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Costs of scaling up Priority Health Interventions in Low-income and selected Middle-income Countries: Methodology and Estimates

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1. Introduction

The cost analysis for Working Group 5 has been undertaken in order to assess what are the total costs of scaling up and sustaining programmes in differing, but generalisable scenarios. In particular, the specific aim of the costing is to undertake a full cost analysis of scaling-up the implementation of priority programmes through the health system. These programmes are designed to address the causes of major disease burden among people in low-income countries, and the poor in middle income countries, in order to maximise health outcomes. The costs of scaling-up programmes will reflect how much it will cost the health system to extend coverage for main disease/health areas in the context of specified targets.

Whereas methodology exists to attribute the burden of disease to specific illnesses or health problems, the practical implementation of most of the programmes for these diseases cannot be separately packaged within a health system. In reality, achieving widespread coverage for these key programmes will require substantial strengthening and upgrading of existing health systems, providing externality benefits for non-priority health conditions. However, our focus will be on strengthening health systems for the needs of the poor – this recognises that the priorities for health system strengthening must relate to achieving a functioning primary health care system within the context of a good referral network required for the implementation of these key programmes. Within the health system we are looking at supporting and strengthening the district-level health system, including both primary and secondary facilities, in order to deliver

these programmes. While theoretically we can cost each key intervention separately, in reality the implementation of most of the programmes must be considered and costed within the context of a health system. This also means that we need to consider the complementary and competing demands for specialised resources and inputs of the various programmes within the health system, as well as the constraints to widespread implementation of these programmes for the poor within the shorter term. In the longer term we need to consider how these constraints can be relaxed.

Three costing scenarios were used for the analysis, based on the level of investment and ability to expand services at different levels of the district health system. Each of the scenarios reflect different assumptions about the time-frame, investments in capacity and infrastructure, and feasible levels of target coverage, in order to achieve health benefits.

- Scenario 2007A looked at the possible levels of delivery with an emphasis on expanding the lower levels of the district health system (e.g. health post and outreach services).

- Scenario 2007B estimates the costs for rapidly scaling-up priority programmes, assuming substantial investments in existing health systems at all levels of service delivery, but limited by the extent to which these investments can take place over five years.

- Scenario 2015 estimates the costs achieving implementation of priority programmes at increased levels of coverage, and with investment in existing health systems, over a thirteen-year period. Where existing and adequate, scenario 2015 reflects target coverage rates set by the international community.

2. Methodology

The cost analysis was designed to estimate the volume of additional resources that would be required for a large-scale expansion of activities. Estimates of current levels of coverage were made, and target levels of coverage for the years 2007A, 2007B and 2015 were established. The costs of expanding activities are presented as the cost additional to current levels of health expenditure that are required. Thus these costs estimates reflect the *additional* expenditure in 2007A, 2007B and 2015, which is required over and above current patterns of expenditure.

Three dimensions of incremental costs were estimated: the implementation costs, the management and administration cost, and the cost of investment in the health systems infrastructure required to support the expansion of these activities. The **implementation** costs were estimated using available demographic, behavioural and epidemiological and facility or project-level cost data. The **investment** and **management and administration** costs were based on the estimation of health system inputs that were required to support the expansion of activities to this higher level of coverage, including provision of institutional support at the district level, training for additional staff and increase numbers of facilities.

2.1. Interventions

Working Group 5 has compared the mortality in low and middle income countries with the mortality among the population of non-smokers in the richest countries. This analysis has identified a small group of diseases and conditions that are responsible for a large share of excess mortality in developing countries: tuberculosis, malaria, HIV/AIDS, complications of motherhood, diseases of the newborn, childhood illnesses and tobacco-related diseases. For each of these sources of mortality there exist effective interventions that will lower the disease burden if they were applied on a larger scale. Accordingly, Working Group 5 designed a package of core interventions, which are not only effective but can also be scaled up relative quickly and applied widely.

Having identified a set of interventions, we calculated the costs of implementing them on a large scale. As mentioned earlier, the model underlying the cost analysis takes demographic, epidemiological, behavioural, coverage and unit costs information into account. Thus, data availability became a crucial criterion for the inclusion of interventions in the cost study. Whereas none of the interventions identified as effective and amenable to change was completely excluded, adaptations of the intervention design couldn't be avoided. For example, the cost analysis does not consider deworming with antiparasitic drugs in endemic areas as part of antenatal care, since epidemiological and coverage data were found to be scarce. However,

by means of sensitivity analyses we could proof that the majority of adaptations do not have any significant impact on the results of the cost analysis.

Defining and describing the priority interventions was an important step in the cost analysis. For most of the interventions, this was a straightforward task (e.g. the diagnosis and treatment of malaria). Some interventions, however, are complex and of multidimensional nature. Acknowledging that the provision of medical services requires adequate infrastructure, management and monitoring systems, these interventions embrace elements beyond the simple service provision. The core of the cost study, however, is the analysis of what we call implementation costs. Implementation costs reflect the service provision, including staff, physical infrastructure and supplies. Therefore, our definition of interventions such as the integrated management of childhood illness and DOTS ignores components beyond the actual service provision. In additional steps of the cost analysis, we acknowledge the importance of support structures. However, the cost components of institutional support and investments reflect resources to scale up the delivery capacity of a district health system as a whole and are not calculated for each intervention.

We have not attempted to estimate the costs of scaling up all interventions in each country but have considered where these interventions are epidemiologically appropriate. For example, malaria control measures are not included in the design of the benefit package in countries where malaria does not significantly contribute to the burden of disease. The cost analysis excludes

activities to reduce the burden of tobacco-related diseases. As the most effective intervention to reduce smoking is to raise prices through taxation but the demand for smoking price inelastic, we assume that the whole package of smoking-related interventions is self-financing. In total, 49 priority interventions are included in the cost study, comprising 65 different treatment lines (table 1). The interventions were classified according to the lowest level of service delivery required to deliver these interventions (district hospital, health centre, health post, outreach services). It was recognised that scaling-up particular interventions would require systems strengthening at all these different levels.

