Chapter 3

Financing malaria control

This chapter reviews (i) recent trends in international and domestic financing in relation to global malaria control and elimination targets, (ii) how funds have been spent on the different interventions, (iii) the scope for cost savings, and (iv) prospects for mobilizing additional resources.

3.1 Resource requirements

Global resource requirements for malaria control were estimated in the 2008 Global Malaria Action Plan to exceed US$ 5 billion per year between 2010 and 2015 and US$ 4.75 billion between 2020 and 2025 (1). The reduced amounts in the later years are primarily due to a projected reduction in the need for diagnostic testing and treatment as malaria becomes better controlled, as has been observed in several low transmission countries over the past decade. However, it is possible that future needs for diagnostic testing will not be reduced substantially in the near term; in countries that currently have high rates of malaria transmission, fever cases may still require parasitological testing even if malaria has been well controlled, for as long as there is a continuing risk of malaria transmission.

3.2 International financing of malaria control

International disbursements to malaria-endemic countries have increased vastly over the past decade but appear to have peaked in 2011, at US$ 2 billion (Fig.3.1). The Global Fund remains the single largest source of funding for malaria control globally, with a peak in disbursements over 2009–2011, reflecting the larger Round 8 and Round 9 Global Fund grants approved in 2008 and 2009, respectively. DFID, PMI, the World Bank and other donors accounted for 49% of total disbursed funding in the year 2010. PMI contributions rose from US$ 385 million in 2009 to US$ 585 million in 2010.

With the exception of the Global Fund, information on disbursements is not available for years after 2010. To assess trends in the funds available for malaria control between 2011 and 2015, it is necessary to examine formal commitments made by funding agencies or, if data are not available, to examine pledges or to make projections regarding the funds that could be available according to information on financing trends (see Box 3.1 for a description of the difference between pledges, commitments, disbursements and expenditures).

For the Global Fund, actual disbursements are shown up to October 2011; disbursements expected in the following years are estimated from the remaining resources in existing grants, including approved Round 10 proposals, allocated to the remainder of 2011 and 2012 and future years according to the number of days remaining in grants. On 22 November 2011 the Global Fund announced that the Round 11 of grant applications would be cancelled owing to lower than expected revenues (3). The next opportunity for countries to apply for new grants will be for 2014 onwards, but the amounts available are not yet known. A transitional funding mechanism has been established to ensure continuity of services for grants that end before 2014. Savings from phase 2 renewals will also be sought. In particular, Group of 20 (G-20) upper middle income countries with less than an extreme disease burden will no longer be eligible for renewals of grants.

Figure 3.1 Past and projected international funding for malaria control

Source: Global Fund: Actual disbursements to October 2011, then resources remaining in existing grants, with 20% efficiency savings, allocated to the remainder of 2011 and future years according to the number of days remaining in grants. PMI: appropriation for 2012 onwards set to 2011 levels. DFID: Average of amounts in country operational plans (lower case scenario) and total of US$ 500,000 in 2015 excluding Global Fund and other contributions (upper case scenario). World Bank and others: funding beyond 2009 assumed to remain at 2009 levels. AMFm: actual disbursements in 2011 up to September then remaining resources allocated to 2011 and 2012 according to the rate of spending to date. Note that the graph excludes funding of AMFm beyond 2012 and possible new round of Global Fund in 2014, owing to uncertainty over future resourcing of these mechanisms.

1 Kiszewski et al (2) estimated that between US$ 3.5 billion and US$ 5.6 billion would be required per year between 2006 and 2015, but used a slightly different basis for calculation, e.g. not budgeting for the use of RDTs in children under five years of age in Africa.

2 Brazil had already announced at the 21st RBM board meeting that it would decline to accept funds for Phase 2 of its Round 8 malaria grant.
Future PMI funding is assumed to be held at 2011 levels of US$ 620 million. United Kingdom direct bilateral funding available to endemic countries for malaria control is projected to increase from US$ 66 million in 2009 to US$ 260 million in 2015. For the World Bank together with other agencies, future funding is assumed to remain at 2009 levels, the latest year for which data are available, at US$ 51 million. AMFm disbursements in 2011 up to September totalled US$ 105 million; the remainder of the initial AMFm budget of US$ 216 million has been allocated to 2011 and 2012 according to the rate of spending to date. Future AMFm funding is uncertain and has been excluded from the graph.

This analysis suggests that international funding for malaria control will reach its highest ever levels in 2011 at US$ 2 billion, of which the Global Fund accounts for approximately 50%. Funding will then remain relatively stable until 2013 largely as a result of increased financing from DFID. However, without further rounds from the Global Fund, it will decrease to US$ 1.5 billion in 2015. Such analysis is relatively optimistic, since in the absence of firm information, it does not project decreases in funding from PMI, World Bank or other sources. As well as reduced amounts of funding, the nature of malaria financing could change as the bilateral programmes of DFID and PMI dominate funding for malaria control in 2015. Such bilateral support is concentrated in the highest burden countries in Africa. Countries outside Africa may find it increasingly difficult to attract international funding for malaria control.

