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UNITED REPUBLIC OF TANZANIA



Ministry of Health and Social Welfare

**MKUKUTA BASED MDGs COSTING  
FOR THE HEALTH SUB-SECTOR**

**DRAFT FINAL REPORT**

Ministry of Health and Social Welfare  
Dar es Salaam

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## ACRONYMS

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AIDS	Acquired Immunodeficiency Syndrome
DHS	Tanzanian Demographic and Health Survey
HIV	Human Immunodeficiency Virus
HRH	Human Resources for Health
IPT	Intermittent Presumptive Treatment
ITNs	Insecticide Treated Nets
MCH	Maternal and Child Health
MDGs	Millennium Development Goals
MKUKUTA	Mpango wa Kukuza Uchumi na Kuondoa Umaskini Tanzania
MoH	Ministry of Health
MP	UN Millennium Project
MTEF	Medium Term Expenditure Framework
NTLP	National Tuberculosis and Leprosy Program
NSGRP	National Strategy for Growth and Reduction of Poverty
NSGRP	National Strategy for Growth and Reduction of Poverty
O&M	Operations and Maintenance
TB	Tuberculosis

## EXECUTIVE SUMMARY

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Health Sector Costing is an attempt to estimate the cost, in terms of human resources, infrastructure, and financial resources – to meet the MDGs as well the MKUKUTA targets by 2015 and 2010, respectively. The costing exercise followed a consultative process, involving the key stakeholders at all stages – the needs assessment, identification of interventions, selection of costing methodology, and output dissemination. The exercise focused on 5 main areas, which reflect most to the burden of disease in Tanzania, namely: *Child health including child nutrition, maternal health, malaria, HIV/AIDS and TB*. In addition, the costing strongly acknowledges that the health system needs to be strengthened in order to be able to respond to all health challenges.

### Needs, Targets and Interventions for Health Outcomes

Cluster two of the MKUKUTA focuses, among other things, on health issues to improve the quality of life amongst the population. It spells out child health, child nutrition, maternal health, HIV/AIDS, malaria and strengthening of human resources as the principal drivers of ill-health, and hence lays out targets to be reached to improve the quality of life. Based of these strategies, the sector needs, strategies and interventions are identified and their costs are estimated respectively.

The following are the identified needs and strategies for each strategic area:

- **Child Health:** Essential Programme of Immunization combined with other interventions (EPI +); EPI vaccines + HIB, yellow fever, hepatitis B; Vitamin A Supplementation and de-worming; *Prevention and case management of diarrhoea, malaria, ARI, and HIV among children less than 5 years of age* (Impregnated bed nets, Case management at household and health facility level (Intensification on IMCI), Breastfeeding and health promotion); *Prenatal care, obstetric and neonatal care*; chemoprophylaxis of malaria and bed nets; Prevention of Mother To Child Transmission of HIV ; Tetanus Toxoid/ micro-nutrients supplementation; *Obstetrical and Neonatal referral care*.
- **Child Nutrition:** Vitamin A supplementation, provision of Iodine, iron and PEM. De-worming and control and management of diarrhoea diseases. Promotion of breast feeding and weaning practice.
- **Maternal Health:** Increase Access to Care for the mother and newborn intervention focusing on reduction of delays in: identification of complications for assisted deliveries; decision to refer complicated cases through information/mobilization of fathers; arrangements for transport to referral health facilities; case management of complications through improvement of capacities of health facilities; Prenatal Care: prevention premature births, low birth through prevention of malaria and micronutrients (especially. Iron), Prevention and screening of HIV and TB; Prevention of Tetanus by immunization; Assisted deliveries: prevention of asphyxia and infections; resuscitate neonates; identification/reference of complications; Neonatal Care: especially for prematurity, low birth weight, pneumonia, meningitis etc.

- **HIV/AIDS:** Prevention of mother to child transmission (PMTCT); Safe Blood Transmission; Proper treatment of sexually transmitted infections; Care and Treatment of opportunistic infections; Care and Treatment with Highly Active Antiretroviral Therapy (HAART); Reduction of stigma and discrimination of PLWHAs; Expansion of the health care capacity (infrastructure and manpower); Training of health workers case management; Equipment of laboratories; Voluntary Counselling and Testing; Strengthening of Antenatal Clinics; Strengthening Monitoring and Evaluation System; Promotion of Safe sex; Advocacy.
- **Malaria:** Treatment: (effective case management in health facilities and at community level), promotion of ITNs, and prevention of malaria in pregnancy.
- **Strengthening the health system:** *Health facilities- rehabilitation, renewal, expansion (upgrading) construction of new facilities*; Human Resources- Hiring, long term and short term training, promoting, retaining, relocating, reallocating

Different interventions are drawn and costs estimates are made for implementing the interventions based on the identified strategies focusing on the needs assessment. The inter-sectoral synergies and cross cutting issues are also identified. The costing exercise is done taking into consideration the synergistic relationships among sectors.

## Costing Methodology and Assumptions

The costing quantifies the needs in terms of human resources, infrastructure, and financial resources required to meet the MKUKUTA as well as MDGs targets by 2010 and 2015, respectively. It refers to specific interventions and health services. The exercise is based on a wide range of assumptions.

The costing has two broad objectives. First, it answers what it takes to fully implement MKUKUTA thereby reaching the targets. Comparing the results with current expenditure levels, the level of available financial resources can be assessed and the financing gap can be calculated. Second, it provides important guidance on MKUKUTA implementation to policy makers, especially about how to sequence and prioritize interventions to increase the efficiency of budget allocations.

The costing is based on a horizontal approach to the health system in which health services are *not* delivered in isolation of other activities in a health facility and the country in general. It recognizes that the successful scale-up and utilization of a broad range of health services requires a functioning health system that is able to respond, not only to current, but also to future emerging and re-emerging health problems. This implies that the health system requires strengthening disregarding any possible improvement of the health status in order to remain responsive to any possible future health challenges. In contrast to this, other studies often implicitly assume that for instance lower prevalence rates of major diseases lead to lower human resource for health requirements.



At the same time, expenses for drugs and supplies needed for the treatment of major diseases depend to a large extent on the future number of cases and hence on prevalence rates. Two factors potentially reduce incidence and thereby prevalence of many diseases which in turn affects costs. First, preventive activities can reduce the incidence of diseases. For example, the distribution of ITNs is likely to reduce the treatment costs for malaria. Second, due to cross-sectoral linkages, activities in other sectors can generate positive pullovers or synergetic effects in the sense that they reduce future prevalence rates and thereby the required resources in the health sector. For example, improved access to clean and safe water reduces the incidence of diarrhoea diseases.

## Intervention Synergies

Health outcomes are a result of health and non-health interventions. This fact underscores the importance of exploring the synergies for achieving the above mentioned health related targets, bearing in mind that some interventions would involve players outside the health sector. Table 1 shows the identified synergies for the identified interventions.

**Table 1: Synergies for Identified Interventions**

<i>Infant and Child Mortality</i>	
Health Interventions	Provide the neonatal integrated package of interventions, immunization, the integrated management of childhood illness (IMCI), and the range of preventative approaches to public health (such as mass distribution of insecticide-treated bed nets). Family planning can delay first births and reduce very short and very long birth intervals, thereby improving child health outcomes. Strengthening health systems will be critical to achieving this MDG.
Agriculture	Increased rural incomes and food availability lead to improved health outcomes
Nutrition	Nutrition interventions for pregnant women lead to higher birth weight, an important determinant of child survival
	Micronutrient supplementation and complementary feeding reduce child mortality
Education	Secondary education increases the age of marriage, lowers fertility rates, and increases care seeking for child illnesses
	Adult literacy programs increase awareness of the causes and prevention of child mortality
Gender Equality	Women's empowerment leads in multiple ways to greater awareness of child health issues
Environment	Reducing pollution of water and air can lower child morbidity and mortality
Water and Sanitation	Access to sanitation and improved hygiene reduce incidence of waterborne disease
Slum upgrading and urban planning	Slum upgrading, improved urban infrastructure, and access to basic services (including solid waste disposal) can reduce exposure to pollutants and thereby reduce child mortality rates
	Road curbing and street lighting can reduce traffic deaths
Science and	ICT improves diffusion of hygiene education and thereby lowers child mortality

Technology	Access to higher education increases the supply of health workers
Energy	Reducing indoor air pollution through improved cooking fuels and stoves decreases respiratory infections
	Improved access to energy allows households to boil water, thus reducing incidence of waterborne diseases
Transport	Improved transport infrastructure increases access to health care clinics and services and reduces cost for health care workers to serve rural areas
<b>Maternal Mortality</b>	
Health Interventions	Ensure access to emergency obstetrical care, skilled birth attendance and clean delivery, antenatal care and post-partum counselling, as well as safe abortion (where permitted by law). Access to family planning can reduce the number of unwanted and ill-timed pregnancies, reducing the lifetime exposure to the risk of maternal mortality and preventing recourse to abortion. Strengthening health systems will be critical to achieving this MDG.
Agriculture	Increased rural incomes and food intake lead to improved health outcomes
Nutrition	Nutrition interventions such as iron supplementation for women of reproductive age reduce risk during pregnancy and childbirth
Education	Secondary education increases the age of marriage, contraception use, and access to prenatal care and safe delivery, all of which reduce maternal mortality
	Adult literacy programs increase awareness of the causes and prevention of maternal mortality
Gender Equality	Women's empowerment leads to greater effective demand for prenatal care and safe delivery
Water and Sanitation	Running water and sanitation facilities are essential for provision of prenatal care and emergency obstetric care
	Access to sanitation and hygienic behaviours improve women's health
Slum upgrading and urban planning	Slum upgrading and security of land tenure improve women's access to health systems and emergency obstetric care
Science and Technology	ICT is critical for providing adequate access to emergency obstetric care
	Access to higher education increases the supply of health workers
Energy	Improved access to energy services improves communication and transport, which are critical for emergency obstetric care
	Modern energy services reduce cost for health care workers serving in rural areas
Transport	Feeder roads are critical for providing timely access to emergency obstetric care
	Improved transport infrastructure reduces the cost for health care workers serving in rural areas
<b>HIV/AIDS</b>	
Health Interventions	Provide comprehensive HIV/AIDS prevention programs, orphan support, voluntary counselling and testing, harm reduction for drug users, prevention of mother-to-child transmission, antiretroviral treatment, and treatment of opportunistic infections. Linking Reproductive Health and HIV/AIDS program efforts can increase effectiveness, coverage and efficiency of service delivery. Strengthening health systems will be critical to achieving this MDG.
Agriculture	Increased agricultural incomes improve access to prevention services
Nutrition	Adequate nutrition can improve survival and quality of life of patients with HIV/AIDS
Education	Education and literacy programs increase awareness of ways to prevent and treat HIV/AIDS

Gender Equality	Women's empowerment leads to greater effective demand for HIV/AIDS prevention and treatment, including the ability to negotiate safe sexual practices
Water and Sanitation	Improving access to clean water and sanitation improves the nutritional status of HIV/AIDS patients
Slum upgrading and urban planning	Slum upgrading and security of land tenure improve access to HIV/AIDS treatment and prevention
Science and Technology	Scientific research can improve diagnosis and treatment of HIV/AIDS
	ICT is critical for media-based HIV/AIDS prevention
	Access to higher education increases the supply of health workers
Energy	Electricity and modern energy services support functioning health clinics and hospitals
	Modern energy services increase incentives for health care workers to work in rural areas
Transport	Improved transport infrastructure facilitates treatment and prevention of HIV/AIDS
	Improved transport infrastructure reduces cost for health workers serving in rural areas
<b><i>Malaria and other major diseases</i></b>	
Health Interventions	<b>MALARIA:</b> Combine comprehensive use of insecticide-treated bed nets, indoor-residual spraying where appropriate, effective malaria treatment (using artemisinin combination therapies where appropriate), and epidemic control measures. Strengthening health systems will be critical to achieving this MDG.
	<b>TUBERCULOSIS:</b> Contain tuberculosis through promotion of vaccines, Directly Observed Treatment Short-Course (DOTS) protocol, and DOTS-plus for multi-drug resistant tuberculosis. Strengthening health systems will be critical to achieving this MDG.
Agriculture	An increase in agricultural incomes improves access and information to ways of preventing and treating malaria
Education	Education and literacy programs increase awareness of ways to prevent and treat malaria and tuberculosis
Gender Equality	Women's empowerment leads to greater effective demand for insecticide-treated nets and malaria and tuberculosis treatment
Environment	In some instances environmental control can contribute to containing malaria and tuberculosis
Water and Sanitation	In some instances improved water management in urban areas can contribute toward containing mosquito breeding sites and transmission
Slum upgrading and urban planning	Improving housing and urban water management infrastructure can reduce the incidence of malaria and especially tuberculosis (which is transmitted in over-crowded slum conditions)
	Slum upgrading improves access to appropriate malaria and tuberculosis treatment
Science and Technology	Research is necessary to develop new drugs and diagnostics for malaria and tuberculosis
	Access to higher education increases the supply of health workers
Energy	Electricity and modern energy services improve health care
	Modern energy services reduce cost for health care workers serving in rural areas
Transport	Improved transport infrastructure reduces the cost of distributing bed nets
	Improved transport infrastructure increases incentives for health care workers to work in rural areas

## Costing Results

Broadly put, health costing consists of two main parts. In the first part, the resource needs of several broad interventions to strengthen the health system are estimated. The interventions considered in this part aim at ensuring that the correct skill mix is in place (in terms of quantity and quality of human resources), at strengthening administrative capacity and at strengthening health infrastructure. In the second part, the direct costs of the provision of health services through the health system are estimated, which mostly refers to expenses for drugs and supplies. The health services considered are related to prevention, treatment and care within the areas of malaria, HIV/AIDS, child health as well as maternal health. Expenses for drugs and supplies needed for the treatment of minor diseases, which contribute marginally to the burden of diseases, are neglected.

Costs are calculated under two different scenarios. In the first one, it is assumed that prevalence rates in the fields of malaria and child health remain constant. The first scenario can therefore be considered as a high-cost scenario in which the impact of prevention and synergies remains low. In the second one, it is assumed that prevalence rates of childhood diseases and of malaria gradually decrease and reach 50% of their present values until 2015. The second scenario is a low-cost scenario and implies that prevention would be highly effective and that crucial interventions in other sectors cause synergetic effects. Figures 1 to 7 present the costing results.

**Figure 1: Health Sector Costs under Scenario 1**

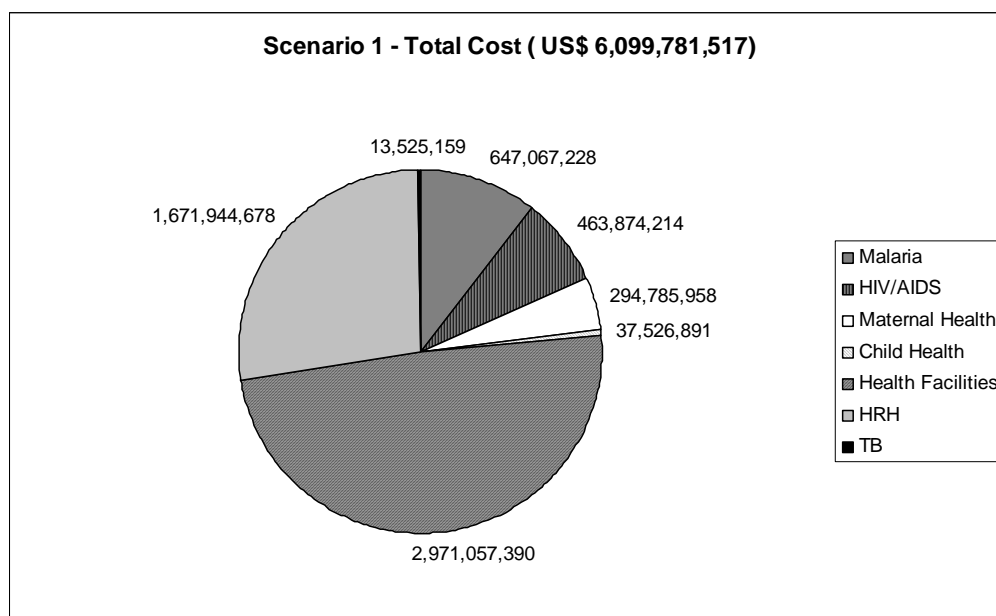


Figure 2: Health Sector Costs under Scenario 2

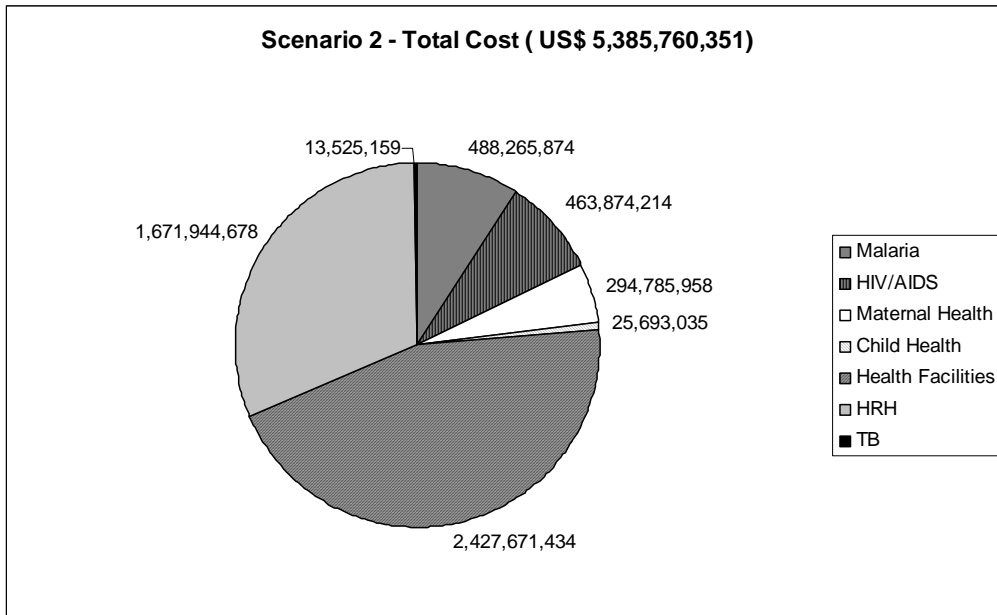


Figure 3: Health Costs by Year for both Scenarios

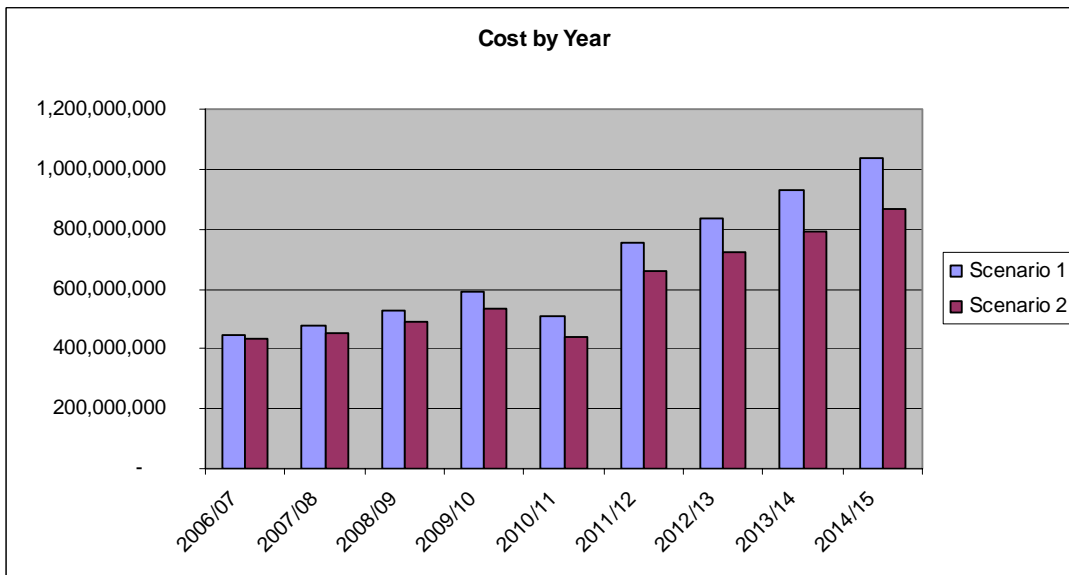


Figure 4: Staffing Requirements by 2015 (in % of current number)

