006 as 50% and set targets of 55% in 2007, 60% in 2008, 65% in 2009 and 70% in 2010. These percentages were then converted into numbers of deliveries. Over the four years of the Child Survival strategic plan the numbers of deliveries attended by a skilled birth attendant would need to increase from 188,234 in 2006 to 262,618 in 2010, an increase of 40%. Since this indicator represents all the elements of the skilled birth attendance package, it is assumed that the pregnancy, delivery and the immediate post-partum would increase at the same rate. The NRHP also set targets for training and deploying midwives, which are also shown in Table 10.2.

We were unable to obtain cost estimates for these activities from the NRHP at the time of this study. A copy of the spreadsheet used for the plan has been provided and additional activities and costs can be added when they become available.

It should be noted that some other NRHP activities were identified in the plans of other programmes, such as the NNP. These costs will probably not be available until the NRHP has completed and costed the action plans for their own strategy. It is understood that this is not expected to happen until the middle of 2007.

**Table 10.2: Activities and targets for skilled birth attendance**

| Objectives and Activities   | Lead Institution | Indicators for Objectives and Activities                           | CDHS 2005 | Estimated actual 2006 | Target 2007 | Target 2008 | Target 2009 | Target 2010 |
|---|------------------|--|-----------|-----------------------|-------------|-------------|-------------|-------------|
| <b>Skilled birth attendance</b>   |                  | Number of deliveries   | 367,445   | 376,467               | 385,421     | 394,817     | 404,028     | 412,904     |
| <b>OBJECTIVE: To increase the number of deliveries attended by a skilled birth attendant</b>  | NRHP             | <b>Percent of deliveries attended by a skilled birth attendant</b> | 42%       | 50%                   | 55%         | 60%         | 65%         | 70%         |
|   |                  | Number attended  | 154,327   | 188,234               | 211,982     | 236,890     | 262,618     | 289,033     |
| ACTIVITY: Train midwives  |                  | Midwives trained   |           |                       | 128         | 128         | 128         | 196         |
| ACTIVITY: Deploy midwives   |                  | Midwives deployed to health centres                                |           | 2,850                 | 2,850       | 2,978       | 3,106       | 3,302       |
|   |                  | Health centres with midwives                                       |           | 719                   | 719         | 783         | 847         | 945         |
| ACTIVITY: Increase deployment in rural areas through incentives                               |                  |  |           |                       |             |             |             |             |
| ACTIVITY: Increase proportion of births in health facilities by paying incentives to midwives |                  | % of births in health facilities                                   | 21.5%     |                       |             |             |             |             |
|   |                  | Number of births in health facilities                              | 79,001    |                       |             |             |             |             |
| ACTIVITY: Improve skills of midwives through in-service training                              |                  |  |           |                       |             |             |             |             |
| ACTIVITY: Provide drugs for deliveries  |                  |  |           |                       |             |             |             |             |
| ACTIVITY: Implement BCC program with help from DCHP   |                  |  |           |                       |             |             |             |             |

## **11. Related costs**

### **11.1 National Centre for Health Promotion**

The objectives of the National Centre for Health Promotion (NCHP) include providing support to MOH programmes in areas related to health promotion. The Centre does not have a strategic plan as yet but its proposed AOP for 2007 includes several activities that are related to the scorecard interventions. These include the following:

- Various activities related to the promotion of 12 key family practices described below (assistance from UNICEF and the EU).
- Campaigns on reproductive health (assistance from UNFPA).
- Promotion of C-IMCI interventions (assistance from EU and UNICEF).
- Strengthening of service delivery at health centres (assistance from EU and UNICEF).

The activities in the NCHP AOP were not included in this costing, but it is recognized that they play an important role for child survival. Promoting 12 key family practices is an important area of the NCHP's plan. These practices cover key household behaviours that will improve the health of children and many of them relate to the scorecard interventions. The 12 practices relate to: breastfeeding, complementary feeding, micronutrients, immunization, malaria, food and fluids for sick children, mental and social development, treatment of infections, recognizing danger signs, seeking care at the health centre, hygiene and ante-natal care.

Several of the programmes responsible for implementing the scorecard interventions include promotion activities in their plans. It will be important for the programmes to coordinate their promotion activities with those of the NCHP since this could result in greater effectiveness and cost-savings.

## 12. Summary of findings

### 12.1 Scorecard intervention targets

The cost findings are based on the targets set out in the operational plans. These targets are, therefore, important elements of the study and it is useful to summarize them here.

The targets that these investments are expected to achieve by 2010 range from 60% for early initiation of breastfeeding to 95% for complementary feeding and malaria treatment and 100% for dengue vector control (Table 12.1). (Note that the dengue vector control target is shown as the number of positive breeding sites per household, which is expected to decrease over time to reach less than 10 positive sites per 100 households in 2010, which in terms of coverage for high risk households and children is expected to be equivalent to 100%).

Table 12.1 also shows the increases in coverage required to achieve the 2010 targets – both in terms of numbers of persons covered and percentage increase (scale-up factor). The scale-up factors are calculated by taking the additional coverage figures as percentages of the 2006 coverage figures. Since population growth is taken into account in the coverage targets, the increases represent increases in population plus the increases in the percentage targets. These scale-up factors are not directly comparable across interventions since the starting coverage levels differ considerably, but they do give some indication of the additional effort required for each intervention.

**Table 12.1 Coverage and levels and scale-up factors**

|                                   | (a)           | (b)         | (c)                            | (d)                  | (e)                  | (f)                  | (g)                  | (h) =<br>(d)+(e)+(f)+(g)      | (i) =<br>(g)-(c)                 | (j)=<br>(g)/(c)-1 |
|-----------------------------------|---------------|-------------|--------------------------------|----------------------|----------------------|----------------------|----------------------|-------------------------------|----------------------------------|-------------------|
| Scorecard Interventions           | 2006 estimate | 2010 target | Estimated actual 2006 coverage | Target 2007 coverage | Target 2008 coverage | Target 2009 coverage | Target 2010 coverage | Total target coverage 2007-10 | Additional coverage 2006 to 2010 | Scale-up factor   |
| Early initiation of breastfeeding | 40%           | 60%         | 150,587                        | 173,439              | 197,409              | 222,215              | 247,742              | 840,805                       | 97,155                           | 65%               |
| Exclusive breastfeeding           | 62%           | 80%         | 233,410                        | 250,524              | 276,372              | 303,021              | 330,323              | 1,160,240                     | 96,913                           | 42%               |
| Complementary feeding             | 83%           | 95%         | 312,468                        | 327,608              | 347,439              | 371,706              | 392,259              | 1,439,012                     | 79,791                           | 26%               |
| Vitamin A                         | 76%           | 85%         | 1,650,816                      | 1,785,098            | 1,885,342            | 1,989,381            | 2,081,110            | 7,740,931                     | 430,294                          | 21%               |
| Measles vaccine                   | 84%           | 92%         | 316,680                        | 331,462              | 347,439              | 363,625              | 379,872              | 1,422,398                     | 63,192                           | 20%               |
| Tetanus toxoid                    | 73%           | 80%         | 2,268,392                      | 2,417,834            | 2,585,686            | 2,718,057            | 2,793,768            | 10,515,345                    | 525,376                          | 28%               |
| Insecticide-treated nets          | 20%           | 80%         | 40,645                         | 166,839              | 171,190              | 175,587              | 179,979              | 693,595                       | 139,334                          | 243%              |
| Malaria treatment                 | 31%           | 95%         | 62,999                         | 177,267              | 203,289              | 208,510              | 213,725              | 802,791                       | 150,726                          | 139%              |
| Dengue vector control             | 80            | 10          | 530,834                        | 544,747              | 824,077              | 967,391              | 991,589              | 3,327,804                     | 460,755                          | 87%               |
| Oral rehydration therapy          | 59%           | 85%         | 1,017,657                      | 1,338,884            | 1,447,069            | 1,540,600            | 1,636,909            | 5,963,462                     | 619,252                          | 61%               |
| Antibiotic for pneumonia          | 57%           | 75%         | 991,563                        | 1,097,884            | 1,208,944            | 1,324,540            | 1,444,331            | 5,075,699                     | 452,768                          | 46%               |

With the following exceptions, the indicators used for most of the above figures are shown in Table 3.1:

- Vitamin A – the targets are the numbers of children aged 6 – 59 months receiving one dose of Vitamin A in the past 6 months plus the numbers of women who received one vitamin A capsules within 8 weeks after delivery<sup>82</sup>.

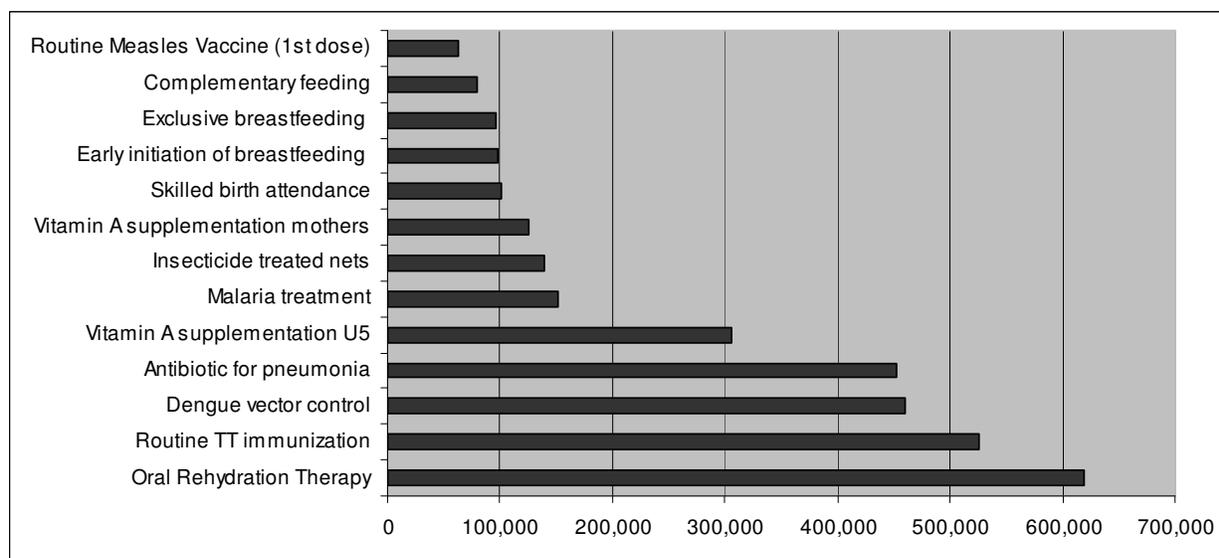
<sup>82</sup> It is understood that the policy was changed after the study was done to provide the capsules within 6 weeks of delivery.

- Measles – the targets are the numbers of infants receiving first dose of measles vaccine, whereas the unit cost is per child fully immunized.
- Tetanus toxoid – the targets are the numbers of child bearing women receiving routine immunization whereas the unit cost is per woman fully immunized.
- Dengue vector control – the targets are the numbers of positive breeding sites per 100 households. The coverage figures shown here are the numbers of children protected.

The incremental numbers of persons to be reached (scale-up factors) are also illustrated in Figure 12.1. The ORT intervention will reach the greatest number of additional children (619,252), which represents an increase (scale-up factor) of 61%, from current coverage level of 59% to 85%. The routine measles vaccine will reach the smallest (63,192)<sup>83</sup> number of additional children, which represents an increase of 20% from the coverage level of 84% in 2006. The increase in measles coverage is relatively low because the existing coverage level is believed to be already quite high. The greatest expected percentage increase is 243% for the provision of ITNs, and is a result of the existing coverage level being very low.

The targets for some of the interventions appear rather ambitious given that the current levels of coverage are low and constraints at the service delivery level have not all been fully considered. For example, scaling up malaria treatment from 20% to 80% in four years is likely to be a challenge.

**Figure 12.1: Incremental number of persons to be reached in 2010, in addition to 2006 coverage, by intervention**



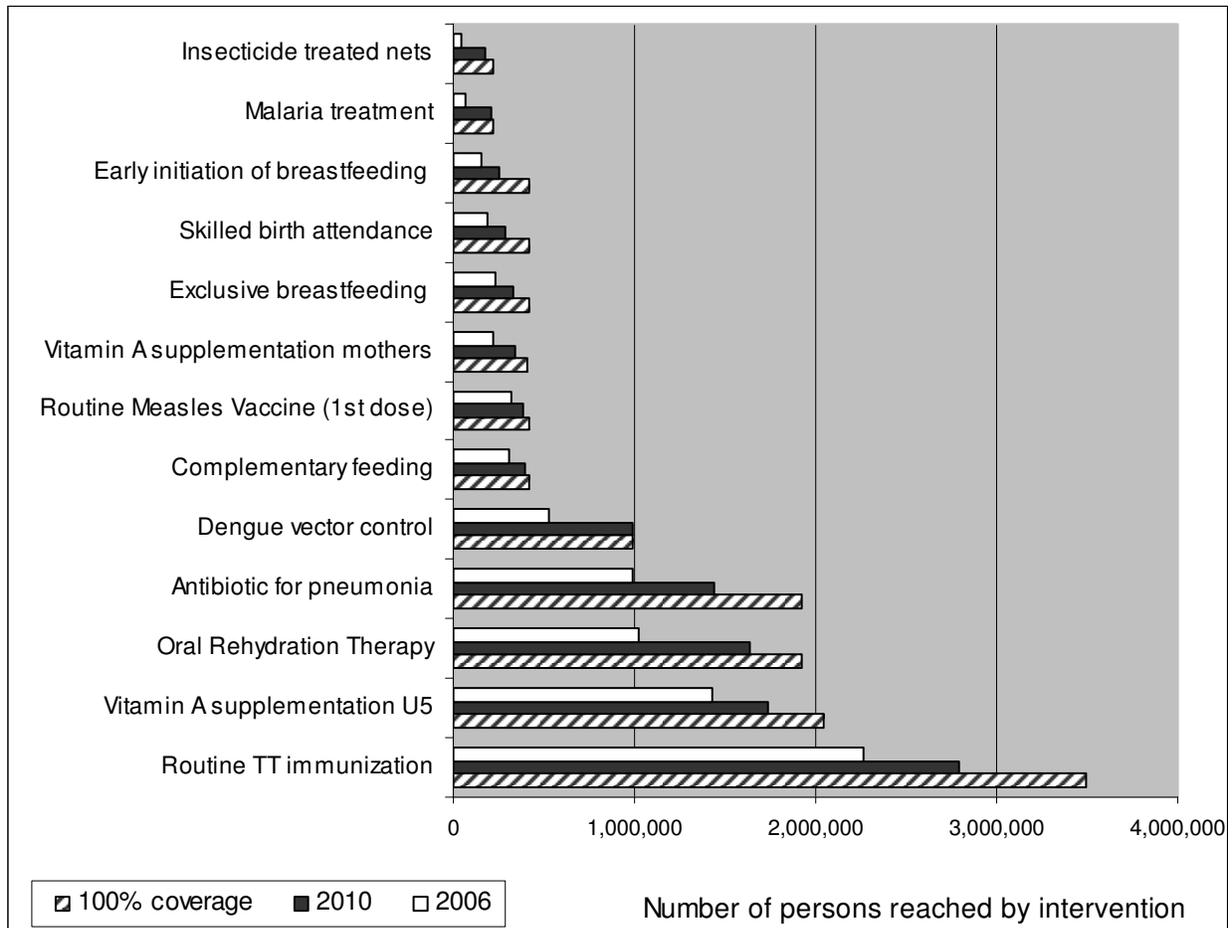
\* Note that three feeding interventions are not programmatic interventions - (IBF, EBF, CF) but behaviour changes taken up by individual mothers. For some of the other interventions the scale-up refers to either one-time (skilled birth attendance) or multiple deliveries (e.g., Vitamin A supplementation)

<sup>83</sup> The 63,192 is for routine measles immunization only. With additional delivery channels from 2008 onwards, more children will be reached.

