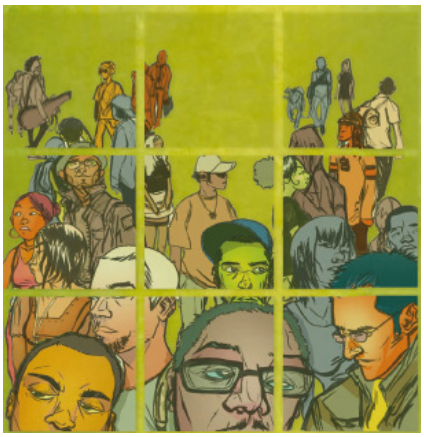
# Improving health system efficiency as a means of moving towards universal coverage

Dan Chisholm and David B. Evans

**World Health Report (2010)**
**Background Paper, 28**

**HEALTH SYSTEMS FINANCING**
The path to universal coverage

World Health Organization



# Improving health system efficiency as a means of moving towards universal coverage

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**Dan Chisholm[1] and David B. Evans[1]**

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## 1. Introduction / overview

Five years ago, the 58th session of the World health Assembly endorsed a resolution urging member states to work towards sustainable health financing, with a view to achieving 'universal coverage' - the latter defined in terms of 'access to key promotive, preventive, curative and rehabilitative health interventions for all at an affordable cost, thereby achieving equity in access' (WHO, 2005). A number of implications follow from such a defined goal, including 1) the need to specify what interventions are considered 'key' in a particular context, and 2) the need to generate sufficient funds to ensure that these key interventions or services are made available and affordable to all (including those with very limited ability to contribute funds themselves). A further, more distal implication is that by securing such universal access, significant strides forward can be made in terms of the defining goal of health systems, namely health improvements. In this HSF working paper, prepared as a background document for the *World Health Report 2010* on financing for universal coverage, we set out to look into these implications from the economic or efficiency perspective.

As defined above, universal coverage necessarily requires a high level of health service output, i.e. access for all those in need to a core set of health interventions (the precise range of covered services or interventions will depend on the availability of resources in a country, as well as the local epidemiological context). In order to achieve the complete coverage of these interventions in the population, a high level of resource inputs will also be needed. It is therefore important to use these resources efficiently. At its most fundamental, efficiency in the health sector should be about attaining the highest level of health possible with the available resources (together with the realization of other key health system goals around financial protection and responsiveness to the needs of service users); commonly, however, efficiency is also assessed in (more intermediate) terms as the amount or mix of service outputs that can be produced within a fixed budget. Use of such intermediate or proxy measures of efficiency potentially diverts attention away from the primary unit of interest (health improvements), but has the advantage of being more easily measured over the shorter term - health outcomes, by contrast, may take many years to materialise - and are unaffected by other, environmental factors that might influence health outcomes (Smith, 2009). We consider the evidence for both forms of (in)efficiency, and ask the question of how far towards universal coverage would removal of existing inefficiencies take countries (i.e., what extra amounts would be available for reinvestment if efficiency improvements were realized?). In so doing, we also attempt to identify and examine a 'top 10' sources of inefficiency in the health sector (and how to overcome them), as these will most notably affect the formulation or provision of 'key' interventions or the generation of a sufficient resource base necessary for universal coverage.

Before that, we start out by identifying a group of countries who, in simple input-output terms, are relatively efficient producers of health; that is, they generate high levels of population-level health (defined in terms of life expectancy) for the amount of money that they invest into health. What makes these countries perform better than others at a similar (or even higher) level of health spending or economic development? Analysis of these countries' health systems may provide helpful insights into what might constitute critical success factors for

universal coverage. In short, is there a strong relationship between performance (the efficient production of health) and universal coverage (equality of access to health)?

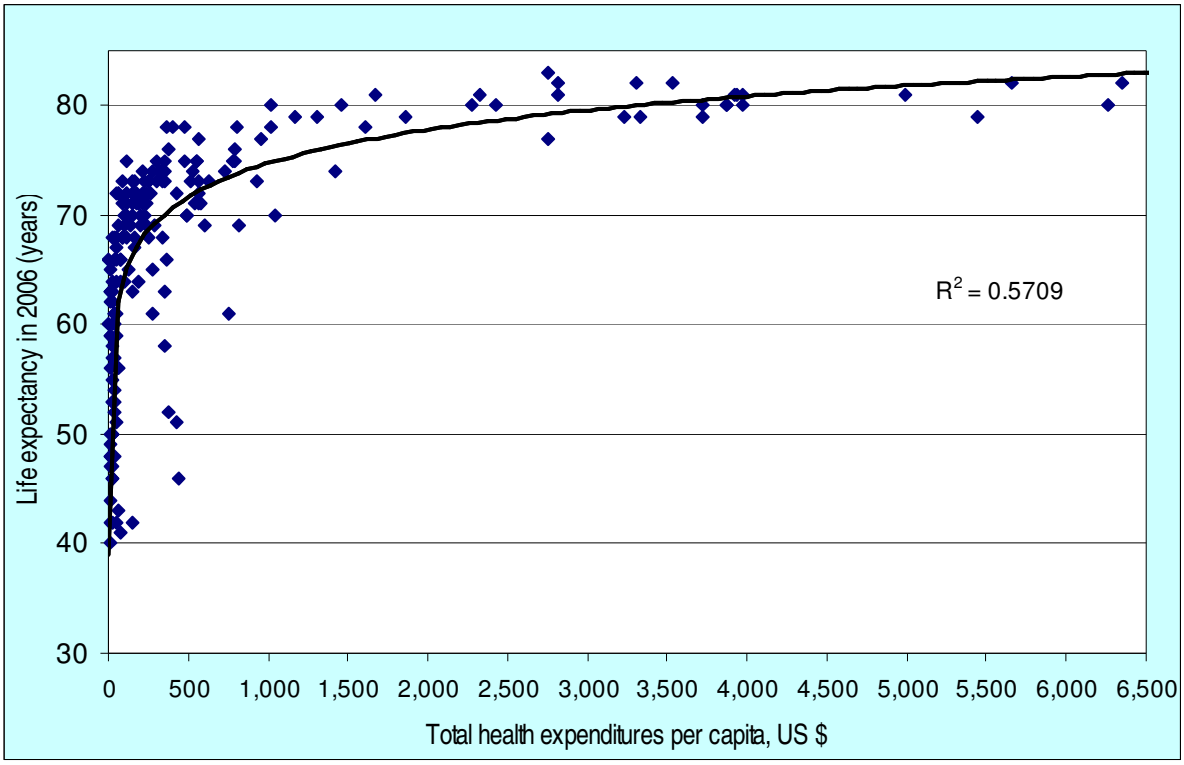
## 2. 'High-performing' countries: showing the way to universal coverage?

Figure 1 reveals a telling degree of correlation between the inputs that countries put into health and the return they derive in terms of health outcomes ($R^2 = 0.57$), but also illustrates vast differences between countries, both in terms of health spending - from less than US$ 10 to more than US$ 6,000 - and in life expectancy (ranging from 40 to more than 80 years). Figure 2 zooms in on countries with health spending of US$ 10-1,000 per person, and identifies a number who achieve a relatively high life expectancy for the resources they put in. What might explain why the ratio of health outcome to health spending in these countries is so much better than comparator countries on or above the line? Some examples help to illustrate the point:

- Life expectancy in Paraguay and Uruguay is the same (75 years); but Uruguay spends four times as much on health services (US$ 476 compared to US$ 117);
- Brazil, Chile and Cost Rica all spend over US$ 400 per head on health, but life expectancy in Brazil is 6 years lower than the 78 years achieved in the other two countries.
- China spends the same on health as Egypt (US$ 92-94 per capita) but each newborn in China can expect to live an extra 5 years (to the age of 73, which is the same as that achieved in Peru, Turkey and Hungary, but at considerably less cost).

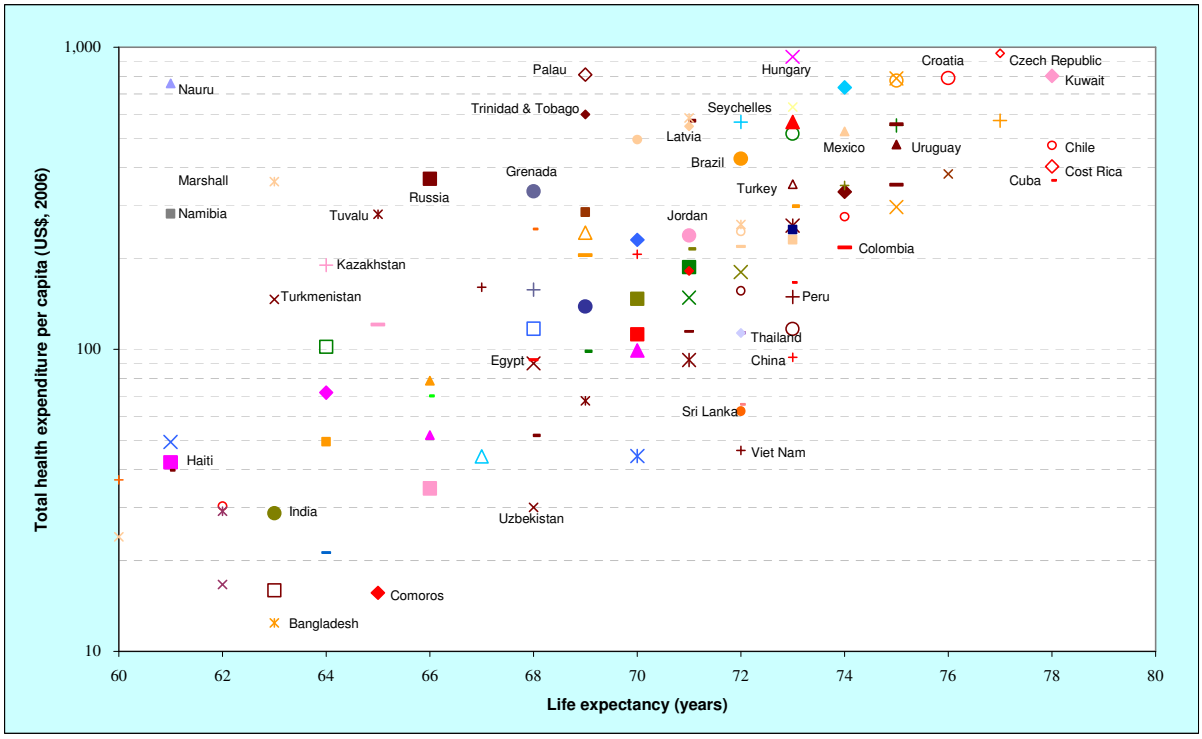
Simply eye-balling Figure 2 shows that many of the countries with a less favourable ratio are in fact small and in many cases remote island populations (Nauru, Palau, Seychelles, Marshall Islands, Trinidad and Tobago, Grenada), all of whom therefore face the problem of diseconomies of scale and scope (e.g. the fixed, unavoidable costs of running and overseeing a health system are shared across a small pool of potential users).