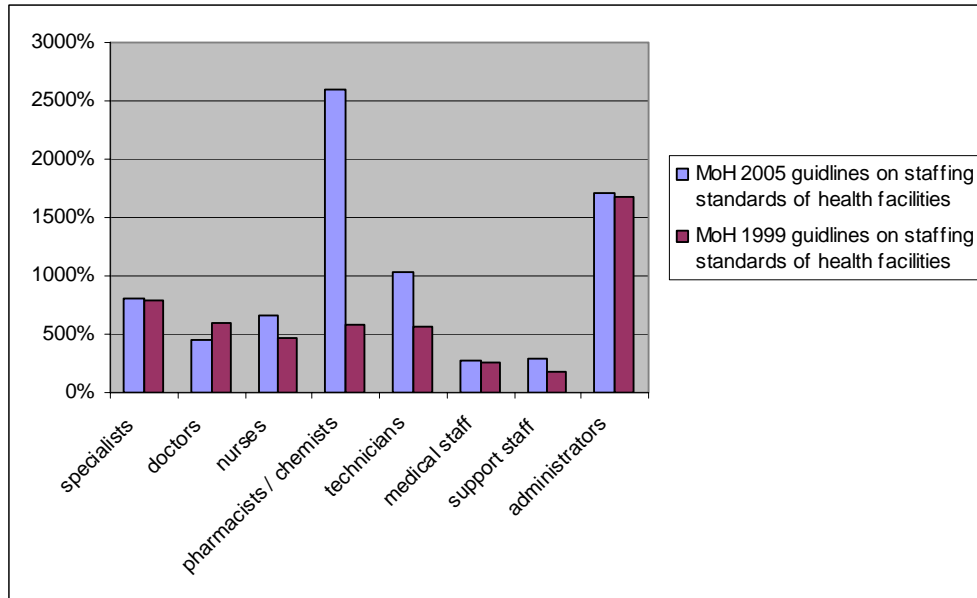


Figure 5: Unit Cost by Health Facility

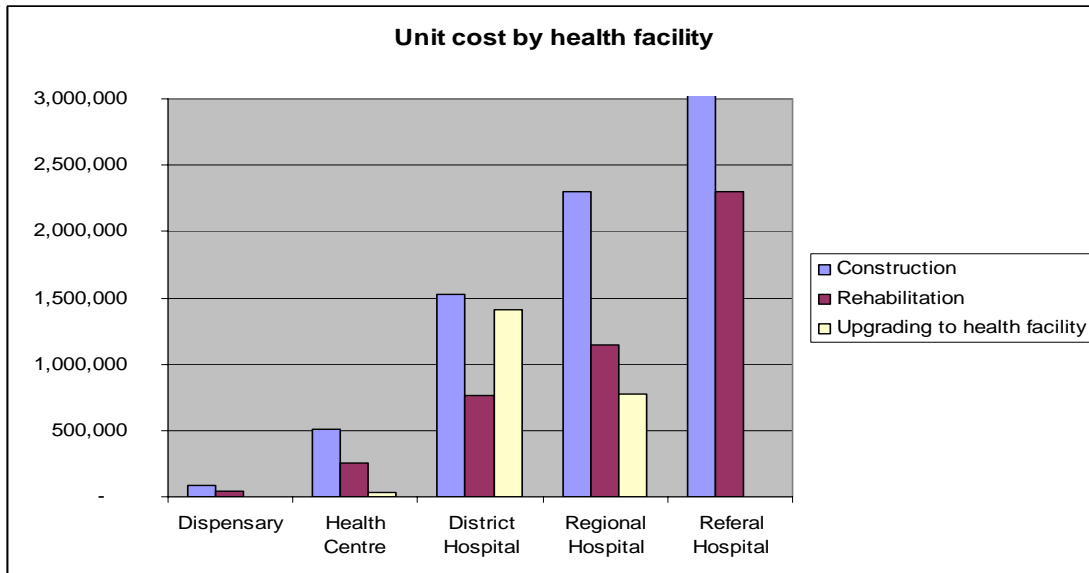
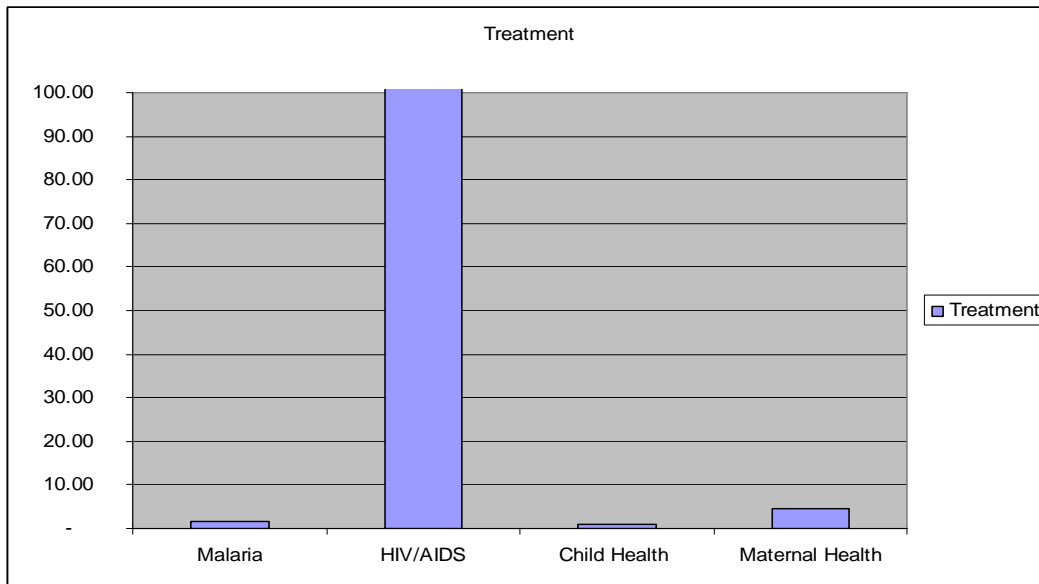
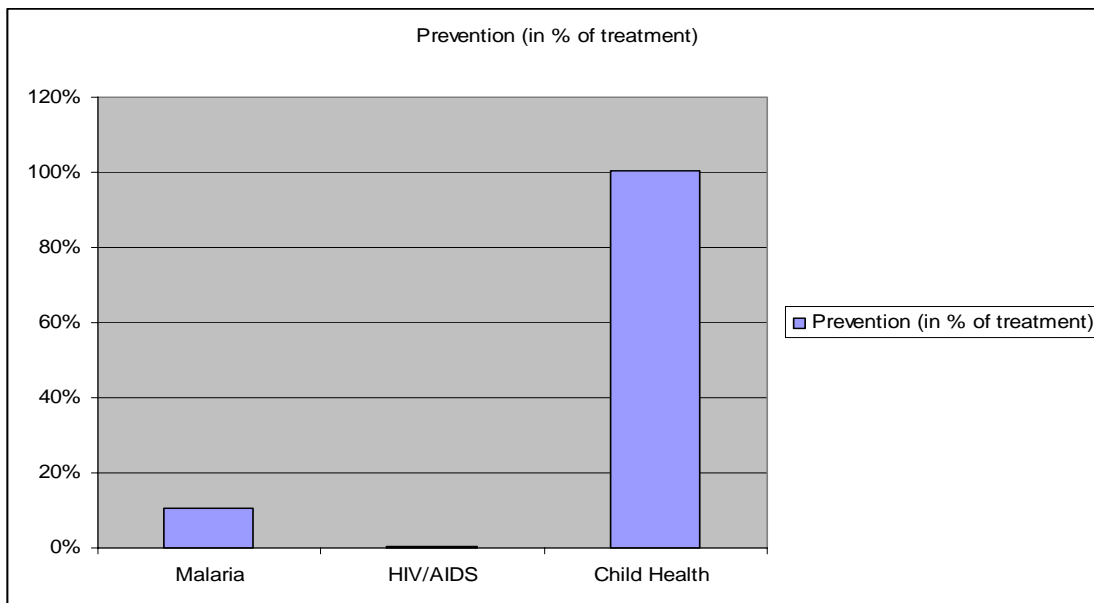


Figure 6: Cost per Case by Disease for Treatment



Notes: The value for HIV/AIDS treatment exceeds by far the maximum value on the scale.

Figure 7: Cost per Person Reached for Prevention in % of Treatment Costs



Note: There is no prevention for maternal health; for child health, prevention refers to the immunization against childhood diseases; for HIV/AIDS, the value is close to 0% and therefore not visible.

## Quick Wins

The key interventions that could be identified as quick-wins for achieving the health outcomes fall under maternal health, malarial control and child health – specifically focusing on child nutrition. These are briefly outlined here:

### *Maternal Health:*

To date, mortality rates remain high in Tanzania. Broadly put, the continued high rates partly result from lack of necessary skills on the part of health workers. Therefore, more training for health workers would lead to quick outcomes in terms of reduced maternal deaths. However, since mothers die at home also, interventions that link the community and health facilities would be very effective. Also, for quick results, there is need for increased access to care for the mother and newborn interventions focusing on reduction of delays in: identification of complications for assisted deliveries; decision to refer complicated cases through information/mobilization of fathers; arrangements for transport to referral health facilities; case management of complications through improvement of capacities of health facilities

### *Malarial Control:*

Tanzania's experience provides a strong basis for selecting specific interventions for malaria control as quick-wins for achieving timely outcomes in dealing with the disease. The quick-wins will be well achieved through effective implementation of the Strategic Plan for Malaria Control Program. The Interventions that have a potential for quick results in malarial control, which are also part of the strategic plan include:

1. Improved malaria case management;
2. National scale use of insecticide treated nets (ITNs), which have demonstrated to be effective in killing mosquitoes and reducing the burden of malaria morbidity and mortality among under-fives ;
3. Prevention of malaria in pregnancy; and
4. Malaria epidemic prevention and control, Integrated Management of Childhood Illnesses (IMCI), intermittent presumptive treatment in pregnancy (IPT) and Insecticide Treated Nets (ITNS) are all part of Tanzania's national package of essential health interventions.

### *Vitamin A supplementation to curb child Malnutrition:*

It is estimated that about 13% of children in Tanzania are born with a birth weight of under 2,500 grams (UNICEF, 2004). It is also estimated that 53% of deaths of children under-five years of age are caused by under nutrition underlying cause. Recent studies have found that about 9.18% of under five children were moderately and severe underweight. Malnutrition could also cause deaths. It is also estimated that with Vitamin A intervention, malnutrition against children is to be reduced by 50% in Tanzania by 2010. Although the costs for the interventions are not indicated, it is further estimated that 48,000 lives could be saved if the current Vitamin A deficiency is reduced by 50% between 2000-2010.

The main intervention to decrease child malnutrition should therefore focus on provision of Vitamin A, PEM, Iodine and Iron. Since diarrhoea diseases also significantly cause malnutrition, interventions should also focus on control and management of diarrhoea diseases.



## Lessons Learned and Challenges

One important challenge that emerges in the costing exercise is the difficulty in quantifying the effects of prevention and synergies on prevalence rates. Treatment cost for childhood diseases and malaria depend on prevalence rates, which need to be forecasted. Prevalence rates are influenced by prevention and synergies. However, in the context of costing, a problem arises since the impact of both factors cannot be exactly quantified so that forecasting becomes impossible. The reasons for this dilemma are obvious. First, the amount of potential positive spillovers is very large. Second, the magnitude of synergetic and preventive effects depends on a multitude of factors on which no data exists or which cannot be quantified. For instance, ITNs may be distributed, but proper usage remains low, or access to safe water exists, but people may not practise good health and hygienic behaviour. For HIV/AIDS and maternal health, this may not be a problem including the optimal allocation and sequencing of interventions.

## 1.0 INTRODUCTION

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Tanzania has adopted the Millennium Development Goals (MDGs) and the National Strategy for Growth and Reduction of Poverty (NSGRP or MKUKUTA in Kiswahili which stands for Mpango wa Kukuza Uchumi na Kuondoa Umaskini Tanzania) as part of its fight against poverty. Both enjoy broad acceptance among stakeholders and contain specific and quantified targets to be reached by 2015 and 2010, respectively. MKUKUTA aims at high and shared growth, high quality of livelihood, peace, stability, unity, good governance, high quality education and international competitiveness. The document is aligned to the MDGs, which contain targets related to reduction of poverty, hunger diseases, literacy, illiteracy, environmental degradation and discrimination against women to be reached by 2015. MKUKUTA as well as the health sector strategy identify specific and necessary interventions and actions to attain both set of targets. They are multidimensional and they touch various sectors involving various players. Thus, as in all sectors, there is agreement in the health sector on what to achieve and how to achieve it.

At the same time, great efforts are needed to tackle demanding health challenges in Tanzania. Within this context, the health sector costing is an essential policy tool. It quantifies the needs in terms of human resources, infrastructure, and financial resources required to meet in the MDGs as well the MKUKUTA targets by 2015 and 2010, respectively. It refers to specific interventions as well as health services and is based on a wide range of assumptions.

The costing has two broad objectives. First, it answers what it takes to fully implement MKUKUTA as well as to reach the targets. Comparing the results with current expenditure levels, the level of available financial resources can be assessed and the financing gap can be calculated. Second, it provides important guidance on MKUKUTA implementation to policy makers, especially about how to sequence and prioritize interventions to increase the efficiency of budget allocations. In order to meet these objectives, the reference of the costing, the overall methodology, general assumptions, parameters and the calculation must be as transparent as possible.

Up to date, there exists no comprehensive costing of the health sector. Furthermore, with exception of the HIV/AIDS treatment and care plan, most of the interventions have annual budget lines in the MTEF but do not have detailed financial and or economic costs.

The remaining sections of the report are organized as followed:

- Section 3 focuses on the health challenges in Tanzania. It provides an assessment of the situation on the ground thus pointing to the important areas for action by all the players.
- The reference of the costing is clearly specified within the analytical framework in section 4. It contains the overall approach to the health sector as well as the scope of the costing and identifies the specific interventions and synergies for achieving the health related MDGs and MKUKUTA targets.

- The overall methodology and general assumptions are described in a clear and transparent way in section 5 to guide the interpretation of the results.
- All parameters used to calculate the cost are drawn from the best data available, locally or internationally. Critical inputs for the calculations are presented in section 6 and include demographic, socioeconomic as well as intervention and health service specific parameters.
- The results are displayed in a disaggregated manner in section 7. An Excel accounting model was used for the calculations.
- Non-financial constraints are considered and summarized in section 8. These refer to obstacles in achieving the MKUKUTA targets and the MDGs which cannot be simply bypassed or removed by higher spending levels.
- Important factors for policy conclusions are included in section 9.
- Finally, a way forward is suggested in section 10.

## 2.0 THE HEALTH SECTOR COSTING AS A CONSULTATIVE PROCESS

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The health sector costing was developed as a consultative process which involved stakeholders in identifying the scope and inputs for the costing exercise, based on the MKUKUTA strategies and MDG goals. In this process, relevant synergies and cross-cutting issues to be included were also identified.

A core team, which included experts from different departments of the MoH two consultants, one international and one local, was formed. A number of individual and group consultative meetings were held for discussions. Furthermore, three workshops with a broad range of stakeholders for discussion were held. The first workshop laid the ground for identification of interventions and the synergistic relationships, with a light touch on identifying the costing methodology.

In the course of the exercise, a number of published and unpublished reports were used. The literature review also involved searching for different costing methods that have been applied in other sites. The list of interventions, synergies, cross-cutting issues and costing methodologies were later presented in the second workshop which involved a larger group of stakeholders. Their comments and suggestions were considered, also with regard to the modification of the costing methodology.

In the third workshop, a draft report with the costing results was presented, and comments were also received and incorporated in the final version. A number of methodological issues were raised and suggestions were made for improving the quality of results and the presentation.

## 3.0 HEALTH CHALLENGES IN TANZANIA

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There are health challenges in many fields in Tanzania. The health sector costing focuses on those which contribute most to the burden of disease including child health and nutrition, maternal health, malaria, HIV/AIDS and TB. In addition, it is strongly acknowledged that the health system needs to be strengthened in order to be able to respond to all health challenges.

### 3.1 Child Health and Child Nutrition

The 2002 Census data shows that the infant mortality rate, child mortality rate and the underfive mortality rate were about 95/1000, 66/1000, and 154/1000, respectively. However, the 2002 Census also shows that there is a large variation between regions regarding the under five mortality. It is observed that infant and child mortality rates have been declining annually in some of the districts (NSS, 2004). Although the data collected from NSS are epidemiologically accepted as reliable with quality assurance, yet the NSS are only implemented in few districts, which do not necessarily represent the whole of Tanzania.

More than half of the children in Tanzania mainly die from five diseases (malaria, pneumonia, measles, diarrhea and HIV/AIDS). Malaria alone is responsible for 25% of child deaths (MoH (2002)).

The rural population of Tanzania has pronounced micronutrient deficiencies. In addition, poor food safety, inadequate feeding, and micronutrient deficiencies, such as iron, iodine as well as vitamin A, and frequent illness put children at high risk of suffering and eventually dying from PEM (MoH (2005)). Makundi et al (2005) studying 10 districts of Tanzania in 2003 found that 9.18% of underfive children showed moderate and severe underweight.

Child malnutrition leads to a number of health problems. It increases the vulnerability of getting disease, it increases the severity of disease, it increases the length of treating the diseases, it affects the progression of the disease to more severe states that lead to death (also in HIV that leads to AIDS) and it has long term negative effects, most of which are irreversible. Therefore, the underlying cause for child mortality is often malnutrition.

At the same time, malnutrition also causes poverty through its effect on morbidity, limitation of physical activity and impairment of mental development. Furthermore, malnutrition increases poverty at household levels through: cost of treating illnesses attributable to malnutrition, cost of caring for sick persons (absenteeism from work or school, lost care for other (not sick) household members and lost productivity (due to low physical activity)).

## 3.2 Malaria

Malaria remains to be a major contributor to the burden of disease in Tanzania: It highly contributes to morbidity and mortality in the population, even though simple, effective and affordable treatments exist. Every single person living in Tanzania is at risk of contracting the disease. Malaria transmission occurs in Tanzania throughout the year with different geographical intensities and the poor and other vulnerable groups, especially children under five years of age and pregnant mothers, are proportionately highly affected. Malaria is the leading cause of outpatient and in-patient health service attendance for all ages and the leading cause of death in both children and adults in all regions of Tanzania (MoH (2004)). There are about 16 million annual malaria episodes which are believed to be directly or indirectly responsible for about 100,000 to 125,000 annual deaths (70–80,000 in under-fives) (MoH (2004)). At least 100 Tanzanian children die daily because of the disease.

Malaria's pervasive morbidity and high mortality persist because of the failure to bridge the gap between those at risk of malaria transmission as well as the health seekers and available preventive and curative health systems (Mamop report (2004)). Malaria even though it is a preventable disease can have a serious negative impact on pregnant women and young children: pregnant women have a risk of having low birth weight babies, maternal anemia, impaired fetal growth, spontaneous abortions, stillbirths and premature babies.

## 3.3 Maternal Health

Data from the demographic surveillance sites shows that the maternal mortality ratio is 534 per 100,000 live births in 2004 (NSS (2004)). Furthermore, MoH (2005), Women Dignity Project (2002), and UNFPA show that up to 250,000 mothers annually experience morbidity from fistula and other birth related problems. However, these data cannot be generalized for the whole country since they are based on data from few sites. Public and private health facilities in Tanzania collect routine data (HMIS) on health services utilization including deaths occurring in health facilities. However, the HMIS recorded deaths are not a good representative of the deaths in the population, since not all individuals who fall sick or eventually die, seek care from the formal health facilities.

Maternal morbidity and mortality are caused by a combination of different factors. Haemorrhage is the leading factor, followed by sepsis, obstructed labour, eclampsia and finally unsafe abortions (MOH (2005)). Apart from haemorrhage, hypertension/eclampsia, sepsis and dystopia, as direct causes, indirect causes (malaria, TB, HIV/AIDS, violence) also contribute significantly to maternal deaths. Poor nutrition is not only a problem of children, but also of their mothers.

Poor access to basic health facility of women is another explanation to the deterioration of maternal health. Lack of qualified and highly skilled professionals in the low levels health facilities, where most of the mothers would seek care, is one reason that exacerbates the maternal morbidity and mortality levels. Furthermore, it is estimated that only about 50 and 83 percent of the births are attended by a skilled health worker in the rural and urban areas, respectively (MoH (2005)). The quality of care

provided in most of the health facilities, public and private, is referred to as one of the main factors that hinder women from seeking care from health facilities (MoH (2005)).

### 3.4 HIV/AIDS

HIV/AIDS is one of the most threatening public health problems in Tanzania. The prevalence rate in the general population is estimated to be between 6.4% and 11.9% (TACAIDS (2003); UNAIDS (2003)). Antenatal clinic surveillance results from 2002 estimate the prevalence rate of HIV to be 9.6% and among blood donors in 2003 was 11.01% (NACP (2003)). However, apart from a few population based survey, NACP estimates that there are more than one million Tanzanians infected by the HIV virus. It is also estimated that only one in 14 AIDS cases are reported in a health facility and that about 187,000 lives were lost due to AIDS (NACP (2004)). Out of a population of 34.5 million people, more than 2 million individuals above age of 15 were estimated to be living with the HIV virus in 2003 (NACP (2003)).