This excludes support to the Global Fund and UNITAID and indirect funding for malaria through direct budget and sector support and maternal, newborn and child health programme support.

### BOX 3.1

Types of financial information and sources of data

**Pledge:** A non-binding announcement to contribute a certain amount of funds.

**Commitment:** A firm obligation to provide money for malaria control activities or purchasing commodities. A commitment should normally be formalized in writing and backed by sufficient funds. Commitments indicate the level of priority given to malaria control but the amounts of money finally disbursed or spent may differ from the amount committed because disbursements or expenditures can be reduced if problems arise during programme implementation.

Information on commitments was obtained from several sources. The Global Fund provides information on grant awards and funds committed on its web site. The US President’s Malaria Initiative (PMI) and the United Kingdom Department for International Development (DFID) provide information on commitments in their country operational plans.

Information on commitments made by other donor organizations was obtained from the Organisation for Economic Co-operation and Development (OECD) which maintains a database on foreign aid flows. The OECD database only provides information until 2009, hence commitments by the organizations represented (principally the World Bank, the governments of Japan, and UNICEF) were assumed to remain at 2009 levels in 2010 and 2011.

### Disbursement:

A disbursement is the transfer of funds which places resources at the disposal of a government or other implementing agencies. The Global Fund produces reports detailing disbursements for specific grants up to 2010. Information on disbursements from other sources was obtained from the OECD database, which contains information for the years 2004–2009. Because data for 2010 were not available, levels of disbursement in 2010 were assumed to be equal to those in 2009.

**Expenditure:** The use of funds to pay for commodities, buildings, equipment, salaries or services (including training, supervision, quality control, monitoring and surveillance etc).

Information on disbursements often lags behind information on commitments by one year or more and information on expenditures may be delayed for longer. This is because of the time required to transfer money (often in instalments) or make expenditures as well as the need to report after transactions have been completed. Also auditing is often required before official release of expenditure data. Information on disbursements provides a more accurate picture of the amount of money going into malaria control than information on commitments and it is typically more complete than expenditures.

3.4 Categories of expenditure by source of funds

Figure 3.3 shows how funding from different sources is spent. The proportion of national government spending on different activities was calculated from the 42 reports with a breakdown of government expenditures for 2010 submitted by NMCPs to WHO, with each country weighted equally (rather than by total expenditures). Information on Global Fund expenditures was obtained from the fund’s enhanced financial reporting system for 2010. Information on planned PMI expenditures was obtained from country operational plans for 2011.

National government expenditure for malaria is generally focused on human resources (36%), IRS (17%) and programme management (16%), although this varies by WHO Region, with proportionally more spent on human resources in the American and South-East Asian Regions (72% and 74% respectively) compared to 22% in the African Region. The majority of Global Fund resources are used for ITNs (43%), antimalarial treatment (21%), programme management (12%) and diagnostic testing (3%). PMI funds are allocated primarily for ITNs (35%), IRS (25%), treatment (20%) and diagnostic testing (7%).

3.5 Potential Savings

The fact that current funding for malaria programmes falls short of the amount required to achieve universal access to malaria interventions implies that funding needs to be increased from existing levels and/or that malaria control programmes should seek cost savings so that more can be done with existing funds. Larger cost savings are likely to be achieved by focusing on elements that account for the largest proportion of expenditures in malaria control programmes, i.e. ITNs, IRS, diagnosis and treatment. This section draws on findings of the Results for Development Institute's LLIN Market Dynamics Project and work by the Clinton Health Access Initiative (CHAI) on value for money in malaria programming(5).
### 3.5.1 Vector control

**ITN prices:** ITNs, or more specifically LLINs, account for the largest share of most malaria programme expenditures. The median cost of delivering a LLIN in studies conducted since 2005 was US$ 7.66 (range US$ 6.61–US$ 10.84). Most of the cost (70%–85%) is accounted for by the cost of the LLIN, including shipping and insurance costs (Fig.3.4).

**Figure 3.4 Breakdown of costs to deliver an LLIN**

Historical LLIN pricing data from the Global Fund’s Price and Quality Reporting1 (PQR) database shows a downward pricing trend since 2007. The average price of the most widely procured 180x190x150cm net, which accounted for 47% of purchases in 2009–2010, fell by 22% between 2007 and 2010, and by an additional 9% in the first half of 2011 (Fig.3.5).