*Figure 1* *Correlation between health expenditures and outcomes (2006)*




Source: WHO (2009)

*Figure 2* *Health expenditures and outcome for WHO member states with life expectancy of 60-80 years and spending in the range $10-1,000*



Other outlier countries above the line include Hungary, Latvia, Kazakhstan, Turkmenistan and the Russian Federation, all of whom are characterized by high levels of exposure to chronic disease risk factors (particularly alcohol and tobacco use) and consequently elevated rates of adult mortality. Moving to the other end of the spectrum, a number of countries stand out as relatively 'high performers':

- Chile, Costa Rica and Cuba, all of whom spend in the range of US$ 350-470 per person per year and where life expectancy at birth has now reached 78 years;
- at a lower level of expenditure and outcome - US$ 50-100, but where life expectancy still exceeds 70 years - China, Viet Nam and Sri Lanka stand-out;
- in between, a third cluster of countries can be discerned (Colombia, Peru, Thailand).

Table 1 below provides a number of health and socioeconomic indicators for these relatively well-performing countries (WHO, 2009) [2]. As well as the better than average ratio of health spending to life expectancy, a number of other common features stand out. All of these countries devote 4-7% of their national wealth to health, which although insufficient to meet all legitimate needs for health interventions, is appreciably higher than many low-income countries (where the average is closer to 2-3%). In addition, all of these countries have well-educated populations (as indicated by adult literacy and primary school enrolment rates of at least 90%).

***Table 1 Health and socioeconomic characteristics of 'high performing' countries***

| Selected indicators (2006, unless specified otherwise) | | Chile | Costa Rica | Cuba | Colombia | Peru | Thailand | Sri Lanka | China | Viet Nam |
|---|---|---|---|---|---|---|---|---|---|---|
| HEALTH | | | | | | | | | | |
| Health care inputs | *Density of physicians / nurses (per 1,000 population)* | 1.09/0.63 | 1.32/0.92 | 5.91/7.44 | 1.35/0.55 | 1.17/0.67 | 0.37/2.82 | 0.55/1.58 | 1.06/1.05 | 0.53/0.56 |
| | ***Per capita health spending (US$)*** | **$ 473** | **$ 353** | **$ 355** | **$ 217** | **$ 145** | **$ 113** | **$ 60** | **$ 90** | **$ 46** |
| | *Per capita health expenditure (PPP int. $)* | $ 697 | $ 743 | $ 363 | $ 626 | $ 300 | $ 346 | $ 213 | $ 342 | $ 264 |
| | *Total expenditure on health as % of GDP* | 5% | 7% | 7% | 7% | 4% | 4% | 4% | 5% | 7% |
| | *Government spending as % of total health spending* | 53% | 68% | 92% | 85% | 58% | 65% | 48% | 41% | 32% |
| Fairness (financing) | *Out-of-pocket spending as % of total health spending* | 26% | 19% | 9% | 6% | 33% | 27% | 44% | 54% | 61% |
| Health outcome | *Under-5 mortality rate (%) both sexes* | 0.9% | 1.2% | 0.7% | 2.1% | 2.5% | 0.8% | 1.3% | 2.4% | 1.7% |
| | ***Life expectancy at birth (years) both sexes*** | **78** | **78** | **78** | **74** | **73** | **72** | **72** | **73** | **72** |
| Efficiency | *Efficiency index, 2000 (0-1 scale; 1 = efficient)** | 0.88 | 0.88 | 0.85 | 0.81 | 0.66 | 0.71 | 0.78 | 0.80 | 0.61 |
| GENERAL | | | | | | | | | | |
| Demography | *Population size (millions)* | 16 | 4 | 11 | 46 | 28 | 63 | 19 | 1,328 | 86 |
| Education | *Adult literacy rate (%)* | 96% | 95% | 100% | 93% | 88% | 93% | 91% | 91% | 90% |
| | *Net primary school enrolment ratio female (%)* | 89% | 88% | 98% | 90% | 98% | 94% | 100% | 96% | 91% |
| Wealth | *Gross national income per capita (PPP int. $)* | $11,300 | $ 9,220 | $ 4,399 | $ 6,130 | $ 6,490 | $ 7,440 | $ 3,730 | $ 4,660 | $ 2,310 |
| Fairness (income) | *Gini coefficient (0-100 scale; 0 = perfect equality)* | 55 | 50 | - | 59 | 52 | 42 | 40 | 47 | 34 |

[2] There are also countries at lower levels of health expenditure (< $30), such as Bangladesh and Uzbekistan, who have comparatively good life expectancy, but in no case does this reach 70 years. As argued in the World Health Report 2000, there is a critical threshold (of around $50-60) below which it is really not feasible to provide a comprehensive range of interventions or services, so these latter countries would not appear to provide the best examples to follow in the pursuit of universal coverage.

In other respects, however, there remain notable differences: for example, there is a three-fold variation in the under-5 mortality rate, and out-of-pocket [OOP] spending ranges from below 10% to more than 50% of total health expenditures (or put conversely, governments contribute 32-92% towards total health spending). Since OOP payments represent the most regressive form of paying for health care, this measure provides a relevant measure of the fairness of health financing in a country, and might therefore be expected to be correlated with the fairness with which societal income is distributed (as measured by the Gini coefficient, for example). In fact, no such association emerges for this set of nations, since there exist countries with a highly inequitable distribution of wealth (such as Colombia) where the rate of OOP health spending is in fact low, while certain other countries with a much more equitable distribution of wealth (such as Viet Nam) have very significant levels of OOP health spending. So on the face of it, apart from having a well-educated population and investing a reasonable amount of society's resources in the health system, such a collection of statistics does not really shed a great deal of light on the question of why these countries stand out as relatively good performers. Perhaps this should come as no surprise, since such a static snapshot is unable to reflect the historical trends that may have importantly influenced the present situation. Also, efficiency is not the sole objective of a health system, so it is possible that some degree of efficiency has been sacrificed by countries in favour of other valued goals such as financial risk protection or improved equity in access to health care.

A more formal, regression-based approach to the question of comparative efficiency across countries can also be undertaken. For example, Evans et al (2001) use panel data to produce an efficiency index for all WHO member states, using healthy life expectancy as the measure of health system output, total per capita health spending in international dollars as the measure of health system inputs, and average years of schooling among adults as a proxy measure of 'non-health system' inputs to health production. Although somewhat outdated now due to the major health system changes that have occurred in some of the nine selected countries over the last decade (such as Thailand), efficiency index scores - included in Table 1 for reference - are relatively high (> 0.75) for Chile, Cuba, Costa Rica, Colombia, Sri Lanka and China.

An alternative but complementary approach to appraising the health systems of these selected countries is via a more qualitative assessment of the ***three core dimensions of universal coverage*** (WHO, 2008), namely its depth (what proportion of the population is covered by some form of insurance or pre-payment?), its breadth (the range of services or interventions that are available to members of the insured pool), and also its height (the proportion of total costs covered by pre-payment). A summary for each of the 9 countries is given in Table 2.

***Table 2*** ***Dimensions of universal coverage in 'high-performing' countries***

| Country *(Reference No.)* | Dimensions of universal coverage | | |
|---|---|---|---|
| | **Breadth** *(proportion of population insured)* | **Depth** *(scope /range of services available)* | **Height** *(proportion of costs covered)* |
| Chile [7] | Universal coverage is guaranteed by law. Public and private providers are required to offer a mandatory benefit package and there are guaranteed limits on waiting times / copayments. | There is a defined medical benefits package, which consists of explicitly prioritized interventions for 56 specified conditions (paid for out of taxation and private insurance premiums). | Primary care is free at the point of use, whereas secondary care is subject to copayments (which together with OOP payments for non-insured treatment make up 26% of total health spending). |
| Costa Rica [26] | Major reforms introduced in 1998 have resulted in universal coverage: mandatory SHI for workers / pensioners; voluntary insurance for informal workers / unemployed; and state subsidies for the poor. | A decentralized, comprehensive care model is in place, consisting of a primary care strategy with integrated basic health care teams and secondary care services. | A large proportion of costs (over 80%) covered by pre-payment mechanisms; OOP payments account for 19% of all health spending (largely by uninsured persons ineligible for state subsidies) |
| Cuba [18] | Core health reforms were introduced in the 1970s and 1980s, including decentralization of services and the expansion of primary care. Access to care is universal. | A full range of preventive and curative health interventions are provided by the state via a large primary care network - private providers are barred. | Health services are free at the point of use. OOP payments represent < 10% of total health spending. |
| Colombia [20] | Universal coverage was introduced by law in 1993: workers pay into a contributory scheme, while the poor are covered by a subsidized (means-tested) scheme. A proportion of the poor remain uninsured [1]. | The basic benefits package for the contributory scheme includes all levels of care, while the subsidized scheme is less comprehensive (but complemented by public hospital services that receive state subsidies) [a]. | Although a proportion of the population remains uninsured and at risk of impoverishment due to health care spending, OOP payments account for less than 10% of all health expenditures. |
| Peru [11] | Although a public health insurance system has been introduced for those without private or social insurance arrangements, more than half of the population remains uninsured [b]. | A basic health care package is available to those covered by the MoH's health insurance system. | One third of all health spending comes OOP. |
| Thailand [34] | Universal coverage policy introduced via a major health reform process in 2001. All members of the population are eligible to receive treatment in their locality for a fixed fee per episode, once registered. | A defined benefit package was stipulated under the '30 Baht scheme'. Earlier exclusions such as antiretroviral therapy, haemodialysis now covered (subject to a cost ceiling). | 30 Baht (< US$1) is charged to paying members per episode of local treatment (outside their local area, only accident and emergency care is covered). OOP still accounts for 27% of all health spending. |
| Sri Lanka [51] | Dating back many decades, access to government health services continues to be available to all. There is no social insurance, but some employers (and individuals) purchase private medical benefit schemes. | A full range of health services - paid out of general tax revenues - are available at government health facilities. No referral system is in place. Implicit rationing mechanisms are used to contain costs. | State-provided health services are free at the point of use (or highly subsidized), yet half of all health spending comes OOP (for drugs bought OTC but also because the rich opt to use private providers). |
| China [33] | State insurance schemes have been rapidly expanded in recent years and now cover up to 70% of the population. | The health service benefit package is limited, with most outpatient visits and some inpatient admissions not fully insured. | Over half of all health spending comes from OOP payments, reflecting high fees and copayments. |
| Viet Nam [41] | SHI for government and corporate employees; state subsidies for children, the poor and other 'policy beneficiaries'; voluntary insurance for others. Overall coverage rate across all schemes is only about 50%. | The basic package is similar for all, covering most inpatient and outpatient care. Exclusions include programs for HIV and drug use disorders, dental care, cosmetic surgery and drugs not on MoH list. | More than half of all health spending comes from OOP payments, not just from those uninsured but also in the form of co-payments by the insured (for example, OTC drug costs are not reimbursed). |

Abbreviations: OOP, out-of-pocket; OTC, over-the-counter; SHI, social health insurance;
Notes: [a] This has led to a surge of personal writs or *tutelas* pertaining to the right to health, culminating in a 2008 ruling by the constitutional court requiring the government to reimburse medical costs of those granted *tutelas*; it also ordered unification of the two benefit packages (Yamin & Parra-Vera, 2009).
[b] In April 2009, the Government of Peru published the Law on Health Insurance, which entitles all Peruvians to access quality health services.