NACP (2003) reveals that the current age and gender distribution of reported AIDS cases impacts more on individuals at their prime production and reproduction years. This has a serious negative bearing on the productivity and ability of Tanzania to combat poverty in the future. NACP shows early infections among young women, with a peak at the age 25-34, while men the infection occurs slightly later in life peaking at 30-34 (NACP (2004)). It is also estimated that more than 800,000 children are orphaned and poor widows due to HIV/AIDS, putting an additional pressure to the already devastated families (UNAIDS (2002)).

Estimates show that HIV/AIDs will lower population growth and GDP growth in the future (ESRF (2004)). By lowering of productivity and increasing in mortality rates of professionals and other skilled workers, HIV/AIDS will create a shortage of experienced personnel in all sectors of the economy. Deaths among health workers and teachers have already alarming (Mujinja and Kessy (2003)). The Minister of Education reported that more 114 teachers die of AIDS each month.

The health sector in Tanzania is already overwhelmed. In most urban public hospitals, more that 50% of the medical hospital beds are occupied by patients with HIV/AIDS related complications or opportunistic infections (ESRF (2003)). The number of individuals with HIV/AIDS opportunistic infections attending to health facilities is increasing<sup>1</sup> without a corresponding increase in health resources. Such situations call for interventions to reduce the burden of HIV/AIDS and the corresponding poverty levels. It is estimated that an average HIV positive adult with AIDS has an average of three or more hospitalizations in a year (ESRF (2004)).

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<sup>1</sup> Even if the increase in population, when controlled, the attendances at health facilities still remains comparatively high.

### 3.5 Tuberculosis

TB is a contagious disease spread through the air by coughing and sneezing. As the most common major infectious disease today, TB affects more than one-third of the world's population and kills approximately two million people each year. The global epidemic is growing and becoming more dangerous. The incidence of TB in Tanzania has increased almost six-fold since 1983

TB is a curable disease. However, the duration of treatment is several months resulting in compliance issues leading to resistant strains. Between 1984 and 2003, Tanzania reported an average treatment success rate of about 80%, with a death rate of about 10%. Tanzania aims to increase its TB detection rate from the current 55% to the 70% recommended by the WHO (MoH/ NTLP annual report (2004)).

The Tanzanian Tuberculosis and Leprosy Program (NTLP) report that between 40 percent and 70 percent of TB patients are HIV-positive. Most of these patients are currently eligible for ARV treatment according to the NCTP criteria. Apart of being stigmatized like HIV/AIDS, TB is also a leading cause of death among AIDS patients, accounting for about 30% of the deaths (MoH/NTLP report (2004)).

Despite the close relationship between TB and HIV, before 2003, the TB program in Tanzania was mainly focusing on TB case-finding and treatment, and paid little attention to HIV/AIDS interventions. Similarly, HIV/AIDS programs have generally paid little attention to TB. Realizing this lacuna and the magnitude of the socio-economic impact of co-infection, the Tanzanian Government initiated collaborative TB/HIV activities through the support of the WHO and the Global Fund to Fight AIDS, TB and Malaria in 2001.



## 4.0 ANALYTICAL FRAMEWORK

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### 4.1 Overview

The analytical framework serves as a basis and reference for the costing. The costing is based on a horizontal approach to the health system in which health services are *not* delivered in isolation of other activities in a health facility or in the country in general. It recognizes that the successful scale-up and utilization of a broad range of health services requires a functioning health system that is able to respond, not only to current, but also to future emerging and re-emerging health problems. This implies that the health system requires strengthening disregarding any possible improvement of the health status in order to remain responsive. In contrast to this, other studies often implicitly assume that for instance lower prevalence rates of major diseases lead to lower human resource for health requirements<sup>2</sup>.

The costing estimates the total needs (needs to maintain current service levels as well as increments) in terms of financial resources for reaching the MKUKUTA targets and the MDGs in mainland Tanzania using the interventions identified in MKUKUTA and the health sector strategy. The costing covers nine fiscal years, starting with 2006/07 and ending with 2014/15. The estimated financial cost reflects needs mainly in terms of human resources, infrastructure as well as drugs and supplies. Depending on Government policies, the costs may have to be shared among the public sector and private sources. Due to the synergetic relationship between sectors, other sectors must also contribute to efforts to achieve the targets. However, costs to be born by public institutions outside the health sector are not considered. Furthermore, expenses for drugs and supplies needed for the treatment of minor diseases which contribute marginally to the burden of diseases are neglected.

### 4.2 Health Related MDGs and MKUKUTA Targets

#### 4.2.1 Health Related MKUKUTA Targets and Goals

The health related strategies and operational targets are included in the MKUKUTA second cluster which sets two broad outcomes:

- Improved quality of life and social well-being, with particular focus on the poorest and most vulnerable groups.
- Reduced inequalities (e.g. education, survival, health) across geographic, income, age, gender and other groups.

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<sup>2</sup> For instance: Kurowski, Christoph; Wyss, Kaspar; Abdulla, Salim; Yémadji, N'Diekhon; Mills, Anne (2004): Human resources for health: Requirements and availability in the context of scaling-up priority interventions in low-income countries. Case studies from Tanzania and Chad. HEFP working paper.

The second cluster therefore also includes specific goals and targets for the improvement of health of the Tanzanians. They refer to child health and nutrition, maternal health, HIV/AIDS and malaria.

#### *Operational Targets for Child Health and Child Nutrition*

- Reduced infant mortality from 95 in 2002 to 50 in 2010 per 1,000 live births
- Reduced child (underfive) mortality from 154 to 79 in 2010 per 1000 live births
- Reduced hospital-based malaria related mortality amongst under fives from 12% in 2002 to 8% in 2010
- Reduced prevalence of stunting in under fives from 43.8 %to 20% in 2010
- Reduced prevalence of wasting in under fives from 5.4% to 2 % in 2010

#### *Operational Targets for Malaria*

- Prevent malaria related mortality and reduce morbidity due to malaria in all 21 regions of the country by 50% by the year 2010
- Reduced hospital-based malaria-related mortality amongst under fives from 12% in 2002 to 8% in 2010
- Protect 80% of all underfive children against malaria in the country by the year 2010

#### *Operational Targets for Maternal Health*

- Reduced maternal mortality from 529 to 265 per 100,000 in 2010.
- Increased coverage of births attended by trained personnel from 50% to 80% in 2010

#### *Operational Targets for HIV/AIDS*

- Reduced HIV prevalence among 15-24 years old pregnant women from 11% in 2004 to 5% in 2010
- Reduced HIV prevalence from 11% in 2004 to 5% in 2010 between the ages of 15 and 24 years
- Reduce HIV and AIDS prevalence among women and men with disabilities (among age group 15 - 35 years)
- Increased knowledge of HIV/AIDS transmission in the general population
- Reduced HIV/AIDS stigmatisation

### 4.2.2 Health Related MDGs

There are several health related MDGs:

- Goal 4: Reduce child mortality
  - Target 5: Reduce by two thirds, between 1990 and 2015, the underfive mortality rate.
- Goal 5: Improve maternal mortality
  - Target 6: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio.

- Goal 6: Combat HIV/AIDS malaria and other diseases
  - Target 7: Have halted by 2015 and begun to reverse the spread of HIV/AIDS
  - Target 8: Halve halted by 2015 and begun to reverse the incidence of malaria and other major diseases
  
- Goal 8: Develop a Global Partnership in Development
  - Target 17: In co-operation with pharmaceutical companies provide access to affordable essential drugs in developing countries.

### 4.3 MKUKUTA Interventions and Strategies

The necessary interventions for achieving these broad outcomes are multidimensional touching various sectors and involving various players. MKUKUTA as well as the health sector strategy contain a comprehensive list of health sector interventions to achieve the MKUKUTA targets as well as the MDGs.

In order to derive the list of items considered in the costing, as a first step, all interventions which do not add costs were dropped. Further, interventions related to the introduction of new procedures, to the reorganization of practices or to organizational change were likewise excluded. Their costs usually only occur once and they should be considered in a separate costing. Secondly, all interventions whose consideration would lead to double costing were eliminated. Thirdly, the remaining interventions were classified either as interventions to strengthen the health system or as disease-specific health services provided by the health system. Fourth, in order that the costs can be estimated, most interventions and health services are further broken down into specific activities which can be associated with cost components as explained later.

Table 4.1 displays all interventions, health services, activities and cost components to which the costing refers.

Table 4.1: Interventions, health services, activities and cost components

	Subdivision	Intervention / Health Service	Activity	Cost Component
Health System	Health Facilities	Strengthening health infrastructure	<ul style="list-style-type: none"> <li>➤ Construction</li> <li>➤ Rehabilitation</li> <li>➤ Upgrading</li> <li>➤ Renewal</li> <li>➤ Operation and Maintenance</li> </ul>	<ul style="list-style-type: none"> <li>➤ buildings</li> <li>➤ instruments and equipment</li> <li>➤ furniture</li> <li>➤ communication</li> <li>➤ transport</li> <li>➤ electricity and water</li> </ul>
	Human Resources	Capacity building for human resources for health to have the correct skill mix in place (quantity and quality wise)	Hiring and retention	pay package
			Relocation	Allowance
			In-service-training	school fee / fare / allowance
			Attendance of international meetings	allowance / fare
		Strengthen management capacity	Hiring and retention	pay package
			Relocation	Allowance
			In-service-training	Teaching mat. / fare / fee/ allowance
			Linking health system with the community	allowance / fare
	Strengthening MoH training centres (including zonal training centers)	Provision of equipment	IT / furniture	
<ul style="list-style-type: none"> <li>➤ Rehabilitation</li> <li>➤ Installation of IT</li> <li>➤ Hiring and retention</li> <li>➤ In service training</li> <li>➤ Operations and Maintenance</li> </ul>		buildings medical equipment teaching equipment furniture IT pay package utilities communication		
Capacity building for health systems research		<ul style="list-style-type: none"> <li>➤ Provision of funds</li> <li>➤ Provision of technical assistance</li> </ul>	per diem	
Management at the Ministry of Health	All			
Disease-specific	Malaria	Treatment	<ul style="list-style-type: none"> <li>➤ Diagnostic Testing</li> <li>➤ Uncomplicated Malaria (outpatient)</li> <li>➤ Complicated Malaria (inpatient)</li> </ul>	drugs and supplies
		Prevention	Vector control through use of ITNs	supply of ITN
			Prevention of malaria in pregnancy	drug for IPT and supply of ITN
			Emergency preparedness, prevention and containment	drug (spraying) and supply
	Promotion of positive health practices		communication	
	HIV/AIDS	Safe blood	Safe Blood Transmission	Supplies
		Reduction of stigma and discrimination of PLWHA	Awareness creation and sensitization of general public through media	radio and TV programmes
		Promotion of safer Sex	Procurement and distribution of male condoms	Supplies
		Voluntary Counselling and Testing	Procurement and distribution of reagents and other medical supplies	reagents and supplies to test sero positive
				reagents and supplies to test sero neqative
			Training of counselors	supplies and allowances
		Care and Treatment	Provide Antiretroviral drugs to adults, 1st line	drugs and supplies
			Provide Antiretroviral drugs to adults, 2nd line	drugs and supplies
Provide Antiretroviral drugs to children, 1st line	drugs and supplies			
Provide Antiretroviral drugs to children, 2nd line	drugs and supplies			

	Subdivision	Intervention / Health Service	Activity	Cost Component	
Disease Specific	Child Health	Immunization	➤ Transport of vaccines	Vehicles	
				Fuel for Vehicles (l/100km)	
				Maintenance of vehicles (40% of fuel)	
		De-worming programme	➤ Provision of drugs		Pharmaceuticals
					Lunch allowances
		IMCI workshops			workshop
	Maternal Health	Family Planning		<ul style="list-style-type: none"> <li>➤ Oral Contraceptives (Pill)</li> <li>➤ Injectables</li> <li>➤ Condom - Male</li> <li>➤ Condom - Female</li> <li>➤ Intrauterine Device (IUD)</li> <li>➤ Implant</li> <li>➤ Sterilization - Female</li> <li>➤ Sterilization - Male</li> <li>➤ Other Method</li> <li>➤ Emergency Contraceptives (EC)</li> </ul>	drugs and supplies
		Obstetric Complications		<ul style="list-style-type: none"> <li>➤ Prolonged Labour (&gt;18 hours)</li> <li>➤ Forceps or Vacuum-Assisted Delivery (AVD)</li> <li>➤ Cesarean Section (C-Section)</li> <li>➤ Postpartum Hemorrhage</li> <li>➤ Puerperal Sepsis</li> <li>➤ Hypertensive Disorders of Pregnancy (eclampsia &amp; pre-ecl.)</li> <li>➤ Post abortion Complications (PAC)</li> </ul>	
		Newborn Interventions		<ul style="list-style-type: none"> <li>➤ Prevention of Ophthalmia Neonatorum</li> <li>➤ Treatment of Neonatal Complications (LBW, Sepsis, etc.)</li> <li>➤ Prevention of Mother-to-Child Transmission of HIV (PMTCT)</li> </ul>	
	TB	Treatment	➤ Treatment		drugs and supplies

The list of interventions takes into account that technological change has major implications for the health sector. For health facilities, it is assumed that the equipment has to be renewed after a certain number of years. In addition, in-service training is considered.

#### 4.4 Cross-Sectoral Issues: Synergies and Complementarities

A central feature of the health sector is that health outcomes are the result of interventions within the health sector as well as of interventions of other sectors. This fact underscores the importance of exploring the complementarities as well as the synergies for achieving the above mentioned health related targets which are shown in tables 2 to 6. Due to cross-sectoral linkages, efforts in the health sector are in some cases not sufficient and must be complemented by interventions in other sectors.

For instance, health facilities must be connected to some type of transportation network. Likewise, even if activities in other sectors do not create essential preconditions to achieve the health related targets, they can generate positive spillovers or synergetic effects in the sense that they reduce future prevalence rates and thereby also reduce the required resources in the health sector. For example, improved access to clean and safe water reduces the incidence of diarrhea diseases.

**Table 4.2: Synergies and complementarities for the health system**

Sector	Intervention
Education	Secondary education increases pool of educated individuals who can be trained for employment in the health system and thereby would decrease the shortage of nurses and health officers
	Improvement in higher education would reduce the shortage of doctors
Energy	Electricity and modern energy services improve health care
	Modern energy services reduce cost for health care workers serving in rural areas
Transport	Improved transport infrastructure increases access to health care clinics and services and reduces cost for health care workers to serve rural areas

**Table 4.3: Synergies and complementarities for child health**

Sector	Intervention
Agriculture	Increased rural incomes and food availability lead to improved health outcomes
Nutrition	Nutrition interventions for pregnant women lead to higher birth weight, an important determinant of child survival
	Micronutrient supplementation and complementary feeding reduce child mortality
Education	Secondary education increases the age of marriage, lowers fertility rates, and increases care seeking for child illnesses
	Adult literacy programs increase awareness of the causes and prevention of child mortality
Gender Equality	Women's empowerment leads in multiple ways to greater awareness of child health issues
Environment	Reducing pollution of water and air can lower child morbidity and mortality
Water and Sanitation	Improved access to sanitation and water as well as improved hygiene reduce incidence of waterborne, water related and diarrhea diseases
Slum upgrading and urban planning	Slum upgrading, improved urban infrastructure, and access to basic services (including solid waste disposal) can reduce exposure to pollutants and thereby reduce child mortality rates
	Road curbing and street lighting can reduce traffic deaths
Science and Technology	ICT improves diffusion of hygiene education and thereby lowers child mortality
Energy	Reducing indoor air pollution through improved cooking fuels and stoves decreases respiratory infections
	Improved access to energy allows households to boil water, thus reducing incidence of waterborne diseases

**Table 4.4: Synergies and complementarities for malaria and other major diseases**

Sector	Intervention
Agriculture	An increase in agricultural incomes improves access and information to ways of preventing and treating malaria
Education	Education and literacy programs for prospective mothers reduce child diseases
Gender Equality	Women's empowerment leads to greater effective demand for insecticide-treated nets and malaria and tuberculosis treatment
Environment	In some instances environmental control can contribute to containing malaria and tuberculosis
Water and Sanitation	In some instances improved water management in urban areas can contribute toward containing mosquito breeding sites and transmission
Slum upgrading and urban planning	Improving housing and urban water management infrastructure can reduce the incidence of malaria and especially tuberculosis (which is transmitted in over-crowded slum conditions)
	Slum upgrading improves access to appropriate malaria and tuberculosis treatment
Science and Technology	Research is necessary to develop new drugs and diagnostics for malaria and tuberculosis
	Access to higher education increases the supply of health workers
Transport	Improved transport infrastructure reduces the cost of distributing bed nets

**Table 4.5: Synergies and complementarities for maternal health**

Sector	Intervention
Agriculture	Increased rural incomes and food intake lead to improved health outcomes
Nutrition	Nutrition interventions such as iron supplementation for women of reproductive age reduce risk during pregnancy and childbirth
Education	Secondary education increases the age of marriage, contraception use, and access to health care which all reduce maternal mortality
	Adult literacy programs increase awareness of the causes and prevention of maternal mortality
Gender Equality	Women's empowerment increases demand for prenatal care and safe delivery
Water and Sanitation	Running water and sanitation facilities are essential for provision of prenatal care and emergency obstetric care
	Access to sanitation and hygienic behavior improve women's health
Slum upgrading and urban planning	Slum upgrading and security of land tenure improve women's access to health systems and emergency obstetric care
Science and Technology	Information and communication technology is critical for providing adequate access to emergency obstetric care
	Access to higher education increases the supply of health workers
Energy	Improved access to energy services improves communication and transport, which are critical for emergency obstetric care
Transport	Feeder roads and improved transport are critical for providing timely access to emergency obstetric care

Table 4.6: Synergies and complementarities for HIV/AIDS

Sector	Intervention
Agriculture	Increased agricultural incomes improve access to prevention services
Nutrition	Adequate nutrition can improve survival and quality of life of patients with HIV/AIDS
Education	Education and literacy programs increase awareness of ways to prevent and treat HIV/AIDS
Gender Equality	Women's empowerment leads to greater effective demand for HIV/AIDS prevention and treatment, including the ability to negotiate safe sexual practices
Water and Sanitation	Improving access to clean water and sanitation improves the nutritional status of HIV/AIDS patients
Slum upgrading and urban planning	Slum upgrading and security of land tenure improve access to HIV/AIDS treatment and prevention
Science and Technology	Scientific research can improve diagnosis and treatment of HIV/AIDS
	Information and communication technology is critical for media-based HIV/AIDS prevention
Transport	Improved transport infrastructure facilitates treatment and prevention of HIV/AIDS



## 5.0 METHODOLOGY AND ASSUMPTIONS

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The costing is financially unconstrained implying that total costs solely reflect needs and do not depend on past expenditure levels. Total costs equal the sum of the costs calculated of all interventions and health services. The cost of every intervention and health service is the sum of the costs of all activities pertaining to them. Activities are designated specific unit costs and quantities. In case of treatment or prevention, more appropriate terms for unit costs are cost per case or cost per person reached, respectively. Quantity may for instance refer to cases or facilities. Activity-specific costs are calculated by multiplying the unit cost or the cost per case with the required quantity. Whereas unit costs or costs per case are assumed to remain constant over the full period, quantities are allowed to differ by year.

The quantity in the base year reflects current levels (e.g. current coverage), whereas the quantity for the final year of the costing reflects the levels needed to reach the MDGs as well as the MKUKUTA targets. The scaling-up path of every health service and intervention determines how fast target levels are reached. Technically, the scaling-up refers to the way in which the overall costs are distributed over the entire period. In other words, it refers to how fast the target is reached based on current levels. For some interventions like operation and maintenance of health facilities which are carried out recurrently, the annual costs are predetermined by the number of existing health facilities in a given year, whereas for others, like the construction of infrastructure, several options exist. A linear scaling-up path implies for instance that the increments each year are constant.

The speed of scaling-up is determined by non-financial constraints (mostly related to capacity) discussed in a later section. In the costing, it is assumed that through a gradual and simultaneous scale-up of all interventions capacity constraints can be removed. The section on constraints however underlines that additional measures and efforts not considered in the costing may be necessary to ensure that the cost scenarios calculated are realistic and that the MDGs and the MKUKUTA targets can be reached.

The costing is subdivided into costs pertaining to health system related interventions and costs pertaining to disease-specific health services. This subdivision has no implications for the way health services are provided; it does not imply that health services are provided vertically. There are two methodological reasons for this division.

First, as explained above, due to the horizontal approach to the health system, interventions to strengthen the health system do not depend on the current or future health status. However, it is assumed that expenses for drugs and supplies needed for the treatment of major diseases depend to a large extent on the future number of cases and hence on prevalence rates. Prevention (e.g. the distribution of ITNs) and synergetic effects can potentially reduce incidence and thereby prevalence rates of many diseases which in turn affect treatment costs. Second, it follows that the cost components and therefore the derivation of unit costs and quantities differ between both parts so that the calculation of the costs is facilitated under this division.

## 6.0 COSTING OF INTERVENTIONS AND HEALTH SERVICES

### 6.1 Parameters

The costing of interventions and health services is based on demographic and socioeconomic parameters as well as on specific assumptions about unit costs or cost per case, quantities as well as the scaling-up paths of all activities considered. All parameters used for the calculation of the costs are presented in this section.