This decreasing price trend is likely to be due to a combination of several factors: a dramatic increase in LLIN purchases, from 17 million in Africa in 2007 to 145 million in 2010; increased market competition, with the number of WHOPEs-recommended suppliers increasing from three in 2007 to ten in 2011; and most recently, excess production capacity after the scale-up in 2010 to suppliers increasing from three in 2007 to ten in 2011; and most recently, excess production capacity after the scale-up in 2010 to.

Analysis conducted by CHAI suggests that the savings achievable by accessing lower prices in the market are modest, because large purchasers are already obtaining the lowest prices. If all countries were able to access the lowest price reported to the PQR database for the net types that they purchased, total expenditure would fall by only 11%. However, value for money depends not only on the cost of nets, and it may be more cost effective to pay more for a more durable net that is likely to last longer in the field, or for a type of net that may be more popular with the local population, and therefore increase net usage.

**ITN delivery costs:** Distribution costs, which include warehousing and transportation, typically comprise approximately 5%–10% of the total cost of delivery (Fig.3.4). A review has suggested that mass campaigns have the lowest median cost per net delivered, with continuous distribution through routine health services slightly behind, and continuous retail and community-based strategies being 50%–100% more expensive (12). While the cost of delivering an ITN may be modest for the two most commonly used strategies (through mass campaigns or health services) the strategy chosen to identify recipients may offer an opportunity for savings. Some programmes deliver a fixed number of ITNs per household in a mass campaign, such as two nets per household, rather than providing them according to the number of people in the household. Such a strategy could not only fail to provide sufficient ITNs to all of the population at risk, but would provide more nets than needed for households of one or two people and lead to significant wastage if the extra nets were not shared with neighbours who have insufficient nets (Fig.3.6). In a country the size of Nigeria the number of excess ITNs delivered to households with just one or two residents would be more than 10 million nets costing at least US$ 60 million.

ITN coverage begins to fall even in the first year after a campaign as a result of loss, damage, and population growth, so that regular top-ups are necessary (12). Mass campaigns to replace nets at regular intervals would be wasteful, as older but still effective nets would be replaced. ITNs can be delivered through antenatal and immunization clinics, but some households without a birth in a year would not be covered, while it is also possible that ITNs would be supplied to families which had already received an ITN through other channels (e.g. an ITN supplied at both antenatal and immunization clinics). Ideally, nets would be replaced continuously as they wear out, but a practical strategy for identifying the need for replacement nets at the household level has not been fully developed, and administrative costs may be high. There is an urgent need to devise ways of efficiently targeting households in need of nets.

**Spatial targeting of ITNs:** Malaria transmission is heterogeneous, particularly outside Africa, and cost savings might be achieved by focusing vector control only on areas above a specific threshold of transmission intensity2. However, evidence suggests that the levels of vector control coverage required to suppress malaria in low transmission areas are lower than in high transmission areas (13). While it is possible that some populations in areas of very low transmission may not derive substantial benefits from ITNs (14), precise knowledge of the levels of risk and the required levels of coverage for effective control in different epidemiological settings is lacking, and suspending vector control or aiming for partial coverage targets could put some populations at heightened risk of malaria. Hence, the scope for cost savings by better spatial targeting currently appears to be limited. More knowledge is needed on the extent to which universal coverage of vector control measures is required in areas of very low transmission, and where they could be replaced by intensified case detection and response.

**Increasing the lifespan of ITNs:** Although manufacturers state that nets may last for more than three years, in practice net lifespan varies widely (15, 16). With ITNs that last three years, approximately 1.25 billion ITNs will be required to ensure that all people at risk of malaria in Africa have access to an ITN between 2011 and 2020, whereas only 750 million ITNs would be required for ITNs that last five years. If the unit cost of delivering both types of ITNs were similar, at US$ 7.66 (as described above, Fig.3.4), US$ 3.8 billion could be saved from a total ITN financing requirement of US$ 9.6 billion. However, the savings would depend on the strategy for replacing nets. Moreover, the distribution of net life is as important as the average value, because net distribution mechanisms must replace nets that fail before the end of the average net lifespan and, ideally, avoid replacing nets that last longer than expected. Additionally, with

2. At present there is little evidence that substantial vector control resources are spent on areas with no malaria risk.
increasing concerns about pyrethroid resistance, caution is needed regarding the implications of more durable nets. It will be important to consider whether a more durable net should also have resistance-breaking or resistance management insecticidal properties.