Table 1. Interventions

Tuberculosis Treatment	Directly observed short course treatment for smear positive patients Directly observed short course treatment for smear negative patients
Malaria Prevention	Insecticide Treated Nets Residual Indoor Spraying
Malaria Treatment	Treatment for clinical episodes of malaria
HIV/AIDS Prevention	Youth focused interventions Interventions working with sex workers and clients Condom social marketing and distribution Workplace interventions Strengthening of blood transfusion systems Voluntary counselling and testing Prevention of mother-to-child transmission Mass media campaigns Treatment for sexually transmitted diseases
HIV/AIDS Care	Palliative care Clinical management of opportunistic illnesses Prevention of opportunistic illnesses Home-based care
HIV/AIDS HAART	Provision of HAART
Childhood disease related interventions (care)	Treatment of various conditions (acute respiratory infections, diarrhoea, causes of fever, malnutrition, anaemia)
Childhood disease related interventions (prevention)	Vaccinations (BCG, OPV, DPT, Measles, Hepatitis B, HiB)
Maternal conditions related interventions (ante and intra-partum)	Antenatal care Treatment of complications during pregnancy Skilled birth attendance Emergency obstetric care
Maternal conditions related interventions (post-partum care)	Postpartum care (including family planning)

2.2. Countries

Working group 5 is concerned with improving the health outcome of the poor. For the purpose of the costing exercise this has led to a focus on poor countries, defined as a GNP per capita of less than 1200 US$ (1999 US$). The burden of disease due to infectious diseases was the second criterion in the country selection process. As the largest share of this burden falls into Sub-Saharan Africa, all countries of this region have been included in the analysis, independent of their economic performance. Due to a lack of country specific information, countries with a population of less than 150,000 people have been excluded from the study. For the same reason East Timor has been excluded. Table 2 presents the list of 83 countries included in the analysis, by geographic region.

Table 2. Countries in cost analysis by regional classification

Region	Countries
Sub-Saharan Africa (SSA)	Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Cape Verde, Chad, Comoros, Congo, Cote d'Ivoire, Dem. Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Syrian Arab Republic, Togo, Uganda, United Rep. Of Tanzania, Yemen, Zambia, Zimbabwe.
East Asia and Pacific (EAP)	Cambodia, China (excluding Hong Kong SAR and Macau), Dem. People's Republic of Korea, Indonesia, Lao People's Dem. Republic, Mongolia, Myanmar, Papua New Guinea, Philippines, Samoa, Solomon Islands, Vanuatu, Viet Nam
South Asia (SA)	Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka
Eastern Europe and Central Asia (EEC)	Albania, Armenia, Azerbaijan, Georgia, Kyrgyzstan, Republic of Moldova, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
Latin and Central America (LAC)	Bolivia, Cuba, Guyana, Haiti, Honduras, Nicaragua

Note: Note these are based on the World Bank classification of regions, but the few Middle-Eastern and North African (MENA) countries have been included in SSA.

As we will discuss later, the costs of expanding services depend on a wide range of variables, which vary from region to region, from country to country and from district to district. The cost analysis takes these variations into account, on the smallest geographical level data availability allowed for. For most of the variables, this has been the national level, sometimes even desegregated into urban and rural populations. Accordingly, the costs of scaling-up have been computed for each country and intervention.

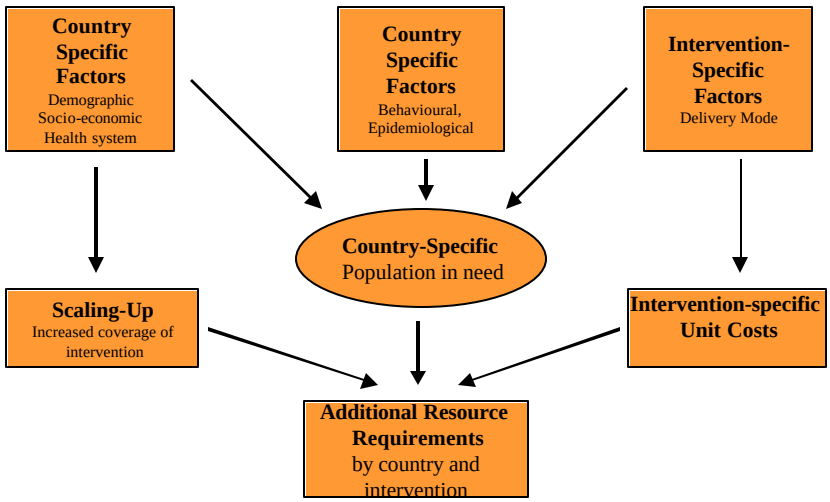
2.3. Cost categories

2.3.1. Implementation Costs

General Approach

The costs of expanding services will vary by country according to the extent and type of illness, and demographic and socio-economic factors. Hence the costs of scaling-up have been modelled on a country-specific basis for each intervention, taking into account complementarities between interventions. The model estimates the costs for each strategy using country-specific estimates of the population in need for each intervention. A summary of the model structure and categories of data inputs that have been used in the analysis is presented in figure 1.

Figure 1. Model Summary and Data Inputs



Adapted from Kumaranayake and Watts 2000

The population in need

Estimation of the country specific population in need for a particular service rests principally on two parameters: the population size and the incidence or prevalence of a condition or risk. Current estimates and future prospects of population sizes have been available. For most of the countries, we were able to collect information on current morbidity and risk patterns. The literature, however, provides little information on the impact of interventions on disease epidemiology, let alone the massive scaling up of a large set of services. Due to this substantial lack of information, we assumed the incidence and prevalence of diseases or risks as constant over time. This approach ignores any effect of the increased service coverage on disease

epidemiology. Whereas this is of little or no relevance for conditions such as obstructed labor, it is a more severe limitation for transmittable diseases, in particular HIV/AIDS and tuberculosis. As discussed earlier, centrality to the epidemic has been a criterion for the selection of interventions. Therefore, we would expect a drop in the incidence of both diseases. On the other hand, there is evidence that the scaling-up of some of interventions will result in an increase in the incidence and prevalence of these diseases, as improved screening and case detection will identify new cases. Thus, there is great uncertainty surrounds the estimates of actual morbidity and risk patterns. Hence, the direction and extent of the overall bias attributable to constant incidence and prevalence rates remains unclear.