#### 6.1.1 Demographic and Socioeconomic Parameters

There is a wide range of demographic and socioeconomic parameters which strongly influence the overall cost including the size of the current population, population growth and other factors like for example the distribution among age groups.

In practice, population growth is strongly affected by several interventions and health services considered in the costing. For instance, family planning may reduce population growth. In contrast to this, improved treatment of childhood diseases, for example, may increase the latter through lower child and infant mortality. It becomes clear that an exact quantification of the various inter-sector synergistic effects is not feasible and that the effects may roughly cancel each other out. Therefore, it is assumed that population growth and future population composition are exogenously determined, and not influenced by the scaling-up any interventions or health services.

Table 6.1 displays all demographic parameters used in the costing. Since some are based on UN estimates or rough estimations, they can be replaced by national data and forecasts wherever possible.

**Table 6.1: Demographic and socioeconomic parameters**

Parameter \ Year	2005	2006	2011	2015
growth rate, total population	2.11%	2.11%	2.39%	2.39%
population (mainland)	37,379,000	38,167,697	42,484,118	46,693,537
growth rate, women of repr. Age (15-49)	2.30%	2.30%	2.39%	2.39%
women of reproductive age (15-49)	8,795,460	8,997,933	10,091,458	11,093,066
% women married	64.8%	64.4%	62.8%	62%
crude birth rate	39.2	39.2	39.7	39.7
pregnant women	number of births × 1.05			
TFR	5.04	5.04	5.04	5.04
population under five (growth rate)	2.70%	2.70%	2.81%	2.81%
population under five (mainland)	5,895,172	6,054,456	6,925,166	7,737,353
sexually active population (growth rate)	2.43%	2.43%	2.48%	2.48%
sexually active population	17,649,434	18,078,598	20,395,530	22,494,300
children under one	1,800	1,800	1,800	1,800

Source: UN World Population Prospects / Authors' calculations

## 6.1.2 Assumptions Regarding Health System Related Interventions

### *Health Facilities*

There are five types of health facilities considered: dispensaries, health centers, district hospitals, regional hospitals and referral hospitals.

Different unit costs for construction, rehabilitation, renewal, upgrading as well as operation and maintenance of health facilities are needed. First, unit costs for construction by health facility were calculated. For dispensaries, health centers and district hospitals, detailed equipment lists are provided by the UN Millennium Project (Sachs, et al, 2004). By adjusting them for Tanzanian health facility standard guidelines given by the Ministry of Health (MoH, 2004), and adding costs on the construction of the buildings, total construction costs for dispensaries, health centers and district hospitals were calculated. Standard equipment lists for the facilities and calculations are shown in Tables 23, 24, and 25 (Appended at the end of this report). Unit costs for the construction of dispensary, health center, district hospital, regional hospital and referral hospitals were estimated as displayed in Tables 8, 9 and 10, 11 and 12 respectively.

**Table 6.2: Unit costs for construction of dispensary**

Component	Cost
Building	\$40,000
Medical Equipment and Instruments	\$21,662
Furniture	\$5,270
Communication Devices and IT	\$4,000
Transport	\$10,140
<b>Total Unit Cost for Construction</b>	<b>\$81,072</b>

Source: Authors' estimation and calculation

**Table 6.3: Unit costs for construction of health centres**

Component	Cost
Building	\$180,000
Medical Equipment and Instruments	\$57,582
Furniture	\$20,020
Communication Devices and IT	\$4,000
Transport	\$30,280
<b>Total Unit Cost for Construction</b>	<b>\$291,882</b>

Source: Authors' estimation and calculation

**Table 6.4: Unit costs for construction of district hospitals**

Component	Cost
Building	\$860,000
Medical Equipment and Instruments	\$303,471
Furniture	\$98,542
Communication Devices and IT	\$10,200
Transport	\$250,420
<b>Total Unit Cost for Construction</b>	<b>\$1,522,633</b>

Source: Authors' estimation and calculation

**Table 6.5: Unit costs for construction of regional hospitals**

Component	Cost
Building	\$1,400,000
Medical Equipment, Instruments, Furniture, Communication and IT, Transport	\$900,000
<b>Total Unit Cost for Construction</b>	<b>\$2,300,000</b>

Source: Authors' estimation and calculation

**Table 6.6: Unit costs for construction of referral hospitals**

Component	Cost
Building	\$2,800,000
Medical Equipment, Instruments, Furniture, Communication and IT, Transport	\$1,800,000
<b>Total Unit Cost for Construction</b>	<b>\$4,600,000</b>

Source: Authors' estimation and calculation

Unit costs for rehabilitation and operation and maintenance are fractions of unit costs for constructing as indicated in table 13. Cost of rehabilitation is estimated at 50% of the construction cost, while the annual operation and maintenance costs are calculated at 5% of the unit cost of construction.

**Table 6.7: Unit cost for rehabilitation and operation and maintenance (per year)**

Health Facility	Rehabilitation (in % of unit cost for construction)	Yearly cost for operation and maintenance (in % of unit cost for construction)
Dispensary	50%	5%
Health Centre	50%	5%
District Hospital	50%	5%
Regional Hospital	50%	5%
Referral Hospital	50%	5%

Source: Authors' estimation and calculation

The unit cost for upgrading dispensaries, health centers and district hospitals was calculated as the cost difference for construction (e.g. in the case of dispensary, it equals the cost for construction of a health centre minus the cost for construction of a dispensary) (table 14). Unit costs for renewal equal the total unit cost for construction minus the unit cost for construction of the health facility (table 15).

**Table 6.8: Unit cost for upgrading**

Health Facility	Unit Cost (calculated as the difference in unit costs for construction)
Dispensary → Health Centre	210,810
Health Centre → District Hospital	1,230,751
District Hospital → Regional Hospital	777,367

Source: Authors' calculation

**Table 6.9: Unit cost for renewal**

Upgrade	Unit Cost (equals the total unit cost for construction minus the unit cost for the construction of buildings)
Dispensary	41,072
Health Centre	332,022
District Hospital	662,633
Regional Hospital	900,000
Referral Hospital	1,800,000

Source: Authors' estimation and calculation

The quantities for construction and upgrading were calculated as follows: It was assumed that the number of dispensaries and health centers has to correspond to certain ratios per 100,000 habitants in terms of the 2015 population. In addition, it was estimated that a certain percentage of dispensaries and a fixed number of health centers would be upgraded. Table 16 presents the number of existing facilities, the number of facilities and the total number envisaged. Both assumptions combined with the number of existing dispensaries and health centers allow the calculation of the number of dispensaries and health centers to be constructed. For the number of referral hospitals, regional hospitals and district hospitals to be constructed, MoH plans were used (MoH, 2005). The number of district hospitals to be constructed was reduced by the number of health centers to be upgraded.

**Table 6.10: Construction and upgrading of health facilities**

Health Facility	Existing	Optimal ratio (per 100,000 inhabitants)	To be constructed	To be upgraded	Total number envisaged
Dispensary	4678	10	242	233.9	4686
Health Centre	491	2	259	4	980
District Hospital	217	-	6	0	227
Regional Hospital	21	-	0	0	21
Ref. Hospital	4	-	1	0	5

Source: MoH / Authors' estimation

The quantities for rehabilitation refer to the number of existing health facilities. Rehabilitation requirements are assumed to differ by component of the health facility (e.g. buildings require few rehabilitations compared to equipment and instruments) and by type of health facility. In addition, it is assumed that every health facility needs to be renewed after a certain number of years (except for the building as reflected by the unit cost). Operation and maintenance is carried out recurrently (i.e. yearly). In other words, all existing health facilities in a particular year need to be operated and maintained. Table 26 (appended at the end of this report) displays the estimated quantities.

A rapid scale-up of health infrastructure is assumed. Construction, rehabilitation and upgrading of health facilities are assumed to be carried out within the first four years. Renewal of health facilities starts after five years and is then carried out annually.

### *Human Resources for Health*

Human resources for health (HRH) greatly differ in terms of skills and functions so that MoH staffing classifications distinguish a wide range of cadres. In order to facilitate analysis and to reduce complexity, all cadres were grouped into nine categories that differ by skill level and function: specialists, doctors, trained nurses, pharmacists and chemists, technicians, other medical staff, non-medical (support) staff and administrators. Quantities and unit costs were therefore not estimated for individual cadres, but only for groups. Table 27 (appended at the end of this report) provides details about how cadres were classified.

Activities mentioned in the analytical framework differ by staff category. It is assumed that the MoH hires graduate (degree holders) doctors, nurses and pharmacists, and does not incur costs for the initial degree course training. Relocation as well as attendance of international meetings only applies to

specialists and doctors. Likewise, doctors and specialists receive in-service training at higher learning institutions. Whereas the latter are assumed to mostly attend short courses, doctors also attend long term courses if they want to become specialists. Technicians, other medical staff and nurses are assumed to attend long courses at MoH training institutions. In addition, nurses and technicians also attend short courses (on-the-job training).

Unit costs mostly refer to the cost per person (e.g. per participant in trainings, per person employed) and are based on authors' estimations. For hiring and retention of staff of all classifications, the pay packages assumed is displayed in Table 6.11.

**Table 6.11: Assumed salary by staff classification**

Classification	Unit Cost (Pay Package)
Specialists	1000
Doctors	400
Trained Nurses	150
Pharmacists / Chemists	200
Technicians	150
Other medical staff	120
Support Staff	90
Administrators	150

Source: Authors' classification

The derivation of unit costs for in-service training, attendance of international meetings by specialists and doctors as well as on-the-job training is more complex since they include several components. Assumptions are shown in table 28 (appended at the end of this report). Estimations for unit cost of the remaining activities are not yet available.

In order to calculate the required staff levels, MoH guidelines on optimal staffing standards were used. Staffing standards refer to MoH cadres and therefore had to be 'translated' in the staff classification used in the costing. Briefly, total staff requirements are the result of the product of recommended staffing levels and the number of health facilities including dispensaries, health centers and district, regional and referral hospitals as envisaged for 2015. To avoid excess complexity, identical staffing ratios were used for health facilities in rural and urban areas. However, Muhimbili National Hospital was considered separately.

This approach implies that staff productivity is assumed to remain constant at current levels. Staff requirements are calculated for two different scenarios using the MoH 1999 guidelines and the MoH 2005 guidelines on optimal staffing standards. The reason is that at the time of writing, the 2005 guideline was still under review and not official; at the same time, the preliminary version could not be ignored. Both guidelines are shown in Tables 6.12 and 6.13 below, in terms of the categories used in the costing.

**Table 6.12: Staffing standards based on the MoH 2005 guidelines**

Costing Classification	Muhimbili	Referral Hospital	Regional Hospital	District Hospital	Health Centre	Dispensary
Specialists	200	106	7	0	0	0
Doctors	170	78	31	20	1	0
Trained Nurses	1366	588	173	93	13	4
Pharmacists / Chemists	14	4	2	1	2	0
Technicians	191	70	21	9	0	1
Other medical staff	23	21	27	10	6	2
Support Staff	952	412	70	55	10	3
Administrators	238	59	15	7	1	0

Source: Authors' Calculation

**Table 6.13: Staffing standards based on the MoH 1999 guidelines**

Costing Classification	Muhimbili	Referral Hospital	Regional Hospital	District Hospital	Health Centre	Dispensary
Specialists	200	424	126	0	0	0
Doctors	170	312	630	6810	980	0
Trained Nurses	1366	2352	1827	11804	10780	14058
Pharmacists / Chemists	14	16	21	454	0	0
Technicians	191	280	357	1362	1960	0
Other medical staff	23	84	273	2043	4900	9372
Support Staff	952	1648	1449	10896	8820	0
Administrators	238	236	252	1589	980	0

Source: Authors' Calculation

Staffing levels are annually increased (with annual increments being constant) until the staff requirements are met. Annual increments reflect hiring plus upgrading of lower staff categories through in-service training (only the number of doctors and specialists are affected by upgrading) minus staff upgraded to higher categories minus attrition. Under simplifying assumptions (e.g. no hiring cost), in terms of cost for salaries, it does not make a difference if staff is retained or newly hired so that retention and hiring are grouped together. Therefore, explicit assumptions on attrition rates and on the numbers of staff to be hired are not needed either for the purpose of costing. Current staffing levels and annual increases are shown in Table 6.14 below.

**Table 6.14: Current staffing levels (2004) and annual increases**

Costing Classification	Current Levels	Annual Increase under Scenario 1	Annual Increase under Scenario 2
Specialists	96	75	73
Doctors	1483	574	824
Trained Nurses	9093	5650	3677
Pharmacists / Chemists	87	241	46
Technicians	741	767	379
Other medical staff	6478	1302	1135
Support Staff	13778	2959	1110
Administrators	196	351	344

Source: Wizara Ya Afya - Ripoti Ya Huduma Za Afya Tanzania Bara 2004 / Authors' Calculation

For in-service training and attendance of international meetings, it was assumed that a certain percentage of staff annually receives training. Assumptions are shown in Table 6.15. Quantities for the remaining activities are not yet available.

**Table 6.15: Percentage of staff receiving in-service training and attending int. meetings per year**

Costing Classification	In-service training (all types)	Attendance of international meetings
Specialists	20%	20%
Doctors	20%	20%
Trained Nurses	20%	-
Pharmacists / Chemists	20%	-
Technicians	20%	-
Other medical staff	20%	-
Support Staff	20%	-
Administrators	20%	-

Source: Authors' Estimation

### 6.1.3 Assumptions Regarding Disease Specific Activities

#### *Child Health*

Based on the Integrated Management of Childhood Illness principles and requirement, the cost for treatment of childhood diseases, in terms of drugs and supplies, the cost for vaccines and their transportation (the transport requires special equipment) and the cost for a de-worming program (which is supposed not to be carried out within the health system) are taken into account. For treatment of childhood diseases as well as for immunization, the UN Millennium Project calculated detailed cost per case reflecting all drugs and supplies needed on average<sup>3</sup>. All costs per case are displayed in table 28 (appended at the end of this report).

It was assumed that in order to reach the MDGs and the MKUKUTA targets, all episodes of childhood diseases have to be treated over the full period. The prevalence rates by disease were calculated based on the number of cases for 2000 as stated in the Statistical Abstract 2002 and the DHS 2005 (table 29 appended at the end of this report). Assumptions for the future number of cases are explained in section 0. Furthermore, it was assumed that all children under one have to be vaccinated over the entire period.

#### *Malaria*

Costs for Malaria include costs for drugs and supplies needed for treatment as well as costs for prevention of malaria. Costs per case are shown in Table 30 (appended at the end of this report) as provided by the MoH. It was assumed that appropriate health services are provided for the entire population in need over the whole period. The current population requiring treatment or in need for every activity was calculated based on MoH figures and is displayed in table 31 (appended at the end of this report) in relation to the reference population (e.g. in terms of percentage of pregnant women). To derive the future population in need for preventive activities, the proportion was held constant and the

<sup>3</sup> The child health model of the UN Millennium Project provides details about the calculations of costs per case.



reference population was extrapolated using the demographic parameters introduced above. Furthermore, the proportion for diagnostic testing was likewise held constant.

### *Maternal Health*

The cost for health services for maternal health refers solely to drugs and supplies. The cost per case as displayed in table 32 (appended at the end of this report) was calculated by the Millennium Project<sup>4</sup>. The current population in need was calculated by multiplying the reference population (e.g. pregnant women) and the percentage of the reference population requiring service. For family planning, the population in need was multiplied with the percentage share of one particular contraceptive method. The percentage indicating the need for service is displayed in table 33 for all activities. Current coverage of the population in need is assumed to increase at a constant rate to reach coverage targets by 2015. Current and target coverage levels are based on Millennium Project numbers and shown in table 34. In order to derive the number of cases for every year of the period, the reference population was extrapolated for every year and multiplied by the coverage rate and the percentage requiring service.

### *HIV/AIDS*

The cost for treatment of HIV/AIDS only refers to drugs and supplies, whereas the cost for HIV/AIDS prevention also includes additional cost components. Costs per case are included in table 35. For most activities including treatment, quantities in absolute terms are assumed to be constant over the entire costing period. In other words, the scale of treatment is independent of prevalence rates. However, for some preventive activities, quantities are calculated by multiplying constant percentages and the reference population by year. Table 36 provides details. The data used to calculate the costs were provided by the National AIDS Control Programme (NACP) of the MoH.

### *The Effects of Prevention and Synergies on Prevalence Rates*

Treatment cost for childhood diseases and malaria depend on prevalence rates which need to be forecasted<sup>5</sup>. As explained above, prevalence rates are influenced by prevention and synergies. However, in the context of costing, a problem arises since the impact of both factors cannot be exactly quantified so that forecasting becomes impossible. The reasons for this dilemma are obvious. First, the amount of potential positive spillovers is very large. Second, the magnitude of synergetic and preventive effects depends on a multitude of factors on which no data exists or which cannot be quantified. For instance, ITNs may be distributed, but proper usage remains low, or access to safe water exists, but people may not practise good health and hygienic behaviour.

Therefore, simplifications are necessary. Costs are calculated under two different scenarios. In the first one, it is assumed that prevalence rates in the fields of malaria and child health remain constant. The first scenario can therefore be considered as a high-cost scenario in which the impact of prevention and synergies remains low. In the second one, it is assumed that prevalence rates of childhood diseases

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<sup>4</sup> The reproductive health model of the UN Millennium Project provides details about the calculations of costs per case.

<sup>5</sup> As explained before, the prevalence rate of AIDS is not a parameter in the calculation of the cost, and prevalence rates in the field of maternal health can reasonable assumed to be constant.

and of malaria gradually decreases and reach 50% of their present values until 2015. The second scenario is a low-cost scenario and implies that prevention would be highly effective and that crucial interventions in other sectors cause synergetic effects.

## 6.2 Results

In order to interpret the results, the following points are important:

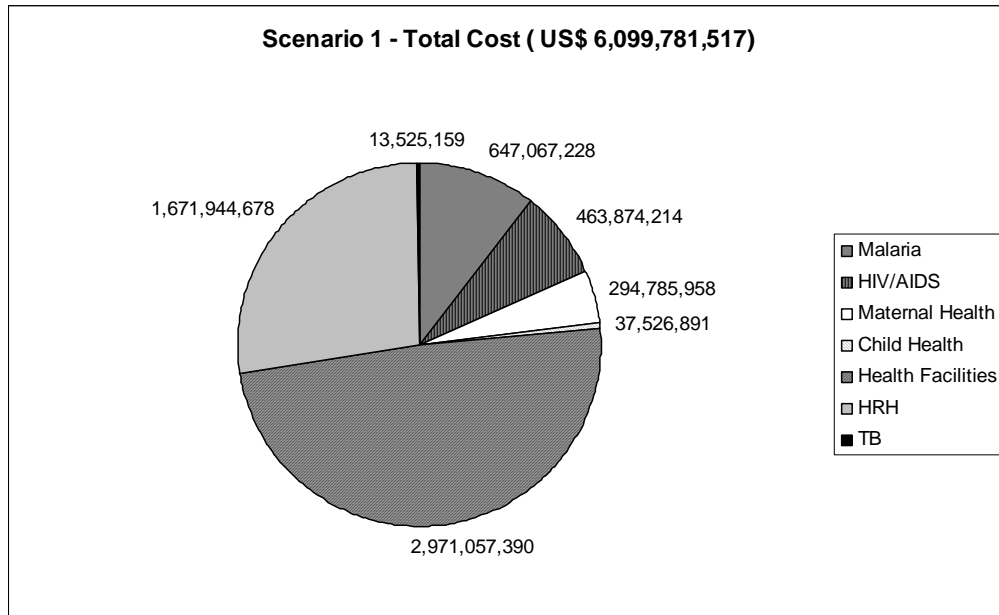
- The calculated cost match required expenditure only if there is no leakage or mismanagement of funds.
- Inflation is not considered implying that costs in nominal terms may be higher.
- All costs are in US\$. The exchange rate is assumed to be 1000TSH/US\$.
- The results are totally based on the analytical framework (e.g. every intervention and health service previously listed is costed) and are based on all assumptions and parameters mentioned.
- Costs are calculated for a high cost and a low cost scenario. In the former, MoH guidelines on staffing standards of health facilities from 2005 were used and it was assumed that prevalence rates of malaria and childhood diseases remain constant. In the latter, the MoH guidelines on staffing standards of health facilities from 1999 were used and it was assumed that prevalence rates for malaria and childhood diseases drop by 50%.

Table 6.16 contains a summary of all costs. Results for both scenarios by field and year are graphically displayed in Figures 6.1 to 6.3. Figure 4 presents staffing requirements in percentage of current levels. Figure 6.5 presents unit cost by health while figure 6 presents treatment cost per case by disease. Figure 6.7 presents prevention cost per person as a percentage of treatment cost.