WHO has developed guidelines on measuring ITN durability, and has recommended that procurement decisions should be based on the cost per year of protection, not simply on the cost per net (16, 17). While retrospective data on existing nets is being gathered, the guidelines emphasize the importance of prospective data gathering on ITN durability in order to establish whether the LLIN product procured by a country for large-scale distribution is indeed the best for that particular local setting, and should be purchased again, or whether a different product would give better value for money in the next round of procurement. Prospective data gathering involves comparing up to six different products, including the one or more products that are already in large-scale use in that setting, together with some selected alternatives (e.g. some of those that were not selected in the last tender). The median lifespan of each product (i.e. the time at which 50% had been lost) could then be divided into the quoted offer price for each product in a tender, to produce an estimate of the cost-per-year of effective coverage. In this way, price can be considered in the tender process as ‘per year of expected coverage’ rather than ‘per net’, while the other tender criteria (such as delivery conditions) can retain their respective weightings relative to price.

Once protocols for measuring the life of nets are implemented in the field, and the results considered in tenders, manufacturers will have strong incentives to develop better, longer-lasting nets. Extension of the lifespan of nets would not only reduce commodity costs but also the frequency of redistribution campaigns and expenditures associated with ITN delivery.

IRS expenditure: Expenditure on IRS comprises a significant share of malaria control programme expenditures, particularly those of ministries of health and the PMI (Fig.3.3). Analysis of PMI programme costs indicated that the cost per person protected by IRS per year varies by programme size (18); those protecting 1 million people or more were less costly (median US$ 2.62 per person protected) than those that protect fewer than 1 million (median US$ 5.52 per person protected) (Fig.3.7). Costs in large programmes also decreased over time by about 25% as they matured. Evidently IRS may have to be undertaken on a considerable scale for the lowest costs to be achieved.

To reduce the risk of insecticide resistance emerging, IRS programmes should use several different insecticides, either in annual rotation or as a mosaic, and avoid using pyrethroids where LLIN coverage is high. Where pyrethroids were the predominant class of insecticide, insecticides comprised only 13%–18% of total costs in large IRS programmes, and 7%–10% in small programmes (18), the difference due to proportionally higher staff and other costs in small programmes. Given that carbamates cost roughly five times more than pyrethroids, these proportions suggest that spraying costs would increase by 50%–70% in large programmes and 30%–40% in small programmes if pyrethroids were replaced by carbamates in a cycle (or to US$ 4.0–4.5 per person protected in large programmes compared to US$ 7.0–7.7 in small programmes). While IRS is undoubtedly effective, and there is scope for reducing the cost per person protected by expanding programmes, the cost per person protected per year is greater than that for ITNs (which is approximately US$ 1.39 assuming ITNs are used at 96% of capacity (see section 4.1.3, Fig.4.5)).

1 The cost of delivering an LLIN which lasts three years and covers an average of 1.8 people is US$ 7.66.

Figure 3.5 Weighted average unit price for 190x180x150 LLINs (US$)
Source: Global Fund PQR database accessed Nov 2011. Includes only entries with ‘Shipping reported separately’. Prices for 2011 are up to June.

Figure 3.6 Effect of delivering two ITNs per household in a mass campaign

Figure 3.7 Cost per person protected by IRS per year in relation to programme size
3.5.2 Diagnostic testing and treatment

Diagnostic testing and treatment is the largest category of expenditure after vector control. In countries with high levels of transmission, suspected malaria cases can comprise up to 50% of outpatient visits and all should receive a diagnostic test; in the absence of availability of malaria diagnostic testing, such patients are generally treated presumptively with antimalarial medicines.

Rapid diagnostic tests: According to 2010 PQR data, the weighted average price for *Plasmodium falciparum*-specific RDTs was US$ 0.51 (range: US$ 0.42–0.88) and US$ 0.69 (US$ 0.58–1.05) for multi-species tests. The weighted average prices for both types of tests fell by 11%–15% annually from 2008 to 2010.

The scope for cost savings by improving procurement is limited. If all countries purchasing *P. falciparum* or multi-species tests had been able to access the lowest price recorded in the PQR in 2010, they would have collectively saved approximately 15%. However, because of differences between competitors’ tests, there are costs involved in switching from one product to another (e.g. re-training, new job aids, increased supervision). Even if countries had continued to purchase the same products, but with access to the lowest prices for each (for instance, through effective pooled procurement), they could have saved only 11%.

Little is known about the cost structure of RDTs for malaria. With the exception of monoclonal antibodies for detecting malaria-specific antigens, all of the components are readily available commodities, suggesting that there may be limited scope for reducing costs. In round 3 of product quality testing, undertaken by WHO, FIND, CDC, and TDR in 2010, 23 suppliers submitted 50 products for test quality assessments (19) suggesting that the market is relatively competitive, although in practice five manufacturers dominate actual sales. As the drive towards universal diagnostic testing accelerates, expenditures on RDTs will increase and the potential for cost savings will need to be kept under continual review. Excessive focus on RDT prices could jeopardize product quality. However, RDTs that score highest in quality testing also appear to be among the least expensive, perhaps because their popularity enables the manufacturers to achieve economies of scale (see Fig. 5.3).