Coverage

The cost analysis was designed to estimate the volume of additional resources that are required for a large-scale expansion of core health services. Coverage levels reported over recent years served as an approximation for the lower end of the expansion scale. The distinction between the three costing scenarios is reflected in the target coverage levels used. Table 3 presents baseline coverage and minimum target levels for each intervention area. The target coverage levels were set, where available and adequate, according to international coverage targets. Coverage levels reported over recent years served as an approximation for the baseline of the analysis. As the cost exercise is based on country specific data, the data presented for baseline coverage reflect an average for the countries included. The target coverage levels represent the minimum coverage rates achieved in each scenario. However, the actual performance of some

countries is higher than these levels. Thus, the average resulting coverage is higher. This is particularly the case in scenarios 2007A and 2007B as the minimum target levels of coverage are lower.

Table 3. Baseline and minimum coverage targets for costing scenarios

Interventions	***Scenarios***			
	2002 **Baseline**	2007 A **Minimum Target**	2007 B **Minimum Target**	2015 **Minimum Target**
Tuberculosis				
Diagnosis and treatment	44%	50%	60%	70%
Malaria				
Diagnosis and treatment	31%	50%	60%	70%
Prevention (ITN, RIS)	2%	30%	50%	70%
HIV/AIDS				
Prevention (outside health sector)	10-20%	40%	70%	80%
Prevention (within health sector)	< 1% - 10%	20%	40%	70%
Care of OI	6%-10%	25%	40%	70%
HAART	< 1%	10%	45%	65%
Childhood diseases				
Vaccinations (BCG, OPV, DPT, HiB*, HepB*)	75%	80%	90%	90%
Vaccinations (Measles)	68%	70%	80%	80%
Diagnosis and treatment Acute respiratory infection	59%	60%	70%	80%
Diagnosis and treatment Fever	52%	60%	70%	80%
Maternity related conditions				
Antenatal care	65%	70%	80%	90%
Skilled birth attendance	45%	60%	80%	90%

Note: * Data are not included in the calculation of the average coverage in 2002. The cost analysis excludes activities to reduce the burden of tobacco-related diseases. As it is assumed that the most effective intervention to reduce smoking is to raise prices through taxation and that demand is relatively inelastic.

Data availability was a major limitation to the cost analysis, information availability on actual

service coverage no exception. For interventions central to the benefit package, such as DOTS or antenatal care, we were generally able to collect the required information. Data on actual coverage for more specialised services, such as caesarean sections or the treatment of severe pneumonia, were often not available. Wherever this was the case, we used coverage data of more general services or information on access to health care as a proxy. For example, the proportion of births attended by a health professional and information on access to health care services were used to estimate the frequency of caesarean sections. However, birth attendance or access to health services does not necessarily implies access to a first line hospital where caesarean sections are routinely performed. Therefore, we developed a model to compute estimates for service coverage that recognises the probability of the access to a particular hierarchical tier of the health system as well as a referral between different tiers. We assume that these probabilities increase over time, for example, that a referral to a hospital is more likely in the 2015 scenario than in the 2007A one. This approach results in substantial changes of the case mix between different scenarios. On the cost side, the major implication of this approach is a significantly increasing proportion of patients treated for severe disease forms in first line hospitals.

Actual coverage data vary widely among countries. In some countries, high levels of coverage have already been achieved, while other countries lag far behind. For example, the spectrum of coverage levels of DOTS recently achieved in SSA countries varies between 10 and 95%. These variations do not allow for a homogenous process of scaling up. Instead, the model

underlying the cost analysis is about achieving minimum coverage levels. For example, the 2007A scenario reflects a minimum coverage for DOTS of 50% in all countries. As many countries already perform better than this and since the model does not consider scaling down as an option, the resulting regional average is 60%. This approach has implications for the cost estimates. In comparison with middle income countries, low-income countries are often characterised by lower coverage levels. Thus, achieving a minimum coverage affects low-income countries rather than middle income countries, in particular when the minimum coverage level is low (2007A scenario). Lower income countries, however, differ not only with respect to coverage levels, but also with respect to unit costs. The costs of treating a patient with TB are cheaper in low-income countries than in middle-income countries. As scaling up is, in its first step, primarily about increasing coverage in low income countries, the costs of achieving a higher average level are relatively low, compared to the second step of scaling up (2015) which implies coverage increases also in low as well as in middle income countries.

Unit costs

The costs of expanding activities thus reflect additional expenditure over and above what is being spent today. Every attempt was made to cover the full cost of providing services. Costs include annualised capital components.

Due to differing price structures across countries and regions, we stratified countries by region and income group (i.e. whether they were low income 1999 GNP per capita < $750 or above).

We then undertook a review to try and obtain cost data for each intervention and for each of the income/regional groupings. However, given the paucity of data, we have had to use a number of sources with differing methodologies in terms of data collection and interpretation, and undertook standardisation. Where such data was not available, we have extrapolated the figures from established sources and adjusted for purchasing power parity (PPP). Costs for each intervention were broken down by their tradable and non-tradable components, and PPP-adjustments were undertaken for the non-tradable component. A limitation of the PPP adjustment is that it assumes that prices and costs in the health sector follow the same structure as in the general economy. Given the uncertainty regarding the need of services and the costs of different interventions, a likely low-high range of costs was estimated.

We standardised as much as possible – attempting to obtain the economic costs of delivering the intervention from a public sector perspective. A public sector perspective would exclude costs incurred by the private sector and by private consumers and collate only those costs incurred by the public sector in implementing the strategy. These costs can be considered as the costs of providing particular programs, and are borne by the organisation delivering the services.

Economic or **opportunity costs** "recognise the cost of using resources that could have been productively used elsewhere. Thus **economic costs** include the estimated value of goods or services for which there were no financial transactions or when the price of the good did not reflect the cost of using it productively elsewhere. **Financial costs** represent actual expenditure

on goods and services purchased. Costs are thus described in terms of how much money has been paid for the resources used in the project or service. The main ways that financial and economic costs differ is in the way they treat:

- donated goods and services;
- other inputs whose prices are incorrect;
- valuation of capital items.

Cost data drawn from a range of interventions was related to the size of the PIN in order to provide national estimates for each country. The original studies presented figures for a variety of different years, so we have converted them to constant US dollars using the average annual inflation rate, as measured by the GDP deflator (World Bank, 1997b), for the period between 1985-1995[1].