Table 6.16: Summary of costs

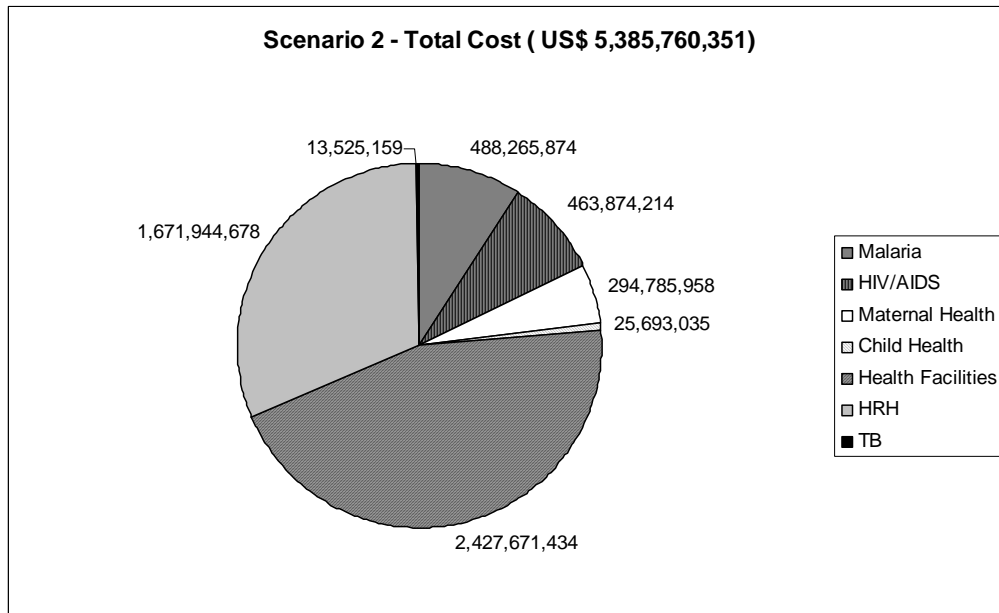
Year	Scenario	Malaria	HIV/AIDS	Maternal Health	Child Health	HRH	Health Facilities	TB	Total
2006/07	Scenario1	65,805,233	50,896,030	19,368,609	3,734,654	103,211,950	201,312,927	996,000	445,325,403
2006/07	Scenario2	61,990,491	50,896,030	19,368,609	3,458,119	94,735,000	201,312,927	996,000	432,757,176
2007/08	Scenario1	67,193,514	51,045,150	22,537,440	3,835,454	144,101,046	186,619,692	1,095,600	476,427,895
2007/08	Scenario2	59,691,782	51,045,150	22,537,440	3,288,492	126,546,636	186,619,692	1,095,600	450,824,792
2008/09	Scenario1	68,611,087	51,198,084	25,719,509	3,938,977	190,443,228	188,192,254	1,205,160	529,308,299
2008/09	Scenario2	57,541,447	51,198,084	25,719,509	3,127,195	162,482,114	188,192,254	1,205,160	489,465,763
2009/10	Scenario1	70,058,571	51,354,930	28,903,211	4,045,297	243,016,031	189,395,495	1,325,676	588,099,211
2009/10	Scenario2	55,531,869	51,354,930	28,903,211	2,973,819	203,109,708	189,395,495	1,325,676	532,594,708
2010/11	Scenario1	71,536,597	51,515,789	32,150,804	4,154,490	302,702,506	47,483,378	1,458,244	511,001,808
2010/11	Scenario2	53,655,857	51,515,789	32,150,804	2,827,975	249,105,024	47,483,378	1,458,244	438,197,072
2011/12	Scenario1	73,296,135	51,691,093	35,628,652	4,271,170	370,482,897	214,735,233	1,604,068	751,709,246
2011/12	Scenario2	52,098,982	51,691,093	35,628,652	2,692,152	301,190,126	214,735,233	1,604,068	659,640,306
2012/13	Scenario1	75,047,675	51,871,135	39,632,922	4,391,129	447,513,361	214,735,233	1,764,475	834,955,930
2012/13	Scenario2	50,605,070	51,871,135	39,632,922	2,562,860	360,236,112	214,735,233	1,764,475	721,407,808
2013/14	Scenario1	76,841,076	52,056,046	43,439,465	4,514,461	535,054,004	214,735,233	1,940,922	928,581,207
2013/14	Scenario2	49,217,864	52,056,046	43,439,465	2,439,788	427,183,377	214,735,233	1,940,922	791,012,694
2014/15	Scenario1	78,677,340	52,245,957	47,405,345	4,641,260	634,532,367	214,735,233	2,135,014	1,034,372,516
2014/15	Scenario2	47,932,510	52,245,957	47,405,345	2,322,635	503,083,338	214,735,233	2,135,014	869,860,032
TOTAL	Scenario1	647,067,228	463,874,214	294,785,958	37,526,891	2,971,057,390	1,671,944,678	13,525,159	6,099,781,517
TOTAL	Scenario2	488,265,874	463,874,214	294,785,958	25,693,035	2,427,671,434	1,671,944,678	13,525,159	5,385,760,351
MKUKUTA (2006/07 - 2009/10)	Scenario1	343,205,002	256,009,984	128,679,574	19,708,871	983,474,761	813,003,746	6,080,680	2,550,162,616
MKUKUTA (2006/07 - 2009/10)	Scenario2	288,411,447	256,009,984	128,679,574	15,675,600	835,978,482	813,003,746	6,080,680	2,343,839,511

Figure 6.1: Costs under scenario 1



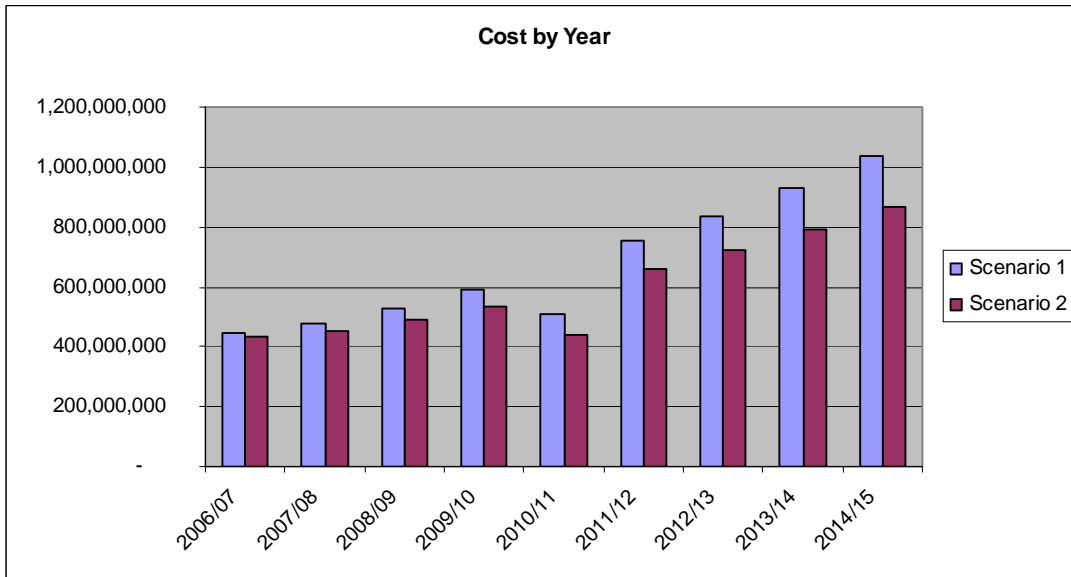
Source: Based on authors' calculation

Figure 6.2: Costs under scenario 2



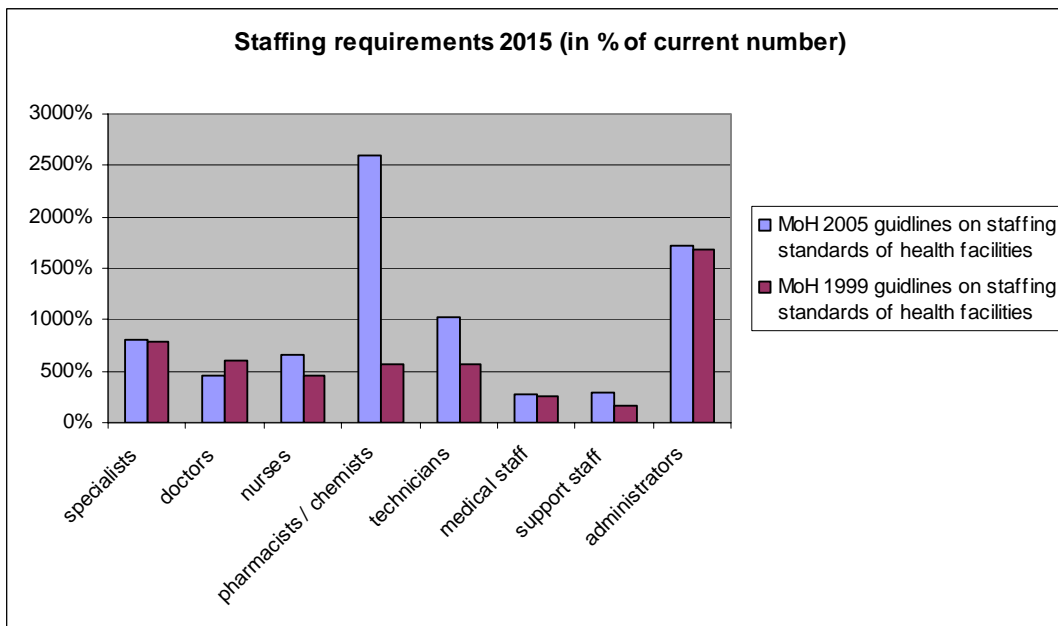
Source: Based on authors' calculations

Figure 6.3: Costs by year for both scenarios



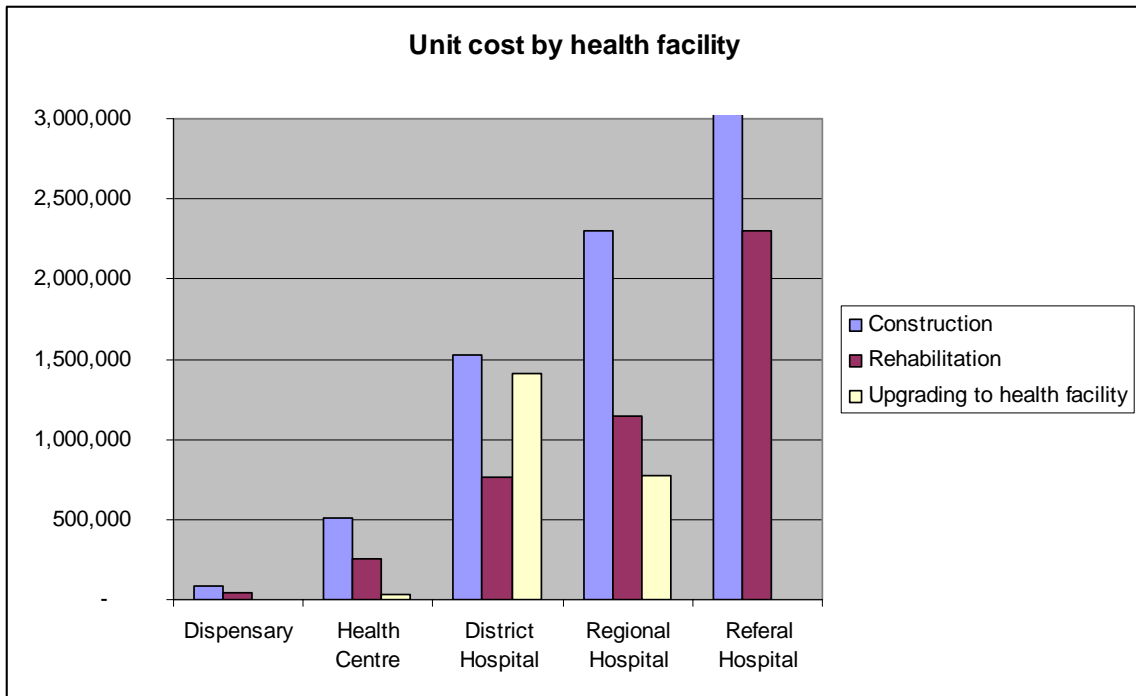
Source: Based on authors' calculations

Figure 6.4: Staffing requirements 2015 (in % of current number)



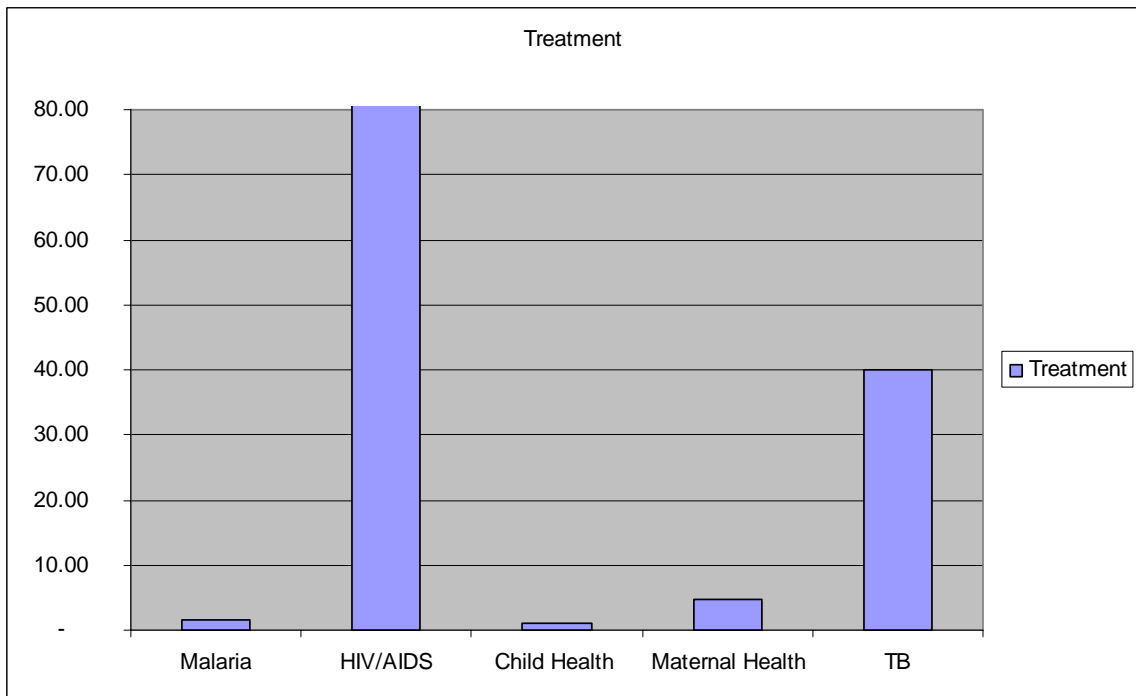
Source: Based on authors' calculations

Figure 6.5: Unit cost by health facility



Source: Based on authors' calculations

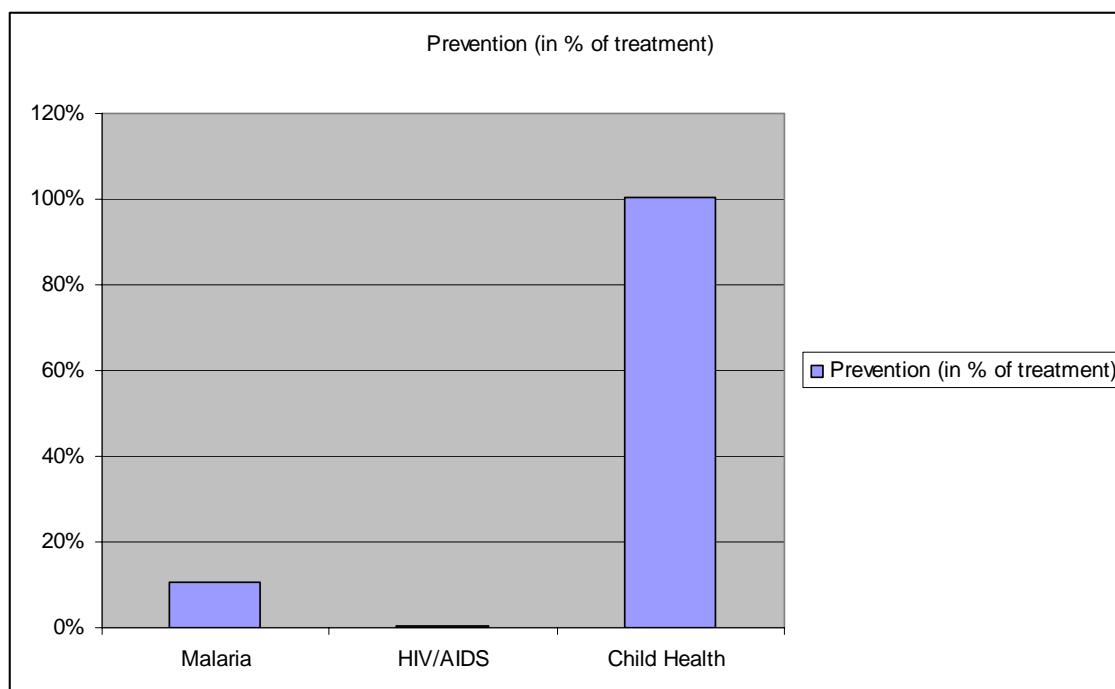
Figure 6.6: Cost per case by disease for treatment



Notes: The value for HIV/AIDS treatment exceeds by far the maximum value on the scale.

Source: Authors' calculation

Figure 6.7: Cost per person reached for prevention in % of treatment costs



Notes: There is no prevention for maternal health; for child health, prevention refers to the immunization against childhood diseases; for HIV/AIDS, the value is close to 0% and therefore not visible.

Source: Authors' calculation

### 6.3 Data Gaps

For several interventions, health services or particular activities, total costs could not be calculated as data for parameters were missing. They include the following:

- Strengthening management capacity of the health system
- Strengthening MoH training centres
- De-worming programme
- IMCI workshops
- Transport of vaccines

## 7.0 NON-FINANCIAL CONSTRAINTS IN THE HEALTH SECTOR

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Non-financial constraints can prevent the scaling-up of interventions and health services and therefore the achievement of the MDGs and the MKUKUTA targets even if there are sufficient financial funds available. In other words, even if public expenditure corresponded to the cost scenarios presented above, in the presence of non-financial constraints the targets could not be achieved. In the health sector, there are two major capacity constraints.

First, at present, administrative capacity of the health system is not sufficient to allow a scaling up of interventions and health services. Capacity at present is not sufficient to ensure that additional funds are adequately allocated and spent. The simultaneous scaling up of interventions to strengthen the health system including administrative capacity seems appropriate to achieve the goals in the medium term. Therefore, the cost scenarios presented are realistic even if administrative capacity constraints exist.

Second, the scaling-up of interventions and health services is only feasible if all inputs are available in sufficient quantities. The supply of most inputs, for instance drugs, is unconstrained as long as there are funds available. However, there is a lack of adequate and sufficiently trained human resources for health. Tanzania has witnessed a steady decline in the size and in the per capita availability of its health workforce. The costing underlines that future HRH requirements are extremely high in terms of current HRH deployed in the health system as displayed in figure 4. It becomes clear that staffing levels in all cadres need to be increased massively. Whereas for cadres with low training requirements, meeting staffing requirements by 2015 through additional hiring seems to be achievable, there is serious shortage of more skilled cadres, especially of doctors, specialists and nurses.

The costing includes several interventions to minimize and possibly remove this capacity constraint. MoH training institutions are seriously considered in the costing exercise, which possibly would result in a higher annual output of middle cadre graduates. Moreover, competitive salaries are assumed and in-service training is considered, and both could attract back unemployed HRH, lower attrition rates and possibly raise productivity. However, increasing training capacity and training itself takes considerable time, and higher learning institutions are not directly under the umbrella MoH but under the education sector. Furthermore, the pool of trained but unemployed professional HRH is limited, and with the current compensations and or remuneration scales, the attrition rate can be lowered but certainly not completely removed.

Therefore, additional efforts in scaling up synergistic interventions in other sectors are necessary to enable the health sector to achieve the projected MKUKUTA goals. For example, a scaling up of interventions within the education sector is critical. Further, other measures to increase staff productivity in the health sector need to be discussed. However, the complete review and assessment of additional measures are beyond the scope of the health sector costing.



## 8.0 ANALYSIS AND POLICY CONCLUSIONS

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The results of the costing can be analyzed from several different perspectives in order to derive conclusions for policy. Especially in the likely case of a large financing gap, it is essential to increase the efficiency of public spending in the health sector and to systematically align the budget allocations with the MKUKUTA targets and the MDGs. In this context, the costing provides guidance by highlighting three central issues which require consideration: relative costs, cross-sectoral linkages and capacity constraints.