Decreases in the cost of RDTs may require new technologies, but research expenditure on diagnostic testing lags far behind that of ACTs, representing only 4.5% of total malaria research and development funding, compared to 31% for drugs (amounting to US$ 12 million in 2009) (20). The impact of reducing RDT costs could be considerable: even if RDTs were used for only half of the fever cases attending public health facilities in the WHO African Region, reducing their cost from US$ 0.50 to US$ 0.25 would save over US$ 45 million annually. Cheaper diagnostics would also encourage their use in the private sector, and thereby promote more rational use of subsidized ACTs.

Artemisinin-based combination therapy: Two artemisinin combinations dominate the market today, artemether-lumefantrine (AL) and artesunate-amodiaquine (AS-AQ). The public sector accounts for the largest share of orders for prequalified ACTs, and in 2011 the price offers of adult treatment packs of AL ranged between US$ 1.30 and US$ 1.40, while for adult treatment courses of AS-AQ the price was US$ 0.78 for a co blister pack and US$ 0.94 for a fixed-dose combination. Despite its higher cost, AL accounted for two thirds of ACTs procured by the public sector in 2010 (Fig. 6.10 page 42).

From 2007 to 2009 five additional ACT manufacturers met the WHO prequalification standards and the growing demand for ACTs in 2010 was met by increased production capacity. Higher sales volumes, increasing competition and lower artemisinin price have led to a progressive reduction of ACT prices. However, the tight supply of artemisinin in 2011 and its marked price increase this year is likely to have an impact on ACT prices in 2012: total sales were approximately 180 million treatment courses in 2010 but global ACT demand is forecast to reach 300 million treatment courses in 2012 (Fig. 6.12 page 44). The demand for ACTs could potentially decrease in the future if diagnostic testing for malaria becomes more widely available.

Increasing parasitological testing: Expenditure on antimalarial treatment currently greatly exceeds that on diagnostic testing: the Global Fund spent US$ 630 million on treatment in 2010 compared to US$ 130 million on diagnostic testing. In addition to regular Global Fund grant disbursements, US$ 216 million were committed to subsidize ACTs as part of AMFm Phase 1 implementation, which started in the second half of 2010. The PMI allocated US$ 104 million for malaria treatment in 2011 compared to US$ 37 million for diagnostics.

Expenditures on malaria diagnostic tests are expected to increase and expenditures on malaria medicines to decrease as parasitological testing is extended to all suspected cases of malaria. RDTs are currently the most practical tool for expanding testing in health facilities that are unable to offer malaria microscopy. The extent to which cost savings on malaria commodities will be achieved by expanding parasitological diagnosis will depend on the relative cost of RDTs and ACTs and the endemicity of malaria as measured by the test positivity rate. With current prices of RDTs and ACTs (US$ 0.50 for RDT and US$ 1.40 for AL), and perfect compliance with test results, savings on commodities can be expected if test positivity rates are less than 64% (Fig. 3.8). Test positivity rates lower than 60% are observed in the vast majority of African countries and in all countries elsewhere. It is estimated that approximately 183 million fever cases are seen annually at public health facilities in the WHO African Region; this would give rise to a commodity cost of US$ 256 million if all cases were treated presumptively with AL, but only US$ 188 million if all cases had a parasitological diagnosis and were only treated with AL if positive, a saving of US$ 68 million. Further savings would be made if the cost of RDTs decreases relative to that of ACTs. However, savings will be less if health workers continue to provide antimalarial medicines to patients who have negative test results.

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1. Global Fund enhanced financial reporting system
4. Of the estimated 174 million malaria cases in WHO African Region (Section 7.11), 40% are estimated to attend public health facilities, according to the treatment-seeking behaviour for fever observed in household surveys. The number of fever cases is estimated from the test positivity rates observed in each country.
This type of analysis does not take into account increased staff costs (if the time required to perform tests implies that more staff will be hired or that staff time will be taken away from other activities), the costs of establishing a quality control system for testing, the cost of alternative therapies in the event of a negative test, as well as the start-up costs of training staff, revising protocols and supervision which will be important in ensuring that health workers comply with test results. If these costs are taken into account, the expansion of RDTs may not lead to overall cost savings. However, any additional costs need to be balanced against the improved quality of care provided to patients, the expected enhanced health outcomes, and the reduction in the risk of emergence and spread of antimalarial drug resistance.

