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Annotated Bibliography on Malaria and Health Systems Strengthening

Dan Whitaker

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Abbreviations

	Artemisinin-based Combination Therapies, e.g.
ACT	Artesunate, Amodiaquine
ANC	Antenatal Care
CHW	Community Health Worker
DP	Displaced Person
ITN	Insecticide Treated Nets
PMI	President's Malaria Initiative
RDT	Rapid Diagnostic Tests
SSA	Sub-Saharan Africa
UNECA	UN Economic Commission on Africa

HSS Challenges re Malaria Prevention

A shift in policy from targeting ITNs to vulnerable groups towards universal access (**Insecticide treated mosquito nets: a position statement. Global Malaria Programme, WHO, 2007**) has a range of health system implications if scale-up and sustained control is to be achieved. **Kilian et al (2009) Review of delivery strategies for insecticide treated mosquito nets – are we ready for the next phase of malaria control efforts? Malaria Consortium**, reviews 258 articles, concluding that a mix of continuous delivery mechanisms through community, routine services and retail outlets is suitable as long as equity issues are addressed with subsidies. Policy questions include how to affect the switch from ITNs to LLINs in the public and private sector; how to achieve collaboration between public, CSO and commercial sectors; and future replacement of nets. Rarely has either the public sector managed effective ITN distribution alone (one e.g.: **Nyarango et al (2006). A steep decline of malaria morbidity and mortality trends in Eritrea between 2000 and 2004: the effect of combination of control methods. Malar J; 5:33**) or been excluded from it (an e.g.: **Kolaczinski et al. (2004). Subsidized sales of insecticide-treated nets in Afghan refugee camps demonstrate the feasibility of a transition from humanitarian aid towards sustainability. Malar J; 3:15**). There remains a trade-off between speed of coverage (campaigns best) and sustainability (continuous strategies, integration into public health system).

Cliff et al Policy development in malaria vector management in Mozambique, South Africa and Zimbabwe. Health Policy Plan. 2010 Feb argues that with evidence that IRS and ITNs have similar cost and efficacy, political factors will sometimes determine how much each is used. Manufacturers and pro-IRS policymakers (e.g. South African government) may overcome international researchers' and donors' preference for ITNs. The ideal approach is integrated vector control, using a variety of methods tailor-made to the local ecology. IPT for infants, children and pregnant women faces a growing resistance problem due to SP misuse (**Gosling et al. Intermittent preventive treatment against malaria: an update, May 2010, Vol. 8, No. 5**), a reminder for policymakers of the need to place more emphasis on IEC and regulation of private retailers.

Important advances in response times could be achieved with better malaria forecasting and early warning, e.g. **Anderson et al (2003) Micro-Satellite and In Situ Ground Sensor Network For Combating Malaria. Aidharmonization.org**. But strong leadership will be needed to take this area forward. Additional health systems issues involved in prevention include environmental policy regarding insecticides and other materials and enhanced M&E (e.g. **Das Gupta et al. New perspectives of malaria control in India under World Bank Project. J Indian Med Assoc. 2009 Dec;107(12):870**).

HSS Challenges re Diagnosis, Treatment

Detection and treatment are less analysed than prevention, though they consumes much resources. Prompt, accurate diagnosis is vital for effective case management. Microscopy presents multiple requirements: a tiered, integrated laboratory network; trained managerial and technical staff; equipment and infrastructure, including transport; and quality control, including maintenance;

– **Consultation on Technical and Operational Recommendations for Clinical Laboratory Testing Harmonisation and Standardisation, 2008** (http://www.who.int/healthsystems/round9_9.pdf).

Since not all of this may be possible in resource-constrained environments, RDTs may circumvent system constraints and allow greater effectiveness than does clinical diagnosis (**Moody A (2002) Rapid diagnostic tests for malaria parasites. Clinical Microbiology Reviews 15**), as they are easy, rapid and require minimal training. However, note that some RDTs are unsuitable for particular climates or vector/parasite combinations (e.g. **Bendezu et al. Field evaluation of a rapid diagnostic test (Parascreen™) for malaria diagnosis in the Peruvian Amazon. Malar J. 2010 Jun 7;9(1)**)

To move from malaria control towards elimination, surveillance is also vital ('perhaps the most important component' – **Feachem. Shrinking the malaria map—a guide for policy makers. San Francisco, California, Global Health Group, 2009**). This requires passive and active data collection; analysis, including case investigation; and appropriate response, including treatment, screening or revised prevention activities. A malaria-specific reporting system, separate from the national health information system, may be necessary. Investment in equipment, personnel, communications and training may be significant. Mass screening and/or mass drug administration has achieved elimination previously and is currently used in China, but is also controversial (Feachem, 2009).