Here again, there are clearly discernible differences between countries, not only with respect to the *height of coverage* (pre-paid care ranges from less than half to more than 90% of overall costs, as already discussed above in the inverse context of OOP spending), but also with respect to the extent and nature of health insurance coverage schemes. In terms of *depth of coverage*, for example, Cuba and Sri Lanka have long-established and comprehensive universal coverage schemes (financed and provided exclusively by the government); Chile, Costa Rica, Colombia and Thailand have all quite recently instituted major health sector reforms that have achieved a significant and rapid transition towards universal coverage; by contrast, insurance coverage in China, Peru and Viet Nam currently remains at a more incomplete stage of development. Concerning the *breadth of coverage*, it is much harder to gauge how comparable medical benefit packages are (or not), since in most cases no defined list is actually specified - Chile and Thailand being the exceptions - and even where a list is given, that does not necessarily translate into the actual availability of interventions throughout a country. Generally speaking, however, most of the countries appear to provide a fairly broad and comprehensive set of services to eligible members of the various insurance schemes, often with an explicit focus on primary care.

In overall terms, it would seem to be the case that the high-performing low- and middle-income countries described above in Table 2 are also among those who have worked hardest to bring universal health insurance coverage to their populations (other countries would include Mexico and Republic of Korea). This implies that the core attributes of universal coverage - broad access across the population to a wide range of health services that are free at the point of use - are key determinants of a well-functioning or high-performing health system. Making progress on these separate dimensions of universal coverage, however, is clearly a challenging and also a lengthy process (that in many high-income countries took many decades to fully bring about). It is therefore important to note the robust commitment shown by governments in these countries to bring about significant - and in some case radical - reform to their health systems in the form of deepened coverage (or in the case of Cuba and Sri Lanka, to fiercely maintain pre-existing levels of high coverage). Such political will and leadership, backed up by legal resolutions as necessary, necessarily represents a critical first step towards achieving universal coverage (as recently shown so publicly in the case of the health system in the USA).

## 3. Addressing inefficiency as a means of moving towards universal coverage

### 3a. Defining efficiency

To most people, efficiency simply suggests the idea of getting the most out of something, for example making as much use of a hospital X-ray machine as possible (allowing it to stand idle much of the time would be wasteful or inefficient); however, efficiency can also refer to the situation of using least inputs for a given level of output, such as keeping hospital length of stay down to a level that still ensures safe and appropriate discharge. Beyond these two pathways for improving the way in which *inputs* to health care are optimized (so-called ***'technical efficiency'***), there is also the broader notion of ***'allocative efficiency'***, which brings in the question of how well the *outcomes* of health care provision are distributed among the population. Accordingly, questions of allocative efficiency in the health sector tend to revolve around what might represent the mix of services or interventions that maximizes health improvements, both within disease entities (such as prevention versus treatment strategies for HIV/AIDS) and across them (i.e. how the health of a population can be most improved with existing resources). This concept of value for money can be appropriately addressed via the application of cost-effectiveness analysis (CEA), which pulls together into a single ratio the health inputs (summarized in monetary terms) and the health outcomes (expressed in natural units such as lives saved or combined into a summary measure such as disability-adjusted life years averted). In this section, we consider both technical and allocative (in)efficiency, with a view to identifying probable sources of current waste that can be readily addressed through remedial action.

### 3b. Key sources of inefficiency in the health sector (and how to address them)

Table 3 provides a number of key sources of inefficiency relating to health system inputs, together with illustrative examples and case studies from the published literature. As explained above, the primary source of allocative inefficiency relates to the sub-optimal mix of services and interventions currently provided, which we discuss separately in the next sub-section. Under the broad category of technically inefficient use of resource inputs, key sources relate to the sub-optimal or even unnecessary use of resource inputs for a defined outcome (such as excessive hospitalization), and the unnecessarily high cost of intervention (brought about by, among other things, a reliance on brand-name drugs or a top-heavy staff mix). We now discuss these sources of inefficiency, beginning with single 'big ticket' items such as the deployment of health personnel or the use of medicines, then turning to combined resource input categories such as hospital care, and finally consider other critical inefficiencies, in particular leakages out of the health system due to fraud and corruption.

***Table 3 Leading sources of technical inefficiency relating to health system inputs***

| Source of inefficiency | Possible reasons for inefficiency | Evidence of inefficiency (illustrative studies) | Ref No. | Possible ways of addressing inefficiency | Evidence of efficiency gains (illustrative studies) | Ref No. |
|---|---|---|---|---|---|---|
| ***Health care workers:*** ***Inappropriate or costly staff mix*** | Conformity with pre-determined HR policies and procedures; resistance by medical profession; fixed / inflexible contracts | A Cochrane review found that primary care doctors produce no higher quality care or better health outcomes for patients than trained nurses | *39* | Needs-based assessment and training; revise remuneration policies; flexible contracts; performance-related pay | Health workers with less training performed as well as those with more training in assessing and managing childhood illness | *35* |
| ***Medicines:*** ***Under-use and over-pricing of generic drugs*** | Inadequate cost controls on prescribers; lower perceived efficacy / safety of generic drugs; historical prescribing patterns | Across WHO regions, availability of 15 key generic medicines in the public sector was 30-55%, and prices were 10% higher than global reference price | *12* | Improve prescribing guidance, information, training and practice; develop active purchasing; reduce mark-ups | A US survey estimated that $8.8 billion (11% of drug expenditure) could be saved by substituting generic for brand-name drugs. | *28* |
| ***Medicines:*** ***Irrational use of drugs*** | Consumer demand / expectation; limited knowledge about lack of therapeutic effect; inadequate regulatory frameworks | 50-70% of drug spending in developing countries has no discernible impact on health outcome; 40% of prescriptions in Germany not needed | *32* *55* | Improve prescribing guidance, information, training and practice; raise public awareness | A national-wide campaign in France reduced anti-biotic prescriptions by 25% (35% among children) over five years. | *53* |
| ***Medicines:*** ***Sub-standard or counterfeit drugs*** | Weak drug regulatory structures; weak procurement mechanisms | In SE Asia, over 50% of samples of the anti-malarial artesunate were found to contain no active ingredient | *19* | Improve drug regulation and quality control; carry out product testing | Rapid product screening reduced anti-malarial drug failure rates by at least 50% in Lagos and Accra | *8* |
| ***Health care products:*** ***Over-use of procedures, investigations and equipment*** | Supplier-induced demand; Fee for service; fear of litigation ('defensive medicine'); inadequate guidelines / review | 'Unwarranted use' of diagnostic tests and procedures has been estimated to account for 40% of overall waste in the US ($250-325 billion per year) | *59* | Reform incentive and payment structures (e.g. capitation); improve and disseminate guidelines for product use | Peer review and feedback reduced laboratory test orders among community physicians in Canada by 8% or 0.22 tests/visit | *10* |
| ***Health care services:*** ***Sub-optimal quality of care and medical error*** | Insufficient guidelines, standards or protocols; poor coordination; inadequate supervision | 7.5% of hospital admissions in Canada were associated with adverse events (half were deemed to be preventable) | *5* | Enhance monitoring and clinical audit; improve continuity of care; improve hygiene standards | In 6 sites using WHO Guidelines on Hand Hygiene, compliance increased from 39.6% to 56.9% | *70* |
| ***Health care services:*** ***Inappropriate hospital size*** | Uneven historical development of hospitals; inadequate planning, coordination and control | Provincial hospitals in Vietnam in 1996 (47% of total admissions) exhibited notable diseconomies of scale | *63* | Use input-output data to plan hospitals; match managerial capacity to size; raise occupancy | Analysis of scale efficiency in Zambia identified hospitals that could be merged or down-graded | *45* |
| ***Health care services:*** ***Inappropriate hospital admissions or length of stay*** | Lack of alternative care arrangements; insufficient incentives to discharge; limited knowledge of best practice | A systematic review concluded that at least 20% of acute bed use among a wide range of settings was likely to be inappropriate | *46* | Provide alternative care (e.g. day care); alter incentives to hospital providers; raise knowledge about efficient admission practice | In 3 teaching hospitals in Spain, a physician-oriented feedback intervention led to a 45% reduction in inappropriate stays | *4* |
| ***Health system leakages:*** ***Corruption and fraud*** | Corruption; unclear resource allocation guidance; poor accountability mechanisms | In Chad, regions received 27% of the non-wage budget earmarked for them (18% rather than 67% of MoH budget) | *23* | Improve governance, including budgetary management; undertake expenditure surveys | Six years after creating a counter fraud service in the UK, NHS losses to fraud had fallen by 50% | *24* |