The impact of improved malaria control: Improved malaria control should result in lower numbers of malaria cases. Randomized controlled trials indicate that high coverage with ITNs reduces the incidence of malaria by 50% in a variety of settings (22). Therefore, the number of malaria cases can be expected to decrease to 119 million per year in the African Region if universal coverage with either ITNs or IRS is achieved by 2015, compared to 197 million cases if current rates of coverage are maintained (or respectively 48 million and 79 million attending public sector facilities) (Fig.3.9).1

Potential cost savings on antimalarial medicines will not be fully realized as long as antimalarial drugs are given as presumptive treatment to all patients with fever. With a policy of universal parasitological testing, the reduction in cases due to universal vector control coverage would result in total commodity cost savings of US$ 110 million compared to zero ITN coverage, or US$ 59 million compared to current ITN coverage levels. With a policy of presumptive treatment of all fever cases in the public sector the corresponding savings accrued through improved vector control would be US$ 81 million and US$ 44 million (Fig.3.10). On this basis, the additional costs for enhanced vector control would be compensated in part by the reduced diagnostic testing and treatment commodity costs; the amounts saved would be sufficient to purchase and deliver 7.8 million additional ITNs, providing 42 million person-years of protection.

There may be economic benefits beyond commodity costs, and which may fully justify investments in malaria control. For example, in Rwanda it has been estimated that while it would cost US$ 265 million to sustain the malaria control programme over the next five years, the public health system could avert about US$ 267 million in the costs of diagnosing and treating malaria; and households could avert about US$ 547 million in direct and indirect costs, equivalent to about 7% of household income (25). Much of the health-care savings would not result in cash savings since they relate to health worker time and the cost of infrastructure and equipment, but these could be applied to other medical conditions.

1 The current number of cases would be expected to increase in line with population growth if intervention coverage remained unchanged. Non-malarial fevers would also increase in line with population growth irrespective of changes in intervention coverage.
3.6 Potential for increased funds for malaria control

**International financing:** Malaria programmes accounted for approximately 8% of Official Development Assistance (ODA) for health and population in 2009, increasing from 3% in 2005 (Fig 3.11). Overall financing for health and population remained stable between 2008 and 2009; while data for 2010 and 2011 are not yet available, there is little indication that the total funding amount will have increased. Given that malaria programmes account for such a significant proportion of health and population financing, and that total funding will probably remain stable, further increases in malaria funding may be unlikely unless a robust case can be made for investment in malaria control relative to other spending priorities.

It is not yet clear how the economic benefits of malaria control compare with other investments in the health and other sectors. However, malaria control may have wide economic benefits which would warrant its consideration alongside investment projects in other sectors and provide access to a broader range of funding. While total ODA disbursements across all sectors have not increased substantially since 2008, they amounted to US$ 147 billion in 2010.1 Approximately US$ 49.3 billion has been pledged for the 16th International Development Association (IDA) replenishment for the period July 2011–June 2014. IDA funds are traditionally used for infrastructure projects – if just 1% of these funds were made available for malaria control, approximately US$ 160 million could be raised over and above the World Bank’s commitments to the Malaria Booster Program.

**Domestic financing:** Global economic growth since 2000 has led to increased domestic government revenues and spending in malaria-endemic countries (Fig 3.12). Total domestic government spending exceeded US$ 1000 per capita in 43 malaria-endemic countries in 2010, compared to 24 in 2000.2

While there are many demands on domestic government financing, if a modest proportion of 1%4 of domestic spending were dedicated to malaria, this could raise more than US$ 1.39 per capita in 75 of the 99 countries with ongoing malaria transmission, the amount required to provide one person each year with access to an ITN.

Several countries have experienced particularly rapid growth in recent years, yet still benefit from international financial support for malaria control. A total of 28 malaria-endemic countries increased spending per capita by more than US$ 1000 between 2000 and 2010, and 5 more will have done so by 2015. These countries also tend to have relatively low malaria endemicity. If countries with a per capita domestic spending of more than US$ 1500 were to relinquish international assistance from the Global Fund for malaria control, a further US$ 80 million could be released for use in lower-income countries. At the 21st RBM board meeting in November 2011, Brazil announced that it would not accept funds for Phase 2 of the Round 8 malaria grant, even though it has successfully completed Phase 1.