### 8.1 Relative Cost and Quick Wins

The results of the costing can be used to analyze relative costs. These can be defined as the cost of particular interventions and health services in relation to other interventions or to total resource requirements. Costs of different health services and interventions vary widely. The following three examples are given to illustrate the point, although analysis could be easily extended to other areas. First, unit costs for construction, rehabilitation and upgrading by health facility are compared in figure 5. It becomes clear that rehabilitation and upgrading are less expensive. This implies that by focusing on these two activities, the number of functioning health facilities could more rapidly increase if the financial resources are limited. However, it must be noted that opportunities for upgrading and rehabilitation are also limited, and that the spatial distribution of health facilities may not be satisfying. Second, average costs per case for treatment of various diseases are compared in figure 6. It can be noted that treatment of HIV/AIDS is extremely expensive relative to treatment costs of other diseases. Third, figure 7 compares costs per person reached for prevention with costs for treatment by disease. For Malaria and HIV/AIDS, costs of prevention are only small fraction of costs for treatment. Thus, these examples show that with significant differences in terms of costs of interventions and health services, it is tempting to advocate a least cost approach favouring those interventions and health services which require relatively less resources and which can be considered as 'quick wins'. However, at the same time it becomes clear that in every case, a careful analysis of other factors including benefits and linkages between interventions is necessary before drawing conclusions.

### 8.2 Cross-sectoral Linkages

The health sector is closely related to other sectors through many links of which many are evident as discussed above. The costing provides two specific and well grounded reasons for the health sector not to be considered in isolation from other sectors.

First, prevalence rates are strongly affected by conditions in other sectors as explained in previous sections. For disease specific costs, the two cost scenarios calculated differ due to different assumptions about prevalence rates in the future. Therefore, costs for treatment of some diseases can be lowered if interventions in other sectors are scaled-up. This effect is referred to as cross-sectoral synergies. Maximum savings are indicated by the difference of disease-specific costs under both

scenarios. However, relative to total cost, savings are relatively small (US\$ 170,635,210 over the full period).

Second, the costing highlights the massive HRH requirements to achieve the targets. A shortage of HRH can only be avoided if complementary interventions in the education sector are scaled up. In particular, the output of relevant training institutions under the umbrella of the Ministries of Higher Education, Science and Technology and Education and Vocational Training must be expanded to achieve the health sector targets.

Thus, a single sector view is certainly not appropriate in the context of strategies to achieve the health-related MKUKUTA targets as well as the MDGs. Synergies and complementarities between the sectors require a careful sequencing as well as prioritization of interventions and call for a multi-sector approach which is based on a simultaneous and gradual scaling-up of key interventions in several sectors. Therefore, in order to implement MKUKUTA, close cross-sectoral cooperation is imperative.

### 8.3 Capacity Constraints in the Health Sector

Some serious major capacity constraints in the health sector are identified. All need to be eliminated for a successful and smooth achievement of the projected targets. Therefore, appropriate interventions to strengthen capacity are complementary and need to be scaled-up. In other words, a broad scaling up in the health sector must include those interventions which are capable of removing the capacity constraints.

Faced with limited financial resources, it may be tempting to implement interventions addressing particular health problems which contribute enormously to the burden of disease together with them. For instance, massive resources could be invested in relieving the burden from HIV/AIDS. Investing in recruiting HRH for HIV/AIDS would have negative spillover effects to other health problems because the human resource could as well be utilised for other health problems. In other words, in the context of limited capacity, especially in terms of HRH as highlighted in the costing, this approach results in a diversion of capacity away from other diseases thereby worsening the situation elsewhere in the health sector. Thus, due to capacity constraints, financing selective health services and interventions may not improve the overall health situation.

In summary, two factors are critical for an increase of efficiency of the budget composition: linkages including synergies and complements between interventions within the health sector and across sectors as well as cost differences of interventions and health services.

## 9.0 WAY FORWARD

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As part of the follow up process, several next steps are recommended. They include the completion of the costing and the filling of data gaps, the review of all assumptions, the comparison of the results of the costing with the health MTEF as well as the calculation of the financing gap and the derivation of policy prescriptions including the optimal allocation and sequencing.

### 9.1 Review Data and Parameters used in the Costing as Part of Participatory Process

The costing is constrained by the availability and accuracy of data. Several parameters are estimated using data extracted from international sources and or estimated by the costing team. Filling of data gaps and review of parameters and assumptions is of paramount importance for better costing estimates. More consultative discussions with the MoH staff from different units other key stakeholders would help in reducing the gap. Ideally, with the availability of good quality data, all assumptions and parameters could be revised through a participatory process, driven by the MoH and other key stakeholders to arrive at agreed cost estimates. Since the calculations are based on an Excel-based model, changes can be easily incorporated in the costing.

### 9.2 Discussion of Solution for HRH Shortage

Stakeholders should discuss the large HRH requirements which are highlighted by the costing. They should propose further efforts to meet them. HRH availability should be then projected over the full period under an optimistic scenario and compared with the requirements to calculate the difference. If the shortage turns out to remain large, the costing including the scaling-up paths must be adjusted. The Local Government, especially District Councils, should discuss with the Ministry of Health of how best to improve the skills of the existing health workers and how to hire new health workers in order to meet the projected MKUKUTA targets.

### 9.3 Comparison of Results with MTEF

The results of the costing must be made comparable to the MTEF so that the financing gap can be calculated and consequently use the results of the costing as a guideline for future budget allocations. Potentially, insights can be gained from analyzing whether the MTEF is need driven and if it reflects relative costs.

### 9.4 Derivation of a Costed Cross-sectional MKUKUTA Implementation Strategy

More concrete policy prescriptions must be discussed which take into account the conclusions of the costing. In particular, it should be analyzed whether the budget allocation could be made more efficient. Quick wins which refer to interventions and health services which can be easily scaled-up and require relatively fewer resources should be identified. Also, interventions that have intra-sector synergies and

spill-over effects and complements of interventions should be earmarked to improve allocative efficiency. It is recognised that it needs time and other financial resources to have an integrated costing, involving all inter-sectional synergies and complements from different sectors, to avoid double counting and to improve the estimates. Sectors should come together identify synergies and their interrelationships and cost them accordingly, as a separate exercise, and later add to the respective sector costing. Ultimately, a 'costed' MKUKUTA implementation strategy covering the health sector as well as related sectors should be developed and the budget should be fully aligned with the MKUKUTA targets as well as with the MDGs.

## ANNEXES

### Annex I: Tables

*Table 1 Standard equipment list of dispensary (basis for construction unit cost)*

Item	Quantity	Unit Cost	Total Cost
<b>WARD NURSING SUPPLIES</b>			
Lotion Bowls 250 mm dia	10	\$35	\$350
Bowl Washing 350 mm x 120 mm deep	6	\$35	\$210
Funnels Catheter 80 mm dia	4	\$15	\$60
Gallipot/cup 180 ml	12	\$10	\$120
Jar Clinical Thermometer	8	\$20	\$160
Jar Dressing with Lid	12	\$30	\$360
Trays without Lid	10	\$25	\$250
Trays Instrument with Lid	6	\$25	\$150
Burn Bin for Sharps	8	\$20	\$160
Emergency Lamp	5	\$25	\$125
Mucus Extractor	12	\$15	\$180
<b>STETHOSCOPE &amp; SPHYGNOMONOMETER</b>			
Diagnostic set Otoscope + Ophthalmoscope (C-Cell)	4	\$80	\$320
Stethoscope Binaural Bowles	6	\$20	\$120
Stethoscope Foetal Pinard	2	\$25	\$50
Sphygmomanometer anaeroid complete	4	\$35	\$140
Sphygmomanometer Mercury Disk Type 300 mm	10	\$50	\$500
Scale Baby Bean Type	1	\$170	\$170
Scale SALTER Baby Suspens-Type	1	\$150	\$150
Scale Weighing Bathroom Type	2	\$120	\$240
Thermometer Clinical oral	10	\$5	\$50
Thermometer Rectal	4	\$5	\$20
Tongue depressor	3	\$3	\$9
Tourniquet Latex Tubing Blood taking	4	\$18	\$72
Torch Pen Light for Examination	6	\$6	\$36
<b>SURGICAL INSTRUMENTS</b>			
Scalpel blade size 10	2	\$20	\$40
Scalpel blade size 11	2	\$20	\$40
Scalpel blade size 12	2	\$20	\$40
Handle Size 3	2	\$25	\$50
Handle Size 3	6	\$25	\$150
Needle holder	4	\$15	\$60
Scissors Blunt Points	6	\$20	\$120
Scissors Dressing	4	\$20	\$80
Forceps Lister's sinus straight 120mm	4	\$15	\$60
Forceps Lister's sinus straight 150mm	4	\$15	\$60
Probe Silver	2		\$0
Tourniquet Samway-page modified	4		\$0
Specula nasal	2	\$25	\$50
Syringe Ear all metal	2	\$25	\$50

Item	Quantity	Unit Cost	Total Cost
Sound uterine	2	\$30	\$60
Speculum vaginal medium	2	\$35	\$70
Speculum vaginal small	2	\$35	\$70
Speculum vaginal duckbill, sims-medium	2	\$30	\$60
Speculum vaginal duckbill, sims-small	2	\$30	\$60
Splint Cramers metal wire 600x80 mm	2		\$0
Splint Cramers metal wire 800x100 mm	2		\$0
Splint Cramers metal wire 1000x120 mm	2		\$0
Wire cutting, tungest. carbide inserts 180 mm	1	\$20	\$20
Dressing set large	2	\$450	\$900
<b>FURNITURE</b>			
Chair typist type	2	\$80	\$160
Chairs resting coffee table	8	\$20	\$160
Coffee table	2	\$30	\$60
Chairs stacking plastic	15	\$60	\$900
Cupboard metal	2	\$200	\$400
Desk, metal	3	\$120	\$360
Filing cabinet, metal	3	\$110	\$330
Board notice	2	\$130	\$260
<b>WARD FURNITURE</b>			
Couch	2	\$400	\$800
Measure Height Wall	1	\$40	\$40
Stand. Double	4	\$250	\$1,000
Racking Store	6	\$40	\$240
Trolley dressing	2	\$280	\$560
<b>STERILISING &amp; AUTOCLAVING</b>			
Sterilizer	1	\$1,500	\$1,500
Sterilizer dressing pressure	2	\$500	\$1,000
Drum sterilizer	10	\$55	\$550
Boiler	2	\$150	\$300
Lamps	2	\$200	\$400
Stove table	2	\$40	\$80
<b>BEDDING &amp; LINEN</b>			
Apron plastified linen	6		\$0
Face mask cotton green	10	\$20	\$200
Blanket cellular	24	\$20	\$480
Blanket mixed fibers	40	\$25	\$1,000
Pillow cases	50	\$3	\$150
Pillow foam	40	\$6	\$240
Sheet draw	50	\$10	\$500
Sheet plastic clear	20	\$20	\$400
Towel huckaback	24	\$12	\$288
<b>EPI PROGRAMME EQUIPMENT</b>			
Refrigerator Electric	1	\$1,200	\$1,200
Vaccine Carrier	2	\$60	\$120
Ice Packs	2	\$1	\$2
Thermometer	2	\$5	\$10

Item	Quantity	Unit Cost	Total Cost
Refrigerator Electric	1	\$1,200	\$1,200
<b>GENERATOR</b>			
Diesel Generator	1	\$6,000	\$6,000
<b>COMMUNICATION DEVICES AND IT</b>			
Radio	2	\$2,000	\$4,000
<b>TRANSPORT</b>			
Motorcycle	4	\$2,500	\$10,000
Bicycle	2	\$70	\$140
<b>WARD NURSING SUPPLIES</b>			
Lotion Bowls 250 mm dia	10	\$35	\$350
Bowl Washing 350 mm x 120 mm deep	6	\$35	\$210
Funnels Catheter 80 mm dia	4	\$15	\$60
Gallipot/cup 180 ml	12	\$10	\$120
Jar Clinical Thermometer	8	\$20	\$160
Jar Dressing with Lid	12	\$30	\$360
Trays without Lid	10	\$25	\$250
Trays Instrument with Lid	6	\$25	\$150
Burn Bin for Sharps	8	\$20	\$160
Emergency Lamp	5	\$25	\$125
Mucus Extractor	12	\$15	\$180
<b>STETHOSCOPE &amp; SPHYGNOMOMETER</b>			
Diagnostic set Otoscope + Ophthalmoscope (C-Cell)	4	\$80	\$320
Stethoscope Binaural Bowles	6	\$20	\$120
Stethoscope Foetal Pinard	2	\$25	\$50
Sphygmomanometer anaeroid complete	4	\$35	\$140
Sphygmomanometer Mercury Disk Type 300 mm	10	\$50	\$500
Scale Baby Bean Type	1	\$170	\$170
Scale SALTER Baby Suspens-Type	1	\$150	\$150
Scale Weighing Bathroom Type	2	\$120	\$240
Thermometer Clinical oral	10	\$5	\$50
Thermometer Rectal	4	\$5	\$20
Tongue depressor	3	\$3	\$9
Tourniquet Latex Tubing Blood taking	4	\$18	\$72
Torch Pen Light for Examination	6	\$6	\$36
<b>SURGICAL INSTRUMENTS</b>			
Scalpel blade size 10	2	\$20	\$40
Scalpel blade size 11	2	\$20	\$40
Scalpel blade size 12	2	\$20	\$40
Handle Size 3	2	\$25	\$50
Handle Size 3	6	\$25	\$150
Needle holder	4	\$15	\$60
Scissors Blunt Points	6	\$20	\$120

Source: UN Millennium Project

Table 2 Standard equipment list of health (basis for construction unit cost)

Item	Quantity	Unit Cost	Total Cost
<b>WARD NURSING SUPPLIES</b>			
Lotion Bowls 250 mm dia	10	\$35	\$350
Bowl Washing 350 mm x 120 mm deep	6	\$35	\$210
Funnels Catheter 80 mm dia	4	\$15	\$60
Gallipot/cup 180 ml	12	\$10	\$120
Jar Clinical Thermometer	8	\$20	\$160
Jar Dressing with Lid	12	\$30	\$360
Trays without Lid	10	\$25	\$250
Trays Instrument with Lid	6	\$25	\$150
Burn Bin for Sharps	8	\$20	\$160
Emergency Lamp	5	\$25	\$125
Mususc Extractor	12	\$15	\$180
<b>STETHOSCOPE &amp; SPHYGNOMONOMETHER</b>			
Diagnostic set Otoscope + Ophthalmoscope (C-Cell)	4	\$80	\$320
Stethoscope Binaural Bowles	6	\$20	\$120
Stethoscope Foetal Pinard	2	\$25	\$50
Sphygmomanometer anaeroid complete	4	\$35	\$140
Sphygmomanometer Mercury Disk Type 300 mm	10	\$50	\$500
Scale Baby Bean Type	1	\$170	\$170
Scale SALTER Baby Suspens-Type	1	\$150	\$150
Scale Weighing Bathroom Type	2	\$120	\$240
Thermometer Clinical oral	10	\$5	\$50
Thermometer Rectal	4	\$5	\$20
Tongue depressor	3	\$3	\$9
Tourniquet Latex Tubing Blood taking	4	\$18	\$72
Torch Pen Light for Examination	6	\$6	\$36
<b>SURGICAL INSTRUMENTS</b>			
Scalpel blade size 10	2	\$20	\$40
Scalpel blade size 11	2	\$20	\$40
Scalpel blade size 12	2	\$20	\$40
Handle Size 3	2	\$25	\$50
Handle Size 3	6	\$25	\$150
Needle holder	4	\$15	\$60
Scissors Blunt Points	6	\$20	\$120
Scissors Dressing	4	\$20	\$80
Forceps Lister's sinus straight 120mm	4	\$15	\$60
Forceps Lister's sinus straight 150mm	4	\$15	\$60



Item	Quantity	Unit Cost	Total Cost
Probe Silver	2		\$0
Tourniquet Samway-page modified	4		\$0
Specula nasal	2	\$25	\$50
Syringe Ear all metal	2	\$25	\$50
Sound Uterine	2	\$30	\$60
Speculum vaginal medium	2	\$35	\$70
Speculum vaginal small	2	\$35	\$70
Speculum vaginal duckbill, sims-medium	2	\$30	\$60
Speculum vaginal duckbill, sims-small	2	\$30	\$60
Circumcision shield	2		\$0
Splint Cramers metal wire 600x80 mm	2		\$0
Splint Cramers metal wire 800x100 mm	2		\$0
Splint Cramers metal wire 1000x120 mm	2		\$0
Wire cutting, tungest.carbide inserts 180 mm	1	\$20	\$20
Pump Suction	2	\$350	\$700
Circumcision instrument & sundries	2	\$400	\$800
Dressing set large	2	\$450	\$900
<b>FURNITURE</b>			
Chair typist type	2	\$80	\$160
Chairs resting coffee table	8	\$20	\$160
Coffee table	2	\$30	\$60
Chairs stacking plastic	30	\$60	\$1,800
Cupboard metal	2	\$200	\$400
Desk, metal	6	\$120	\$720
Filing cabinet, metal	4	\$110	\$440
Board notice	2	\$130	\$260
Type writer English & Arabic	1	\$1,000	\$1,000
<b>WARD FURNITURE</b>			
Bed hospital	10	\$300	\$3,000
Mattress Hosp bed	15	\$120	\$1,800
Bed delivery	2	\$700	\$1,400
Locker bed side	10	\$200	\$2,000
Couch	8	\$400	\$3,200
Measure Height wall mount	1	\$40	\$40
Stand, double	4	\$250	\$1,000
Racking Store	6	\$40	\$240
Stools dispenser	2	\$110	\$220
Trolley dressing	2	\$280	\$560
Trolley medicine	2	\$280	\$560

Item	Quantity	Unit Cost	Total Cost
Trolley patient	2	\$500	\$1,000
<b>STERILISING &amp; AUTOCLAVING</b>			
Sterilizer	1	\$1,500	\$1,500
Sterilizer dressing pressure	2	\$500	\$1,000
Drum sterilizer	10	\$55	\$550
Steam Autocl.	1	\$2,500	\$2,500
Lamp Anglepoise	5	\$150	\$750
Lamps Anglepoise, Examination mobile on castors	2	\$250	\$500
Stove table	2	\$40	\$80
<b>BEDDING &amp; LINEN</b>			
Apron plastified linen	6		\$0
Face mask cotton green	10	\$20	\$200
Blanket cellular	24	\$20	\$480
Blanket mixed fibers	40	\$25	\$1,000
Pillow cases	50	\$3	\$150
Pillow foam	40	\$6	\$240
Sheet draw	50	\$10	\$500
Sheet plastic clear	20	\$20	\$400
Towel huckaback	24	\$12	\$288
<b>EPI PROGRAMME EQUIPMENT</b>			
Refrigerator Electric	1	\$1,200	\$1,200
Vaccine Carrier	2	\$60	\$120
Ice Packs	2	\$1	\$2
Thermometer	2	\$5	\$10
<b>LABORTATORY EQUIPMENT</b>			
Beaker Glass Pyrex 250 ml	2		\$0
Beaker Glass Pyrex 500 ml	2		\$0
Microscope Cover Glasses	12		\$0
Microscope Slides	10		\$0
Microscope Mail Box	5		\$0
Pipette Haematology	5		\$0
Pipette Graduated Glass 1mlx0.01	5		\$0
Pipette Graduated Glass 5mlx0.01	5		\$0
Pipette Graduated Glass 10mlx0.01	5		\$0
Pipette Pasteur	1		\$0
Thermometer	1		\$0
Test tube Rimless borosilicate 75x10 mm	1		\$0
Test tube Rimless borosilicate 100x12 mm	1		\$0
Test tube Rimless borosilicate 125x16 mm	1		\$0

Item	Quantity	Unit Cost	Total Cost
Tube centrifugal conical graduated 15 ml	1		\$0
Bottle aspirator	2		\$0
Bottle dropping	2		\$0
Bottle universal with screw cap & liner	30		\$0
Basin utility	2		\$0
Burner Bunsen	1		\$0
Haemocytometer	2		\$0
Counting chamber (Neubauer)	1		\$0
Counting chamber (Fuchs-Rosenthal)	1		\$0
Haemoglobinometer Sahli	2		\$0
Holder test tubes	2		\$0
Holder/stand	1		\$0
Lamp spirit	1		\$0
Washing bottle polythene	3		\$0
Applicator wooden	5		\$0
Lancets for blood	2		\$0
<b>LABORATORY EQUIPMENT</b>			
Centrifuge bench	1	\$800	\$800
Hot air oven drying & sterilizing	1	\$750	\$750
Microscope, binocularly	1	\$1,500	\$1,500
Refrigerator Electric	1	\$1,200	\$1,200
<b>GENERATOR</b>			
Diesel Generator	1	\$8,000	\$8,000
<b>X-RAY</b>			
Fix X-Ray	1	\$15,000	\$15,000
<b>DARK ROOM</b>			
Cassette 180x130 mm	5	\$300	\$1,500
Cassette 400x150 mm	5	\$300	\$1,500
Cassette 300x240 mm	5	\$300	\$1,500
Cassette 350x350 mm	5	\$300	\$1,500
Cassette 430x350 mm	5	\$300	\$1,500
Hangers develop.channel type 180x130mm	5	\$20	\$100
Hangers develop.channel type 400x150mm	5	\$20	\$100
Hangers develop.channel type 300x240mm	5	\$20	\$100
Hangers develop.channel type 350x350mm	5	\$20	\$100
Hangers develop.channel type 430x350mm	5	\$20	\$100
Markers clip on cassette type metal	3	\$10	\$30
Film mark outfit	2	\$150	\$300
Apron, screening	1	\$120	\$120