Figure 12.2 below illustrates the increase in coverage by intervention at the national level. The interventions are sorted by the greatest number of persons reached in 2010, which is the highest for TT immunizations and the lowest for ITNs. The figure also shows the number of persons that would need to be reached for 100% coverage. This provides additional insight on the need for further investments beyond 2010.

**Figure 12.2: Number of persons reached per intervention, years 2006 and 2010**

(\* the calculations refer to the estimated number of *children* reached, except for TT which refers to *CBAW*; and dengue vector control which refers to *households*)



Note that the figure above refers to *events*, which is not always equivalent to full coverage (e.g., for TT immunizations we assumed that three immunization events are required to reach full coverage).

## 12.2 Total costs

The preliminary estimate of the total programme and commodity costs for implementing 11 of the 12 child survival scorecard interventions comes to \$79.9 million over the four years (Table 12.2). These are the costs of implementing all the activities required as defined by the national

programmes in order to scale up the child survival interventions, and not just the incremental costs of activities that are additional to those carried out in 2006.

This estimate covers the cost of the three feeding components for promoting breastfeeding and complementary feeding, Vitamin A supplementation, measles and tetanus toxoid immunization, ITNs, malaria treatment, dengue vector control, management of diarrhoea (ORT) and antibiotics for pneumonia. The cost of the skilled birth attendance intervention is not included.

The costs reflect the resources required to implement the activities planned by the national programmes. They include commodities and programme costs (training, BCC etc). They do not include MOH staff and operating costs at the service delivery level or management level, other than under the immunization interventions. The cost of ITN distribution and dengue fever control spraying do, however, include salaries for workers involved in those activities (temporary workers in the case of dengue fever spraying). Some scorecard interventions include general activities for which the Reproductive Health Programme is responsible and these have not been costed. The figures also do not include any costs incurred by households (see the parameters in Annex 3).

The costs are spread fairly evenly over the four years, ranging from \$19.0 million to \$20.8 million per year. Comparative figures for 2006 are not shown, as the figures were not all available and those that were available are not considered to be very reliable.

**Table 12.2: Summary of scorecard intervention costs**

| Scorecard Interventions           | 2007              | 2008              | 2009              | 2010              | Total 2007-10     |
|-----------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Early initiation of breastfeeding | 343,558           | 348,716           | 405,991           | 452,283           | 1,550,548         |
| Exclusive breastfeeding           | 343,558           | 348,716           | 405,991           | 452,283           | 1,550,548         |
| Complementary feeding             | 464,872           | 480,883           | 532,678           | 575,508           | 2,053,941         |
| Vitamin A                         | 860,410           | 864,387           | 941,239           | 1,002,656         | 3,668,692         |
| Measles vaccine                   | 2,980,337         | 1,801,723         | 1,813,421         | 1,771,458         | 8,366,939         |
| Tetanus toxoid                    | 2,882,390         | 2,663,185         | 2,669,287         | 2,529,534         | 10,744,396        |
| Insecticide-treated nets (ITNs)   | 4,025,827         | 3,093,096         | 3,434,354         | 2,412,977         | 12,966,254        |
| Malaria treatment                 | 275,002           | 224,876           | 264,870           | 199,520           | 964,269           |
| Dengue vector control             | 2,716,810         | 3,440,851         | 3,719,994         | 3,246,099         | 13,123,754        |
| Oral rehydration therapy (ORT)    | 2,975,703         | 3,208,414         | 3,666,111         | 4,000,202         | 13,850,430        |
| Antibiotic for pneumonia          | 2,326,429         | 2,517,379         | 2,956,399         | 3,272,007         | 11,072,214        |
| Skilled birth attendance          | n/a               | n/a               | n/a               | n/a               | n/a               |
| <b>TOTAL</b>                      | <b>20,194,896</b> | <b>18,992,226</b> | <b>20,810,335</b> | <b>19,914,527</b> | <b>79,911,985</b> |

As stated in Section 1.1, the major causes of under-5 deaths in Cambodia are neonatal problems (an estimated 30% of deaths), ARI (21%) and diarrhoeal diseases (17%), with under-nutrition being the single most important risk factor. For the interventions that directly address these top causes of child mortality, the skilled birth attendance intervention aimed at reducing neonatal mortality could not be costed. The pneumonia treatment intervention would require \$11.1 million and the ORT intervention would require \$13.8 million. National programme activities to improve

nutrition practices, which represent the single most important risk factor, would require a total of \$8.8 million.

From a programme perspective the highest resource needs are for CDC/NPADC, since the ORT intervention and the pneumonia intervention total \$24.9 million. The lowest resource needs are for the NNP with the four interventions needing a total of \$8.8 million.

It should be emphasized that the costs presented here are not comparable across interventions. The costs represent estimated resource needs for implementing the national plans. The resources needed by MOH programmes depend on their targets and how they define their role and responsibilities vis-à-vis other actors in the health sector. Moreover, the programmes have set different coverage targets and have assessed the need for programme implementation support activities differently, depending on the historical and current context. In addition, the estimates for each intervention include different components. For example, with the exception of the NIP, they do not include health centre staffing and operating (refer to Annex 3). These service delivery costs, such as salaries and transport, can vary significantly among interventions. For example, the nutrition interventions appear "low cost" given their large target population, but may cost proportionally more than some of the other interventions if staff costs are taken into account. For the above reasons, cost estimates should not be compared across interventions or programmes.

A breakdown of total costs into commodity costs and programme costs is presented in Tables 12.3 and 12.4. The total commodity resource needs for the 11 interventions require \$38.4 million, which represents 48% of the total costs (Table 12.3). The commodities included here are those used directly in the provision of services. Equipment, vehicles and supplies for training and administration are excluded. The interventions with the highest commodity costs are ITNs (the cost of the nets) and dengue vector control (the cost of larvicide). A major reason why these interventions have such high commodity costs is because the costs of all the ITNs and larvicide required for the whole population at risk were allocated to child survival.

**Table 12.3: Summary of scorecard intervention commodity costs (drugs, vaccines, supplies and tests)**

| Scorecard Interventions           | 2007             | 2008             | 2009              | 2010             | Total 2007-10     |
|-----------------------------------|------------------|------------------|-------------------|------------------|-------------------|
| Early initiation of breastfeeding |                  |                  |                   |                  |                   |
| Exclusive breastfeeding           |                  |                  |                   |                  |                   |
| Complementary feeding             |                  |                  |                   |                  |                   |
| Vitamin A                         | 229,268          | 245,841          | 263,444           | 279,435          | 1,017,988         |
| Measles vaccine                   | 642,458          | 486,519          | 458,872           | 460,650          | 2,048,499         |
| Tetanus toxoid                    | 1,034,778        | 974,976          | 980,194           | 983,176          | 3,973,124         |
| Insecticide-treated nets (ITNs)   | 3,161,690        | 2,434,600        | 2,632,000         | 1,974,000        | 10,202,290        |
| Malaria treatment                 | 87,495           | 88,131           | 87,458            | 60,140           | 323,224           |
| Dengue vector control             | 1,548,952        | 2,331,396        | 2,538,790         | 2,078,780        | 8,497,918         |
| Oral rehydration therapy (ORT)    | 1,569,470        | 1,730,213        | 1,878,886         | 2,036,269        | 7,214,838         |
| Antibiotic for pneumonia          | 1,069,318        | 1,201,038        | 1,342,195         | 1,492,855        | 5,105,406         |
| Skilled birth attendance          | n/a              | n/a              | n/a               | n/a              | n/a               |
| <b>TOTAL</b>                      | <b>9,343,429</b> | <b>9,492,714</b> | <b>10,181,839</b> | <b>9,365,305</b> | <b>38,383,287</b> |

Table 12.4 shows the resource needs for programme activities and implementation support, which for the 11 interventions sum to \$41.5 million and make up the other 52% of the total costs). The interventions with the highest resource needs for supporting implementation and delivery are those of the NIP and IMCI programmes: tetanus toxoid (\$6.8 million)<sup>84</sup>, ORT (\$6.6 million, measles (\$6.3 million) and antibiotic for pneumonia (\$6.0 million). The high costs for immunizations can be explained by the significant cost of service delivery (refer to Table 6.4). For ORT and management of pneumonia, programme level support costs are mainly incurred for training activities for general child survival (refer to Table 9.8).

**Table 12.4 Summary of scorecard intervention programme costs (implementation support activities)**

| Scorecard Interventions           | 2007              | 2008             | 2009              | 2010              | Total 2007-10     |
|-----------------------------------|-------------------|------------------|-------------------|-------------------|-------------------|
| Early initiation of breastfeeding | 343,558           | 348,716          | 405,991           | 452,283           | 1,550,548         |
| Exclusive breastfeeding           | 343,558           | 348,716          | 405,991           | 452,283           | 1,550,548         |
| Complementary feeding             | 464,872           | 480,883          | 532,678           | 575,508           | 2,053,941         |
| Vitamin A                         | 631,142           | 618,546          | 677,795           | 723,221           | 2,650,704         |
| Measles vaccine                   | 2,337,879         | 1,315,204        | 1,354,549         | 1,310,808         | 6,318,440         |
| Tetanus toxoid                    | 1,847,612         | 1,688,209        | 1,689,093         | 1,546,358         | 6,771,272         |
| Insecticide-treated nets (ITNs)   | 864,137           | 658,496          | 802,354           | 438,977           | 2,763,964         |
| Malaria treatment                 | 187,507           | 136,745          | 177,412           | 139,380           | 641,045           |
| Dengue vector control             | 1,167,858         | 1,109,455        | 1,181,204         | 1,167,319         | 4,625,836         |
| Oral rehydration therapy (ORT)    | 1,406,233         | 1,478,201        | 1,787,225         | 1,963,933         | 6,635,592         |
| Antibiotic for pneumonia          | 1,257,111         | 1,316,341        | 1,614,204         | 1,779,152         | 5,966,808         |
| Skilled birth attendance          | n/a               | n/a              | n/a               | n/a               | n/a               |
| <b>TOTAL</b>                      | <b>10,851,467</b> | <b>9,499,512</b> | <b>10,628,496</b> | <b>10,549,222</b> | <b>41,528,698</b> |

Table 12.5 shows another breakdown of total cost, which compares shared costs with intervention-specific costs (see Box 12.1 for a clarification on the concept of shared costs). The

<sup>84</sup> Note that this table includes service delivery costs for immunizations.

total shared costs for the 11 interventions amount to \$37.0 million, of which \$17.9 million was allocated to scorecard interventions and \$19.1 million was allocated to non-scorecard interventions (Table 12.5).

**Box 12.1: Shared costs**

The national programmes have a wider responsibility than child survival only, and therefore some of their activities extend beyond the scorecard interventions.

For example, NIP also provides other immunizations not included in the CCSS scorecard, such as Hepatitis B. The cost for the Hepatitis B vaccine and injection supplies is a non-scorecard cost and excluded from this estimate. However, some costs of the NIP programme are shared between all vaccines: for example, maintenance of the cold chain is relevant for all vaccines provided. Therefore, this is a shared cost for the programme.

A proportion of the shared cost was allocated to the scorecard interventions using factors appropriate for each programme. For NIP, the factors used were 27% (TT) and 12% (measles), based on the relative proportion of these injections out of all injections estimated to be provided by NIP in year 2007. These weights were used as factors for allocating shared NIP costs such as cold chain equipment and salary incentives.

Refer also to Table 4.1 for clarification on the concept of shared costs.

It is important to recognize that the share of the costs allocated to a scorecard intervention is somewhat artificial, in that it is only a proportion of the actual investment that may be needed. For example, \$2.5 million of the total shared costs of \$7.9 million for the NNP are allocated to scorecard interventions (equally shared across interventions and activities). The balance of \$5.4 million is allocated to non-scorecard interventions. If these non-scorecard interventions are not implemented or are reduced in scale, then the cost of the activities would not reduce proportionally and the share of the total cost borne by the scorecard interventions would rise. Without further analysis it is not clear by how much these shared costs would rise.

In some cases, the total cost incurred for the shared activities may stay constant. Taking again the NIP example, even if the delivery of Hepatitis B vaccines was to stagnate, the investments required for cold chain maintenance, M&E and staff salary may stay the same given that these costs are not dependent on the volume of delivery (they are more or less fixed). In a cost allocation exercise, this would however lead to a higher share of costs allocated to measles and TT.

The figures indicate that **the minimum amount required to ensure that national programmes have the resources required to implement the operational plan for child survival 2007-2010 is \$79.9 million.** However, given the importance of shared costs, an additional \$19.1 million may be needed, bringing the total required to \$99.0 million.

While the MOH should develop a resource mobilization strategy for obtaining the full \$79.9 million over the four coming years, the MOH will also need to work together with a broader base

of health intervention advocates to ensure that the total resources required for shared activities are secured.