**Innovative financing mechanisms:** A number of innovative financing schemes have been proposed, most of which are in the early stages of development. One option that has already been implemented is to impose taxes on selected financial transactions: the amounts are small enough to have a negligible effect on transaction frequency but generate sufficient funds for malaria control or other health projects for their collection to be worthwhile. For example, under UNITAID, a levy of between US$ 1.20 and US$ 6 is charged on each economy international flight (and more for business and first class). As of September 2011, nine countries were implementing the airline tax: Cameroon, Chile, Republic of Congo, France, Madagascar, Mali, Mauritius, Niger, and Republic of Korea.5 In 2010 the tax generated approximately US$ 210 million (26). The amount generated in countries without well developed tourist industries is modest (e.g. Mali raised US$ 402,000) suggesting that such a tax, if extended to all malaria-endemic countries, would not generally provide sufficient funds for significant malaria programme expansion, but could nevertheless provide an important source of revenue domestically for programme maintenance. Extension of the tax to markets in which airline traffic is prominent and growing could potentially raise significant additional funds – for example, the top three airlines alone carried more than 150 million passengers in China in 2010.6

Other specific taxes may also generate significant revenues locally. Such schemes include a tourist tax, perhaps levied on international arrivals. In Zanzibar, the United Republic of Tanzania, it has been estimated that a tourist tax of US$ 5–10 levied on international arrivals may finance 10%–20% of the annual operating costs of the malaria control programme (25). Senegal is considering creating a solidarity fund which will support the purchase of a range of public health commodities, raising revenue from taxes on products potentially harmful to health (e.g. cigarettes), community health insurance schemes and private sector contributions. In addition, ways to involve the private sector to support malaria control efforts are being considered, either through tax breaks or direct support to the programmes in districts or areas where companies operate.

A tax on bonds and derivatives transactions could also raise significant resources for health development. At low rates, ranging from 0.0001% to 0.2% per transaction, such a tax could generate 12 billion euros annually in a country such as France, and 265 billion across all G20 countries (27). Such a financial transaction tax would be unlikely to have a significant impact on the domestic financial markets of the countries which implement it. However, various uses of such tax revenues have been proposed apart from malaria control or other health and development initiatives, not least to insure against defaults in loan repayments.

Different types of malaria bond have been proposed in order to encourage greater involvement of private sector investors. One such bond would aim to raise money for malaria control from private investors and provide them with a return according to the degree of success of a malaria control programme.7 Ultimately the bond would be repaid by an international donor or domestic government. The advantage of involving the private sector in making an up-front investment is that the risk of programme failure is shared by the

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1 Data on disbursements across all sectors are available up to 2010 but a breakdown by sector only to 2009.
2 World Bank financing for malaria is usually provided as a credit from IDA, which is an interest-free loan, with repayments starting after 10 years and maturing at 35 or 40 years. An annual service charge of 0.75% applies.
4 This could happen if 10% if domestic government spending were spent on health programmes, and 10% of that amount spent on malaria.
5 Norway allocates part of its tax on CO2 emissions from aviation fuel to UNITAID
6 http://www.iata.org/ps/publications/Pages/wats-passenger-carried.aspx
7 Private investors typically expect a return on investments that is proportional to the risk but may be willing to forgo some of the return if investments were linked to a social cause.
private investor and international donor or domestic government, and payments can be linked to improved efficiencies in programme delivery, the aim being that these efficiencies would be sufficient to offset the cost of paying premiums to investors. Other types of bond that have been considered aim to encourage local private sector consortia to take on the role of international donors and domestic governments in bearing the cost of bonds, since they stand to benefit if malaria control is successful.

In another approach, diaspora bonds would target nationals living abroad who may be prepared to lend to their national governments at favorable rates, although such a bond would only apply to a limited number of countries.

Private sector markets might also be used to bridge short term funding gaps in a similar way to the “Vaccine Bonds” issued to finance GAVI. To date US$ 1.8 billion have been disbursed by GAVI to immunization programmes as a result of funds raised in the capital markets since 2006, and repaid over 20 years by Australia, France, Italy, The Netherlands, Norway, the United Kingdom, South Africa, Spain and Sweden (28).

Improved accountability is being increasingly emphasized in malaria programme financing. The Global Fund has always operated on a principle of results-based disbursement. A restructuring of its grant architecture will emphasize achievement of outcomes and impact, as well as requiring domestic government financial contributions. The mechanisms by which development funds are delivered could have a significant influence on the efficiency of programmes. If programmes are rewarded for reducing costs while maintaining coverage, total programme costs could be reduced and the savings used to further increase coverage. More research is needed to assess what mechanisms are likely to maximize programme outcomes from the same levels of investment.

Figure 3.11  Official development assistance for malaria and other health and population activities

Figure 3.12  Median total domestic government spending in malaria-endemic countries by WHO Region

Source: OECD database on foreign aid flows http://stats.oecd.org/qwids/

Source: International Monetary Fund World Economic Outlook Database, September 2011
3.7 Conclusions

International funding for malaria control is expected to peak at US$ 2 billion in 2011. From 2012 to 2013 it is projected to remain relatively stable, but then decrease to US$ 1.5 billion in 2015. This analysis is relatively optimistic as it assumes consistency in funding over time for agencies where firm information on future funding trends is not available, although it excludes a possible future round of funding from the Global Fund in 2014.