2.3.2. Investment costs and Institutional Support

Costs for required investments in training and facilities were calculated on the size of the PIN, which required increased coverage for each scenario. These costs were based on required contact time with health service staff and use of inpatient or ambulatory facilities. Calculations for staff and facility requirements were estimated on the basis of required nursing time, and desirable ratios of nurses to other health facility staff such as physicians and to infrastructure

requirements such as hospital beds were then used to calculate these requirements. The management and institutional support component of the costs included estimates of the administrative and support functions, monitoring, supervision and institutional strengthening within the district health level. These costs were also based on the size of the PIN requiring coverage.

Data sources for the estimation of the model (including coverage, PIN and unit costs) are provided in the reference list.

[1] The GDP deflator for this period was 3.2% for the US over this period.

3. Results

The estimates of costs for all the scenarios are presented in US$ 2002. They give an idea of the magnitude of resources that need to be spent annually, if one hopes to achieve the target coverage levels. This is an additional cost to the current level of spending, and so is referred to as the incremental costs needed. The data reflect a public health system perspective. Both public and, where appropriate, non-profit delivery strategies are considered for the implementation of priority programmes. Cost estimates reflect changes in population sizes, increased coverage rates and current epidemiological profiles.

Table 4 provides the estimates for costs, stratified by country income level, for the three cost scenarios, presented in total dollars, in cost per capita and as a percentage of GNP. Table 5 breaks down the costs by intervention. However, while the set of interventions chosen have been broadly characterised by disease or illness type, in reality the nature of health service delivery means that there are overlaps between them. For example, malaria prophylaxis for pregnant women could be included under malaria prevention or maternity-related interventions. The latter was chosen, as this was the nature of the delivery mechanism. Tables 6-14 provide a breakdown of the costs by intervention area.

Table 4. Annual incremental costs of scaling up by region (US$ 2,002)

	---------- 2007A ----------		---------- 2007B ----------		---------- 2015 ----------	
TOTAL DOLLARS ('000 000 000, BILLIONS OF US DOLLARS)						
All countries	**13**	**(11 - 14)**	**26**	**(23 - 29)**	**46**	**(40 - 52)**
All low income countries	10	(8 – 11)	19	(17 – 22)	33	(28 - 37)
All Middle income countries	3	(3 – 3)	6	(6 – 7)	13	(11 - 14)
SSA	6	(5 – 7)	13	(11 - 15)	23	(20 - 26)
EAP	3	(2 – 3)	5	(5 - 6)	10	(9 - 11)
SA	4	(3 – 4)	7	(6 - 7)	11	(9 - 12)
EEC	0.2	(0.2-0.2)	0.4	(0.4–0.4)	1	(1 - 1)
LAC	0.2	(0.2-0.3)	0.4	(0.4 -0.5)	1	(1 - 1)
PER CAPITA ($)						
All countries	**3**	**(3 – 3)**	**6**	**(5 – 7)**	**10**	**(8 – 11)**
All low income countries	3	(3 – 4)	7	(6 – 8)	10	(9 – 12)
All Middle income countries	2	(2 – 2)	4	(4 – 5)	8	(7 – 9)
SSA	8	(7 – 9)	16	(14 – 18)	24	(21 – 27)
EAP	1	(1 – 2)	3	(2 – 3)	5	(5 – 6)
SA	2	(2 – 3)	4	(4 – 5)	7	(6 – 7)
EEC	2	(2 – 2)	4	(3 – 4)	7	(6 – 7)
LAC	5	(4 – 6)	10	(9 – 11)	16	(14 – 19)
% of GNP						
All countries	**0.4**	**(0.3 - 0.4)**	**0.7**	**(0.6 – 0.8)**	**0.9**	**(0.8 - 1.0)**
All low income countries	0.7	(0.6 - 0.7)	1.3	(1.1 – 1.5)	1.6	(1.4 -1.8)
All Middle income countries	0.2	(0.1 - 0.2)	0.3	(0.3 – 0.3)	0.4	(0.4 - 0.5)
SSA	1.4	(1.1 - 1.4)	2.7	(2.4 – 3.0)	3.7	(3.1 - 4.2)
EAP	0.1	(0.1 - 0.1)	0.3	(0.2 – 0.3)	0.3	(0.3 - 0.4)
SA	0.4	(0.3 - 0.4)	0.8	(0.6 – 0.8)	0.9	(0.8 - 1.0)
EEC	0.2	(0.2 - 0.2)	0.4	(0.4 – 0.5)	0.7	(0.6 - 0.7)
LAC	0.6	(0.4 - 0.6)	0.9	(0.8 –1.0)	1.3	(1.2 - 1.6)

Note: Data is presented in terms of averages, the midpoint between the top and bottom of the low-high range. Figures in parentheses are the rounded low-high range estimates for scaling-up the intervention. The average estimate was calculated before numbers were rounded so it does not necessarily coincide with the mid-point of the high-low range presented.

Table 5. Annual incremental costs of scaling up by intervention area (US$ 2,002)