**Table 12.5: Distribution of direct and shared costs between scorecard and non-scorecard interventions \***

|                        | (a)<br>Scorecard<br>direct costs | (b)<br>Total shared<br>costs | (c)<br>Scorecard<br>allocation of<br>shared costs | (d)<br>Non-<br>scorecard<br>allocation of<br>shared costs | (e)<br>Total<br>scorecard<br>costs |
|------------------------|----------------------------------|------------------------------|---|---|------------------------------------|
|                        | 2007-10                          | 2007-10                      | 2007-10   | 2007-10   | 2007-10                            |
|                        | (c)+(d)                          |                              | (a)+(c)   |   |                                    |
| Nutrition programme    | 6,305,373                        | 7,869,905                    | 2,518,369   | 5,351,535   | 8,823,729                          |
| Immunisation programme | 17,418,104                       | 4,341,615                    | 1,693,230   | 2,648,385   | 19,111,335                         |
| Malaria programme      | 12,168,532                       | 9,773,282                    | 1,761,901   | 8,011,292   | 13,930,523                         |
| Dengue programme       | 12,833,570                       | 362,731                      | 290,185   | 72,546  | 13,123,754                         |
| IMCI (ARI and ORT)     | 13,247,254                       | 14,694,138                   | 11,675,390  | 3,018,748   | 24,922,644                         |
| Reproductive health    | n/a                              | n/a                          | n/a   | n/a   | n/a                                |
| <b>TOTAL</b>           | <b>61,972,833</b>                | <b>37,041,671</b>            | <b>17,939,075</b>                                 | <b>19,102,506</b>   | <b>79,911,985</b>                  |

\* Note: The shared costs are based on programme implementation support activities. For the immunization programme the shared costs for vaccine delivery shown under the intervention-specific costs (for example, category 1a.2 in Table 6.2) are therefore included under (a) direct costs in Table 12.5.

The unit cost figures shown under the section on each intervention have not been summarized in this section. This is because these unit costs are not comparable across interventions given that the costs are incomplete and the denominator for each intervention is different.

### 12.3 Comparison with other studies

A number of health service costing studies have been carried out recently in Cambodia. The following studies were reviewed to see if useful comparisons can be made with the findings of this study.

The WHO-supported cost-effectiveness study (CEA) undertaken for Cambodia by Niessen *et al.* indicates that cost-effective combinations of child survival interventions includes the promotion of breast-feeding, introduction of community-level skilled birth attendants, IMCI, community case management of child diseases, and neonatal attendance both at community level and facility-level.<sup>85</sup> Costs include patient-related costs (i.e. commodities, health worker time, equipment), as well as programme-related costs (e.g., training, management, supervision).

<sup>85</sup> Louis Niessen *et al.*, "Stepwise national priority setting in child intervention programmes: sectoral cost-effectiveness analysis for Cambodia," final draft paper (forthcoming), Institute for Health Policy and Management/ Institute for Medical Technology Assessment, Erasmus MC, Erasmus University Rotterdam, Netherlands, and World Health Organization.

The study shows how the addition and expansion of selected interventions present a cost-effective and feasible approach to reducing child mortality. One of the findings of the study is that the expansion of outreach activities alone is less cost-effective than facility and community based expansion, and combinations thereof. The findings of the Niessen study are not directly comparable with the findings of this study.

Two WHO-supported studies by Steve Fabricant and others<sup>86</sup> produced average costs for services at health centres and hospitals, but did not break the costs down to the intervention level and the costs are therefore not comparable with the costs in this study. Also, the Fabricant studies does not specify specific commodity/ resource needs (e.g., quantity of antibiotics or Vitamin A needed by year). The studies show total costs for 2002 for some of the national programmes but they are somewhat out of date now and there is not sufficient detail to use those figures for forward projections.

A study by David Dunlop provides useful information on child health costs but, again, does not break costs down to the level of individual interventions<sup>87</sup>. It does, however, include cost estimates for 2007 for malaria prevention of \$843,000 and malaria treatment of \$169,000, although it is not clear if these figures are based on Cambodia-specific unit costs. These figures are significantly less than the scorecard intervention costs and without more detail it is not clear why that is so.

The WHO supported study by Catherine Michaud focused on external resource flows to the health sector in general and used 2003 data<sup>88</sup>. It analyzed expenditures but did not include MOH expenditures (service delivery or management) and did not break down expenditures to the level of intervention. The figures from the donors may also include technical assistance and grants to NGOs. For these reasons the expenditures are not comparable with the costs produced under this study.

A National Health Accounts would have provided useful comparable information but has not yet been prepared for Cambodia.

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<sup>86</sup> Cost Analysis of Essential Health Services in Cambodia. MOH/WHO Health Sector Reform Phase III Project Final Report of Data Analysis, Prepared by Steve Fabricant, MBA, Ph.D. Cost Analysis (Part 2) of Essential Health Services in Cambodia MOH/WHO Health Sector Reform Phase III Project. Steve Fabricant, Sok Kanha, and Khout Thavary Final Draft 11 December 2003

<sup>87</sup> Funding and Cost of Child Health Care in Cambodia , Circa 2004: Are We Out of Balance? David Dunlop, University Research Corporation and Dartmouth Medical School.

<sup>88</sup> External Resource Flows to the Health Sector in Cambodia. May 2005. Catherine M. Michaud. World Health Organization.

## 13. Issues, actions and future steps

### 13.1 Issues

A number of issues arose during the course of the study. The more important ones are summarized here.

#### *Development of action plans linking targets to outcomes*

The objective of the costing was estimating resources needed for implementing an operational plan to meet the child survival intervention coverage targets. In order to ensure that plans are linked to programme targets, it is important that activities are specified as is their contribution to reaching the overall programme objective. The plan and costs will then reflect a results-oriented and needs-based approach. Unfortunately at the time of initiating the costing exercise, most of the action plans were still lacking in such detail.

Assistance was given to several of the programmes in the development of their plans prior to costing. While all the activities identified by the programmes were included, there was not sufficient time to review targets for all activities and to link those targets to the overall targets for the interventions. This is especially important for activities that have a geographic focus on certain districts, where targets should be set for those districts and then linked to the national targets. An example would be the strengthening of Vitamin A programme in districts that have low coverage.

#### *Target setting and harmonization of targets*

Current intervention targets are not harmonized for interventions that could be expected to be delivered in packages and thus move in unison vis-à-vis coverage. For example 2010 coverage target is 75% for management of pneumonia, 95% for malaria treatment with ACTs, and 85% for ORT, even though programmatically the conditions for their delivery may be similar. Further work may be needed to review interactions between targets and to harmonize targets for interventions with the same delivery channels.

#### *Feasibility of achieving targets*

The overall targets for the interventions may not have all been reviewed in terms of feasibility, especially in the light of some of the possible constraints. After these constraints have been reviewed it will be important to review those targets – both for 2010 and for the intervening years. Although programmes were encouraged to think creatively about what activities are needed, the review should consider if these are sufficient to reach the ambitious targets set.

#### *Total vs. incremental costs*

Total costs were used as the cost of scaling up the interventions, not incremental costs.

It was not possible in the time available to get reliable, complete and comparable figures for 2006. It is also considered more appropriate to use total costs to estimate the funding gap since the baseline costs include substantial donor funded activities that do not have guaranteed funding in future years.

### ***Service delivery costs***

As has been pointed out in other sections of the report, the costs presented here mainly cover commodity and programme costs. With the exception of the NIP, they do not cover MOH services delivery and management costs such as salaries and transport. They also do not include any management costs that may result by having NGOs implement activities. In order to assess the burden on the health system of implementing the child survival scorecard interventions and potential bottlenecks for successful delivery, it is recommended that a separate study be carried out of these service delivery and management costs.

### ***Alternative service delivery mechanisms***

The operational plans did not identify alternative service delivery mechanisms and it was not, therefore, possible to see if there were any such alternatives that would cost less.

### ***Total costs per national MOH programme***

The costs shown here are only for the scorecard interventions. Information was not available on costs of all the non-scorecard interventions and thus total costs per MOH programme could not be prepared for most of the programmes.

### ***Absence of baseline costs***

Baseline costs provide a good comparison for future cost estimates to help ensure that no costs have been excluded. Since it was not possible to ascertain comparable baseline costs (actual figures for 2005 or good estimates for 2006) for this study, the projected costs for 2007-2010 should be treated with some caution.

### ***Partner costs***

The estimated coverages achieved in 2006 were the result of actions of many different partners. While the MOH has included the activities of the major partners in the plans, the contributory activities of other partners and their related costs have not been taken into account and cannot easily be estimated. This also applies to the contribution of partners to activities carried out under non-scorecard interventions. These factors are likely to result in some under-estimation of costs.

### ***Capital and recurrent costs***

The costs presented here are a mixture of capital and recurrent costs which are identified in the plans but there was not sufficient time to separate the costs in this analysis. Separating these costs will allow for a more accurate analysis of the medium and longer-term recurrent cost implications of scaling up over time.

### ***Consumption/provision cost basis***

Costs have been included in the years in which activities occur and not in the years when payment is actually made. The perspective has been consumption/provision, not purchase. For example, the costs of ITNs are included in the years when they would be required to meet the targets and not in the years when they would actually be purchased (which may be in advance).

### ***Shared costs***

It is important to note that although a portion of the costs of certain activities has been allocated to an intervention it does not mean that only that portion of the activity could be carried out. The total amount for shared activities may need to be funded in order to achieve the desired impact on the scorecard interventions, even if the activity also serves other interventions.

### ***Rationalization and coordination of activities***

It has not been possible to review all activities under each programme or across programmes to ensure that activities are combined where appropriate for effectiveness and cost savings. For example, it may be possible to combine BCC activities within a programme or across programmes. For example, BCC activities are included under each of the nutrition interventions and also under the NNP strengthening element of the plan. It was also not possible to organize a meeting between the programmes and the National Centre for Health Promotion (NCHP) to share or coordinate activities, for example relating to the 12 key family practices. The costs of NCHP activities have not been included in this study.

### ***Sources of funding***

The costs have not been broken out by source of funds although in some cases this information is in the plans. This analysis would be best done as part of the financing gap study.

### ***Potential constraints***

The plans have not been reviewed for possible resource constraints. Such constraints may exist at different levels of the system and can include staff time, transport and procurement. Training, for example, is included under several interventions and may have to be reduced based on the availability of personnel. Service delivery activities are also subject to constraints. Health centre staff are involved in the activities under several of the interventions, with time required for service delivery as well as training, meetings and supervision. For example, under the nutrition interventions alone, health centre staff are involved in the BFCI, Vitamin A and MPA 10 activities. It is also important to note that other programmes, such as HIV/AIDS, may have other demands on health centre staff. A review of such constraints is best done as part of an overall review of health centre, hospital and community health service delivery systems. If, as is likely, additional staffing will be required for scaling up health service provision, this could raise costs significantly.

### ***Absorptive capacity***

The absorptive capacity of the central programmes, PHDs and ODs to implement the scaling up has not been considered. Some of the plans identified the need for management strengthening but this was not dealt with thoroughly and was not completely costed.

### ***Reproductive and newborn health activities***

It was not possible to conduct a costing of the skilled birth attendance intervention. We were able to work with the programme manager to develop a first draft of a plan but neither the programme nor their advisers were able to provide costs. It was also not possible to obtain costs for reproductive and newborn health activities included under the plans for other scorecard interventions. In order to have full costs for all CCSS interventions, it is important that this intervention be costed as soon as possible. This is essential particularly since neonatal causes are

the most important cause of deaths, accounting for around 30% of under-five mortality (Section 1.1).

The government policy on per diems was recently changed to include per diems for trips under 10 km as well as for trips over 10 km. This was not taken into account in estimating the cost of activities requiring per diems and the costs provided in this study may, therefore, be underestimated. In terms of sustainability, when such relevant policy changes this is clearly a relevant issue in terms of safeguarding the financial means to scale-up in the future.

### **13.2 Actions needed to complete the existing plans**

Several actions should be taken by the programmes and the CSSC to complete and review the existing plans and cost estimates. These are listed below:

1. Programme managers should review their individual plans and costs, especially:
  - The feasibility of targets based on current status and ability of the system to absorb resources and expand.
  - Harmonization of coverage targets across interventions that may be delivered as "packages"
  - The contributions of activities to the objectives (e.g., the expected increase in service coverage for each of the ODs involved in the Vitamin A district expansion activity).
  - Areas where costs could be saved with special focus on the high cost activities and resources (e.g., BCC activities)<sup>89</sup>.
  - Any additional activities that may be needed to reach the ambitious targets set.
  
2. The programmes need to meet together to review:
  - Common areas where costs could be saved by sharing activities (e.g., outreach, BCC). The NCHP should participate in the rationalization and coordination of BCC activities.
  - The interdependency of intervention plans on each other, including the coordination of targets and activities) (e.g., the RH activities included in the NNP plan).
  - Training and other activities which involve MOH staff, especially at the health centres, to see if they can participate to the degree expected. This will also need to take into account other expected demands on staff (e.g., under other programmes such as HIV/AIDS).

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<sup>89</sup> Areas worthy of attention are:

- the district strengthening activities under the Vitamin A intervention.
- updating the malaria plan for feedback from the recent Global Fund, changes in treatment guidelines and concerns that nets may not last as long as assumed due to wear and tear.
- details of dengue activities (numbers of persons to be trained etc) and possible duplication.
- possible duplication among immunization activities.
- community based pneumonia and ORT activities and per diem.

3. A special effort will be required to cost the skilled birth attendance intervention. A first draft of a plan with targets and activities was drawn up but prices could not be obtained from the programme or advisors. These prices need to be obtained and the total costs calculated. The same review process described above should then be followed.
4. It is also advisable for the programmes to complete the non-scorecard intervention plans and to cost them so that overall programme plans and costs reflect the scaling up of the scorecard interventions.
5. A separate costing and feasibility review should be conducted of service delivery activities and MOH programme management. This can draw upon the cost-effectiveness study supported by WHO, as well as the Fabricant study, which include analysis of service delivery costs. The Niessen et al findings on the cost-effectiveness of the various service delivery mechanisms should be taken into account, as should information on outreach costs provided by UNICEF and other organizations involved in outreach activities.
6. When the service delivery and MOH programme management costs are determined, they should be combined with the resource needs for commodities and programme implementation support activities found through this study. The resulting costs should then be presented together with the findings of the Niessen et al cost-effectiveness study in order to provide a full analysis of the economic, financial and impact estimates for the child survival scorecard interventions.