Domestic government funding of malaria programmes is generally less than US$ 1 per person at risk in the most highly endemic countries. Domestic government expenditures are also generally substantially less than international malaria expenditures except in countries with relatively low malaria transmission. Thus, while it is currently not possible to ascertain total domestic government spending on malaria, it is likely to be less than the US$ 2 billion from international sources, and the total funds available for malaria control fall short of the US$ 5 billion identified in the Global Malaria Action Plan as being necessary for fully effective malaria control.

ITN and other vector control interventions account for the majority of malaria programme spending. The cost of delivering a LLIN is approximately US$ 7.50. While IRS is effective, and there is scope for reducing the cost per person protected by expanding programmes, the cost per person protected per year is US$ 2.62 in large programmes, which is higher than that for ITNs (approximately US$ 1.39).

The price of an ITN represents the largest component of the cost of supplying an ITN. Prices of the most widely procured ITNs decreased by 22% between 2007 and 2010, and by an additional 9% in the first half of 2011. Large purchasers usually obtain the lowest prices, and in general, most countries now achieve prices quite close to the minimum, leaving little room for further efficiencies through procurement prices alone. However, even relatively small savings may be important to particular countries.

Distribution costs typically comprise approximately 5%–10% of the total cost of delivery. The costs of the two main strategies for delivering ITNs, through mass campaigns and or health services, are similar. Existing channels may need to be refined to ensure that ITNs are delivered to all of those, and only those, who need them. As country programmes mature, the cost of delivery may increase as programmes consider how to replace ITNs, where only a proportion of a population may require a new ITN at any one time, compared to rapidly expanding coverage where ITNs are delivered to the entire population at risk.

Potentially large savings could be made by developing and deploying longer lasting ITNs. Approximately 1.2 billion ITNs are required to ensure that all people at risk of malaria in Africa have access to an ITN between 2011 and 2020 if ITNs last for 3 years. If ITNs lasted for 5 years, only 750 million ITNs would be required. If the unit cost of delivering both types of ITNs were similar, at US$ 7.66, a total of US$ 3.8 billion could be saved from a financing requirement of US$ 9.6 billion.

Expansion of diagnostic testing offers modest potential for cost savings on commodities. Diagnostic testing and treatment constitute the second largest category of malaria programme spending after vector control. Expenditure on treatment currently greatly exceeds that on diagnostic testing but is expected to decrease as parasitological testing is expanded to all suspected cases of malaria. With current prices of RDTs and ACTs (US$ 0.50 and US$ 1.40 for AL respectively), perfect compliance with test results, and test positivity rates less than 60%, savings on commodities could amount to US$ 68 million in the public sector in Africa. The price of RDTs has fallen by 11%–15% annually from 2008 to 2010. The impact of further cost reductions could be considerable: even if RDTs were used for only 50% of fever cases in the WHO Africa Region, reducing their cost from the current US$ 0.50 to US$ 0.25 would save a further US$ 45 million a year.

Improved malaria control will itself lead to some cost savings. With a policy of universal parasitological testing, the reduction in cases accruing from universal coverage of vector control would result in total commodity cost savings of US$ 110 million compared to zero coverage or US$ 59 million compared to current coverage levels. There may be additional significant economic benefits beyond commodity costs, which may further justify investment in malaria control.

There is limited scope for malaria control to attract additional international financing. Malaria programmes accounted for approximately 8% of Official Development Assistance (ODA) for health and population in 2009, increasing from 3% in 2005. Overall financing for health and population remained stable between 2008 and 2009, and is likely to do so thereafter. Given stable total funding, and that malaria programmes already receive a significant proportion of health and population financing, further increases in malaria funding within health sector financing may be unlikely. A clearer demonstration of the economic benefits of malaria control may help malaria programmes to access a broader range of development funding.

There is scope for domestic governments to invest more in malaria control. If just 1% of total domestic government spending were made available for malaria control in 2010, 75 of the 99 countries with ongoing malaria transmission could raise enough funds to provide each person at risk with access to an ITN. Global economic growth has allowed many malaria-endemic countries to increase total domestic government spending: more than 28 countries increased per capita spending by ≥US$ 1000 between 2000 and 2010.

Innovative financing mechanisms are in the early stages of development. Several schemes have been proposed. Taxes on bonds and derivatives transactions may offer the greatest potential for revenue generation – estimated in excess of US$ 250 billions – but their suggested uses go beyond malaria control. Taxes on airline journeys currently raise more than US$ 200 for health development and their extension to additional countries could generate significant additional funds. Other country-specific schemes, such as tourist taxes, may offer opportunities to raise funds for control programmes in malaria-endemic countries.
References