***Human resources for health***

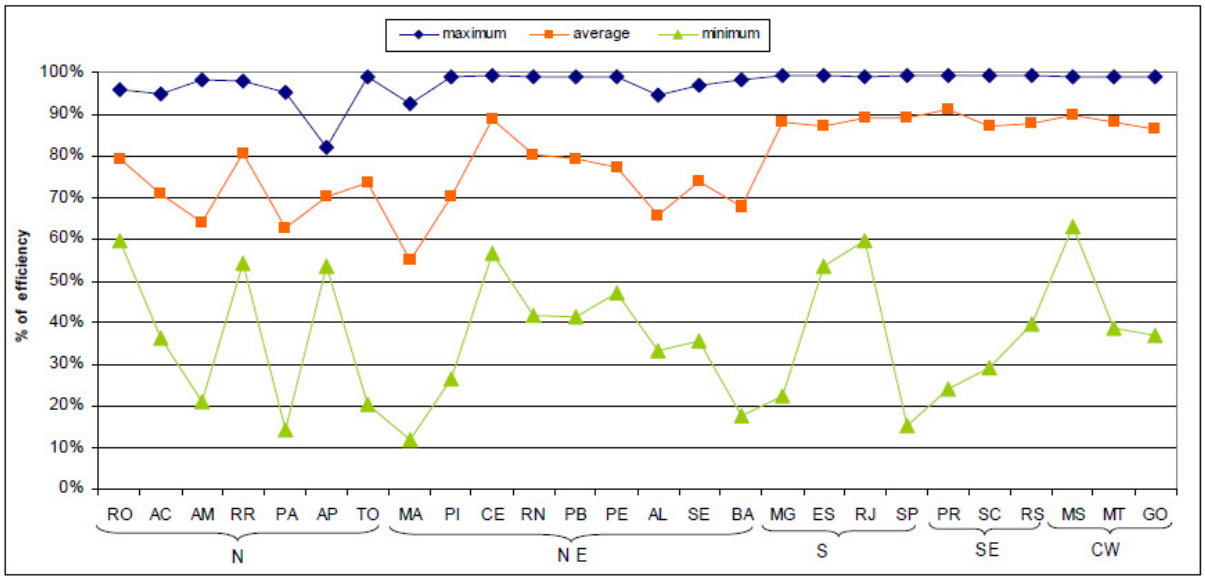
Doctors, nurses and other health workers are at the core of a health system, and where their numbers fall below a certain level, health systems can no longer be expected to operate effectively (WHO, 2006). A well-performing workforce is one that 'works in ways that are responsive, fair and efficient to achieve the best health outcomes possible, given available resources and circumstances' (WHO, 2006; p. 67). Human resources for health of course constitute a major category of cost, with salaries and other payments to workers typically consuming about half of the entire health budget in a country (Hernandez et al, 2006). Inefficiencies can occur at all stages of the working lifespan, from ineffective planning and inappropriate training at the preparation stage, through inadequate supervision and compensation while working, to excessive migration out of or attrition to the workforce at the exit stage. The failure to generate and maintain a suitably qualified and motivated workforce inevitably leads to reduced productivity or performance at the system level, which will in turn impact on overall health system goals including the provision of responsive services and the attainment of health improvements in the population.

Commonly used measures of health workforce attainment or performance include attendance or absenteeism rates, patient satisfaction ratings and workload rates such as number of visits or consultations per day. In Ghana, for example, health workforce productivity was recently assessed by dividing a composite measure of service delivery by an aggregate measure of workforce availability (proxied by total salary expenditures) (Vujicic et al, 2009). The authors found considerable variation across the country and at different levels of the health system, but were unable to find any clear correlation between workforce productivity at the district level with skill mix or the availability of health infrastructure. In the United Republic of Tanzania, Kurowski et al (2003) estimated that unexplained absences plus time spent in breaks, on social contacts and waiting for patients reduced productivity levels by 26%.

Examination of observed variations with respect to these indicators provides some insight into what more can be achieved by under-performing workers, but in order to assess overall efficiency at the system level it is necessary to link human resource inputs into the health production process to overall health outcomes (or some intermediate proxy measure such as intervention coverage). For example, Sousa et al (2006) build on earlier studies showing a clear positive association between the density of health workers and levels of population health or intervention coverage (Anand and Bärnighausen, 2004, Chen et al, 2004) by estimating the efficiency with which health workers attain coverage of ante-natal care across municipalities in Brazil. Using stochastic frontier production models, they find a remarkable variation in efficiency levels, ranging from less than 20% to more than 95% of what could maximally be achieved (see Figure 3), which indicates that many municipalities are underperforming and could increase efficiency by changing the skill mix of workers. Another key finding was that coverage and efficiency depend not only on the availability of workers but also on socioeconomic characteristics at the local level (such as education and income levels), which may explain why other, more

narrowly defined studies did not (Kruk et al, 2009; Vujicic et al, 2009). Using similar methods, but this time in Viet Nam, another study found that the efficiency with which health workers in different regions used available financial resources to reduce infant mortality ranged from as low as 40% to as much as 99% (WHO, 2006)

***Figure 3*** ***Health worker efficiency in different states and regions of Brazil***
(Source: Sousa et al, 2006)




Based on these (admittedly few) analyses, inefficiency with respect to human resources for health is expected to amount to about 20% on average (range 15-25%). Applying this to the proportion of health spending that is devoted to human resources - 45-65% depending on world income region (WHO, 2009) - suggests that workforce inefficiency is costing the global health economy in excess of US$ 500 billion (see Table 4 below).

Improving the productivity and performance of health workers requires a strategic and multi-faceted approach that is able to provide suitable working conditions as well as appropriate specification and remuneration of tasks to be carried out. A number of key strategies and underpinning levers for enhancing health workforce performance are provided in the *World Health Report 2006* (WHO, 2006), including more delegation, improved pay and better matching of skills to tasks.

***Health technologies and pharmaceuticals***

Diagnostic tests and the prescription of drugs represent core elements of health care provision, helping to identify and respond to underlying symptoms of disease. However, due to the asymmetric nature of information between patient and health professional, and exacerbated by a number of incentives on the provider side, there are ample opportunities for the over-supply of health technologies and pharmaceuticals.

Particularly in health systems where 'fee-for-service' is the principle mechanism used to pay or reimburse health care providers, there is no strong incentive to constrain the use of these medical devices or products (unlike in systems where the budget is fixed up-front). In China, for example, where the health landscape has changed radically over a short period of time, providers generate a substantial and increasing proportion of their revenue from the supply and use of diagnostic and other health technologies, as well as drugs (Liu et al. 2000). This is because although the government controls the price of most services offered to patients through quasi-public facilities, official prices are actually below their average cost, so facilities and practitioners compensate by double-billing, unofficial payments and excessive sale of drugs (Liu et al,2000). A further (dis)incentive that is particularly apparent in the US health system relates to the fear of potential litigation by consumers, which encourages providers to order more tests than needed on the basis of clinical examination alone. In fact, such 'defensive medicine' was recently singled out as the biggest contributor (40%) to the estimated $700 billion wasted in the US health system each year (Thomson Reuters, 2009).

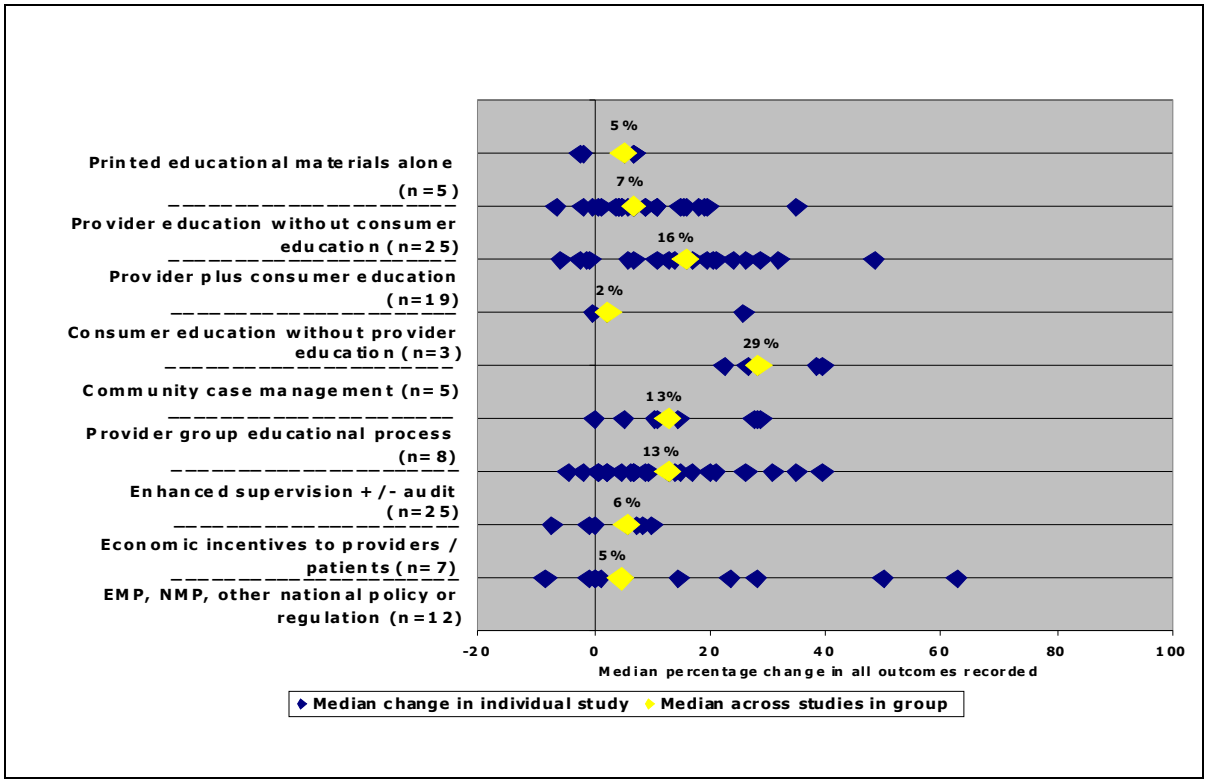
An area that has attracted increasing policy attention and concern relates to the irrational use of medicines. Medicines are used rationally - or indeed efficiently - when "patients receive the appropriate medicines, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest costs to them and their community" (WHO, 2004; p. 75). Worldwide, it is estimated that over half of all medicines are prescribed, dispensed or sold inappropriately (WHO, 2010a). Moreover, it has been estimated that half of all patients fail to take their medication as prescribed or dispensed (Sabate, 2003). Irrational use may take many different forms, for example, poly-pharmacy, over-use of antibiotics and injections, failure to prescribe in accordance with clinical guidelines, or inappropriate self-medication (Holloway and van Dijk, 2010). Overuse and misuse of antibiotics is a particularly serious global problem. Two-thirds of all antibiotics are sold without prescription, through unregulated private sectors, and non-adherence rates are high, with many patients taking antibiotics in under-dose or for a shortened duration. A separate WHR background paper estimates that, across a range of low- and middle-income countries, the over-use of antibiotics to treat acute respiratory tract infections adds an average 36% to the cost of care (Abegunde, 2010).