Item	Quantity	Unit Cost	Total Cost
Sheet lead rubber 350x430mm	2	\$70	\$140
<b>X-RAY DEPARTMENT &amp; DARKROOM FURNITURE</b>			
Protective device X-Ray	1	\$700	\$700
Agitator manual	2	\$10	\$20
Bench loading	1	\$350	\$350
Box X-Ray	1	\$300	\$300
Cabinet filing	1	\$450	\$450
Calibre Measuring	1		\$0
Darkroom lamps ES-fitting	1	\$30	\$30
Safe Light filters	1	\$10	\$10
Drying cabinet	1	\$400	\$400
Processor X-Ray film	1	\$350	\$350
Spare processing tank, 22.5 liters	3		\$0
Spare processing tank, 45 liters	1		\$0
Brushes, tank cleaning	2	\$5	\$10
Thermometer	2	\$20	\$40
Rack film hanger	2	\$20	\$40
Stand irrigation	2		\$0
Timer	2	\$15	\$30
Trolley, wet film	2		\$0
Viewer X-Ray wall mounted box	4		\$0
<b>COMMUNICATION DEVICES AND IT</b>			
Radio	2	\$2,000	\$4,000
mobile phone	2	\$50	
<b>TRANSPORT</b>			
Motorcycle	2	\$2,500	\$5,000
Bicycle	4	\$70	\$280
Vehicle	1	\$25,000	\$25,000

Source: UN Millennium Project

Table 3 Standard equipment list of district hospital (basis for unit construction cost)

Item	Quantity	Unit Cost	Total Cost
<b>MEDICAL FURNITURE</b>			
Hospital Bed with side rail back rest	30	\$600	\$18,000
Bed hospital	10	\$300	\$3,000
Bed side locker	30	\$200	\$6,000
Strand drip	6	\$150	\$900
Couch examination	6	\$400	\$2,400
Instrument cabinet	2	\$350	\$700
Cupboard metal steel	6	\$200	\$1,200
Utility trolley	2	\$300	\$600
Viewer X-Ray fluorescent box	1	\$180	\$180
Viewer X-ray wall mounted box	6	\$120	\$720
D.D.A. cupboard	1	\$200	\$200
Gynecological labor bed	1	\$700	\$700
Gynecological examination couch	1	\$500	\$500
ENT. Examination lamp single perfecting mobile on castors	1	\$240	\$240
Examination lamp, mobile on castors	6	\$250	\$1,500
Trolley anesthetist injection (OT)	1	\$300	\$300
Trolley case note	2	\$250	\$500
Trolley dressing	4	\$280	\$1,120
Trolley instrument	2	\$320	\$640
Trolley linen	2	\$180	\$360
Trolley Mayo table	2	\$400	\$800
Trolley medicine	2	\$280	\$560
Trolley plaster of Paris	1	\$400	\$400
Stretcher for patient removable top	3	\$500	\$1,500
Patient wheel chair	2	\$150	\$300
Mattress foam	30	\$120	\$3,600
Ward Screen	10	\$200	\$2,000
Stool Anesthetist	2	\$400	\$800
Rack (40) swab (OT)	1	\$200	\$200
Leak operation soap valve	1	\$500	\$500
Scale	2	\$300	\$600
St. st. single bowl stand	2	\$150	\$300
St. st. double bowl stand	2	\$200	\$400
Bed pan rack wall mounted st. st. tray	1	\$120	\$120
Stand sterilizer	1	\$300	\$300
Office desk double side drawer	6	\$250	\$1,500
Office desk small	8	\$120	\$960
Office chair with armrest	14	\$80	\$1,120
Coffee table	14	\$30	\$420
Fixed chairs with armrest	56	\$20	\$1,120
Color TV system	1	\$450	\$450
Video player	1	\$300	\$300
Clothes hanger stand type	20	\$20	\$400
Scale, for baby	2	\$150	\$300
Over bed table	20	\$120	\$2,400

Item	Quantity	Unit Cost	Total Cost
<b>HOSPITAL WARD SUPPLY</b>			
Sphygmomanometer mercury desk type	10	\$50	\$500
Stethoscope Binaural Bowles	15	\$20	\$300
Thermometer clinical, oral	50	\$5	\$250
Diagnostic set otoscope + ophthalmoscope light in case	3	\$80	\$240
Oxygen cylinder	6	\$180	\$1,080
Cylinder nitrous oxide	4	\$200	\$800
Bedpans	10	\$20	\$200
Hammer	2	\$20	\$40
Tongue depressor	10	\$3	\$30
Torch Pen Light for Examination	30	\$6	\$180
Measure jug	40	\$15	\$600
Measure medicine	50	\$12	\$600
Infant examination tools	1	\$90	\$90
Waste bin pedal-actions	15	\$90	\$1,350
Sputum mugs with lid	10	\$5	\$50
Urinals s/s female	5	\$30	\$150
Urinals s/s male	5	\$30	\$150
Jar for thermometer	15	\$20	\$300
<b>E.N.T. INSTRUMENTS for O.P.D.</b>			
Nose Box	1	\$150	\$150
Tuning fork set	1	\$100	\$100
Light head with battery box	1	\$80	\$80
Mirror laryngeal	1	\$10	\$10
Spray atomizing	1	\$62	\$62
<b>ANAESTHETIC SUPPLIES</b>			
Endotracheal adaptor metal	2	\$15	\$30
Endotracheal adaptor plastic	2	\$7	\$14
Endotracheal catheter mount rubber	2	\$14	\$28
Corrugated rubber black tube 140 cm	2	\$45	\$90
Corrugated rubber black tube 90 cm	2	\$30	\$60
Endotracheal corrugated tube 90 mm	2	\$150	\$300
Endotracheal Stilait, large	2	\$25	\$50
Endotracheal Stilait, small	2	\$20	\$40
Infant bag mount	2	\$22	\$44
Infant endotracheal connector	2	\$10	\$20
Infant flexible connector complete	2	\$15	\$30
Laryngoscope	2	\$70	\$140
Angle mount for face mask 22 mm	2	\$12	\$24
Angle mount for face mask, paediatric 15 mm	2	\$11	\$22
Face mask ever seal with studs size 1	2	\$21	\$42
Face mask ever seal with studs size 2	2	\$21	\$42
Face mask ever seal with studs size 3	2	\$21	\$42
Face mask ever seal with studs size 4	2	\$21	\$42
Face mask Infant latex 0	2	\$18	\$36
Face mask Infant latex 00	2	\$18	\$36
Face mask Infant latex 000	2	\$18	\$36
<b>STERILIZING &amp; AUTOCLAVING EQUIPMENT (CSSD)</b>			
Steam autoclave sterilizing automatic	1	\$15,000	\$15,000

Item	Quantity	Unit Cost	Total Cost
Paper temperature recording	5	\$20	\$100
Gs sterilizer	1	\$500	\$500
Stainless steel shelves	2	\$300	\$600
Working table	2	\$400	\$800
Square basket	2	\$12	\$24
Wash basin	1	\$350	\$350
Steam autoclave	1	\$2,500	\$2,500
Steam autoclave vertical	1	\$6,000	\$6,000
<b>MEDICAL EQUIPMENT</b>			
Portable suction apparatus	2	\$650	\$1,300
Pump suction, spare filters	10	\$13	\$130
Pump suction	2	\$2,200	\$4,400
Spare polycarbonate bottle	10	\$13	\$130
ECG apparatus	1	\$2,200	\$2,200
Ultrasound system	1	\$12,000	\$12,000
Defibrillator	1	\$5,200	\$5,200
Electrical POP plaster cutter	1	\$1,130	\$1,130
Operation light	2	\$5,500	\$11,000
Gynecology operation table	1	\$700	\$700
Operating theatre table	1	\$9,800	\$9,800
Ultraviolet lamp	2	\$300	\$600
Electro surgical unit, 400 Watts	1	\$8,500	\$8,500
Electro surgical unit, 170 Watts	1	\$3,100	\$3,100
Nebulizer	2	\$1,200	\$2,400
Syringe pump	2	\$1,200	\$2,400
Infusion pump	1	\$1,500	\$1,500
Infant incubators	2	\$7,500	\$15,000
Foetal Doppler	2	\$800	\$1,600
Foetal monitor	1	\$4,000	\$4,000
Vacuum extractor	1	\$1,700	\$1,700
Infant warmer	1	\$6,000	\$6,000
Gynaeco, examination table	2	\$600	\$1,200
Anaesthesia machine	1	\$22,000	\$22,000
<b>DENTAL DEPARTMENT UNIT</b>			
Dental unit/ chair copm.	1	\$12,000	\$12,000
Dentist stool	1	\$300	\$300
Compressor	1	\$400	\$400
Steam sterilizer	1	\$2,500	\$2,500
X-Ray apparatus unit (dental)	1	\$1,800	\$1,800
X-Ray manual processor	1	\$400	\$400
Scaling unit	1	\$500	\$500
Hand pieces, turbine	1		\$0
Hand pieces, micromotor	1		\$0
Hand pieces, contra-angel	1		\$0
Extraction Set	3	\$400	\$1,200
Restorative Set	2	\$300	\$600
<b>LABORATORY ROOM</b>			
Spectrophotometer wave length 199~900nm	2	\$4,500	\$9,000
Bench top centrifuge	2	\$850	\$1,700

Item	Quantity	Unit Cost	Total Cost
Microscope binocular	2	\$1,100	\$2,200
Haematocrit centrifuge	1	\$650	\$650
Incubator for Laboratory	1	\$950	\$950
Sterilizing oven	1	\$750	\$750
Bench top steam sterilizing	1	\$1,200	\$1,200
Water bath 80 degree	1	\$650	\$650
Shaker for tubes	1	\$550	\$550
Laboratory stool swivel adj.	4	\$150	\$600
Laboratory medical refrigerator	1	\$2,500	\$2,500
Glass ware complete set	2	\$250	\$500
Shaker 220 V 50 Hz	1	\$350	\$350
Bilirubin meter	1	\$600	\$600
HP meter	1	\$400	\$400
Doner chair	4	\$150	\$600
Glucometer	1	\$200	\$200
Blood cell counter manual	2	\$60	\$120
Blood Bank refrigerator	1	\$2,500	\$2,500
Glass exhibition vitrins	2	\$300	\$600
Timer	2	\$20	\$40
Glass ware the blood bank comp. Set	2	\$150	\$300
<b>X-RAY ROOM</b>			
X-Ray H.F. Generator mobile	1	\$8,000	\$8,000
X-Ray apparatus diagnostics	1	\$21,000	\$21,000
<b>DARK ROOM</b>			
Cassette 400x150 mm with intensifying screens	4	\$200	\$800
Cassette 300x240 mm with intensifying screens	4	\$220	\$880
Cassette 350x350 mm with intensifying screens	4	\$300	\$1,200
Cassette 430x350 mm with intensifying screens	4	\$350	\$1,400
Hangers develop.channel type 400x150mm	4	\$20	\$80
Hangers develop.channel type 300x240mm	4	\$20	\$80
Hangers develop.channel type 350x350mm	4	\$20	\$80
Markers clip on cassette type metal	2	\$10	\$20
Film mark outfit	1	\$150	\$150
Apron, screening	1	\$120	\$120
Sheet lead rubber 400x500 mm	1	\$70	\$70
Gonodol protection male	1	\$50	\$50
Ovary protection female	1	\$60	\$60
<b>X-RAY DEPARTMENT &amp; DARKROOM FURNITURE</b>			
Protective device X-Ray	1	\$700	\$700
Agitator manual	2	\$10	\$20
Apron X-Ray rack	1	\$12	\$12
Bench loading	1	\$350	\$350
Box X-Ray cassette	1	\$300	\$300
Cabinet filing	1	\$450	\$450
Darkroom lamps ES-fitting	1	\$30	\$30
Safe Light filters	1	\$10	\$10
Drying cabinet	1	\$400	\$400
Processor X-Ray film	1	\$350	\$350
Spare processing tank, 22.5 liters	1		\$0



Item	Quantity	Unit Cost	Total Cost
Spare processing tank, 45 liters	1		\$0
Brushes, tank cleaning	1	\$5	\$5
Thermometer	1	\$20	\$20
Rack film hanger	1	\$20	\$20
Timer	1	\$15	\$15
<b>CENTRAL LAUNDRY DEPARTMENT</b>			
Trolley dry linen light material	2	\$300	\$600
Industrial laundry washer	2	\$9,000	\$18,000
Tumble dryer	2	\$3,500	\$7,000
Washing basin double	1	\$200	\$200
Iron	1	\$300	\$300
Ironing table	1	\$200	\$200
Receiving table tubular frame metal	1	\$300	\$300
<b>KITCHEN COOKING AEA (Set complete for 30 beds)</b>			
Flambeau with oven	1	\$2,400	\$2,400
Combination gas oven	1	\$1,200	\$1,200
Gas boiling pan	1	\$800	\$800
Refrigerator cabinet cooler with freezer	1	\$3,200	\$3,200
Refrigerator freezer	1	\$2,500	\$2,500
Electric water boiler	1	\$1,200	\$1,200
Stainless steel shelves	1	\$400	\$400
Exhaust unit	1	\$250	\$250
Double sink	1	\$300	\$300
Single sink	1	\$200	\$200
Chair plastic	16	\$12	\$192
Pressure cooker	2	\$1,500	\$3,000
Patient food tray	50	\$10	\$500
Patient food trolley with heating facility	2	\$1,100	\$2,200
Working table	1	\$750	\$750
Balance analogue	1	\$600	\$600
<b>GENERATOR</b>			
Generator set	1	\$15,000	\$15,000
<b>WORK SHOP AREA</b>			
Working bench with drawer	1	\$400	\$400
Multi Meter	1	\$250	\$250
Electronics set complete	2	\$800	\$1,600
Mechanical set complete	2	\$700	\$1,400
Electric drill	1	\$300	\$300
Soldering iron	1	\$250	\$250
Carpentering tools	1	\$350	\$350
<b>WASTE TREATMENT</b>			
Incinerator	1	\$20,000	\$20,000
<b>MISCELLANEOUS</b>			
Watercolor for hospital use	4	\$180	\$720
Fire extinguisher powder 10 kg	5	\$60	\$300
Fire extinguisher powder 6 kg	5	\$40	\$200
Fire extinguisher CO2 6 kg	5	\$50	\$250
Fire extinguisher CO2 2 kg	5	\$35	\$175

Item	Quantity	Unit Cost	Total Cost
<b>HOUSING FOR PHYSICIANS</b>			
Sofa three seater	4	\$210	\$840
Sofa single seater	4	\$120	\$480
Center table wooden	4	\$80	\$320
Small table	4	\$60	\$240
TV set	4	\$350	\$1,400
Cabinet with drawers	4	\$110	\$440
Carpet	12	\$10	\$120
<b>BED ROOM (Master)</b>			
Double bed + mattress	4	\$280	\$1,120
Small side bed	4	\$60	\$240
Cupboard	4	\$460	\$1,840
Hair dressing cabinet	4	\$110	\$440
Stool for hair dressing cabinet	4	\$20	\$80
Cloth + coat hanger	4	\$15	\$60
Chair arm wooden	4	\$50	\$200
<b>DINING ROOM</b>			
Dining table for 4	4	\$130	\$520
Dining chair	16	\$30	\$480
Dining cupboard	4	\$250	\$1,000
<b>SECOND BED ROOM (2 persons)</b>			
Bed single with mattress	4	\$120	\$480
Small side bed	4	\$40	\$160
Cupboard	4	\$240	\$960
Desk single pedestal	4	\$160	\$640
Desk chair arm swivel	8	\$80	\$640
Chair plastic	16	\$20	\$320
<b>KITCHEN ROOM</b>			
Cooking range	4	\$200	\$800
Cooker	4	\$350	\$1,400
Gas cylinder	8	\$15	\$120
Refrigerator	4	\$350	\$1,400
Washing machine	4	\$250	\$1,000
<b>COMMUNICATION DEVICES AND IT</b>			
Radio	2	\$2,000	\$4,000
mobile phone	2	\$50	\$100
Laptops	2	\$1,500	\$3,000
Computers	2	\$1,500	\$3,000
internet connection (hardware)	1	\$100	\$100
<b>TRANSPORT</b>			
Vehicle	10	\$25,000	\$250,000
Bicycle	6	\$70	\$420

Source: UN Millennium Project / Authors' estimation

Table 4 Quantities for rehabilitation and renewal of health facilities

Health Facility	Component requiring rehabilitation	Percentage of existing health facilities requiring rehabilitation	Percentage of total health facilities requiring renewal after 5 years
Dispensary	Building	50%	0%
	equipment and instruments	100%	100%
	Furniture	100%	100%
	communication devices and IT	100%	100%
	Transport	100%	100%
Health Centre	Building	50%	0%
	equipment and instruments	100%	100%
	Furniture	100%	100%
	communication devices and IT	100%	100%
	Transport	100%	100%
District Hospital	Building	50%	0%
	equipment and instruments	100%	100%
	Furniture	100%	100%
	communication devices and IT	100%	100%
	Transport	100%	100%
Regional Hospital	Building	50%	0%
	equipment and instruments	100%	100%
	Furniture	100%	100%
	communication devices and IT	100%	100%
	Transport	100%	100%
Ref. Hospital	Building	-	0%
	equipment and instruments	-	100%
	Furniture	-	100%
	communication devices and IT	-	100%
	Transport	-	100%

Source: MoH / Authors' estimation

Table 5 Classification of cadres

Costing Classification	Cadre (MoH classification)
Specialist	Anaesthesiologist
	Cardiothoracic Surgeon
	Casualty & Emergency Specialist Doctor
	Chest T/B Specialist
	Child Psychologist
	Cytologist
	Dental Community Health Specialist
	Dental Specialist
	Dermatology
	Director Clinical Services
	Disaster Preparedness Specialist Doctor
	ECG/Endoscopy
	Endocrinologist
	ENT Surgeon
	Epidemiologist
	Forensic Medicine Specialist
	Gastroenterologist
	General Surgeons
	Haematologist
	Histopathologist
	Maxillofacial Surgeon
	Medical Physicists
	Medical Record Assistant
	Medical Specialist, Clinical Pharmacologist
	Medical Specialist, Emergency Medicine
	Medical Specialist, ENT
	Medical Specialist, Forensic Medicine
	Medical Specialist, Haematologist
	Medical specialist, Histopathologist
	Medical Specialist, Microbiologist/Immunologist
	Medical Specialist, Obstetrician/Gynaecologist
	Medical Specialist, Ophthalmologist
	Medical Specialist, Paediatrician
	Medical Specialist, Parasitologist
	Medical Specialist, Physician
	Medical Specialist, Psychiatrist
	Medical Specialist, Radiologist
	Medical Specialist, Surgeon
	Medical Specialists, Anaesthetist
	Medical Specialists, Clinical Biochemistry
	Medical Supper Specialist, Anaesthesia
	Medical Supper Specialist, Cardiology
	Medical Supper Specialist, Internal Medicine
	Medical Supper Specialist, Obstetrics/Gynaecology
	Medical Supper Specialist, Paediatrics
	Medical Supper Specialist, Surgery

Costing Classification	Cadre (MoH classification)
	Mobid Anatomy Specialist
	Mortuary Attendants
	Neurologist
	Neurosurgeon
	Obsterics & Gynaecology Specialists
	Obstetrician/Gynaecologist
	Oncologist
	Ophthalmologist
	Orthopaedic Surgeon
	Paediatric Oncologist
	Paediatric Psychiatrist
	Paediatric Surgeon
	Paediatrician
	Parasitologist
	Physician
	Plastic Surgeon
	Psychiatrist
	Psychiatrist Doctor
	Psychologist
	Public Health Specialist
	Pysician
	Radiologist
	Restorative Dent. Specialist
	Specialist Doctors
	Specialist Dental Surgeons
	Surgeon
	Urologist
Doctor	AMO - Anaesthesia
	AMO - Dematology
	AMO - General
	AMO - Ophthalmology
	AMO - Radiology
	AMO Anaesthesia
	AMO -Speciality
	Assistant Dental Officer
	Assistant Medical Officer
	Assistant Medical Officer Anaesthesia
	Biochemist
	Clinical Psychologist
	Dental Officer
	Dental Surgeons
	Medical Doctor
	Medical Officer
	Medical Officer - General
	Medical Officer In Charge
	Medical Officers
Trained Nurses	Diabetic Nurse
	ENT Nurse