### **13.3 The overall costing and financing gap activities**

A list of activities required to estimate the financing gap and advocate for additional funds was shown in Section 2 of this report. A modified list is shown below, based on the experiences of conducting the study:

1. Select the package of high-impact cost-effective interventions feasible for implementation in the national context. *Done in the CCSS.*
2. Develop detailed implementation plans for each intervention. *Partly done. Further work is needed, especially planning at OD level for operationalising the targets into delivery strategies.*
3. Estimate the programme and commodity costs of scaling up the interventions. *The exercise presented here provides preliminary estimates. Further work is needed on service delivery costs and health system constraints as under step 7 below.*
4. Further develop plans for operationalising scale-up of services. This involves planning where scale-up will take place, by level of delivery as well as by provider ownership (public/ private)
5. Review the plans and costs and consider options for cost savings and feasibility of proposed activities for each intervention and across the programmes. *Partly done in a past cost effectiveness study. Further work is needed.*
6. Define activities for the skilled birth attendance intervention, including newborn health, and calculate the costs.

7. Estimate the service delivery requirements and associated costs for each intervention and at the same time review the feasibility of scaling up at each level (e.g., assess health system constraints such as sufficient staff, transport).
8. Collect and analyze information on current expenditures and financing commitments.
9. Determine the financing gaps.
10. Review funding flow mechanisms and select appropriate channels.
  - a. Following the review of funding flow mechanisms, assess again delivery mechanisms
11. Advocate with the government and donors for the additional funds needed.
12. If necessary, adjust the operating plans to reflect the final amounts of financing obtained and prepare budgets accordingly.

As noted, operational plans and targets should be continually assessed and updated in line with the most recent evidence. Similarly, the assessment of costs and funds available needs to be a continuous effort of the Ministry of Health. This report provides useful information and encourages further engagement in the step-wise process outline above,

## **14. Conclusions**

Under the Cambodia Child Survival Strategy, twelve cost-effective interventions were chosen that would have the greatest impact on reducing the mortality of children under five years old. Action plans have been developed by the national programmes for scaling up eleven of the twelve interventions for the four years from 2007 through 2010. Most programmes plan for an ambitious increase in coverage over the coming four years, with 2010 targets ranging from 60% for early initiation of breastfeeding to 95% for complementary feeding and malaria treatment. Meanwhile, the CCSS recognizes the lack of funds available for child survival, and the need to raise child health on to the agenda of the Royal Government and donors alike.

Costs have been estimated for the national programme activities and for the commodities required to increase national coverage of the eleven scorecard interventions: early initiation of breastfeeding, exclusive breastfeeding, complementary feeding, Vitamin A supplementation, measles and tetanus toxoid immunization, ITNs, malaria treatment, dengue vector control, ORT, and antibiotics for pneumonia.

Preliminary results suggest that the national programmes and partners need to invest at least \$79.9 million over the years 2007-2010 in order to scale up the child survival scorecard interventions to selected coverage target levels.

At least \$38.4 million are needed to purchase the commodities required, which represents 48% of the total cost. The remaining \$41.5 million (52%) relate to programme implementation support activities (e.g., IEC, surveillance and capacity building) and service delivery costs (NIP immunization delivery costs).

Additional health system resources will need to be utilized during delivery of the interventions to individual children, which will further increase the price tag for the funds needed for successful implementation. Such estimates are missing from this particular study. Estimates of human resource needs, in terms of staff numbers and their required payment, is a particular concern for preventive interventions that are not commodity-based, such as nutrition counselling. Including human resources into the analysis would allow for better comparison across interventions, and it is recommended that the operational plans of each programme are further reviewed to assess human resource implications so that eventual bottlenecks can be analysed and a cost be attached to overcoming those bottlenecks. The same applies to other health system requirements, such as availability of physical health facility infrastructure, vehicles and equipment.

All programmes are engaged in additional activities that extend beyond the child survival scorecard interventions. Some of these activities are not at all related to the scorecard (such as management of dengue fever which is not a scorecard intervention), while other activities are shared between scorecard and non-scorecard interventions. For example, the NIP also provides other antigens, and maintains a general cold chain infrastructure to support all vaccines (refer to Box 12.1). Portions of these shared costs are included in the total CCSS estimate presented here, based on various assumptions for allocation. For shared activities relevant to the scorecard, a

total of \$37.0 million was estimated<sup>90</sup>. Out of this, \$17.9 million was allocated to child survival, and another \$19.1 million is assumed to be financed by other programmes. Given the importance of shared activities for successful implementation, the \$79.9 million should be considered as a minimum estimate, since the additional shared costs of \$19.1 million may also require funding.

Different resource mobilization strategies may need to be developed in order to obtain the full amount of funds needed for child survival. For example, some donors may only be interested in directly funding the specific programmes, which may require the development of a resource mobilization strategy for the intervention-specific funds (total \$62.0 million). Meanwhile, the CSCC will also need to work together with a broader base of public health advocates to ensure that the total resources required for shared activities (an additional \$37.0 million) are secured.

It is envisioned that the cost information produced by this study can be used for advocacy, development of a resource mobilization strategy, and eventually a financing strategy, especially since the MOH and partners are already aware of some of the current and planned funding commitments for the programmes included here.

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<sup>90</sup> As shown in Table 12.5

## **Annex 1 People consulted**

### **MINISTRY OF HEALTH**

Professor Sann Chan Soeung, Deputy Director General for Health  
Dr Hong Rathmony, Vice Director, Communicable Disease Control Department  
Mrs Khout Thavary, Deputy Head of Department of Budget and Finance  
Dr Nong Sao Kry, Vice Director, National Malaria Centre and Malaria Programme Manager  
Dr. Ngan Chantha, MD, MPH, Deputy Director, National Malaria Centre and National Dengue Programme Manager  
Dr. Houll Somuthol, National Malaria Centre and National Dengue Programme  
Chea Monthavy, MA, DHE, School-based Dengue Prevention Project Officer  
To Setha, Research/Operations, Vector Control  
Dr Ork Vichit, National Immunization Programme  
Dr Chhorn Veasna, National Programme for ARI/CDD and Cholera Control  
Dr Bun Sreng, Communicable Disease Control Department / IMCI  
Dr Sok Kanha, Deputy Director, Dept of Planning and Health Information  
Dr Tung Rathavy, Deputy Director Maternal and Child Health Programme and Manager National Reproductive Health Programme  
Dr Lim Thai Pheang, Director National Centre for Health Promotion  
Dr Kiri, Director, Planning and Budget  
Dr Narann, National Malaria Centre  
Prof Koum Kamal, Director, National Maternal and Child Health Centre  
Kang Channa, Department of Budget and Finance  
Ros Chhun Eang, Department of Planning  
Dr Heng Limtry, Deputy Director, National Centre for Health Promotion  
So Sokphy, Head of Accounting, National Maternal and Child Health Centre

### **UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT, CAMBODIA**

Hen Sokun Charya  
Kate Crawford

### **WHO, CAMBODIA COUNTRY OFFICE**

Dr Severin von Xylander, Medical Officer, Child and Adolescent Health and Development  
La-ong Tokmoh – Technical Officer for Nutrition  
Maryam Bigdeli, Health Economist  
Benjamin Lane, Macroeconomics and Health Project Advisor  
Dr Junko Yasuoka, Scientist (Malaria)  
Dr Md. Abdur Rashid, Medical Officer  
Dr Kohei Toda, Technical Officer for Immunization  
Dr. Chang Moh Seng, Scientist (Vector Control)

### **WHO, GENEVA**

Dr Elizabeth Mason, Director, Department of Child and Adolescent Health and Development  
Dr Robert Scherpbier, Medical Officer, Department of Child and Adolescent Health and Development  
Dr Tessa Tan Torres, Coordinator, Department of Health System Financing

WHO, WESTERN PACIFIC REGION

Marianna Trias, Regional Advisor, Child and Adolescent Health and Development  
Dorjsuren Bayarsaikhan, Regional Adviser – Health Care Financing

UNICEF/CAMBODIA

Viorica Berdaga  
Thazin Oo, Head, Health and Nutrition Programme  
Aun Chum, Assistant Project Officer-EPI  
Rasoka Thor

UNFPA/CAMBODIA

Alice Levisay  
Sok Sokun, Programme Manager, Reproductive Health

PATH/CAMBODIA

John Grundy

BASICS, CAMBODIA

Steve Solter, Country Representative

HELEN KELLER INTERNATIONAL, CAMBODIA

Aminuzzaman Talukder

MANAGEMENT SCIENCES FOR HEALTH, CAMBODIA

Valerie Chombard (RPM Plus)

REPRODUCTIVE AND CHILD HEALTH ALLIANCE (RACHA), CAMBODIA

Sun Nasy, Deputy Executive Director  
Hong Chanlida, Maternal and Child Health

ACADEMY FOR EDUCATIONAL DEVELOPMENT (AED)

Mary Dunbar

SERVANTS TO ASIA'S URBAN POOR/TASK

Susan Jack

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## Annex 3.a Parameters

| Parameters   | Breastfeeding and complementary feeding | Vitamin A supplementation | NIP – measles and TT vaccine | ITNs               | Malaria treatment  | Dengue vector control | IMCI –management of ARI and diarrhoea |
|--|---|---------------------------|------------------------------|--------------------|--------------------|-----------------------|---------------------------------------|
| <b>GENERAL PARAMETERS</b>  |   |                           |                              |                    |                    |                       |                                       |
| Inflation  | 2%                                      | 2%                        | 2%                           | (b)                | (b)                | 2% (c )               | 2%                                    |
| Exchange rate  | US\$ only                               | US\$ only                 | 2006: 4100 riels/US\$        | US\$ only          | US\$ only          | US\$ only             | 4100 riels/US\$ for NPADC activities  |
| Under-five population in 2007, and source                            | 1,785,178                               | 1,924,711 (j)             | (e)                          | 208,549 (a)        | 208,549 (a)        | 544,747 (d)           | 1,785,178 (f)                         |
| Geographical focus   | National                                | National                  | National (i)                 | Priority districts | Priority districts | Priority districts    | National                              |
| <b>SERVICE DELIVERY COSTS INCLUDED</b>                               |   |                           |                              |                    |                    |                       |                                       |
| Community level (volunteer salaries, etc)                            | N/A                                     | No                        | No?                          | No?                | No?                | No?                   | Yes                                   |
| Health Centre (staff salaries, etc)                                  | No                                      | No                        | Yes (g)                      | No                 | No                 | No                    | No                                    |
| Health Centre Outreach (per diem and transport costs)                | No                                      | No                        | Yes                          | No?                | No?                | N/A                   | No                                    |
| Referral hospital (staff salaries)                                   | N/A                                     | N/A                       | No                           |                    |                    | N/A                   | No                                    |
| Commodities  | N/A                                     | Yes                       | Yes                          | Yes                | Yes                | Yes                   | Yes                                   |
| Equipment  |   |                           | Yes                          | Yes                | Yes                | Yes                   | No                                    |
| Referral transport   | N/A                                     | N/A                       | No                           | N/A                | No?                | N/A                   | Yes                                   |
| <b>PROGRAMME SUPPORT COSTS INCLUDED</b>                              |   |                           |                              |                    |                    |                       |                                       |
| Support to MOH programme staff (e.g., training, equipment, supplies) | Yes                                     | Yes                       | Yes                          | Yes                | Yes                | Yes                   | Yes                                   |
| MOH programme staff salaries   | No                                      | No                        | Yes                          | Yes                | Yes                | No                    | No                                    |
| MOH programme staff salary top-ups (incentives)                      | No                                      | No                        | Yes                          | Yes?               | Yes?               | No                    | Yes                                   |
| Training PHD/OD staff  | Yes                                     | Yes                       | Yes                          |                    |                    |                       | Yes                                   |
| Training and supervision at hospital level                           | Yes                                     | No                        | No                           | No                 | Yes                | Yes                   | Yes                                   |

| <b>Parameters</b>  | <b>Breastfeeding and complementary feeding</b> | <b>Vitamin A supplementation</b> | <b>NIP – measles and TT vaccine</b> | <b>ITNs</b> | <b>Malaria treatment</b> | <b>Dengue vector control</b> | <b>IMCI –management of ARI and diarrhoea</b> |
|--|--|----------------------------------|-------------------------------------|-------------|--------------------------|------------------------------|--|
| Training and supervision at HC level                           | Yes  | Yes                              | Yes                                 | Yes         | Yes                      | Yes                          | Yes - IMCI                                   |
| Training and supervision at community level                    | Yes  | Yes                              | No                                  | Yes         | Yes                      | Yes                          | Yes  |
| Partner activity costs (e.g., UNICEF, Helen Keller, CARE, WHO) | Yes  | Yes                              | (Yes)                               | Yes         | Yes                      | Yes                          | Yes (most likely)                            |

## **Annex 3.b Notes to Parameters Table**

### Notes

- (a) Malaria affected areas only. Source Global Fund proposal.
- (b) 5% per year was included for some activities (e.g., staff), but none included for commodities.
- (c) Except no inflation was included on commodities.
- (d) Dengue affected areas only. Figures from NDCP.
- (e) The costing does not use total under-five population as a target group for estimating the population in need, but instead makes use of data on (i) births, (ii) pregnant women per birth, and (iii) childbearing age women, to assess targets. Demographic data were obtained from Cambodia Ministry of Planning.
- (f) Population data from MOH file received.
- (g) Salaries only
- (h) N/A – not applicable
- (i) Plus high risk populations
- (j) This was used by the NNP to calculate the number of capsules and was used in the study even though it differs from the population figures used elsewhere.