	--------- 2007A ----------		---------- 2007B ----------		---------- 2015 ----------	
TOTAL DOLLARS ('000 000 000, BILLIONS OF DOLLARS)						
All countries	**13**	**(11 – 14)**	**26**	**(23 – 29)**	**46**	**(40 – 52)**
TB Treatment	0.4	(0.3-0.4)	0.5	(0.5-0.6)	0.9	(0.8-1.0)
Malaria Prevention	1.2	(0.9-1.4)	2.0	(1.6-2.4)	3.4	(2.8-4.0)
Malaria Treatment	0.3	(0.3-0.4)	0.5	(0.4-0.6)	1.0	(0.8-1.2)
HIV Prevention	3.6	(3.5-3.8)	6.5	(6.2-6.8)	8.3	(8.0-8.7)
HIV Care	1.6	(1.4-1.7)	2.8	(2.8-2.9)	6.4	(5.8-7.1)
HIV Treatment (HAART)	1.0	(0.9-1.2)	5.0	(4.3-5.8)	8.0	(6.8-9.2)
Childhood-related illness – Treatment	1.7	(1.5-1.9)	3.7	(3.3-4.1)	10.7	(9.4-12.0)
Childhood-related illnesses – Immunisation (EPI)	0.8	(0.7-0.9)	0.9	(0.8-1.1)	1.2	(1.0-1.6)
Maternity-related illnesses	2.1	(1.6-2.5)	3.6	(2.8-4.5)	5.5	(4.3-6.7)
PER CAPITA ($)						
All countries	**3**	**(3 – 3)**	**6**	**(5 – 7)**	**10**	**(8 – 11)**
TB Treatment	0.1	(0.1- 0.1)	0.1	(0.1-0.1)	0.2	(0.2-0.2)
Malaria Prevention	0.3	(0.2-0.3)	0.5	(0.4-0.5)	0.7	(0.6-0.8)
Malaria Treatment	0.1	(0.1-0.1)	0.1	(0.1-0.1)	0.2	(0.2-0.3)
HIV Prevention	0.8	(0.8-0.9)	1.5	(1.4-1.6)	1.7	(1.7-1.8)
HIV Care	0.4	(0.3-0.4)	0.6	(0.6-0.7)	1.3	(1.2-1.5)
HIV Treatment (HAART)	0.2	(0.2-0.3)	1.2	(1.0-1.3)	1.7	(1.4-1.9)
Childhood-related illness – Treatment	0.4	(0.3-0.4)	0.9	(0.8-1.0)	2.2	(2.0-2.5)
Childhood-related illnesses – Immunisation (EPI)	0.2	(0.2 –0.2)	0.2	(0.2-0.3)	0.3	(0.2-0.3)
Maternity-related illnesses	0.5	(0.4-0.6)	0.8	(0.6-1.0)	1.1	(0.9-1.4)
% of GNP						
All countries	**0.4**	**(0.3-0.4)**	**0.7**	**(0.6-0.8)**	**0.9**	**(0.8-1.0)**
TB Treatment	0.01	(0.01-0.01)	0.02	(0.01-0.02)	0.02	(0.02-0.02)
Malaria Prevention	0.03	(0.03-0.04)	0.06	(0.05-0.07)	0.07	(0.05-0.08)
Malaria Treatment	0.01	(0.01-0.01)	0.01	(0.01-0.02)	0.02	(0.01-0.02)
HIV Prevention	0.10	(0.10-0.11)	0.18	(0.17-0.19)	0.16	(0.15-0.17)
HIV Care	0.04	(0.04-0.05)	0.08	(0.08-0.08)	0.12	(0.11-0.14)
HIV Treatment (HAART)	0.03	(0.02-0.03)	0.14	(0.12-0.16)	0.15	(0.13-0.18)
Childhood-related illness – Treatment	0.05	(0.04-0.05)	0.10	(0.09-0.11)	0.21	(0.18-0.23)
Childhood-related illnesses – Immunisation	0.02	(0.02-	0.03	(0.02-0.03)	0.02	(0.02-

(EPI)		0.03)				0.03)
Maternity-related illnesses	0.06	(0.04-0.07)	0.10	(0.08-0.12)	0.11	(0.08-0.13)

Note: Data is presented in terms of averages, the midpoint between the top and bottom of the low-high range. Figures in parentheses are the rounded low-high range estimates for scaling-up the intervention. The average estimate was calculated before numbers were rounded so it does not necessarily coincide with the mid-point of the high-low range presented.

Table 6. Distribution of TB costs by region (US$ 2002)

	2007A		2007B		2015	
	Low estimate	**High Estimate**	**Low estimate**	**High Estimate**	**Low estimate**	**High Estimate**
TOTAL DOLLARS ('000 000, MILLIONS OF DOLLARS)						
All countries	**336**	**444**	**471**	**621**	**783**	**1,036**
All low income countries	169	233	222	307	389	538
All Middle income countries	167	211	249	314	395	499
SSA	65	89	92	127	179	245
EAP	210	271	302	390	462	595
SA	58	79	70	97	130	180
EEC	0	1	1	1	1	2
LAC	3	4	5	7	11	15
PER CAPITA ($)						
All countries	**0.08**	**0.10**	**0.11**	**0.14**	**0.16**	**0.22**
All low income countries	0.06	0.08	0.08	0.11	0.12	0.17
All Middle income countries	0.11	0.14	0.16	0.20	0.24	0.30
SSA	0.08	0.11	0.12	0.16	0.19	0.26
EAP	0.11	0.15	0.16	0.21	0.23	0.30
SA	0.04	0.05	0.05	0.06	0.08	0.11
EEC	<	<	<	0.01	0.01	0.01
LAC	0.07	0.09	0.12	0.16	0.22	0.29
% of GNP						
All countries	**0.01**	**0.01**	**0.01**	**0.02**	**0.02**	**0.02**
All low income countries	"	0.01	0.01	0.01	0.01	0.01
All Middle income countries	"	0.01	0.01	0.01	0.01	0.01
SSA	"	"	"	"	"	"
EAP	0.01	0.01	0.01	0.01	0.01	0.01
SA	"	"	"	"	"	"
EEC	"	"	"	"	"	"
LAC	"	"	"	"	"	"

Note: < = less than $0.01 per capita; " = less than 0.01% of GNP.

Table 7. Distribution of Malaria prevention costs by region (US$ 2002)

	2007A		2007B		2015	
	Low estimate	**High Estimate**	**Low estimate**	**High Estimate**	**Low estimate**	**High Estimate**
TOTAL DOLLARS ('000 000, MILLIONS OF DOLLARS)						
All countries	**949**	**1,377**	**1,640**	**2,384**	**2,763**	**4,028**
All low income countries	909	1,310	1,567	2,261	2,617	3,776
All Middle income countries	40	67	73	123	146	252
SSA	307	404	522	689	929	1,245
EAP	116	187	222	355	405	646
SA	514	764	873	1,298	1,386	2,063
EEC	-	-	-	-	-	-
LAC	13	23	23	41	42	75
PER CAPITA ($)						
All countries	**0.22**	**0.32**	**0.38**	**0.55**	**0.58**	**0.84**
All low income countries	0.33	0.47	0.56	0.82	0.84	1.21
All Middle income countries	0.03	0.04	0.05	0.08	0.09	0.15
SSA	0.39	0.51	0.66	0.87	0.98	1.31
EAP	0.06	0.10	0.12	0.19	0.21	0.33
SA	0.34	0.50	0.57	0.85	0.82	1.22
EEC	-	-	-	-	-	-
LAC	0.29	0.50	0.52	0.91	0.83	1.48
% of GNP						
All countries	**0.03**	**0.04**	**0.05**	**0.07**	**0.05**	**0.08**
All low income countries	0.03	0.04	0.04	0.06	0.05	0.07
All Middle income countries	"	"	"	"	"	"
SSA	0.01	0.01	0.01	0.02	0.02	0.02
EAP	"	0.01	0.01	0.01	0.01	0.01
SA	0.01	0.02	0.02	0.04	0.03	0.04