A further key form of inefficiency in the use of pharmaceuticals concerns the under-utilization of generic (as opposed to branded) drugs, which have equivalent efficacy yet are substantially cheaper to procure. An analysis conducted by Cameron (2010) in preparation for this year's World Health Report found that tens of millions of

(US) dollars could be saved by switching to generic versions of 17 commonly used drugs in a range of developing countries. In public hospitals of China alone, over $86 million could be saved from switching only 4 medicines, saving patients an average of 65%.

A sense of the level of existing inefficiencies is given by the extent to which prescribing practices can be improved through intervention. Figure 7 shows that interventions aimed at improving levels of education, supervision and feedback can reduce the unnecessary use of medicines by10-15%. Given that pharmaceuticals account for 20-30% of *all* global health spending, the overall global cost associated with the irrational use of medicines is likely to be very substantial; taking a conservative inefficiency level of 10-15%, over $100 billion per year - see Table 4 for details.

***Figure 7 Change in medicine use following prescribing improvement interventions***




Source: WHO, 2010

***Hospitals***

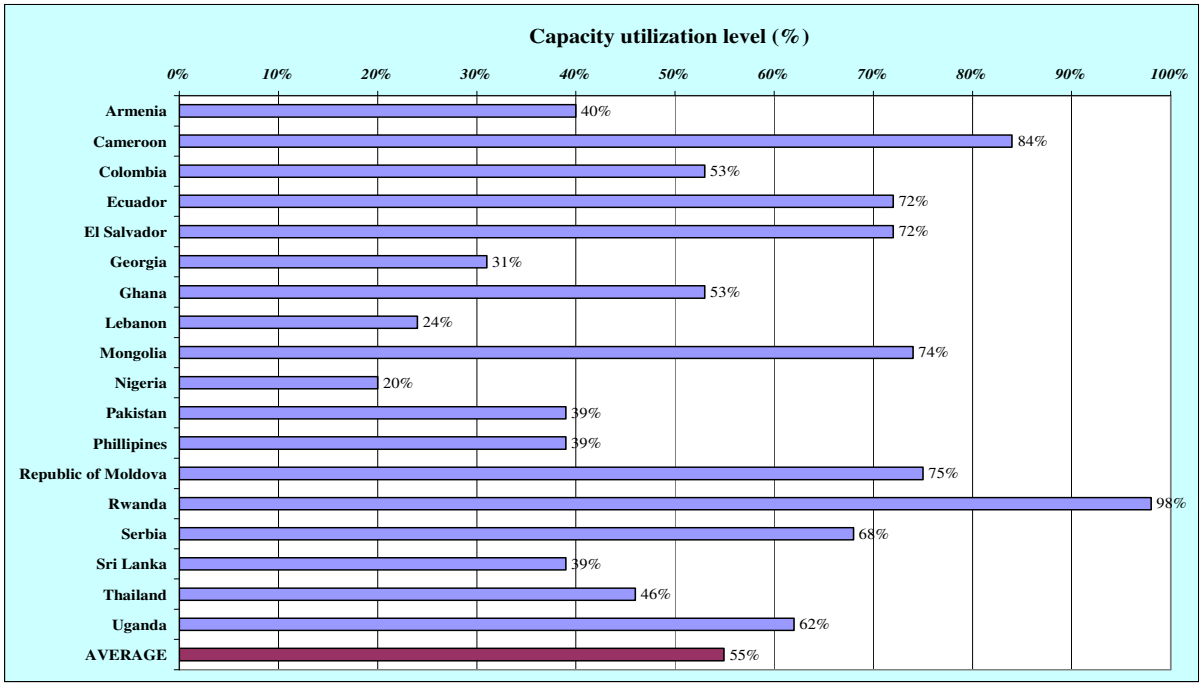
Hospital care clearly represents a critical component of a comprehensive health service; it also constitutes a major budget item or cost category, in many countries taking up over half or even two-thirds of the total health budget. Hospitals are large health care production facilities, bringing together various resource inputs, including physical capital (buildings), human capital (health and administrative personnel), and supplies (including drugs and equipment).

Some of the key inefficiencies that occur with respect to these separable components have already been discussed, but there are other important sources of inefficiency that emerge at the institutional level. A prominent example relates to excessive inpatient admissions and length of stay, for which a substantial literature now exists (for a comprehensive review, see McConagh et al, 2000). In Canada, for example, four separate studies of adult inpatients found that no less than 24-90% of admissions and 27-66% of inpatient days were inappropriate (DeCoster et al, 1997). Also, and driven in part by the payment systems in place, excessive or unnecessary use of investigations or procedures occur on an outpatient basis. This extends not only to over-use but also under-use of services, particularly by people in need but unable to pay, which is inefficient in the longer term as individuals' health problems persist or worsen and they have no choice but to access hospital services (potentially as a more severe case than if they had presented earlier).

A further important source of potential inefficiency in the hospital sector relates to their scale and scope. While it may make good economic sense to enlarge the size and scope of a hospital in order to make better use of available expertise, infrastructure and equipment, there comes a point where a hospital departs from its optimal level of efficiency and begins to exhibit *dis*economies of scale; at the other end of the scale, small hospitals may also be inefficient because the fixed infrastructural and administrative costs are shared across too small a caseload, thereby pushing up the cost of an average hospital episode. Research undertaken mainly in the USA and the United Kingdom indicates that diseconomies of scale can be expected to kick in below about 200 beds and above 600 beds (Posnett, 2002).

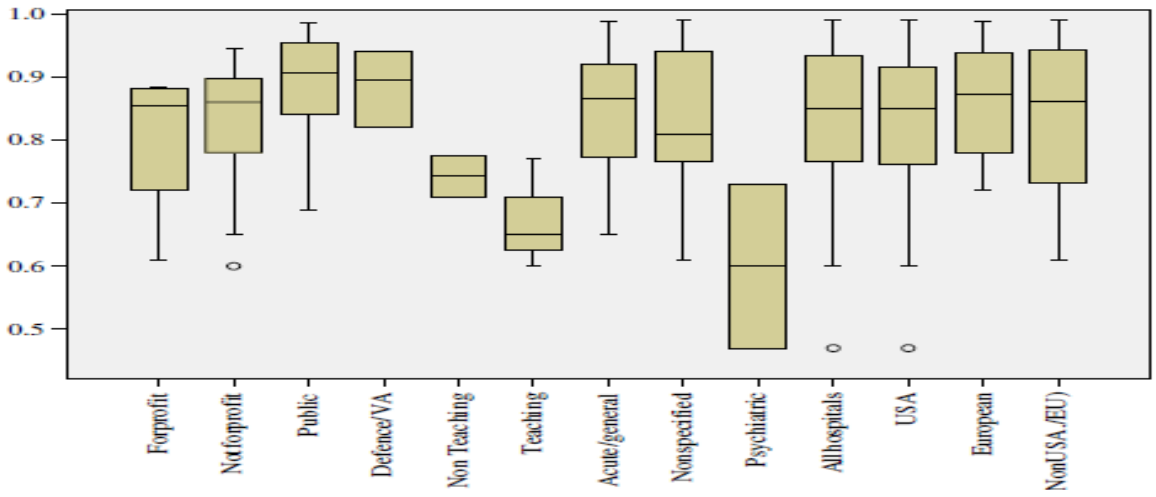
A key indicator of diseconomies of scale is the rate of capacity utilization in hospital inpatient facilities. Figure 4 gives capacity utilization levels in district hospitals for selected countries that submitted unit cost data for the year 2007, and shows that most are operating at quite a bit lower than recommended occupancy levels (85-90%).

*Figure 4* ***Capacity utilization in district hospitals in selected countries***




In terms of the scale of these inefficiencies, there is now a burgeoning literature on the subject, as evidenced by a recent review of more than 300 studies (Hollingsworth, 2008). These studies make use of non-parametric data envelopment analysis - or in some cases, parametric stochastic frontier analysis techniques - to show the extent of deviation away from best-performing hospitals, and have generally found an appreciable level of inefficiency (Figure 5; Hollingsworth, 2008). Applying a median inefficiency rate of 15% to the proportion of total health spending consumed by hospitals in each world income region produces a global figure of nearly US$ 300 billion (Table 4).

*Figure 5* ***Box plot of efficiency scores by hospital category***
(Source: Hollingsworth et al, 2008)



***Health system leakages***

Over and above the inefficiencies highlighted above with respect to the use of drugs, the deployment of health workers and the performance of hospitals, account needs to taken of the ultimate waste of resources for health, namely leakages out of the health system, most commonly as a result of fraud and corruption. Resources for health that are misappropriated for private gain at all junctures of the health production process clearly distort and diminish the flow of inputs into the health system, and this consequently compromises the capacity of the health system to attain the goals it sets for itself. It is argued that corruption in the health sector is accentuated by the fact that health systems are complex, dispersed and rely quite heavily on private actors to carry out public roles.

There are any number of ways in which actors in the health system - faced with a complex set of incentives - can abuse entrusted power for private gain, but key sources of corruption identified in a recent Global Corruption Report focussed on health include the following: embezzlement and theft from health budgets or user-fee revenues; corruption in procurement; corruption in payment systems; corruption in the pharmaceutical supply chain; and corruption at the point of health service delivery, especially charging fees for services that are meant to be free (Transparency International, 2006). Measurement of the extent of overall corruption in health systems is evidently challenging, but a good place to start is tracking the allocation and distribution of government expenditures on health. One such survey in Ghana, for example, found that 80% of non-salary funds did not reach the health facilities they were intended for (Ye and Canagarajah, 2002). A separate study in Tanzania estimated the rate of leakage to be 40% (PriceWaterhouseCoopers, 1999).

More recently, an analysis of health sector fraud and error in high-income countries was published (MacIntyre Hudson, 2010). Based on more than sixty measurement exercises across 33 health care organizations in 6 countries, the analysis found that financial losses resulting from fraudulent practice - relating to drug prescriptions, services, payments and sickness certificates - typically fell in the range of 3-8% , with an overall mean of 5.59%. Applying this mean rate of loss to global health spending levels - as the authors of this report do - gives an estimate of more than US$ 250 billion per year (Table 4).

A great deal can be done to significantly reduce fraudulent practice and corruption in the health sector. The key to success is improved health system governance, key principles of which include accountability, transparency and the rule of law (Siddiqi et al, 2008). Core regulatory functions that can effectively combat budgetary and other leakages range from registration, accreditation and licensing of health providers, facilities and products, respectively (in order to improve quality), through to internal oversight and audit functions. Improved governance also requires intelligence and better use of information, so that breaches of practice can be identified and changes monitored. A recent review provides a set of key indicators relating to budgetary management, individual providers and health facilities that could be usefully be deployed to this end (Lewis and Pettersson, 2009).