## Annex 4.a Nutrition programme activities

| Nutrition Programme Interventions and Activities 2007-2010  | Early Initiation of Breastfeeding | Exclusive Breastfeeding | Complementary Feeding | Vitamin A | Non-scorecard IYCF (two interventions) | Non-scorecard other NNP (3 components) | Total            | Basis for allocation to interventions |
|---|-----------------------------------|-------------------------|-----------------------|-----------|--|--|------------------|---------------------------------------|
| <b>INFANT AND YOUNG CHILD FEEDING</b>   | <b>1,235,752</b>                  | <b>1,235,752</b>        | <b>1,739,144</b>      |           | <b>529,309</b>                         |  | <b>4,739,956</b> |                                       |
| <b>1. BCC activities.</b>   | 630,606                           | 630,606                 | 1,261,212             |           |  |  | 2,522,424        | 100%                                  |
| <b>2. Support for the enforcement and reporting of marketing restrictions for infant feeding.</b>   | 70,067                            | 70,067                  | 70,067                |           |  |  | 210,200          | Note 1                                |
| <b>3. BFHI programme:</b>   |                                   |                         |                       |           |  |  |                  |                                       |
| a. BFHI assessment  | 12,500                            | 12,500                  |                       |           |  |  | 25,000           | Note 2                                |
| b. BFHI expansion - establish 13 new BFHIs, bringing the total to 20. Involves training hospital staff, equipment, assessment and monitoring. Costs include hospital staff per diem.  | 51,645                            | 51,645                  |                       |           |  |  | 103,290          | Note 2                                |
| c. BFHI maintenance of the current 7 and new 13 BFHIs. Involves twice yearly supervision, refresher training for health staff every two years and refresher training for administration staff twice per year. Costs include hospital staff per diem.  | 63,069                            | 63,069                  |                       |           |  |  | 126,138          | Note 2                                |
| <b>4. BFCI programme:</b>   |                                   |                         |                       |           |  |  |                  |                                       |
| a. Review BFCI activities and develop National Strategy.  | 10,000                            | 10,000                  | 10,000                |           |  |  | 30,000           | Note 3                                |
| b. BFCI expansion – establish 2,000 new BFCIs, bringing total to 2,600. Involves training health centre staff, village meetings and training village mother support group (MSG) (2 mothers, 2 VHSG members, chief and TBA). Costs include per diem for health centre staff and MSG members.   | 112,667                           | 112,667                 | 112,667               |           |  |  | 338,001          | Note 3                                |
| c. Maintain existing 600 and 2,000 new BFHIs. Involves refresher training to mother support groups every two years, quarterly meetings with OD and HC staff and mother support groups, and collecting data for monitoring. Costs include per diem for health centre staff and MSG members but do not include costs for collecting data. | 273,198                           | 273,198                 | 273,198               |           |  |  | 819,594          | Note 3                                |
| <b>5. Integrate pre-service of health care providers on IYCF</b>  | 12,000                            | 12,000                  | 12,000                |           |  |  | 36,000           | Note 4                                |
| <b>6. Care for Sick Children</b>  | n/a                               | n/a                     | n/a                   |           |  |  | 0                |                                       |
| a. BCC  |                                   |                         |                       |           | 420,404                                |  | 420,404          | 100%                                  |
| <b>7. Care for Severely Malnourished Children</b>   | n/a                               | n/a                     | n/a                   |           |  |  | 0                |                                       |
| a. Training, supplies and monitoring for hospitals  |                                   |                         |                       |           | 108,905                                |  | 108,905          | 100%                                  |
| b. Survey   |                                   |                         |                       |           | not costed                             |  |                  | Note 6                                |

## Annex 4.b Nutrition programme activities

| Nutrition Programme Interventions and Activities 2007-2010   | Early Initiation of Breastfeeding | Exclusive Breastfeeding | Complementary Feeding | Vitamin A        | Non-scorecard IYCF (two interventions) | Non-scorecard other NNP (3 components) | Total            | Basis for allocation to interventions |
|--|-----------------------------------|-------------------------|-----------------------|------------------|--|--|------------------|---------------------------------------|
| <b>VITAMIN A DEFICIENCY</b>  |                                   |                         |                       | <b>2,094,712</b> |  |  | <b>2,094,712</b> |                                       |
| 1. Revise the National Vitamin A Policy and disseminate the new policy   |                                   |                         |                       | 30,000           |  |  | 30,000           | 100%                                  |
| 2. Discuss with partners to clarify roles and responsibilities of VHSGs in the distribution of vitamin A capsules  |                                   |                         |                       | 0                |  |  | 0                | 100%                                  |
| 3. Expand program to 10 OD s with low coverage (costs based on HKI model). Involves training of HC staff and Village Health Support Groups (VHSGs) (2 per village) |                                   |                         |                       | 121,734          |  |  | 121,734          | 100%                                  |
| 4. Monitoring and supervision of all ODs (costs based on HKI model). Involves mobilizing VHSGs   |                                   |                         |                       | 924,988          |  |  | 924,988          | 100%                                  |
| 5. Purchase Vitamin A capsules. Children aged 6-11 months receive one 100  |                                   |                         |                       | 1,017,990        |  |  | 1,017,990        | 100%                                  |
| 6. Increase the proportion of children under five years (included in MPA 10 activities)  |                                   |                         |                       | 0                |  |  | 0                | 100%                                  |
| 7. Increase the proportion of mothers and newborns (under NRHP)  |                                   |                         |                       | not costed       |  |  | 0                | Note 7                                |
| <b>IRON DEFICIENCY ANAEMIA</b>   |                                   |                         |                       |                  |  | <b>1,817,274</b>                       | <b>1,817,274</b> |                                       |
| Procurement of tablets   |                                   |                         |                       |                  |  | 1,817,274                              | 1,817,274        |                                       |
| Other  |                                   |                         |                       |                  |  | not costed                             |                  | Note 6                                |
| <b>IODINE DEFICIENCY DISORDERS</b>   |                                   |                         |                       |                  |  |  | 0                |                                       |
|  |                                   |                         |                       |                  |  | not costed                             |                  | Note 6                                |
| <b>GROWTH MONITORING AND PROMOTION</b>   |                                   |                         |                       |                  |  |  | 0                |                                       |
|  |                                   |                         |                       |                  |  | not costed                             |                  | Note 6                                |

## Annex 4.c Nutrition programme activities

| Nutrition Programme Interventions and Activities 2007-2010  | Early Initiation of Breastfeeding | Exclusive Breastfeeding | Complementary Feeding | Vitamin A        | Non-scorecard IYCF (two interventions) | Non-scorecard other NNP (3 components) | Total             | Basis for allocation to interventions |
|---|-----------------------------------|-------------------------|-----------------------|------------------|--|--|-------------------|---------------------------------------|
| <b>SUPPORTING ACTIVITIES UNDER MPA 10</b>   | <b>257,145</b>                    | <b>257,145</b>          | <b>257,145</b>        | <b>1,285,726</b> | <b>514,290</b>                         | <b>3,857,177</b>                       | <b>6,428,629</b>  |                                       |
| a. Provide training and implement MPA 10 in OD s not previously covered. Involves training of RH and HC staff, and support for outreach and monitoring and supervision. (Does not appear to include training or support for VHSGs).             | 78,312                            | 78,312                  | 78,312                | 391,559          | 156,624                                | 1,174,677                              | 1,957,795         | Note 5                                |
| b. Provide refresher training and supervision in OD s already covered by MPA 10. Involves training of RH and HC staff, and support for outreach and monitoring and supervision. (Does not appear to include training or support for VHSGs).     | 176,633                           | 176,633                 | 176,633               | 883,167          | 353,267                                | 2,649,500                              | 4,415,834         | Note 5                                |
| c. Revise MPA 10 Manuals and develop a complementary manual for training VHSGs related to community nutrition.  | 2,200                             | 2,200                   | 2,200                 | 11,000           | 4,400                                  | 33,000                                 | 55,000            | Note 5                                |
| <b>NNP MANAGEMENT SUPPORT</b>   | <b>57,651</b>                     | <b>57,651</b>           | <b>57,651</b>         | <b>288,255</b>   | <b>115,302</b>                         | <b>864,766</b>                         | <b>1,441,276</b>  | Note 5                                |
| 7. NNP management support costs (4% of total costs). Involves training of NNP managers (including Masters training), technical consultants, operations, a vehicle, planning and monitoring, BCC materials, and training of PHD and OD managers. | 57,651                            | 57,651                  | 57,651                | 288,255          | 115,302                                | 864,766                                | 1,441,276         | Note 5                                |
| <b>TOTAL</b>  | <b>1,550,548</b>                  | <b>1,550,548</b>        | <b>2,053,940</b>      | <b>3,668,693</b> | <b>1,158,902</b>                       | <b>6,539,217</b>                       | <b>16,521,847</b> |                                       |

### NOTES

1. The marketing restriction activities support the three feeding interventions and the costs are divided equally among the three, which is 33.33% each.
2. The BFHI activities support both breastfeeding interventions and the costs are divided equally among the two, which is 50% each.
3. The BFCI activities support all three feeding interventions and the costs are divided equally among the three, which is 33.33% each.
4. The activity to integrate pre-service training of health care providers on IYCF supports all three feeding interventions and the costs are divided equally, which is 33.33% each.
5. MPA 10 and NNP Management Support costs are allocated 20% to each of the 5 NNP components. The 3 non-scorecard components are allocated 60% in total. 20% of the IYCF component is allocated to each intervention (4% of the total). The 2 Non-scorecard IYCF interventions are allocated 8% in total.
6. There was not sufficient time to cost these non-scorecard intervention activities.
7. These activities are included under another programme.
8. Small differences are due to rounding.

## Annex 5 Measles and Tetanus Toxoid

| Cost category  | Activities                             | Costs included  | Total Amount (\$)<br>2007-2010 | Source for estimate | Comment  | Cost Category       |
|--|--|---|--------------------------------|---------------------|--|---------------------|
| <b>I. Routine Immunization</b>                                 |  |   |                                |                     |  |                     |
| <b>I.1. Logistic and Vaccine cost</b>                          | Delivery of routine vaccines - measles | Vaccines, syringes, safety boxes  | \$830,148                      | cMYP                | For routine measles (1 <sup>st</sup> dose) and routine TT  | Vaccine commodities |
|  | Delivery of routine vaccines - TT      | Vaccines, syringes, safety boxes  | \$3,929,547                    | cMYP                |  | Vaccine commodities |
| <b>I.2 Service delivery</b>                                    | Adequate Human resources               | Salaries for full-time and part time staff  | \$1,112,419                    | cMYP                |  |                     |
|  |  | Outreach per diems  | \$3,596,826                    | cMYP                |  |                     |
|  |  | Per diems for supervision   | \$493,487                      | cMYP                |  |                     |
|  | Adequate transport and other overheads | Recurrent costs for transport and equipment, cold chain, e.g., fuel, ice, gas and vehicle maintenance | \$846,195                      | cMYP                |  |                     |
|  | Capacity building                      | training, reviews   | \$401,863                      | cMYP                |  |                     |
| <b>TOTAL COSTS FOR ROUTINE IMMUNIZATION</b>                    |  |   | <b>\$11,210,485</b>            |                     |  |                     |
| <b>II. Elimination of maternal and neonatal tetanus (MNTE)</b> |  |   |                                |                     |  |                     |
| II.1 High risk Multi antigen Campaign (Routine)                | SIA - Routine campaigns twice yearly   | Vaccine and operational costs (per diem, transport, IEC, monitoring)                                  | \$294,283                      | NIP estimates       | This is based on an estimated need for at least \$70,000 per year. Assumed to exclude vaccine costs. | Service delivery    |
| II.2 Quarterly meeting at OD with HC staff                     | Quarterly meeting                      |   | \$0                            | NIP estimates       | Cost covered by MOH  | Strengthening M&E   |

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| <b>Cost category</b>  | <b>Activities</b>   | <b>Costs included</b>   | <b>Total Amount (\$)<br/>2007-2010</b> | <b>Source for estimate</b> | <b>Comment</b>   | <b>Cost Category</b> |
|---|---|---|--|----------------------------|--|----------------------|
| II.3. TT SIA  | Reach the hard-to-reach CBA population in 5 districts.                | Vaccine and operational costs (per diem, transport, IEC, monitoring)        | \$204,450                              | NIP estimates              |  | Service delivery     |
| II.4. ND and NT surveillance  | Development of guidelines, Training, and ND and NT case investigation | Training, guidelines production and case follow up (per diem, transport)    | \$157,634                              | NIP estimates              |  | Strengthening M&E    |
| II.5. Restart PAB (Protected at Birth) including report of Non eligible Women | Cost implications include training staff and IEC materials            | Information dissemination, printing of protected at birth IEC               | \$5,100                                | NIP estimates              |  | Training             |
| II.6. Factories Immunization  | Outreach visits   | Vaccine and operational costs (per diem, transport, IEC, monitoring)        | \$322,985                              | NIP estimates              |  | Service delivery     |
| II.7. National Workshop   | Annual MNTE review  | Per diem, meeting costs   | \$100,897                              | NIP estimates              |  | Meeting/workshop     |
| II.8. MNT campaigns Vaccine   | Delivery of vaccines  | Vaccines and injection equipment  | \$43,578                               | cMYP                       |  | Vaccine commodities  |
| II.9 TT validation  | Survey and review   | Per diem, travel, meeting costs   | \$47,754                               | NIP estimates              | TT validation is a survey and review that involves an international team to validate coverage statistics | Strengthening M&E    |
| <b>TOTAL COSTS FOR MNTE</b>   |   |   | <b>\$1,176,682</b>                     |                            |  |                      |
| <b>III. Elimination of measles</b>  |   |   |  |                            |  |                      |
| <b>A. Service delivery</b>  | III.A.1. SIAs   | Includes all operational costs including logistics, e.g., per diem and fuel | \$1,122,000                            | NIP estimates              | This does not include vaccine, which is included under section D below.                                  | Service delivery     |
|   |   | Mebendazole and Vitamin A   |  |                            | Excluded from NIP costing since these are included in NNP costing  | None                 |