EEC	-	-	-	-	-	-
LAC	“	“	“	“	“	“

Note: < = less than $0.01 per capita; “ = less than 0.01% of GNP

Table 8. Distribution of Malaria treatment costs by region (US$ 2002)

	2007A		2007B		2015	
	Low estimate	**High Estimate**	**Low estimate**	**High Estimate**	**Low estimate**	**High Estimate**
TOTAL DOLLARS ('000 000, MILLIONS OF DOLLARS)						
All countries	**263**	**399**	**374**	**565**	**772**	**1,239**
All low income countries	247	368	344	508	678	1,042
All Middle income countries	16	30	30	57	93	198
SSA	217	332	301	456	602	943
EAP	32	46	49	75	118	215
SA	13	17	20	28	44	66
EEC	-	-	-	-	-	-
LAC	2	4	3	6	8	15
PER CAPITA ($)						
All countries	**0.06**	**0.09**	**0.09**	**0.13**	**0.16**	**0.26**
All low income countries	0.09	0.13	0.12	0.18	0.22	0.33
All Middle income countries	0.01	0.02	0.02	0.04	0.06	0.12
SSA	0.27	0.42	0.38	0.58	0.64	1.00
EAP	0.02	0.02	0.03	0.04	0.06	0.11
SA	0.01	0.01	0.01	0.02	0.03	0.04
EEC	-	-	-	-	-	-
LAC	0.05	0.08	0.07	0.13	0.15	0.31
% of GNP						
All countries	**0.01**	**0.01**	**0.01**	**0.02**	**0.01**	**0.02**
All low income countries	0.01	0.01	0.01	0.01	0.01	0.02
All Middle income countries	"	"	"	"	"	"
SSA	0.01	0.01	0.01	0.01	0.01	0.02
EAP	"	"	"	"	"	"
SA	"	"	"	"	"	"
EEC	-	-	-	-	-	-
LAC	"	"	"	"	"	"

Note: < = less than $0.01 per capita; " = less than 0.01% of GNP.

Table 9. Distribution of HIV/AIDS prevention costs by region (US$ 2002)

	2007A		2007B		2015	
	Low estimate	**High Estimate**	**Low estimate**	**High Estimate**	**Low estimate**	**High Estimate**
TOTAL DOLLARS ('000 000, MILLIONS OF DOLLARS)						
All countries	**3,486**	**3,809**	**6,184**	**6,758**	**7,975**	**8,685**
All low income countries	2,264	2,474	4,017	4,389	5,180	5,641
All Middle income countries	1,222	1,335	2,168	2,369	2,795	3,044
SSA	1,172	1,280	2,079	2,271	2,680	2,919
EAP	1,204	1,316	2,136	2,334	2,755	3,000
SA	985	1,076	1,747	1,909	2,253	2,454
EEC	78	85	138	151	178	194
LAC	47	52	84	92	109	118
PER CAPITA ($)						
All countries	**0.80**	**0.88**	**1.43**	**1.56**	**1.67**	**1.81**
All low income countries	0.82	0.89	1.45	1.58	1.66	1.80
All Middle income countries	0.78	0.86	1.39	1.52	1.69	1.84
SSA	1.48	1.62	2.63	2.87	2.83	3.08
EAP	0.65	0.71	1.15	1.26	1.39	1.52
SA	0.64	0.70	1.14	1.25	1.33	1.45
EEC	0.66	0.72	1.17	1.28	1.46	1.59
LAC	1.04	1.16	1.87	2.05	2.15	2.33
% of GNP						
All countries	**0.10**	**0.11**	**0.17**	**0.19**	**0.15**	**0.17**
All low income countries	0.06	0.07	0.11	0.12	0.10	0.11
All Middle income countries	0.03	0.04	0.06	0.07	0.05	0.06
SSA	0.03	0.04	0.06	0.06	0.05	0.06
EAP	0.03	0.04	0.06	0.07	0.05	0.06
SA	0.03	0.03	0.05	0.05	0.04	0.05
EEC	"	"	"	"	"	"
LAC	"	"	"	"	"	"

Note: < = less than $0.01 per capita; " = less than 0.01% of GNP.

Table 10. Distribution of HIV/AIDS care costs by region (US$ 2002)

	2007A		2007B		2015	
	Low estimate	**High Estimate**	**Low estimate**	**High Estimate**	**Low estimate**	**High Estimate**
(TOTAL DOLLARS ('000 000, MILLIONS OF DOLLARS)						
All countries	**1,446**	**1,686**	**2,775**	**2,853**	**5,817**	**7,063**
All low income countries	972	1,150	1,908	1,982	3,974	4,875
All Middle income countries	474	537	868	871	1,843	2,188
SSA	1,052	1,233	2,048	2,116	4,250	5,176
EAP	115	131	210	211	448	537
SA	156	181	298	308	648	783
EEC	104	119	183	182	397	476
LAC	19	23	36	37	74	91
PER CAPITA ($)						
All countries	**0.33**	**0.39**	**0.64**	**0.66**	**1.22**	**1.48**
All low income countries	0.35	0.41	0.69	0.71	1.27	1.56
All Middle income countries	0.30	0.34	0.56	0.56	1.11	1.32
SSA	1.33	1.56	2.59	2.67	4.49	5.47
EAP	0.06	0.07	0.11	0.11	0.23	0.27
SA	0.10	0.12	0.20	0.20	0.38	0.46
EEC	0.88	1.01	1.56	1.55	3.25	3.89
LAC	0.42	0.51	0.80	0.82	1.46	1.80
% of GNP						
All countries	**0.04**	**0.05**	**0.08**	**0.08**	**0.11**	**0.14**
All low income countries	0.03	0.03	0.05	0.06	0.08	0.09
All Middle income countries	0.01	0.01	0.02	0.02	0.04	0.04
SSA	0.03	0.03	0.06	0.06	0.08	0.10
EAP	"	"	0.01	0.01	0.01	0.01
SA	"	0.01	0.01	0.01	0.01	0.02
EEC	"	"	0.01	0.01	0.01	0.01
LAC	"	"	"	"	"	"

Note: < = less than $0.01 per capita; " = less than 0.01% of GNP.