***Global cost of health sector inefficiencies***

The aforementioned categories are just some of the main identifiable causes of inefficiency in the use of health care inputs, but there are many others too, including inefficient administration and information systems for example. Putting together the various forms of inefficient practice is evidently hard, and has only very rarely been attempted. Such an attempt has in fact been recently made for the US system (Thomson Reuters, 2009), which is highly relevant to the global picture since this country alone spends over two trillion dollars on health each year (equivalent to more than 40% of total global health expenditures). The authors assessed the potential costs of waste across a number of categories and found their total to be in the range of $600-850 billion per year; their baseline estimate of $700 billion is equivalent to 30% of annual health expenditures in the USA.

The Commonwealth Fund Commission estimated that closing the gap between actual and achievable performance in the USA - as measured by its scorecard system - could prevent 100,000-150,000 deaths per year and could save at least $50-100 billion per year in health care spending (Schoen et al, 2006). Moving to the present year, Collins et al (2010) estimate that the system reform and revenue provisions discussed in the House and Senate bills would more than offset the federal costs of expanding and improving health insurance coverage (to more than 30 million uninsured Americans), to the tune of $132-138 billion over 10 years.

Although imbued with considerable uncertainty, a crude indication of the global cost associated with the aforementioned sources of health sector inefficiency can be ascertained by applying estimated inefficiency rates to existing expenditure patterns. Data on total health expenditures (THE) as well as estimated proportions of THE for human resource, drugs and hospitals are available from the National Health Accounts database (WHO, 2009). Table 4 provides a summary of the monetary value for five areas of inefficiency (human resources for health, drugs, hospitals, leakages out of the health system, plus a separate category for the inefficient choice of interventions; described in the following section), both per person and for the entire population of different world income regions.

***Table 4 Potential efficiency savings by cost category and world income region***

| | Share of total health spending (%) | | Potential efficiency savings (%) | | Potential efficiency savings (% of total health spending) [a] | | Potential efficiency savings per capita (US$) [b] | | | Potential efficiency savings across total population (US$ billion) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *From* | *To* | *From* | *To* | *From* | *To* | *Mean* | *Range* | | *Mean* | *Range* | |
| Human resources | | | | | | | | | | $563 | 110 - | 851 |
| High-income | 55% - | 65% | 15% - | 25% | 8% - | 16% | $492 | 78 - | 629 | $499 | 79 - | 639 |
| Mid-income | 45% - | 55% | 15% - | 25% | 7% - | 14% | $14 | 7 - | 48 | $61 | 29 - | 206 |
| Low-income | 50% - | 60% | 15% - | 25% | 8% - | 15% | $2 | 1 - | 5 | $3 | 1 - | 6 |
| Medicine | | | | | | | | | | $115 | 24 - | 193 |
| High-income | 15% - | 21% | 10% - | 15% | 1.5% - | 3% | $93 | 14 - | 122 | $95 | 14 - | 124 |
| Mid-income | 20% - | 30% | 10% - | 15% | 2% - | 5% | $5 | 2 - | 16 | $19 | 9 - | 67 |
| Low-income | 25% - | 35% | 10% - | 15% | 3% - | 5% | $1 | 0 - | 2 | $1 | 0 - | 2 |
| Hospitals | | | | | | | | | | $287 | 54 - | 503 |
| High-income | 32% - | 42% | 10% - | 20% | 3% - | 8% | $233 | 30 - | 325 | $236 | 31 - | 330 |
| Mid-income | 35% - | 45% | 15% - | 25% | 5% - | 11% | $11 | 5 - | 39 | $49 | 23 - | 168 |
| Low-income | 27% - | 37% | 15% - | 25% | 4% - | 9% | $1 | 1 - | 3 | $2 | 1 - | 4 |
| Leakages | | | | | | | | | | $271 | 51 - | 468 |
| High-income | | | | | 3% - | 8% | $221 | 28 - | 310 | $224 | 29 - | 315 |
| Mid-income | | | | | 5% - | 10% | $10 | 5 - | 35 | $44 | 22 - | 150 |
| Low-income | | | | | 5% - | 10% | $2 | 1 - | 3 | $2 | 1 - | 4 |
| Intervention mix | | | | | | | | | | $705 | 141 - | 1,094 |
| High-income | | | | | 10% - | 20% | $602 | 95 - | 774 | $611 | 96 - | 786 |
| Mid-income | | | | | 10% - | 20% | $21 | 10 - | 70 | $89 | 43 - | 299 |
| Low-income | | | | | 10% - | 20% | $3 | 2 - | 7 | $4 | 2 - | 8 |
| TOTAL | | | | | | | | | | $1,409 | 282 - | 2,188 |
| High-income | | | | | 20% - | 40% | $1,204 | 189 - | 1,548 | $1,223 | 192 - | 1,573 |
| Mid-income | | | | | 20% - | 40% | $42 | 20 - | 140 | $178 | 86 - | 599 |
| Low-income | | | | | 20% - | 40% | $7 | 3 - | 13 | $8 | 4 - | 17 |

Notes:

[a] Derived by multiplying ranges of potential efficiency savings in each country income group by share of total health spending; Source: National Health Accounts database; WHO, 2009). Potential efficiency savings for leakages and intervention mix estimated directly as a percentage of total health spending.

[b] Derived by multiplying potential efficiency savings (as % of total health spending) by average health expenditure per capita [inter-quartile range]: $4,013 [947-3,871] (high-income); $139 [101-351] (middle-income); $22 [15-33] (low-income); Source: NHA database (WHO, 2009)

The single largest source of inefficiency relates to human resources for health, amounting to US$ 563 billion (range: $ 110-851 billion), which is equivalent to approximately 10% of the $5.3 trillion now spent each year on health worldwide. Wasteful use of pharmaceuticals is estimated to cost a further $ 115 billion (range: $24-193 billion). Assessed from the institutional perspective, hospitals are estimated to operate at 85% of their optimal efficiency, which suggests that efficiency savings of as much as US$ 287 billion ($ 54-503 billion) could potentially be realized in that sector alone. Finally, a conservative global estimate for health care fraud and corruption is put at US$ 271 billion (range: $51-468 billion).

Given the overlap between some of these identified areas, it is challenging to come up with an aggregate figure for all forms of inefficiency combined, but on the basis of the above it is expected to amount to at least 20% of total health spending and quite possibly as much as 40%. It is important to note that due to the exponentially greater levels of per capita health spending in high-income countries, a high proportion of the global costs of

inefficiency - and therefore most of the potential savings to be made - apply to those settings. However, that should not hide the fact that as a proportion of current spending levels, inefficiencies are at least as significant in low- and middle-income countries as they are in higher income contexts.

A further important point to make is that some of these costs associated with inefficiency are in fact unavoidable, due to the inherent uncertainty surrounding ill-health and the consequent requirement for health services. For example, it is well-established that hospitals need to build in some 'slack' with respect to bed availability in order to be able to respond to the need for acute or emergency admissions; accordingly, it is recommended that occupancy rates be in the range of 85-90% rather than trying to reach 100%. The same concept would apply to certain cadres of health workers, who likewise need to be able to respond to sudden changes in demand.

### 3c. Allocative inefficiency

In this sub-section, we move onto the question of how well available health sector resource inputs are used in relation to the defining outcome of a health system (improved health at the population level). Economic evaluation, often using cost-effectiveness analysis (here we use the term to include cost-utility analysis), has become a commonly used tool to inform health policy as well as to guide clinical decisions. It establishes the relative costs and impacts of health interventions, with the underlying objective of maximizing population health for the available resources. There are now many thousands of completed evaluations that have identified how and where efficiency improvements could be made (see for example Walker et al, 2000 and Mulligan et al, 2006 for literature reviews for communicable and non-communicable diseases in developing countries, respectively). Many are clinical and most focus on ways to address a particular disease or health problem; only a few have considered how the efficiency of the health sector as a whole could be improved (the focus of interest here).

The few examples of sector-wide analysis suggest that many countries undertake interventions that are not very cost-effective, while not fully implementing some that are cost-effective. Yet most analyses focus only on marginal changes that require additional resources. Understanding the extent to which the current mix of interventions is efficient is critical to understanding if more could be achieved with the same resources. It can also be used to assess the cost and impact of intervention packages that could be subsidized by government or included in health insurance packages.

WHO's CHOICE project (CHOosing Interventions that are Cost-Effective; www.who.int/choice) has now assembled a large repository of information on the costs, effects and cost-effectiveness of a wide-ranging set of interventions for leading contributors to disease burden in a range of resource settings. Looking within and across disease and injury categories, there is now increasingly clear economic evidence for what works and what does not work; this is as true for health prevention and promotion as it is for treatment.

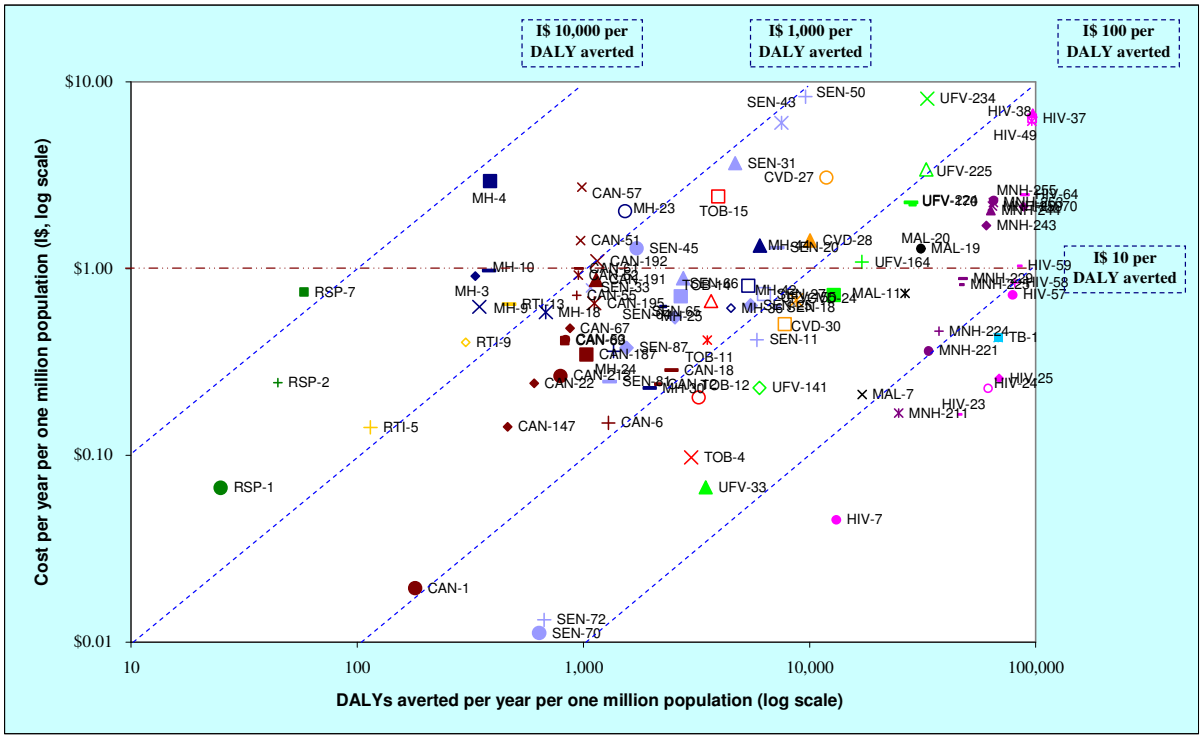
Taking current strategies and future priorities for achieving the millennium development goals, for example, higher priority should be given to increasing coverage of highly cost-effective preventive interventions for maternal and neonatal health, such as community-based management of neonatal pneumonia or support for breastfeeding mothers and low birth-weight babies; lower priority should be given to high cost, low effect interventions such as antibiotics for preterm rupture of membranes and antenatal steroids for preterm births. Likewise for HIV/AIDS, preventive and promotive strategies such as mass media campaigns or peer education and treatment of sex workers offer better value for money than treatment with anti-retrovirals. By contrast, case management of malaria via artemisinin-based combination therapy is estimated to be just as cost-effective a response as preventive strategies like insecticide-treated bed nets (Evans et al, 2005).