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| <b>Cost category</b> | <b>Activities</b>                  | <b>Costs included</b>  | <b>Total Amount (\$)<br/>2007-2010</b> | <b>Source for estimate</b> | <b>Comment</b>  | <b>Cost Category</b>   |
|----------------------|------------------------------------|--|--|----------------------------|---|------------------------|
|                      | III.A.2. Service delivery strategy | Fixed site and CIP improvement, including outreach include meetings at HC with VHV , TBA , teachers , police, etc. | \$840,808                              | NIP estimates              |   | Service delivery       |
|                      |                                    | Establish national database of district indicators for coverage  | \$42,040                               | NIP estimates              |   | Strengthening M&E      |
|                      |                                    | IEC , community health centre projects to improve access (i.e. per diems)  | \$52,551                               | NIP estimates              |   | Service delivery       |
|                      |                                    | Operational costs for special Measles campaign in high risk areas (Per diem and fuel?)                             | \$126,121                              | NIP estimates              | Potential overlap with other costs  | Service delivery       |
|                      |                                    | Including routine in district microplans   | \$0                                    | NIP estimates              |   | none                   |
|                      | III.A.3. Management                | Supervisory follow up priority districts from Central to PHD, OD to health centre (per diems)                      | \$279,148                              | NIP estimates              | Potential overlap with I.2 and I.3 above  | Supervision/Management |
|                      | III.A.4. Transport                 | Hire or purchase vehicles for mobile visits , inc. Motorbike and boats (based on GAVI Application)                 | \$0                                    | NIP estimates              | These are shared costs for the whole programme. A percentage of costs was allocated to TT and measles (27%, 12%) .Costs are shown here as \$0 since they are included under shared costs (VI) below | Capital                |
|                      | III.A.5. 2nd dose measles vaccine  | 2nd dose operational cost ( per diem and fuel).  | \$15,920                               | NIP estimates              | Vaccine cost are included below, section D  | Service delivery       |
|                      |                                    | school entry operational cost  | \$15,920                               | NIP estimates              | Vaccine cost are included below, section D  | Service delivery       |

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| <b>Cost category</b>                  | <b>Activities</b>   | <b>Costs included</b>                                      | <b>Total Amount (\$)<br/>2007-2010</b> | <b>Source for estimate</b> | <b>Comment</b>    | <b>Cost Category</b>         |
|---------------------------------------|---|--|--|----------------------------|-------------------|------------------------------|
|                                       |   | School entry - Meeting with MoE                            | \$42,040                               | NIP estimates              |                   | Meeting/workshop             |
|                                       |   | School entry - Pilot in Districts + evaluation             | \$131,600                              | NIP estimates              |                   | Service delivery             |
|                                       |   | School entry - - IEC                                       | \$130,680                              | NIP estimates              |                   | IEC                          |
|                                       |   | School entry - M&E   | \$2,102                                | NIP estimates              |                   | Strengthening M&E            |
|                                       |   | Study tour   | \$12,240                               | NIP estimates              |                   | Training / capacity building |
|                                       | III.A.6. Monitoring adverse events (AEFI)   | Per diems  | \$42,040                               | NIP estimates              |                   | Strengthening M&E            |
| <b>B. Advocacy and communications</b> | III.B.1. Greater ICC and NGO involvement  | Meetings   | \$12,612                               | NIP estimates              |                   | Meeting/workshop             |
|                                       | III.B.2. Multi-lingual materials, IEC among migrant/ minority population, to raise coverage in High Risk groups | IEC materials  | \$52,551                               | NIP estimates              |                   | IEC                          |
|                                       | III.B.3. Communications plan and mass media   | Advocacy, including messages on TV and radio (for routine) | \$81,979                               | NIP estimates              |                   | IEC                          |
| <b>C. Surveillance</b>                | III.C.1. Case-based surveillance  | Meetings, surveys, and annual national workshop            | \$201,794                              | NIP estimates              |                   | Strengthening M&E            |
|                                       | III.C.2. Quality laboratory support   | Support, Lab supplies, test kits                           | \$20,400                               | NIP estimates              |                   | Strengthening M&E            |
|                                       |   | Equipment (ELIZA Reader Machine, Washer Machine)           | \$42,040                               | NIP estimates              | Capital equipment | Capital                      |

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| <b>Cost category</b>  | <b>Activities</b>   | <b>Costs included</b>                                | <b>Total Amount (\$)<br/>2007-2010</b> | <b>Source for estimate</b> | <b>Comment</b>  | <b>Cost Category</b> |
|---|---|--|--|----------------------------|---|----------------------|
| <b>D. Vaccine supply, Logistics/Cold chain and Waste Management</b> | III.D.1 Measles campaign                                    |  | \$418,364                              | cMYP (GAVI estimate)       | Vaccines and injection equipment (commodities)                      | Vaccine commodities  |
|   | III.D.2 second dose of measles vaccine                      |  | \$603,175                              | cMYP (GAVI estimate)       | Vaccines and injection equipment (commodities)                      | Vaccine commodities  |
|   | III.D.3 second dose school entry check                      |  | \$196,812                              | cMYP (GAVI estimate)       | Vaccines and injection equipment (commodities)                      | Vaccine commodities  |
|   | III.D.4 Logistic support (Transport vaccine and Cold chain) |  | \$5,255                                | NIP estimates              | (low cost, only \$1,500 per year. Ignore potential double counting) | Service delivery     |
|   | III.D.5 AD syringe (policy)                                 |  | \$128,223                              | NIP estimates              |   | Service delivery     |
|   | III.D.6 Replace 20% of cold chain equipment                 | Annual 20% equipment replacement cost (capital cost) | \$210,202                              | NIP estimates              | Capital equipment   | Capital              |
|   | III.D.7 Monitor stock                                       | Per diems?   | \$107,729                              | NIP estimates              |   | Strengthening M&E    |
|   | III.D.8 incinerators and waste management                   | Replace incinerators for 20% by 2008 (capital cost)  | \$68,316                               | NIP estimates              | Capital equipment   | Capital              |
| <b>E: Program management</b>  | III.E.1 Additional high-risk activities                     |  | \$5,255                                | NIP estimates              |   | Service delivery     |
|   | III.E.2 Monitoring high risk                                |  | \$21,020                               | NIP estimates              |   | Strengthening M&E    |
| <b>TOTAL COSTS FOR MEASLES ELIMINATION ACTIVITIES</b>               |   |  | <b>\$5,030,938</b>                     |                            |   |                      |

| Cost category                                      | Activities   | Costs included                                    | Total Amount (\$)<br>2007-2010 | Source for estimate                   | Comment  | Cost Category      |
|--|--|---|--------------------------------|---------------------------------------|--|--------------------|
| <b>VI. Program costs (shared costs)</b>            |  |   |                                |                                       |  |                    |
| Vehicles   | Hire or purchase vehicles for mobile visits , inc. Motorbike and boats (based on GAVI Application) | Capital costs Vehicles, e.g., Motorbike and boats | \$241,098                      | cMYP                                  | Capital equipment This was cut from the measles elimination activities (III) in the original activity plan and a proportional cost was included here | Capital            |
| Advocacy and Communication                         | Social mobilization, mass media, printed materials   | Mass media, printed materials                     | \$468,263                      | cMYP                                  |  | IEC                |
| Monitoring and Disease Surveillance                | Detection, data management, supportive activities  | Per diems   | \$221,959                      | cMYP                                  |  | Strengthening M&E  |
| Programme Management                               | Meetings, supervision, office supplies   | Office supplies, per diems, etc.                  | \$326,112                      | cMYP                                  |  | Meeting/workshop   |
| Incentives   | General NIP programme staff  | Salary top-ups for NIP staff                      | \$435,799                      | NIP own estimates (39% of total cost) | This cost was moved here from section I above  | Salary / incentive |
| <b>TOTAL COSTS FOR SHARED PROGRAMME ACTIVITIES</b> |  |   | <b>\$1,693,230</b>             |                                       |  |                    |
| <b>Grand total</b>                                 |  |   | <b>\$19,111,335</b>            |                                       |  |                    |

## Annex 6.a Malaria programme activities

| Malaria Summary 2007-2010  | ITN scorecard<br>intervention costs | Treatment<br>scorecard<br>intervention costs | Non-Scorecard<br>intervention costs | 2007-2010 total<br>resources needed<br>for activity | Basis for allocation to CCSS<br>(see Notes for details) |
|--|-------------------------------------|--|-------------------------------------|---|---|
| <b>NMCP Objective 1.0 Halt the development and prevent the spread of antimalarial drug resistance</b>  |                                     |  | <b>2,038,147</b>                    | <b>2,038,147</b>                                    |   |
| SDA 1: Other - Drug resistance - fake and substandard drugs.   |                                     |  | 626,711                             | 626,711   | 100%  |
| SDA 2: Other - Drug resistance - rational use of drugs.  |                                     |  | 408,171                             | 408,171   | 100%  |
| SDA 3: IEC - rational use of antimalarials.  |                                     |  | 332,140                             | 332,140   | 100%  |
| SDA 4: Monitoring, evaluation and operational research - drug resistance monitoring.   |                                     |  | 566,000                             | 566,000   | 100%  |
| SDA 5: Other - Drug resistance - intensified malaria control efforts.  |                                     |  | 105,125                             | 105,125   | 100%  |
| <b>NMCP Objective 2.0 Improve access to and utilization of effective diagnosis and treatment for malaria.</b>  |                                     | <b>627,985</b>                               | <b>8,897,289</b>                    | <b>9,525,274</b>                                    |   |
| SDA 6: Improve availability of quality EDAT supplies in public and private sectors. The commodities include ACT and RDTs for public and private sectors.   |                                     |  |                                     | -   |   |
| Supplies – ACT and Rectocaps for children under 5  |                                     | 84,775                                       |                                     | 84,775  | 100%  |
| Supplies - drugs for children over 5 and adults  |                                     |  | 4,008,399                           | 4,008,399   | 100%  |
| Supplies –strengthening forecasting, storage, procurement and delivery   | 45,265                              |  | 407,385                             | 452,650   | 0% / 10% / 90%  |
| Supplies and strengthening - RDTs  | 238,449                             |  | 2,146,044                           | 2,384,494   | 0% / 10% / 90%  |
| 3. Improve quality of diagnostic services. This includes   |                                     |  |                                     | -   | 0% / 10% / 90%  |
| SDA 7: Improving training curriculum.  |                                     | 2,797  | 25,170                              | 27,967  | 0% / 10% / 90%  |
| SDA 8: Training of HC and other staff, training of private providers, strengthening public diagnostic capability, and quality assurance and monitoring.  |                                     | 59,298                                       | 533,678                             | 592,975   | 0% / 10% / 90%  |
| 4. Provide prompt, effective anti-malarial treatment in public facilities.   |                                     |  |                                     | -   | 0% / 10% / 90%  |
| SDA 9: Improve malaria case management, comprising refresher training for RH and HC staff and training selected RH doctors in severe case management.  |                                     | 38,577                                       | 347,196                             | 385,773   | 0% / 10% / 90%  |
| SDA 10: Improve referral systems and treatment of severe cases in remote areas, including assessments, performance incentives for VHWs., and telemedicine scheme at RHs.   |                                     | 21,775                                       | 195,975                             | 217,750   | 0% / 10% / 90%  |
| SDA 11: Implement ante-natal screening at HC level, including training and supervision of ANC midwives in the use of RDTs, and IEC/BCC activities.   |                                     | 5,250  | 47,250                              | 52,500  | 0% / 10% / 90%  |
| SDA 12: Expand the VMW project, including training VMWs in new target areas and refresher training of existing VMWs in the provision of treatment. (VMW scheme is to be integrated with IMCI and in future all training and supervision will be done in collaboration with the Child Health Department.) |                                     | 73,599                                       | 662,395                             | 735,995   | 0% / 10% / 90%  |
| SDA 13: Provide prompt, effective anti-malarial treatment in private sector. Further involve private sector in Early Diagnosis and Adequate Treatment (EDAT) services, including evaluation and revision of programmes and IEC/BCC   |                                     | 45,540                                       | 409,857                             | 455,397   | 0% / 10% / 90%  |
| SDA 14: Further develop IEC materials for EDAT and implement BCC activities, including designing, developing, printing and distributing materials.   |                                     | 12,660                                       | 113,940                             | 126,600   | 0% / 10% / 90%  |

## Annex 6.b Malaria programme activities

| Malaria Summary 2007-2010   | ITN scorecard<br>intervention costs | Treatment<br>scorecard<br>intervention costs | Non-Scorecard<br>intervention costs | 2007-2010 total<br>resources needed<br>for activity | Basis for allocation to CCSS<br>(see Notes for details) |
|---|-------------------------------------|--|-------------------------------------|---|---|
| <b>NMCP Objective 3.0 Improve access to and utilization of effective malaria prevention measures.</b>   |                                     |  | <b>1,249,588</b>                    | <b>1,249,588</b>                                    |   |
| SDA 16: Insecticide-treated nets - hammock nets   |                                     |  | 1,249,588                           | 1,249,588   | 100%  |
| <b>NMCP Objective 3.0 Improve access to and utilization of effective malaria prevention measures.</b>   | <b>11,845,308</b>                   |  |                                     | <b>11,845,308</b>                                   |   |
| SDA 15. Provision of LLINs, including   |                                     |  |                                     |   |   |
| Re-stratification and mapping of high-risk villages   | 41,900                              |  |                                     | 41,900  | 100%  |
| Procuring 870,000 LLINs   | 4,466,600                           |  |                                     | 4,466,600   | 100%  |
| Distributing nets through integrated campaigns and health facilities. Distribution managed by CNM and NGOs and carried out by VHWs, VMWs and village authorities supported by OD and HC staff.  | 619,117                             |  |                                     | 619,117   | 100%  |
| Provision of 600,000 new conventional bednets   | 5,793,690                           |  |                                     | 5,793,690   | 100%  |
| SDA 17: Retreatment of 470,000 existing conventional bednets to maintain coverage during first three years while LLINs are being rolled-out. Led by CNM and NGOs with community-based treatment carried out by VHWs, VMWs and local authorities | 202,100                             |  |                                     | 202,100   | 100%  |
| SDA 18: IEC/BCC targeted at 2 million people, including dissemination of materials by VHWs, TV and radio, school-based BCC, community theatre etc   | 721,901                             |  |                                     | 721,901   | 100%  |
| <b>NMCP Objective 4.0 Strengthen the management of the national malaria control effort especially at operational levels.</b>  | <b>1,120,946</b>                    | <b>336,284</b>                               | <b>5,268,446</b>                    | <b>6,725,676</b>                                    |   |
| SDA 19: Management capacity building - Management and technical training. Includes training at all levels (including Health centre), software development, and entry and analysis.  | 37,800                              | 11,340                                       | 177,660                             | 226,800   | 16.67% / 5% / 78.33%                                    |
| SDA 20: Coordination and partnership development - HC & community level. Includes training and supervision and support funding for committees.  | 60,433                              | 18,130                                       | 284,037                             | 362,600   | 16.67% / 5% / 78.33%                                    |
| SDA 21: Coordination and partnership development - OD level. Includes study tours, workshops and meetings.  | 29,802                              | 8,941  | 140,070                             | 178,812   | 16.67% / 5% / 78.33%                                    |
| SDA 22: Monitoring, evaluation and operational research - Conduct needs based operational research. Includes training and research.   | 42,377                              | 12,713                                       | 199,172                             | 254,262   | 16.67% / 5% / 78.33%                                    |
| Human resources. Includes programme management and implementation staff and advisors.   | 374,800                             | 112,440                                      | 1,761,562                           | 2,248,802   | 16.67% / 5% / 78.33%                                    |
| Infrastructure. Includes building renovation, vehicles (purchase and rental), computers, furniture, supplies and fuel.  | 123,763                             | 37,129                                       | 581,685                             | 742,577   | 16.67% / 5% / 78.33%                                    |
| Training. Management training and capacity building.  | 1,333                               | 400  | 6,267                               | 8,000   | 16.67% / 5% / 78.33%                                    |
| Procurement and Supply Management. Includes rent, communications, fuel, repairs, staffing and administration.   | 450,637                             | 135,191                                      | 2,117,994                           | 2,703,822   | 16.67% / 5% / 78.33%                                    |
| <b>TOTAL</b>  | <b>12,966,253</b>                   | <b>964,269</b>                               | <b>17,453,470</b>                   | <b>31,383,992</b>                                   |   |

## **Annex 6.c Malaria programme activities**

NOTES:

1. Under Objective 2 the shared costs are allocated 10% to under-5s on the basis that 10% of the population subject to malaria are assumed to be under-5s (eg in the drugs calculation).