Table 11. Distribution of HIV/AIDS Treatment (HAART) costs by region (US$ 2002)

	2007A		2007B		2015	
	Low estimate	**High Estimate**	**Low estimate**	**High Estimate**	**Low estimate**	**High Estimate**
TOTAL DOLLARS ('000 000, MILLIONS OF DOLLARS)						
All countries	**855**	**1,157**	**4,275**	**5,783**	**6,846**	**9,190**
All low income countries	691	937	3,454	4,683	5,646	7,597
All Middle income countries	164	220	822	1,100	1,201	1,593
SSA	720	970	3,598	4,850	5,818	7,784
EAP	34	46	169	231	255	348
SA	87	120	437	602	665	911
EEC	6	8	29	39	39	53
LAC	9	12	44	60	70	94
PER CAPITA ($)						
All countries	**0.20**	**0.27**	**0.99**	**1.33**	**1.43**	**1.92**
All low income countries	0.25	0.34	1.25	1.69	1.80	2.43
All Middle income countries	0.11	0.14	0.53	0.70	0.73	0.96
SSA	0.91	1.23	4.54	6.13	6.14	8.22
EAP	0.02	0.02	0.09	0.12	0.13	0.18
SA	0.06	0.08	0.29	0.39	0.39	0.54
EEC	0.05	0.07	0.25	0.33	0.32	0.43
LAC	0.20	0.27	0.98	1.33	1.38	1.86
% of GNP						
All countries	**0.02**	**0.03**	**0.12**	**0.16**	**0.13**	**0.18**
All low income countries	0.02	0.03	0.10	0.13	0.11	0.15
All Middle income countries	"	0.01	0.02	0.03	0.02	0.03
SSA	0.02	0.03	0.10	0.14	0.11	0.15
EAP	"	"	"	0.01	"	0.01
SA	"	"	0.01	0.02	0.01	0.02
EEC	"	"	"	"	"	"
LAC	"	"	"	"	"	"

Note: < = less than $0.01 per capita; " = less than 0.01% of GNP.

Table 12. Distribution of childhood related treatment costs by region (US$ 2002)

	2007A		2007B		2015	
	Low estimate	**High Estimate**	**Low estimate**	**High Estimate**	**Low estimate**	**High Estimate**
TOTAL DOLLARS ('000 000, MILLIONS OF DOLLARS)						
All countries	**1,513**	**1,897**	**3,260**	**4,128**	**9,414**	**11,987**
All low income countries	1,063	1,307	2,010	2,491	5,470	6,816
All Middle income countries	450	589	1,250	1,637	3,944	5,171
SSA	844	1,041	1,424	1,770	3,391	4,249
EAP	295	387	999	1,305	3,417	4,456
SA	280	348	675	845	2,227	2,794
EEC	10	12	19	24	49	61
LAC	84	108	143	184	329	427
PER CAPITA ($)						
All countries	**0.35**	**0.44**	**0.75**	**0.95**	**1.97**	**2.50**
All low income countries	0.38	0.47	0.72	0.90	1.75	2.18
All Middle income countries	0.29	0.38	0.80	1.05	2.38	3.12
SSA	1.07	1.32	1.80	2.23	3.58	4.49
EAP	0.16	0.21	0.54	0.70	1.73	2.26
SA	0.18	0.23	0.44	0.55	1.32	1.65
EEC	0.08	0.11	0.17	0.21	0.40	0.50
LAC	1.87	2.39	3.19	4.10	6.51	8.44
% of GNP						
All countries	**0.04**	**0.05**	**0.09**	**0.11**	**0.18**	**0.23**
All low income countries	0.03	0.04	0.06	0.07	0.11	0.13
All Middle income countries	0.01	0.02	0.03	0.05	0.08	0.10
SSA	0.02	0.03	0.04	0.05	0.07	0.08
EAP	0.01	0.01	0.03	0.04	0.07	0.09
SA	0.01	0.01	0.02	0.02	0.04	0.05
EEC	"	"	"	"	"	"
LAC	"	"	"	0.01	0.01	0.01

Note: < = less than $0.01 per capita; " = less than 0.01% of GNP.

Table 13. Distribution of Child Immunisation (EPI) costs by region (US$ 2002)

	2007A		2007B		2015	
	Low estimate	**High Estimate**	**Low estimate**	**High Estimate**	**Low estimate**	**High Estimate**
TOTAL DOLLARS ('000 000, MILLIONS OF DOLLARS)						
All countries	**655**	**934**	**785**	**1,133**	**1,044**	**1,556**
All low income countries	529	740	638	903	840	1,220
All Middle income countries	126	195	146	230	204	335
SSA	208	355	246	422	328	571
EAP	141	213	168	258	245	398
SA	290	343	354	426	447	547
EEC	10	15	11	17	15	25
LAC	5	8	6	10	9	16
PER CAPITA ($)						
All countries	**0.15**	**0.22**	**0.18**	**0.26**	**0.22**	**0.33**
All low income countries	0.19	0.27	0.23	0.33	0.27	0.39
All Middle income countries	0.08	0.12	0.09	0.15	0.12	0.20
SSA	0.26	0.45	0.31	0.53	0.35	0.60
EAP	0.08	0.11	0.09	0.14	0.12	0.20
SA	0.19	0.22	0.23	0.28	0.26	0.32
EEC	0.08	0.13	0.09	0.14	0.13	0.20
LAC	0.11	0.19	0.13	0.22	0.17	0.31
% of GNP						
All countries	**0.02**	**0.03**	**0.02**	**0.03**	**0.02**	**0.03**
All low income countries	0.01	0.02	0.02	0.03	0.02	0.02
All Middle income countries	"	0.01	"	0.01	"	0.01
SSA	0.01	0.01	0.01	0.01	0.01	0.01
EAP	"	0.01	"	0.01	"	0.01
SA	0.01	0.01	0.01	0.01	0.01	0.01
EEC	"	"	"	"	"	"
LAC	"	"	"	"	"	"

Note: < = less than $0.01 per capita; " = less than 0.01% of GNP.