Policy makers faced with the escalating burden of chronic, non-communicable conditions such as cardiovascular disease (CVD) and stroke likewise require comparative cost and effectiveness information on the respective merits of different strategies. This might range from preventive efforts, both at the population level (e.g. decreasing the risk of CVD by reducing salt intake or curbing tobacco consumption) or individual level (e.g. combination drug therapy for people at high risk of a CVD event), through to acute and longer-term management of patients who have suffered a heart attack or stroke (Murray et al, 2003).

Looking across the full set of diseases and risk factors affecting a population, the objective is to maximize aggregate health gain for the total available resources, which is tantamount to minimizing the average ratio of cost to outcome for the array of interventions delivered by the health system. By applying a standardized and therefore consistent approach to measuring the cost-effectiveness of health interventions, it is possible to build up a picture of the relative efficiency with which different diseases are being addressed. Figure 6 shows selected results from multiple CHOICE analyses for an epidemiologically-defined WHO sub-region in Africa. The specific points on the graph represent the dominant interventions for each of the disease areas considered (see the footnote for an explanation of the various disease codes). A logarithmic scale is used in order to show - and allow for - the remarkable range in costs, effects and cost-effectiveness that is apparent across this set of interventions. For example, costs range from ten international dollars (I$) per person in the population down to just a few cents, and the cost of averting one DALY - equivalent to gaining one healthy year of life - varies from less than I$ 10 to more than I$ 10,000 (three orders of magnitude different).

***Figure 6*** ***Overview of costs, effects and cost-effectiveness of health interventions***

(WHO sub-region AfrE)



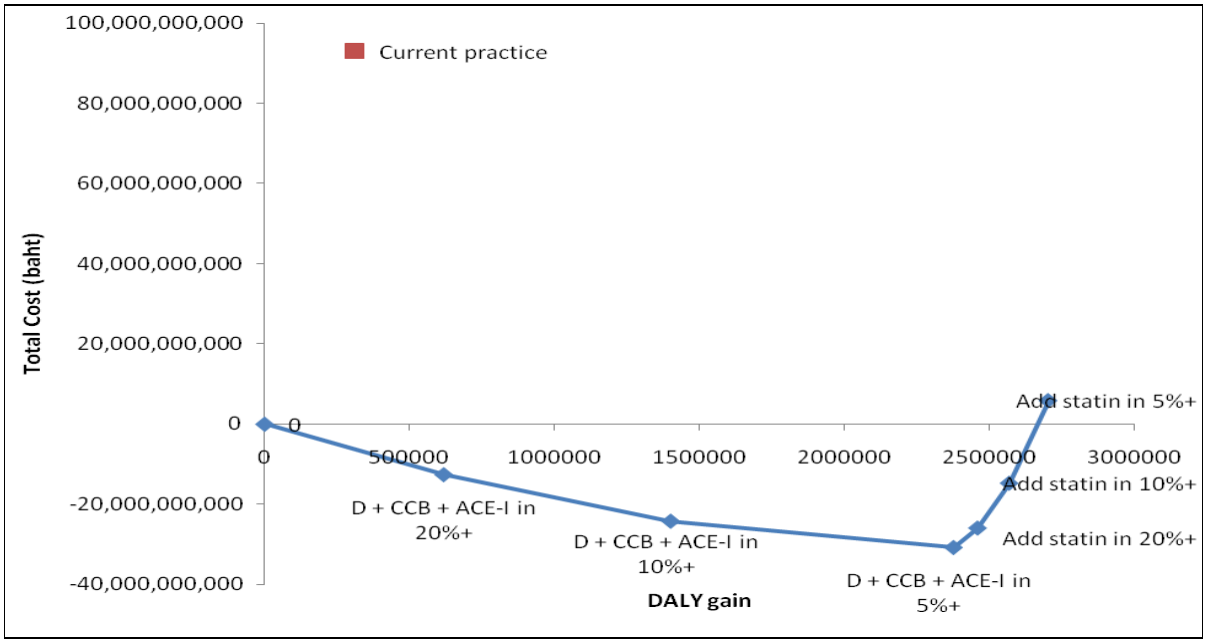

*Key*: CAN, cancer (breast, cervical, colorectal); CVD, cardiovascular disease; HIV, human immunodeficiency virus; MAL, malaria; MH, mental health (alcohol use disorder, bipolar disorder, depression, epilepsy, schizophrenia); MNH, maternal and neonatal health; RSP, respiratory disorders (asthma, chronic obstructive pulmonary disease);RTI, road traffic injuries; SEN, sensory disorders (cataract, trachoma, hearing loss); TOB, tobacco use; TB, tuberculosis; UFV, under-nutrition in children aged < 5 years.

From a purely economic perspective aimed at maximizing population health with available resources and which takes no account of other allocation criteria (equity, poverty, disease severity or frequency), such wide variations in intervention cost-effectiveness represent an inefficient allocation of resources and a reallocation would need to take place that heavily targets the most cost-effective interventions (i.e. those towards the lower right hand of the graph, which are largely MDG-related strategies). From a public health perspective, however, such a scattered landscape could perhaps be better described in terms of the efficiency trade-offs that need to be made in a civil society in order to meet other stated goals of the health system, including universal access or coverage. In other words, there is an increasingly high price to pay as successively less efficient strategies are covered.

Over and above providing this kind of "bird's eye" view of the relative efficiency with which different disease burdens can be tackled, sectoral CEA can further contribute to health policy and planning by indicating the extent to which the current mix of interventions for a particular disease is (in)efficient. This has been a problem with conventional practice in economic evaluation (which assesses the incremental changes in costs or outcome compared to the current situation), because even in the event that a new intervention proves to be less costly and more effective than current practice, the question of whether current practice should have been done in the first place is not asked.

Figure 7 shows the extent of current inefficiency in addressing cardiovascular disease in Thailand, based on results from the Setting Priorities using Information on Cost-Effectiveness (SPICE) project (Bertram, personal communication). Current practice for CVD prevention, characterized by low use of cholesterol and blood pressure lowering drugs at all levels of CVD risk, consumes 93 billion baht over the lifetime and averts 310,000 DALYs. By lowering the risk of CVD with blood pressure and/or cholesterol lowering drugs (Thiazide diuretics, β blockers, calcium channel blockers and ACE-Inhibitors, statins), as many as 2,700,000 DALYs could be averted, at a net cost of just 5.9 billion baht.

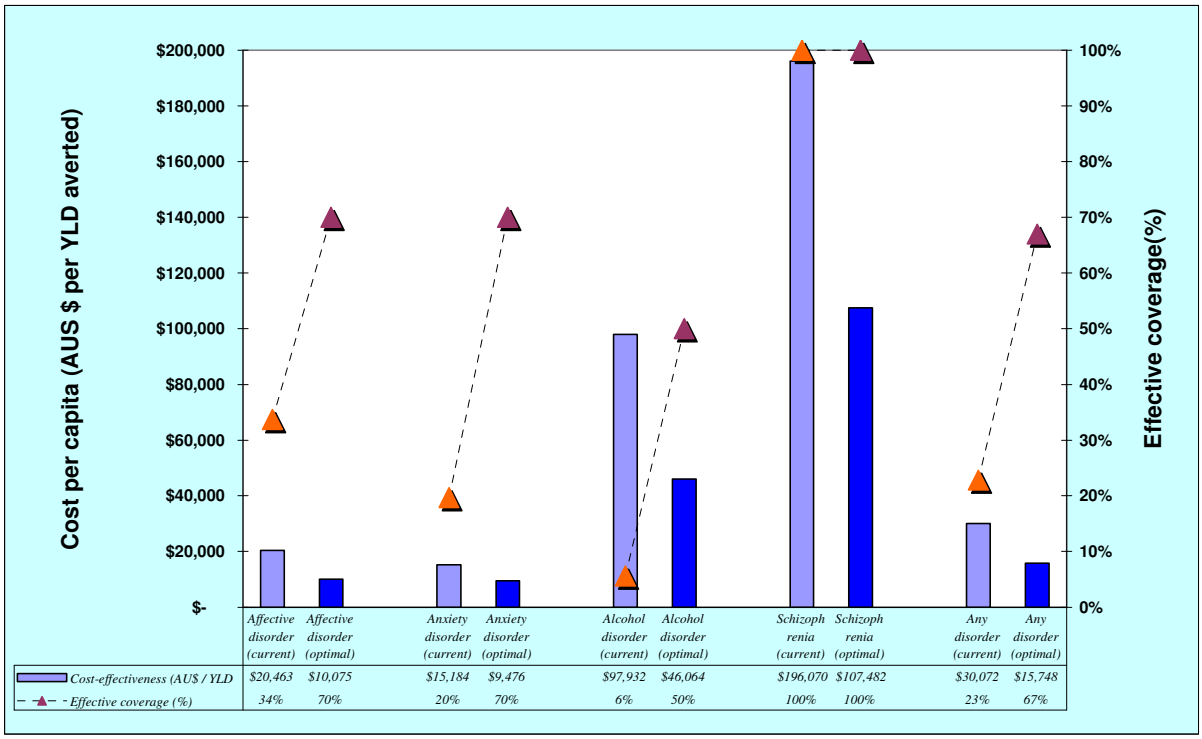
***Figure 7 Inefficiency of current practice in addressing cardiovascular disease in Thailand***




*Data source*: SPICE project. *Key*: D, diuretic; CCB, calcium channel blocker; ACE-I, angiotensin converting enzyme inhibitor

In Australia, Andrews et al (2004) assessed the efficiency with which the burden of mental disorders is being addressed by comparing the cost-effectiveness of ten mental disorders under current versus optimal levels of effective treatment coverage. They found that effective coverage for all of the studies mental disorders combined was currently 23%, but could be increased to 67% by fully implementing clinical practice guidelines. This could be achieved at no additional cost (due to fewer inpatient stays and elimination of ineffective treatment), thereby providing a win-win situation in which not only does coverage improve, but so does the efficiency or cost-effectiveness of intervention programmes aimed at these disabling conditions (Figure 8).