2. The Malaria programme has 4 objectives:

1. Halt the development and prevent the spread of antimalarial drug resistance,
2. Improve access to and utilization of effective diagnosis and treatment for malaria,
3. Improve access to and utilization of effective malaria prevention measures, and
4. Strengthen the management of the national malaria control effort especially at operational levels.

The first three of these are direct objectives and the third is indirect, in that it supports the three direct objectives.

The objectives have 22 Service Delivery Areas (SDAs) of which 18 are “direct” (under Objectives 1 to 3 above) and 4 are “indirect” (management and administration under Objective 4).

An additional 4 areas of work relate to human resources, infrastructure, training and procurement.

Of the 18 direct SDAs, 3 are for child survival scorecard interventions, 6 are for non-child survival scorecard interventions, and 9 are shared between scorecard and non-scorecard activities.

The shared management costs were allocated across the SDAs: 3/18 to child survival scorecard interventions, 6/18 to non-scorecard interventions, and 9/18 to shared treatment interventions.

10% of the shared treatment intervention costs are allocated to the treatment scorecard intervention and 90% to the treatment non-scorecard intervention (as per Note 1).

3. Small differences in the figures are due to rounding.

## Annex 7 Malaria net purchase and treatment plan

|                                       | 2005 | 2005    | 2006    | 2006    | 2007    | 2007    | 2008    | 2008    | 2009    | 2009    | 2010    | 2010    |
|---------------------------------------|------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| <b>New conventional nets</b>          |      | 329,738 |         | 195,200 |         | 280,500 |         | 300,000 |         | 200,000 |         | 100,000 |
| <b>Nets available for retreatment</b> |      |         | 329,738 | -       | 195,200 | -       | 280,500 | -       | 300,000 | -       | 200,000 | -       |
| <b>Retreated ITN</b>                  |      | 153,894 |         | 197,843 |         | 117,120 |         | 168,300 |         | 180,000 |         | 120,000 |
| <b>LLINs (GFR4)</b>                   |      |         |         | 120,000 |         |         |         |         |         |         |         |         |
| <b>LLIN (GFR6)</b>                    |      |         |         |         |         | 200,000 |         | 70,000  |         | 200,000 |         | 200,000 |
| LLINs surviving from: 2006            |      |         |         |         | 120,000 |         | 120,000 |         | 120,000 |         |         |         |
| 2007                                  |      |         |         |         |         |         | 200,000 |         | 200,000 |         | 200,000 |         |
| 2008                                  |      |         |         |         |         |         |         | 70,000  |         | 70,000  |         |         |
| 2009                                  |      |         |         |         |         |         |         |         |         | 200,000 |         |         |
| 2010                                  |      |         |         |         |         |         |         |         |         |         |         |         |
| 2011                                  |      |         |         |         |         |         |         |         |         |         |         |         |
| 2012                                  |      |         |         |         |         |         |         |         |         |         |         |         |
| 2013                                  |      |         |         |         |         |         |         |         |         |         |         |         |
| 2014                                  |      |         |         |         |         |         |         |         |         |         |         |         |
| 2015                                  |      |         |         |         |         |         |         |         |         |         |         |         |
| 2016                                  |      |         |         |         |         |         |         |         |         |         |         |         |
| <b>total LLIN surviving</b>           |      |         |         |         | 120,000 |         | 320,000 |         | 390,000 |         | 470,000 |         |
| <b>total ITN</b>                      |      | 483,632 |         | 513,043 |         | 717,620 |         | 858,300 |         | 970,000 |         | 890,000 |
| <b>% coverage</b>                     |      | 60.5    |         | 64.1    |         | 89.7    |         | 107.3   |         | 121.3   |         | 111.3   |

|  |  |        |      |
|--|--|--------|------|
| <b>People per net:</b>                   | 2                                      |        |      |
| <b>Population at risk:</b>               | 1,600,000                              |        |      |
| <b>Life of conventional nets(years):</b> | 2                                      |        |      |
| <b>Life of LLINs (years)</b>             | 4                                      |        |      |
|  | <b>total</b> <b>retreated</b> <b>%</b> |        |      |
| <b>2002</b>                              | 246836                                 |        |      |
| <b>2003</b>                              | 269490                                 | 117492 | 0.48 |
| <b>2004</b>                              | 267144                                 | 142351 | 0.53 |
| <b>2005</b>                              |  | 153894 | 0.58 |
|  | <b>mean%</b>                           |        | 0.60 |

## Annex 8 Malaria programme net quantities and costs

| NETS   | 2006 | 2007             | 2008             | 2009             | 2010             | Total             | 2006      |
|--|------|------------------|------------------|------------------|------------------|-------------------|-----------|
| <b>Numbers</b>   |      |                  |                  |                  |                  |                   | Unit cost |
| LLINs/ new   |      | 200,000          | 70,000           | 200,000          | 200,000          | 670,000           |           |
| Conventional/ new  |      | 280,500          | 300,000          | 200,000          | 100,000          | 880,500           |           |
| <b>Total bought</b>  |      | <b>480,500</b>   | <b>370,000</b>   | <b>400,000</b>   | <b>300,000</b>   | 1,550,500         |           |
| <b>Procurement costs</b>   |      |                  |                  |                  |                  |                   |           |
| LLINs/ new   |      | 1,316,000        | 460,600          | 1,316,000        | 1,316,000        | 4,408,600         | 6.58      |
| Conventional/ new  |      | 1,845,690        | 1,974,000        | 1,316,000        | 658,000          | 5,793,690         | 6.58      |
| <b>TOTAL</b>   |      | <b>3,161,690</b> | <b>2,434,600</b> | <b>2,632,000</b> | <b>1,974,000</b> | <b>10,202,290</b> |           |
| Nets - Conventional/ retreated   |      | 117,120          | 168,300          | 180,000          | 120,000          | 585,420           |           |
| <b>Costs</b>   |      |                  |                  |                  |                  |                   |           |
| Conventional retreated - non commodities   |      | 72,200           | 68,700           | 61,200           | -                | 202,100           |           |
| Conventional retreated - kits and bags   |      | 41,963           | 17,757           | 10,280           | 0                | 70,000            |           |
| Note that inflation is not included  |      |                  |                  |                  |                  |                   |           |
| Note that the retreatment commodities are included under SDA 15 (LLINs)                        |      |                  |                  |                  |                  |                   |           |
| The targets are not shown as the above figures do not include nets still in use after one year |      |                  |                  |                  |                  |                   |           |

## Annex 9 Malaria programme drugs and tests

| DRUGS AND TESTS                        | 2007          | 2008          | 2009          | 2010          | Total          | 2006      |
|--|---------------|---------------|---------------|---------------|----------------|-----------|
| Children under 5 only                  |               |               |               |               |                | Unit cost |
| TREATMENT TARGETS UNDER CCSS           | 177,267       | 203,289       | 208,510       | 213,725       | 802,791        |           |
| QUANTITIES                             |               |               |               |               |                |           |
| ACT                                    | 17,000        | 14,250        | 13,538        | 12,861        | 57,648         | 1.15      |
| Rectocaps (box of 6 * 50 mg)           | 2,917         | 2,217         | 2,106         | 2,001         | 9,240          | 2.00      |
| RDTs - Plas Falc only (10%)            | 16,500        | 21,375        | 20,306        | 19,291        | 77,472         | 0.83      |
| RDTs - Plas Falc and Vivax (10%)       | 7,500         | 7,125         | 6,769         | 6,430         | 27,824         | 1.54      |
| RDTs ante-natal screening (10%)        | 3,000         | 3,000         | 3,000         | 3,000         | 12,000         | 0.83      |
| RDTs for private sector - PF and Vivax | 49,000        | 49,000        | 49,000        | 16,000        | 163,000        | 0.70      |
| COSTS                                  |               |               |               |               |                |           |
| ACT                                    | 19,550        | 16,388        | 15,568        | 14,790        | 66,295         |           |
| Rectocaps                              | 5,833         | 4,433         | 4,212         | 4,001         | 18,479         |           |
| RDTs - Plas Falc only (10%)            | 13,728        | 17,784        | 16,895        | 16,050        | 64,457         |           |
| RDTs - Plas Falc and Vivax (10%)       | 11,520        | 10,944        | 10,397        | 9,877         | 42,738         |           |
| RDTs ante-natal screening (10%)        | 2,490         | 2,490         | 2,490         | 2,490         | 9,960          |           |
| RDTs for private sector - PF and Vivax | 34,374        | 36,092        | 37,897        | 12,932        | 121,295        |           |
| <b>TOTAL</b>                           | <b>87,495</b> | <b>88,131</b> | <b>87,458</b> | <b>60,140</b> | <b>323,224</b> |           |

## Annex 10.a Dengue programme activities

| Objectives and Activities  | Scorecard Interventions | Non-scorecard interventions | Total             | Allocation basis |
|--|-------------------------|-----------------------------|-------------------|------------------|
| <b>NDCP Objective 2: To Improve disease surveillance through existing HIS and increase serology/ virology surveillance at selected target provinces.</b> | <b>683,072</b>          |                             | <b>683,072</b>    |                  |
| Activity 2a. Weekly zero reporting data collection   |                         |                             |                   |                  |
| Activity 2b. Weekly case detection at 5 sentinel hospitals   |                         |                             |                   |                  |
| Activity 2c. Epidemiological data analysis and reporting   | 20,608                  |                             | 20,608            | 100%             |
| Activity 2d. Outbreak investigation  | 164,864                 |                             | 164,864           | 100%             |
| Activity 2e. Sero/Virological surveillance at sentinel hospitals   | 82,432                  |                             | 82,432            | 100%             |
| Activity 2f. Strengthen of dengue surveillance system in 6 provinces (Phnom Penh, Battambang, Siem Reap, Takeo, Kampong Cham, Kandal)                    | 403,918                 |                             | 403,918           | 100%             |
| Activity 2h. Bicycles  | 11,250                  |                             | 11,250            | 100%             |
| <b>NDCP Objective 4: To reduce dengue incidence in the high risk provinces through early outbreak intervention at the target areas</b>                   | <b>11,300,255</b>       |                             | <b>11,300,255</b> |                  |
| Activity 4a. Procurement of spraying machines and maintenance of spray equipment   | 184,013                 |                             | 184,013           | 100%             |
| Activity 4b. Establish and train Emergency Response Team   | 49,748                  |                             | 49,748            | 100%             |
| Activity 4c. Mass media /Health Education Campaign during Mass Abate (temephos) application and production of IEC materials                              | 113,344                 |                             | 113,344           | 100%             |
| Activity 4d. 150 tons Abate (temephos) procurement and other larvicide   | 8,497,919               |                             | 8,497,919         | 100%             |
| Activity 4e. Transportation of Abate (temephos) to target and high risk areas as plan  | 123,423                 |                             | 123,423           | 100%             |
| Activity 4f. Abate (temephos) training workshop  | 68,007                  |                             | 68,007            | 100%             |
| Activity 4g. Operational plan of mass larviciding (Abate/temephos) in high risk provinces: hiring of temporary workers                                   | 1,305,115               |                             | 1,305,115         | 100%             |
| Activity 4h. Emergency vectors controls DURING outbreaks (sources reduction, larviciding and space spraying)   | 577,437                 |                             | 577,437           | 100%             |
| Activity 4i. Insecticide space spraying (PRE-EMPTIVE--before outbreaks)  | 92,736                  |                             | 92,736            | 100%             |
| Activity 4j. Strengthen community-based vector control in high risk provinces by using COMBI approach  | 288,513                 |                             | 288,513           | 100%             |
| <b>NDCP Objective 5: Strengthen operational research on new and alternative vector control measures</b>  | <b>271,820</b>          |                             | <b>271,820</b>    |                  |
| Activity 5a. Monitoring Insecticide resistance and vector surveillance   | 78,104                  |                             | 78,104            | 100%             |
| Activity 5b. Entomological Assessement of Abate and Pyriproxifen   | 61,824                  |                             | 61,824            | 100%             |
| Activity 5d. Other biological vector control (fish)  | 131,891                 |                             | 131,891           | 100%             |