Table 14. Distribution of Maternity related illness costs by region (US$ 2002)

	2007A		2007B		2015	
	Low estimate	**High Estimate**	**Low estimate**	**High Estimate**	**Low estimate**	**High Estimate**
TOTAL DOLLARS ('000 000, MILLIONS OF DOLLARS)						
All countries	**1,582**	**2,534**	**2,804**	**4,478**	**4,272**	**6,724**
All low income countries	1,482	2,377	2,553	4,082	3,664	5,782
All Middle income countries	100	157	251	396	608	942
SSA	686	1,101	1,159	1,853	1,738	2,743
EAP	162	255	372	587	836	1,301
SA	709	1,138	1,221	1,956	1,616	2,557
EEC	7	10	13	21	23	30
LAC	18	29	39	62	59	92
PER CAPITA ($)						
All countries	**0.36**	**0.58**	**0.65**	**1.03**	**0.89**	**1.40**
All low income countries	0.53	0.86	0.92	1.47	1.17	1.85
All Middle income countries	0.06	0.10	0.16	0.25	0.37	0.57
SSA	0.87	1.39	1.46	2.34	1.84	2.90
EAP	0.09	0.14	0.20	0.32	0.42	0.66
SA	0.46	0.75	0.80	1.28	0.96	1.51
EEC	0.06	0.09	0.11	0.18	0.19	0.25
LAC	0.41	0.64	0.86	1.37	1.16	1.82
% of GNP						
All countries	**0.04**	**0.07**	**0.08**	**0.12**	**0.08**	**0.13**
All low income countries	0.04	0.07	0.07	0.11	0.07	0.11
All Middle income countries	"	"	0.01	0.01	0.01	0.02
SSA	0.02	0.03	0.03	0.05	0.03	0.05
EAP	"	0.01	0.01	0.02	0.02	0.03
SA	0.02	0.03	0.03	0.05	0.03	0.05
EEC	"	"	"	"	"	"
LAC	"	"	"	"	"	"

Note: < = less than $0.01 per capita; " = less than 0.01% of GNP.

4. Interpretation of results

These costs give an idea of the magnitude of resources that need to be spent annually by 2007 and 2015, if one hopes to achieve the scale of the target coverage levels in 2007. This cost is in addition to the current level of spending, used to support existing activities. In particular, the data reflect the following:

a. Public health system perspective: A public health system perspective has been adopted for the cost analysis. We implicitly assume universal public funding in order to achieve targets. Both public and, where appropriate, non-profit (e.g. mission) delivery strategies are considered for the implementation of priority programmes.

b. Institutional and capacity constraints to scaling up: The coverage estimates relate to the population in need and target levels of coverage within the context of specific levels of infrastructure and timing.

c. Full cost data: The cost data selected aim to present full and comprehensive costs associated with implementing the intervention. They include the costs of all resources that are being employed in running a project or program, including minimum levels of physical and human infrastructure, improvements in capacity, training, administration and management. An economic rather than financial approach has been used to value costs,

with inputs valued in terms of their opportunity cost.

d. Use of Annualised Costs: There is a differential timing in terms of when costs of certain inputs are incurred and when their benefits or use occur over the life-time of a programme intervention. For example, the purchase of capital items and start-up components (e.g. recruitment and training of staff, social mobilisation and IEC campaigns) will occur at the beginning of the intervention, but their use/benefit will be over the duration of the project. For other input categories, the purchase and use of the items will be reflected completely in the current year's costs. In order to obtain total costs, we need to add these two categories together in a consistent fashion. This is done by calculating the annual equivalent cost of those capital/start-up items, and then adding them to other costs. We thus use these 'annualised' costs as the basis of estimation. In practice these annualised costs will give a good idea of the overall resource requirements for an intervention, over the lifetime of a project.

e. Population growth: The costs of scaling up reflect not only increasing coverage levels but also the predicted population growth as predicted by the UN population division (UN population division 1998).

f. Impact not considered: The analysis does not take into account the effectiveness or the likely impact of widespread implementation of interventions on subsequent rates of disease

incidence and prevalence.

The analysis has explored the costs of scaling-up for feasible levels of implementation, also providing estimates of the likely levels of infrastructure and investment that is also needed. However, it is already clear that the impact of disease and particularly the HIV/AIDS epidemic means that there is also substantial losses in infrastructure, which will compromise the ability to scale-up. A recent survey in Malawi found that the rate of HIV infection among schoolteachers was 30% (UNICEF, 1999). This will seriously compromise the ability and sustainability of prevention efforts within schools, where trained teachers have a critical role. Critical on the care side, is the ability of current health system infrastructure to cope with the growing burden that HIV/AIDS imposes. For example, it has been estimated that a country with a stable 5% HIV prevalence can expect that each year between 0.5 and 1% of its health care providers will die from AIDS. In contrast, a country with a 30% prevalence would lose 3-7% of health workers to the epidemic each year (World Bank, 1997). About 50-70% of medical beds in large hospitals are taken by patients with HIV-related illnesses. This suggests the need for complementary actions to sustain and expand current levels of infrastructure.

The focus of the analysis is on the level of resources that might be needed to scale-up different activities. However, the actual process of scaling-up entails a consideration of the operational context. This has been outside of the current analysis but are crucial to consider in the implementation of policy. This is particular true for countries with very low levels of existing

health infrastructure. Many of these countries face disruptions due to conflict situations. Thus a real question is how to implement activities when there are constraints which are more than limited infrastructure. In particular, further investigation needs to be made of the issues related to absorptive capacity of resources. Constraints related to organisation and governance may mean that even that the resources that would be each of the scenarios will in practice take longer to be used than the time horizon which has been adopted.

The analysis provides estimates of scaling-up a range of interventions. Clearly, the required level of coverage for different interventions will vary from setting to setting. In practice, a smaller sub-set of interventions may be identified as priorities for scaling-up and resource mobilisation. The exact mix of interventions will vary by country. The process of priority-setting entails a strategic planning process.

Finally, the focus on feasibility of scaling-up may also mean that priority-setting also considers which activities can be rapidly scaled-up, given the need to intervene quickly. The task ahead is complex. In the short term, effective activities that can be scaled-up quickly need to be identified. For rapid scaling-up, the potential to use the existing infrastructure to achieve widespread coverage must be maximised. For example, with current enrolment rates a quarter of youths aged 12-16 years could potentially be reached each year through interventions based on secondary schooling (Watts and Kumaranayake, 1999). The substantial potential to use private-sector and informal networks must not be overlooked.

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