*Figure 8* ***Cost-effectiveness and effective coverage of mental health interventions in Australia***




These and other studies where the current intervention mix has been compared to a more optimal mix are summarized in Table 5, which demonstrates that sizeable efficiency savings - typically of at least 20% - could be made by switching resources to more optimal configurations. Clearly such changes to the allocation of resources do not happen seamlessly or without transaction costs; nevertheless, analysis of this kind can provide relevant information to policy makers concerning how relatively inefficient current practice can be and where they should be heading in terms of longer-term budgetary planning and allocation.

**Table 5 Efficiency improvements to current practice**

| Study | Reference [Currency] | Cost of obtaining one year of healthy life * Current mix | Optimal mix | Improvement (%) |
|---|---|---|---|---|
| **Malaria drug treatment in Zambia** | Chanda et al, 2007 | 10.65 | 8.57 | **20%** |
| *(cost per case cured)* | *[US$]* | | | |
| **Disease and injury prevention in Thailand** | Betram, 2010 | | | |
| *CVD prevention* | *[BHT]* | 300,000 | 2,185 | **99%** |
| *Road traffic injury prevention (alcohol)* | | 6,190 | 3,375 | **45%** |
| *Road traffic injury prevention (helmets)* | | 1,000 | 788 | **21%** |
| **Alcohol and tobacco control in Estonia** | Lai et al, 2007 | | | |
| *Alcohol* | *[EEK]* | 2,621 | 893 | **66%** |
| *Tobacco* | | 292 | 247 | **15%** |
| **Neuropsychiatric interventions in Nigeria** | Gureje et al, 2007 | 37,835 | 26,337 | **30%** |
| *Schizophrenia* | *[NGN]* | 210,544 | 67,113 | 68% |
| *Depression* | | 104,586 | 62,095 | 41% |
| *Epilepsy* | | 13,339 | 10,507 | 21% |
| *Alcohol abuse* | | 20,134 | 10,677 | 47% |
| **Mental health care package in Australia** | Andrews et al, 2005 | 30,072 | 17,536 | **42%** |
| *Schizophrenia* | *[AUD]* | 196,070 | 107,482 | 45% |
| *Affective disorder (any)* | | 20,463 | 10,737 | 48% |
| *Anxiety disorder (any)* | | 15,184 | 9,130 | 40% |
| *Alcohol disorder* | | 97,932 | 53,412 | 45% |
| **Cervical cancer care and prevention** | Ginsberg et al, 2009 | | | |
| *High-income sub-region (EurA)* | *[I$]* | 4,453 | 3,313 | **26%** |
| *Middle-income sub-region (WprB)* | | 3,071 | 1,984 | **35%** |
| *Low-income sub-region (SearD)* | | 421 | 355 | **16%** |

** Average cost-effectiveness ratio (total costs divided by total effects, relative to the situation of no intervention)*

### 3d. Beyond efficiency: other priority-setting criteria in health

As already mentioned, economic evaluation focuses on only one outcome, population health. There are many other outcomes people also care about - inequalities in health outcomes, utilization of services, responsiveness and fairness of financing, for example. Therefore, the results of economic evaluation cannot be used to set priorities by themselves but should be introduced into the policy debate to be considered along with the impact of different policy and intervention mixes on other outcomes. Such multi-criteria priority-setting is most usually undertaken in a strictly qualitative way - for example with reference to a series of 'second stage' criteria such as strength of evidence, equity, feasibility and acceptability (Haby et al, 2004). Recent work has sought to develop more quantitative methods that introduce these other goals explicitly into the cost-effectiveness calculus (Baltussen et al, 2006), but it is too early to assess the extent to which it usefully guides the policy-making process. Whichever approach is adopted, the conclusion to be drawn is that there is a clear need to go beyond cost-effectiveness considerations only, and that the way to most appropriately accomplish this is by carefully considering the priority to be accorded to interventions from a number of locally determined perspectives (in isolation and then in conjunction with each other).

## 4. Conclusion

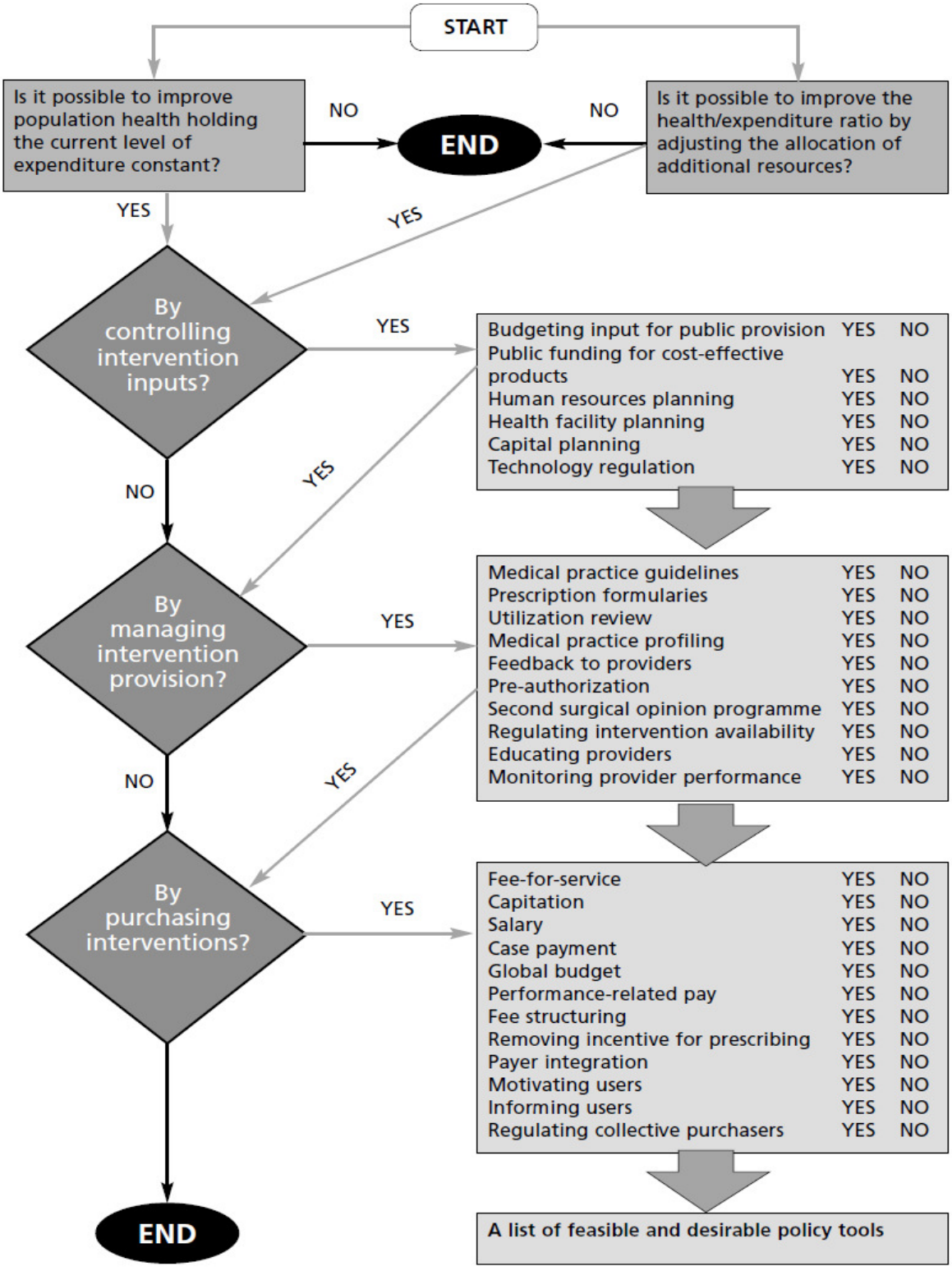
In this HSF working paper, prepared as a background document for the *World Health Report 2010* on financing for universal coverage, we set out to explore the contribution that improvements in the efficient allocation and delivery of health services could make to efforts to move closer to universal coverage. By identifying known causes of inefficiency, we even aimed to place a value on the monetary value that would be made available by their elimination.

Our overall conclusion is that there is an alarmingly large degree of inefficiency in the health sector, irrespective of the income level of different regions or countries. At a global level, we put this at between 20-40% of total health spending, equivalent to a current monetary value that approaches $1.5 trillion per year. Needless to say, this is something of a ball park estimate and entirely hides the inevitable variations that exist between countries, but serves to remind that all countries could and can do a lot more to make better use of resources devoted to health. In terms of practical steps forward, Annex 1 provides a schematic presentation of the various policy tools that could be considered in order to improve allocative efficiency (for more details, see Liu, 2003).

Earlier in the background paper, we had identified a number of countries that in crude terms produce relatively good value (in terms of life expectancy) for the money they put into health systems; however, their better than average performance would appear to have more to do with equality of access / coverage than the particular efficiency with which they employ inputs into the health production process.

Much ultimately depends on appropriate levels of health system governance, which provides the essential set of checks and balances needed to provide efficient and equitable health care delivery (in the context of increasingly market-driven and pluralistic health systems). Despite the often nebulous nature of this health system function or component, strong governance or leadership - that is inclusive, equity-oriented and accountable - provides the essential foundation for a more efficient (as well as equitable) health system. Some of the policy tools that can be considered

*Annex 1* ***A flowchart for the selection of policy tools for improving allocative efficiency***
(Source: Liu, 2003)



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