## Annex 10.b Dengue programme activities

| Objectives and Activities  | Scorecard Interventions | Non-scorecard interventions | Total             | Allocation basis |
|--|-------------------------|-----------------------------|-------------------|------------------|
| <b>NDCP Objective 6: To foster intra and inter-sectoral collaboration and coordination for sustainable prevention and control of dengue fever:</b> | <b>578,424</b>          |                             | <b>578,424</b>    |                  |
| Activity 6a. Carry out community-based vector control through communities' participation with NGOs   | 22,669                  |                             | 22,669            | 100%             |
| Activity 6b. School-based dengue control   | 98,256                  |                             | 98,256            | 100%             |
| Activity 6c. Inter-sectoral coordinating on dengue control activities  | 127,770                 |                             | 127,770           | 100%             |
| Activity 6d. Training and support of community volunteers in 5 provinces   | 206,080                 |                             | 206,080           | 100%             |
| Activity 6e. Mass advertisement on dengue messages (TV spots, Radios and Newspapers)   | 123,648                 |                             | 123,648           | 100%             |
| <b>NDCP Objective 3: To reduce Case Fatality Rate through promoting and improving the quality of clinical diagnosis and case management</b>        |                         | <b>713,751</b>              | <b>713,751</b>    |                  |
| Activity 3a. Clinical Management training at Central levels and development of treatment guidelines and flow charts                                |                         | 73,159                      | 73,159            | 100%             |
| Activity 3b. Clinical Management training at PHD levels/OD-HC at Provincial levels.  |                         | 24,412                      | 24,412            | 100%             |
| Activity 3c. Clinical training for Nurses at high risk selected Provinces  |                         | 121,587                     | 121,587           | 100%             |
| Activity 3d. Follow-up clinical management training  |                         | 82,432                      | 82,432            | 100%             |
| Activity 3e. Equipments (Blood pressures, centrifuges)   |                         | 309,121                     | 309,121           | 100%             |
| Activity 3f. Disseminate information to private sectors  |                         | 103,040                     | 103,040           | 100%             |
| <b>NDCP Objective 1: To strengthen Dengue Program Management and Capacity Building</b>   | <b>290,185</b>          | <b>72,546</b>               | <b>362,731</b>    |                  |
| Activity 1a. Communication (phone, Fax, email, etc.)   | 3,840                   | 960                         | 4,800             | 80%              |
| Activity 1b. Office supplies and stationery  | 4,800                   | 1,200                       | 6,000             | 80%              |
| Activity 1c. Maintenance of facility   | 4,800                   | 1,200                       | 6,000             | 80%              |
| Activity 1d. National Dengue Committee Meeting   | 3,924                   | 981                         | 4,905             | 80%              |
| Activity 1e. National Annual Dengue Workshop   | 23,500                  | 5,875                       | 29,375            | 80%              |
| Activity 1f. Supervision and monitoring the DHF situation  | 79,761                  | 19,940                      | 99,702            | 80%              |
| Activity 1g. Office Equipment and Materials  | 17,600                  | 4,400                       | 22,000            | 80%              |
| Activity 1h. Pick Up Vehicles  | 50,135                  | 12,534                      | 62,669            | 80%              |
| Activity 1j. Attend Regional Dengue Meeting  | 2,796                   | 699                         | 3,495             | 80%              |
| Activity 1k. Fellowship training   | 12,629                  | 3,157                       | 15,786            | 80%              |
| Activity 1l. National and local consultants  | 86,400                  | 21,600                      | 108,000           | 80%              |
| <b>TOTAL</b>   | <b>13,123,755</b>       | <b>786,297</b>              | <b>13,910,052</b> |                  |

### Notes

1. The costs of Objective 1 are allocated 80% to the scorecard intervention and 20% to the non-scorecard intervention.

The basis is that 4 of the 5 direct objectives (excluding Objective 1) relate to the vector control intervention. The fifth is for treatment.

## Annex 11 Antibiotic for pneumonia and oral rehydration therapy

| Objectives and Activities   | Total Costs for programme activities 2007-10 | Costs allocated to ARI | Costs allocated to ORT | Costs excluded from CCSS costing | Key activities   | Key assumptions                        |
|---|--|------------------------|------------------------|----------------------------------|--|--|
| <b>DIRECT COSTS FOR CHILD SURVIVAL SCORECARD INTERVENTIONS</b>                    |  |                        |                        |                                  |  |  |
| Antibiotic for Pneumonia  |  |                        |                        |                                  | ARI case management at HC and hospital level   | As in Table 5.2                        |
| Commodity costs   | \$5,105,406                                  | \$5,105,406            |                        |                                  |  |  |
| Referral  | \$173,659                                    | \$173,659              |                        |                                  |  |  |
| Diarrhoea / Oral Rehydration Therapy  |  |                        |                        |                                  | Diarrhoea case management at HC and hospital level   | As in Table 5.3                        |
| Commodity costs   | \$7,214,838                                  |                        | \$7,214,838            |                                  |  |  |
| Referral  | \$753,352                                    |                        | \$753,352              |                                  |  |  |
| <b>SHARED PROGRAM COSTS</b>   |  |                        |                        |                                  |  |  |
| <b>CDC</b>  |  |                        |                        |                                  |  |  |
| <b>CDC Goal 1: Health Services Delivery</b>                                       |  |                        |                        |                                  |  |  |
| Goal 1 obj 1: Control outbreak of emerging and resurging diseases                 | \$338,959                                    |                        |                        | \$338,959                        | Cost of staff conducting field work  | N/A                                    |
| Goal 1 Obj 2: Strengthen IMCI   | <b>\$2,359,357</b>                           | \$1,179,678            | \$1,179,678            |                                  | Capacity building in clinical management for staff at OD and HC level (11 day IMCI course) | 20% annual increase from 2006 baseline |
| Goal 1 obj 3: Strengthen emerging and resurging diseases control across countries | \$376,426                                    |                        |                        | \$376,426                        | Training staff, maintaining quarantine and procedures at border check points               | N/A                                    |

| Objectives and Activities  | Total Costs for programme activities 2007-10 | Costs allocated to ARI | Costs allocated to ORT | Costs excluded from CCSS costing | Key activities  | Key assumptions   |
|--|--|------------------------|------------------------|----------------------------------|---|---|
| <b>CDC Goal 2: Behaviour Change Communication</b>                                    |  |                        |                        |                                  |   |   |
| Goal 2 obj 1: Raise public awareness on emerging diseases and Strengthen legislation | \$855,614                                    |                        |                        | \$855,614                        | Information and coordination of disease surveillance  | N/A   |
| Goal 2 Obj 2: Improve family and community practices                                 | <b>\$6,975,517</b>                           | \$3,487,758            | \$3,487,758            |                                  | Training community volunteers to promote selected key family practices; conduct monthly health education sessions at village level                  | Gradual increase in activities as follows: 32%; 54%; 77%;100%   |
| <b>CDC Goal 3: Quality Improvement</b>   |  |                        |                        |                                  |   |   |
| Goal 3 obj 1: Strengthen disease surveillance and outbreak response                  | \$786,612                                    |                        |                        | \$786,612                        | Training staff, monitoring and supervision to strengthen alert system   | N/A   |
| Goal 3 Obj 2: Improve IMCI implementation  | <b>\$884,042</b>                             | \$442,021              | \$442,021              |                                  | Planning workshops, annual reviews and supervision at OD and HC level   | Cost for annual planning workshops remain constant 2007-2010. Costs for activities at OD level are scale up successively to include 77 ODs by 2010. |
| Goal 3 Obj 3: Capacity ARI and Diarrhoea management                                  | <b>\$22,618</b>                              | \$11,309               | \$11,309               |                                  | Facilitator training; IMCI training at HC level; capital investment (vehicles) and running costs for monitoring and supervision of trained HC staff | Cost remain constant 2007-2010.   |

| Objectives and Activities                                      | Total Costs for programme activities 2007-10 | Costs allocated to ARI | Costs allocated to ORT | Costs excluded from CCSS costing | Key activities   | Key assumptions  |
|--|--|------------------------|------------------------|----------------------------------|--|--|
| Goal 3 Obj 4: Quality Improvement referral hospitals           | <b>\$366,509</b>                             | \$183,254              | \$183,254              |                                  | Training referral level staff; supervision and monitoring, workshops to evaluate quality improvement process   | Cost inputs remain constant 2007-2010 except for referral level training which is scaled up from 6 teams in 2007 and 2008 to 12 teams in 2009 and 2010 |
| Goal 3 Obj 5: Monitoring and evaluation of IMCI/Child Survival | <b>\$161,918</b>                             | \$80,959               | \$80,959               |                                  | Health Facility survey and Household Surveys   | Costs include activities in 2007 and 2009 and these are the same in both years.  |
| <b>CDC Goal 4: Human Resource Development</b>                  |  |                        |                        |                                  |  |  |
| Goal 4 Obj 1: Human Resources                                  | <b>\$847,322</b>                             | \$93,092               | \$93,092               | \$661,138                        | Capacity building in Master degree for IMCI implementation<br><i>Performance incentives for CDC/ IMCI staff at central, PHD and OD levels (top-up salaries) were added</i> | Costs for Master degree remain constant<br><br><i>Assume gradual increase in incentive payments from 49 ODs in 2007 to all 77 ODs in 2010</i>          |
| Goal 4 Obj 2: Capacity building for IMCI Preservice Education  | <b>\$94,237</b>                              | \$47,118               | \$47,118               |                                  | Clinical courses for key trainers; orientation sessions for high level decision makers   | Assume intensive training of trainers and facilitators in 2007 after which efforts are reduced   |
|  |  |                        |                        |                                  |  |  |

| Objectives and Activities                                       | Total Costs for programme activities 2007-10 | Costs allocated to ARI | Costs allocated to ORT | Costs excluded from CCSS costing | Key activities   | Key assumptions  |
|---|--|------------------------|------------------------|----------------------------------|--|--|
| <b>NPADC</b>  |  |                        |                        |                                  |  |  |
| <b>NPADC Key Area of Work 1: Health Services Delivery</b>       |  |                        |                        |                                  |  |  |
| Obj 1: Increase ARI and Diarrhoea treatment and care            | <b>\$283,130</b>                             | \$116,933              | \$166,197              |                                  | Annual activities includes: 15 IMCI training courses; 5 Surveillance Training Courses on outbreak response (Cholera/ Dysentery)                            | Same activities carried out every year 2007-2010   |
| <b>NPADC Key Area of Work 2: Quality Improvement</b>            |  |                        |                        |                                  |  |  |
| Obj 1: Strengthen ARI treatment and care                        | <b>\$76,468</b>                              | \$38,234               | \$38,234               |                                  | Supervision of ORT Corner and correct use of antibiotic for pneumonia  | 50 missions / 200 facilities visited per year  |
| Obj 2: Strengthen Cholera outbreak response                     | <b>\$39,827</b>                              | \$0                    | \$39,827               |                                  | Cholera outbreak response at peripheral level  | 25 missions/ 25 outbreaks per year   |
| <b>NPADC Key Area of Work 3: Behaviour Change Communication</b> |  |                        |                        |                                  |  |  |
| Obj 1: Knowledge and treatment seeking behaviour.               | <b>\$225,583</b>                             | \$112,791              | \$112,791              |                                  | Mass media interventions, demand side interventions and IEC (includes radio and TV broadcasts; the production of leaflets and other information materials) | A set amount of activities costed for each year (e.g., 30 health messages broadcast by radio, by year) |
| <b>Grand total</b>  | <b>\$27,941,393</b>                          | <b>\$11,072,214</b>    | <b>\$13,850,431</b>    | <b>\$3,018,748</b>               |  |  |

## Annex 12 Differences between the CDC 3 year rolling plan (AOP) and Child Survival cost estimates

|  | 2006-2008 Rolling plan estimates |           |           | CS cost estimates |             |
|--|----------------------------------|-----------|-----------|-------------------|-------------|
|  | 2006                             | 2007      | 2008      | 2007              | 2008        |
| CDC goal 1 obj 1: Control outbreak of emerging and resurging diseases                    | \$67,200                         | \$84,995  | \$81,101  | Not incl.         | Not incl.   |
| CDC Goal 1 Obj 2: Strengthen IMCI  | \$270,884                        | \$342,614 | \$326,920 | \$424,655         | \$519,777   |
| CDC goal 1 obj 3: Strengthen emerging and resurging diseases control across countries    | \$74,628                         | \$94,389  | \$90,066  | Not incl.         | Not incl.   |
| CDC goal 2 obj 1: Raise public awareness on emerging diseases and Strengthen legislation | \$169,629                        | \$214,547 | \$204,719 | Not incl.         | Not incl.   |
| CDC Goal 2 Obj 2: Improve family and community practices                                 | \$270,174                        | \$341,716 | \$326,063 | \$1,441,947       | \$1,544,482 |
| CDC goal 3 obj 1: Strengthen disease surveillance and outbreak response                  | \$155,949                        | \$197,244 | \$188,209 | Not incl.         | Not incl.   |
| CDC Goal 3 Obj 2: Improve IMCI implementation  | \$135,776                        | \$171,729 | \$163,863 | \$173,512         | \$204,563   |
| CDC Goal 3 Obj 3: Capacity ARI and Diarrhea management                                   | \$98,550                         | \$124,646 | \$118,936 | \$5,488           | \$5,597     |
| CDC Goal 3 Obj 4: Quality Improvement referral hospitals                                 | \$143,482                        | \$181,476 | \$173,163 | \$81,559          | \$83,190    |
| CDC Goal 3 Obj 5: Monitoring and evaluation of IMCI/Child Survival                       | \$47,800                         | \$60,457  | \$57,688  | \$79,356          | \$0         |
| CDC Goal 4 Obj 1: Human Resources  | \$173,475                        | \$219,411 | \$209,360 | \$60,156          | \$44,580    |
| CDC Goal 4 Obj 2: Capacity building for IMCI Preservice Education                        | \$43,900                         | \$55,525  | \$52,981  | \$44,778          | \$16,161    |

For some of the CDC programme goals, CCSS cost estimates are lower than those in the original AOP. This is the result of either not including specific activities in the costing or because of adjusting targets and inputs.

- *Excluding activities:* Based on information from the CDC team, some AOP activities were excluded from the CCSS costing. For Goal 4 the CCSS costs are lower than the rolling plan estimates because not all activities under Goal 4 are included in the CCSS estimate (see Table 9.9). The same applies to Goal 3 Objective 3, where activities 1-4 in the original AOP were excluded from the CCSS costing.
- *Adjusting targets:* For Goal 3, Objective 4 the lower CCSS is because training and monitoring targets were reduced during discussions.

For other Goals and objectives, the child survival costs may be higher than in the original plan. This is the result of adding activities or because of adjusting targets and inputs.

- *Adding activities:* The only added activity was performance incentives for CDC/ IMCI staff at central, PHD and OD levels (top-up salaries), under Goal 4 objective 1.
- *Adjusting targets:* This applies to goal 1 objective 2 and goal 2 objective 2. In discussions it was agreed that targets should be set ambitiously, since CDC and NPADC programme staff and partners felt that the CCSS targets for intervention coverage will not be met unless investments at programme level are considerably raised. Therefore, for this exercise, targets for training, community IEC activities etc., were revised and in many cases now go from estimated current coverage of 5-10% to 2010 targets of 90 or 100%. Whether such targets are "realistic" or not is another issue not dealt with here.