Costing Classification	Cadre (MoH classification)
	Nurse B/Nurse Midwife
	Nurse Counsellor
	Nurse Midwife/Trained Nurse
	Nurse Officer in Charge
	Nurse Paediatrician
	Nurse/Nurse Midwife
	Nurse/Nurse Midwives
	Nursing Officer
	Nursing Officer - General
	Nursing Officer - Speciality
	Nursing Officer (General)
	Nursing Officer (Speciality)
	Nursing Officer A
	Nursing Services and Quality Assurance
	Nursing Officer General
	Nurse Tutors
	Ophthalmic Nursing Officer
	Public Health B
	Public Health Nurse
	Public Health Nurse A
	Public Health Nurse B
	Trained Nurses
Pharmacists / Chemists	Pharmacist
	Pharmacists
Technicians	Biochemistry and Clinical Chemistry
	Chemical Laboratory Technicians
	Dental Laboratory Technologist
	Dental Technician
	Dental Therapist
	EEG Technician
	General Technician
	Haematology and Blood Transfusion
	Health Technician
	Laboratory Technicians (Dip)
	Laboratory Technologist (Adv. Dip)
	Laboratory Technician
	Laboratory Technologist
	Laboratory Technologist - General
	Maxillofacial Technician
	Mechanical Technician
	Medical Laboratory Technicians
	Microbiology/Parasitology
	Occupational Therapist
	Ophthalmic Optician
	Optometrist
	Optometry Technicians
	Orthopaedic Technician
	Pharmaceutical Technician

Costing Classification	Cadre (MoH classification)
	Physiotherapist
	Radiographer
	Radiographers
	Speech Therapist
	Technician - Imaging Equipment
	Technician - Laboratory Equipment
	Technician - Theatre Equipment
	Technician (FTC) Electrical
	Technician (FTC) Electronic
	Technician (FTC), Laboratory
	Technician, Automobile
	Technician, Biomedical
	Technician, Civil
	Technician, ECG
	Technician, EEG
	Technician, Information Technology
	Technician, Mechanical
	Technician, Pharmaceutical
	Technician, Telephone
	Technicians - Electronics
Other medical staff	Assistant Clinical Officer
	Biomedical Engineer
	Biostatistician
	Blood Donor Counsellor
	Blood Donor Organizer
	Blood Donor Phlebotomist
	Blood Donor Recruiter/Organizer
	Clinical Officer
	Clinical Officer in Charge
	Counsellor
	Dental Therapist
	Dermographer
	Dietician
	Educationist
	Environmental Scientist
	Health Officer
	Laboratory Assistant
	Laboratory Attendants
	MCH Aides
	Nutritionist
	Occupation Therapy Assistant
	Occupational Therapist
	Occupational Therapist 1
	Pharmaceutical Assistant
	Physiotherapist
	Radiographic Assistant
	Radiographic Assistant
	Research Officer
Other Non-Medical Staff	<i>All other non-classified staff</i>
	Artisans

Costing Classification	Cadre (MoH classification)
	Audiometrist
	Carpenter
	Catering Officers
	Civil Technician
	Computer Analyst
	Computer Operator
	Cook
	Craftsman, Civil
	Customer Service Officer
	Data Entry Clerk
	Dental Attendant
	Dhobi
	Drainage
	Driver
	Electrical Technician
	Engineer, Civil
	Gardener
	Health Attendant
	Incinerator Operator
	IT and System Development Manager
	Kitchen Attendant
	Laboratory Assistants
	Laboratory Attendant
	Labourer
	Launderer
	Laundry Manager
	Livestock/Field Officer
	Mason
	Medical Attendant
	Medical Attendant
	Medical Attendant Nurse
	Medical Attendants
	Medical Record Officer
	Medical Recorder
	Medical Records Technician
	Microbiologist
	Mortuary Attendant
	Nursing Attendant
	Office Attendant
	Officer Attendant
	Office Attendant
	Painter
	Pharmaceutical Attendant
	Plumber
	Registry Assistant
	Registry Clerk
	Sanitary Labourer



Costing Classification	Cadre (MoH classification)
	Security Officer
	Social Worker
	Statistician
	Store Clerks/Attendants
	Supplies Assistant
	Telephone Operator
	Telephone Operators
	Telephone Supervisor
	Trained Cook
	Typyst
	Watchman
	Watchman/Security Guards
	Watchmen
	X-Ray Attendant
Administrators	Accoountants
	Accoountants Assistants
	Accountant
	Accountant Assistant
	Accounts Assistant
	Administrative Manager
	Administrator
	Assistant Accountant
	Assistant Accountants
	Assistant HR Officer
	Assistant System Administrator
	Cash Collector
	Cashier
	Catering Officer
	Chief Accountant
	Chief Supplies Officer
	Civil Engineer
	Director
	Director of Finance
	Director of Maintenance
	Director of Management Services
	Director of Training and Research
	Electrical Engineer
	Engineer, Electrical
	Engineer, Electronic
	Engineer, Mechanical
	Estates Manager
	Executive Dirctor
	Executive Director
	Health Secretaries
	Hospital Secretary
	Human Resource Manager
	Human Resource Officer/Administrative Officer
	Internal Auditor

Costing Classification	Cadre (MoH classification)
	Legal and Contract Officer
	Legal Officer
	Mechanical Engineer
	Medical Record Officer
	Office Attendant
	Officer Supervisor/Registry Attendant
	Personal Secretary
	Public Relation Officer
	Public Relations Officer
	Security Officer
	Social Worker
	Supplies Assistant
	Supplies Officer
	System Administrator
	Transport Officer
	Warehousing Officer

Table 6 Unit cost of in-service training and of attendance of int. meetings by specialists

Activity	Cost Component	Unit Cost (cost per participant)
In-service-training (higher learning institutions, short course) of specialists	school fees per participant	500
	fare per participant	50
	Allowance	350
In-service-training (higher learning institutions, long course) of doctors / specializing / upgrading	school fees per participant	10,000
	fare per participant	150
	Allowance	2,400
In-service-training (higher learning institutions, short course) of doctors	Fees	1,500
	Allowance	560
In-service-training (long-course, in MoH institutions as above) of nurses (upgrading)	training cost per participant	2,500
	allowance per participant	1,200
	fare per participant	150
	Accommodation per participant	600
In-service-training (short-course(on-the-job training, in MoH institutions as above) of nurses	training cost per participant	800
	allowance per participant	420
	fare per participant	50
In-service-training (long-course, in MoH institutions as above) of technicians	training cost per participant	2,500
	allowance per participant	1,200
	fare per participant	50
In-service-training (long-course, in MoH institutions as above) of other medical staff	training cost per participant	2,500
	allowance per participant	1,200
	fare per participant	50
Attendance of international meetings by specialists	Allowance	1,000
	fare per participant	1,500
On-the-job training (esp. IT) of other technical staff	consultancy fees	300
	per diem	30

Source: Authors' Estimation

Table 7 Cost per case for child health

Health Service	Activity	Cost component	Cost per case
IMCI - Outpatient Treatment	Acute Respiratory Infections	drugs and supplies	0
	All diarrheal diseases	drugs and supplies	0
	All ear infections	drugs and supplies	0
	Acute ear infection	drugs and supplies	\$0.18
	Anaemia	drugs and supplies	\$0.11
	Chronic ear infection	drugs and supplies	\$0.00
	Cough or cold	drugs and supplies	\$0.00
	Dysentery	drugs and supplies	\$0.22
	Fever - Malaria unlikely	drugs and supplies	\$0.02
	Malaria	drugs and supplies	\$0.02
	Mastoiditis	drugs and supplies	\$0.16
	Measles	drugs and supplies	\$0.06
	Measles with eye or mouth complications	drugs and supplies	\$1.07
	No dehydration	drugs and supplies	\$0.16
	Persistent diarrhoea	drugs and supplies	\$0.16
	Pneumonia	drugs and supplies	\$0.20
	Severe anaemia	drugs and supplies	\$0.06
	Severe complicated measles	drugs and supplies	\$1.14
	Severe dehydration	drugs and supplies	\$1.39
	Severe malnutrition	drugs and supplies	\$0.06
	Severe persistent diarrhoea	drugs and supplies	\$1.35
	Severe pneumonia or very severe disease	drugs and supplies	\$0.15
	Some dehydration	drugs and supplies	\$0.23
	Very low weight	drugs and supplies	\$0.00
Very severe febrile disease	drugs and supplies	\$0.43	
IMCI - Inpatient Treatment	Acute Respiratory Infections	drugs and supplies	0
	Bacterial Diarrheal Diseases	drugs and supplies	0
	Dengue haemorrhagic fever	drugs and supplies	\$24.90
	Diphtheria	drugs and supplies	\$46.79
	Emergency treatment	drugs and supplies	\$0.54
	Heart failure	drugs and supplies	\$30.19
	Mastoiditis	drugs and supplies	\$27.24
	Meningitis	drugs and supplies	\$45.10
	Other Respiratory Diseases, including	drugs and supplies	\$0.00
	Pertussis	drugs and supplies	\$17.86
	Pleural effusion and empyema	drugs and supplies	\$58.84
	Septic arthritis	drugs and supplies	\$3.42
	Septicaemia	drugs and supplies	\$39.05
	Severe anemia	drugs and supplies	\$132.56
	Severe asthma	drugs and supplies	\$0.35
	Severe complicated measles	drugs and supplies	\$41.63
	Severe dehydration	drugs and supplies	\$1.27
	Severe dysentery	drugs and supplies	\$13.82
	Severe Malaria	drugs and supplies	\$0.00
	Severe malnutrition	drugs and supplies	\$30.28
Severe persistent diarrhoea	drugs and supplies	\$12.12	

Health Service	Activity	Cost component	Cost per case
	Severe pneumonia	drugs and supplies	\$29.45
	Tuberculosis	drugs and supplies	\$40.03
	Typhoid fever	drugs and supplies	\$34.25
	Uncomplicated malaria	drugs and supplies	\$0.00
	Urinary Tract Infection	drugs and supplies	\$7.17
	Very severe pneumonia	drugs and supplies	\$125.34
	Viral croup	drugs and supplies	\$11.68
Immunization	BCG	drugs and supplies	\$0.17
	DPT 1	drugs and supplies	\$0.10
	DPT 2	drugs and supplies	\$0.10
	DPT 3	drugs and supplies	\$0.10
	Hepatitis B 1	drugs and supplies	\$0.21
	Hepatitis B 2	drugs and supplies	\$0.21
	Hepatitis B 3	drugs and supplies	\$0.21
	Hib 1	drugs and supplies	\$0.00
	Hib 2	drugs and supplies	\$0.00
	Hib 3	drugs and supplies	\$0.00
	Measles	drugs and supplies	\$0.32
	MMR	drugs and supplies	\$0.00
	Polio 1	drugs and supplies	\$0.11
	Polio 2	drugs and supplies	\$0.11
	Polio 3	drugs and supplies	\$0.11
	Yellow Fever	drugs and supplies	\$0.49
	Transport of vaccines	Vehicles	
		Fuel for Vehicles (liter)	
		Maintenance of vehicles	
		Refrigeration + kerosene	
De-worming programme	Provision of drugs	Pharmaceuticals	
		<i>Lunch allowances</i>	

Source: UN Millennium Project / Authors' Estimation

Table 8 Number of cases for child health

Health Service	Disease	Cases in 2000	Proportion (in % of under fives 2000)
IMCI - Outpatient Treatment	Acute Respiratory Infections	621,738	11.12%
	All diarrheal diseases	317,864	5.69%
	All ear infections	68,654	1.23%
	Acute ear infection	-	0.00%
	Anaemias (all)	88,933	1.59%
	Chronic ear infection	-	0.00%
	Cough or cold	-	0.00%
	Dysentery	-	0.00%
	Fever - Malaria unlikely	-	0.00%
	Malaria	1,661,533	29.73%
	Mastoiditis	-	0.00%
	Measles	4,457	0.08%
	Measles with eye or mouth complications	-	0.00%
	No dehydration	-	0.00%
	Persistent diarrhea	-	0.00%
	Pneumonia	344,410	6.16%
	Severe anaemia	-	0.00%
	Severe complicated measles	-	0.00%
	Severe dehydration	-	0.00%
	Severe malnutrition	206,795	3.70%
	Severe persistent diarrhea	-	0.00%
	Severe pneumonia or very severe disease	-	0.00%
	Some dehydration	-	0.00%
	Very low weight	-	0.00%
Very severe febrile disease	-	0.00%	
IMCI - Outpatient Treatment	Acute Respiratory Infections	6,401	0.11%
	Bacterial Diarrheal Diseases	3,102	0.06%
	Dengue haemorrhagic fever	-	0.00%
	Diphtheria	-	0.00%
	Emergency Treatment	-	0.00%
	Heart failure	-	0.00%
	Mastoiditis	-	0.00%
	Meningitis	-	0.00%
	Other Respiratory Diseases, including	1,555	0.03%
	Pertussis	-	0.00%
	Pleural effusion and empyema	-	0.00%
	Septic arthritis	-	0.00%
	Septicaemia	-	0.00%
	Severe anaemia	19,813	0.35%
	Severe asthma	-	0.00%
	Severe complicated measles	-	0.00%
	Severe dehydration	9,600	0.17%
	Severe dysentery	-	0.00%
	Severe malaria	16,931	0.30%
	Severe malnutrition	-	0.00%
	Severe persistent diarrhea	-	0.00%
	Severe pneumonia	23,165	0.41%
	Tuberculosis	-	0.00%
	Typhoid fever	-	0.00%
	Uncomplicated malaria	64,837	1.16%
	Urinary Tract Infection	-	0.00%
	Very severe pneumonia/disease	-	0.00%
Viral croup	-	0.00%	

Source: Statistical Abstract 2002, DHS 05 and Authors' calculations

Table 9 Cost per case for malaria

Health Service	Activity	Cost Component	Cost per Case
Treatment	Diagnostic Testing	drugs and supplies	0.50
	Uncomplicated Malaria (outpatient)	drugs and supplies	2.00
	Complicated Malaria (inpatient)	drugs and supplies	8.00
Prevention	Vector control through the use of ITNs	supply of ITN	6.50
	Prevention of malaria in pregnancy	drug for IPT and supply of ITN	6.80
	Emergency preparedness, prevention and containment	drug (spraying) and supply	0.91
	Promotion of positive health practices	communication	0.04

Source: MoH

Table 10 Population in need for malaria treatment and prevention in 2000

Health Service	Activity	Reference Population	Percentage in Need
Treatment	Diagnostic Testing	total population	48.2%
	Uncomplicated Malaria (outpatient)	total population	48.2%
	Complicated Malaria (inpatient)	total population	4.8%
Prevention	Vector control through the use of ITNs	children under one	85.0%
	Prevention of malaria in pregnancy	pregnant women	33.0%
	Emergency preparedness, prevention and containment	total population	1.5%
	Promotion of positive health practices	total population	80.0%

Source: MoH

Table 11 Cost per case for maternal health

Intervention / Health Service	Activities	Unit cost
Family Planning	Oral Contraceptives (Pill)	5.09
	Injectables	3.85
	Condom – Male	2.85
	Condom – Female	118.10
	Intrauterine Device (IUD)	1.24
	Implant	25.89
	Sterilization - Female	4.73
	Sterilization – Male	0.88
	Other Method	0.00
	Emergency Contraceptives (EC)	0.29
ANC and Delivery Care	Antenatal Care (ANC)	4.86
	Malaria Prevention within ANC	5.64
	Malaria Treatment within ANC	11.23
	Delivery Care	5.24
	Postpartum Care	0.23
Obstetric Complications	Prolonged Labour (>18 hours)	1.61
	Forceps or Vacuum-Assisted Delivery (AVD)	4.39
	Cesarean Section (C-Section)	33.24
	Postpartum Hemorrhage	41.24
	Puerperal Sepsis	25.71
	Hypertensive Disorders of Pregnancy (eclampsia & pre-ecl.)	11.21
	Postabortion Complications (PAC)	12.03
Other Maternal Conditions	Obstetric Fistula (OF)	33.58
	Urinary Tract Infection (UTI)	0.30
	Mastitis	1.07

Intervention / Health Service	Activities	Unit cost
Newborn Interventions	Prevention of Ophthalmia Neonatorum	0.02
	Treatment of Neonatal Complications (LBW, Sepsis, etc.)	26.05
	Prevention of Mother-to-Child Transmission of HIV (PMTCT)	54.93
Sexually Transmitted Infections	Chlamydia	0.97
	Gonorrhea	0.56
	Syphilis	2.77
	Trichomonas	0.63
	Pelvic Inflammatory Disease (PID)	0.64

Source: UN Millennium Project

Table 12 Percentage of reference population in need for maternal health related activities

Health Service	Activity	Reference Population	Percentage of Reference Population in need (for family planning: method mix)
Family Planning	Oral Contraceptives (Pill)	married women in reproductive age	20.90%
	Injectables	married women in reproductive age	24.80%
	Condom – Male	married women in reproductive age	10.60%
	Condom – Female	married women in reproductive age	0.00%
	Intrauterine Device (IUD)	married women in reproductive age	1.60%
	Implant	married women in reproductive age	0.00%
	Sterilization - Female	married women in reproductive age	7.90%
	Sterilization – Male	married women in reproductive age	0.00%
	Other Method	married women in reproductive age	0.40%
Emergency Contraceptives (EC)	married women in reproductive age	0.00%	
ANC and Delivery Care	Antenatal Care (ANC)	pregnant women	100.00%
	Delivery Care	number of births	100%
	Postpartum Care	number of births	100%
Obstetric Complications	Prolonged Labour (>18 hours)	number of births	7.94%
	Forceps or Vacuum-Assisted Delivery (AVD)	number of births	3.97%
	Cesarean Section (C-Section)	number of births	6.62%
	Postpartum Hemorrhage	number of births	5.11%
	Puerperal Sepsis	number of births	6.50%
	Hypertensive Disorders of Pregnancy (eclampsia & pre-ecl.)	number of births	6.43%
	Postabortion Complications (PAC)	number of births	3.00%
Newborn Interventions	Prevention of Ophthalmia Neonatorum	number of births	100.00%
	Treatment of Neonatal Complications (LBW, Sepsis, etc.)	number of births	10.00%
	Prevention of Mother-to-Child Transmission of HIV (PMTCT)	number of births	8.80%
Sexually Transmitted Infections	Chlamydia	Women in reproductive age	1.23%
	Gonorrhea	Women in reproductive age	6.29%
	Syphilis	Women in reproductive age	5.86%
	Trichomonas	Women in reproductive age	11.34%
	Pelvic Inflammatory Disease (PID)	Women in reproductive age	2.53%

Source: UN Millennium Project



Table 13 Current and target coverage for maternal health related activities

Health service	Current coverage	Coverage target
Contraceptive Prevalence Rate (all methods)	25.39%	40.77%
Delivery Coverage Rate	36%	94%
Coverage Rate Skilled Attendance	36%	94%
STI Coverage Rate	24%	92%

Source: UN Millennium Project

Table 14 Costs per case / unit costs for HIV/AIDS related health services

Health Service	Activity	Cost Component	Cost per Case / Unit Cost
Safe blood	Safe Blood Transmission	supplies	14.53
Reduction of stigma and discrimination of PLWHAs	Awareness creation and sensitization of general public through media	radio and TV programmes	0.45
Promotion of safer Sex	Procurement and distribution of male condoms	supplies	1.15
Voluntary Counselling and Testing	Procurement and distribution of reagents and other medical supplies	reagents and supplies to test sero positive	4.57
Voluntary Counselling and Testing	Procurement and distribution of reagents and other medical supplies	reagents and supplies to test sero negative	6.18
Voluntary Counselling and Testing	Training of counsellors	supplies and allowance	2033.33
Care and Treatment	Provide Antiretroviral drugs to adults, 1st line	drugs and supplies	370.52
	Provide Antiretroviral drugs to adults, 2nd line	drugs and supplies	3661.54
	Provide Antiretroviral drugs to children, 1st line	drugs and supplies	955.80
	Provide Antiretroviral drugs to children, 2nd line	drugs and supplies	5576.68

Source: MoH, 2005 and Dr. Sommi (personal communication)

Table 15 Quantities for HIV/AIDS related health services

Health Service	Activity	Reference Group for Quantity	Quantity
Safe blood	Safe Blood Transmission	fixed quantity	210,000
Reduction of stigma and discrimination of PLWHAs	Awareness creation and sensitization of general public through media	total population	10.00%
Promotion of safer Sex	Procurement and distribution of male condoms	sexually active population	60.00%
Voluntary Counselling and Testing	Procurement and distribution of reagents and other medical supplies	fixed quantity	600,000
Voluntary Counselling and Testing	Procurement and distribution of reagents and other medical supplies	fixed quantity	60,000
Voluntary Counselling and Testing	Training of counsellors	fixed quantity	210
Care and Treatment	Provide Antiretroviral drugs to adults, 1st line	fixed quantity	88,200
Care and Treatment	Provide Antiretroviral drugs to adults, 2nd line	fixed quantity	1,800
Care and Treatment	Provide Antiretroviral drugs to children, 1st line	fixed quantity	800
Care and Treatment	Provide Antiretroviral drugs to children, 2nd line	fixed quantity	200

Source: MoH, 2004

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