ACTs are the first line treatment for malaria virtually everywhere (**Bosman et al: A major transition in malaria treatment: the adoption and deployment of artemisinin-based combination therapies. Am J Trop Med Hyg 2007, 77**), with the private sector co-opted to increase access (see private sector section, below). However, the first signs of resistance are visible on the Thai/Cambodian border (**Samarasekera et al Countries race to contain resistance to key antimalarial The Lancet, Volume 374, Issue 9686, 25 July 2009**). Containing resistance (WHO led) is a challenge require cross-border and cross-sector cooperation, political will, as well as substantial financial commitments and human resources. With 70% of care obtained privately sector in Cambodia, private sector regulation and IEC (of the population and providers) will be crucial. Village malaria workers are useful in extending public sector influence over care. Global surveillance is needed to control international spread of resistance (not just in Southeast Asia). Pushing ACT dispensing before countries have improved their diagnostic and prescribing capability may also increase resistance (**Bate & Hess, Affordable Medicines Facility, Lancet, 9:7, July 2009**).

HSS Challenges re Financing of Malaria-related Health Care

The global malaria action plan. WHO/RBM 2008 estimates that malaria control programmes were financed in 2007 34% through national government funds, 47% through donors and 19% through out-of-pocket spending. The large donor component raises concerns about sustainability given fiscal pressure in donor countries. The 2008 plan also estimated that 'sustaining the build-up of control and elimination of malaria' would require \$5-6.2bn annually during 2009-2015, with IRS and ITNs the two main items. Donor commitments are on an increasing trend, from \$0.3bn in 2003 to \$1.7bn in 2009. At present the largest donors are the GFATM, followed by the PMI, then DFID. The recent increase in donor funding may have produced a decline in national government funding during 2007-8, though data is

incomplete. Donor funding per malaria case in Africa is still a small fraction of that in several other regions, though it does better per person at risk, while smaller countries also receive more per capita than larger ones (**WHO World Malaria Report 2009**).

The increased manufacturing cost of ACT versus previous antimalarials (10-15 times as much) represents a financing challenge. International action has focused on reducing this upstream cost via the Affordable Medicines Facility (**Laxminarayan et al. A global subsidy: key to affordable drugs for malaria? *Hlth Aff.* 2009 Jul-Aug;28(4)**). A criticism has been that the opportunity cost of this subsidy has not been appreciated, e.g. a corresponding reduction in GFATM grants (see **The Global Fund to Fight AIDS, Tuberculosis and Malaria. Report of the affordable medicines facility—malaria ad hoc committee. http://www.theglobalfund.org/documents/board/18/GF-B18-07_**) and that this may lead to a verticalisation of malaria programmes, reducing national government control (Bate & Hess, 2009), factors which may be problematic in much donor funding.

More positively, RDTs represent an important potential decline in the cost of diagnostics. And for countries that achieve elimination, the costs of maintain malaria at bay should be much lower. Suggestions for sustainable funding mechanisms include trust funds, ear-marked taxes and multi-year pledges from donors (Feachem, 2009). Within countries, malaria may often be under-funded in relation to its disease burden and highlighting this can produce additional funds (**Watts 'An extra dollar can go a long way'. *BMJ* 2004: 1126 13 Nov**).

HSS Challenges re Access to Malaria-related Health Care

[see accompanying annotated bibliography on malaria, poverty and exclusion for further sources]

How Malaria May Affect HSS

Malaria incidence is likely to have contributed to a number of health system problems (**Sachs & Malaney The economic and social burden of malaria, (*Nat*, Vol. 415, Feb 2002)**), including insufficient funding, drain on health service resources (**Yukich et al. Costs and cost-effectiveness of vector control in Eritrea using insecticide-treated bed nets. *Malar J.* 2009 Mar 30;8:51**) and shortages of trained personnel. At the same time, more recently the disease has broad new funding streams for health system issues via the GFATM's switch to finance HSS (**<http://www.theglobalfund.org/en/performance/effectiveness/hss/?lang=en>**, and perhaps strengthened political will with the inclusion of malaria incidence among the MDGs (**Travis et al: Overcoming health-systems constraints to achieve the Millennium Development Goals, *Lancet.com* Vol 364 September 4, 2004**). For a view of the type of HSS issues which GFATM is addressing, see ***Physicians for Human Rights. 2010. Summaries of cross-cutting HSS sections of 3 successful Round 9 Global Fund proposals: Eritrea, Tanzania, and Cambodia*** (link), summarizing cross-cutting HSS sections of successful Round 9 proposals from Eritrea, Tanzania, and Cambodia.

In many countries malaria is addressed via programmes that even if government-led are still vertically organised (encouraged by vertical donor programmes). While there has been an integration of these into the main health service in some countries, in most malaria is addressed with a mix of vertical and integrated activities (**Atun et al. A systematic review of the evidence on integration of targeted health interventions into health systems. Health Policy and Planning 2010;25**). Treatment policy may not be evidence-based (**Williams et al. Changing national malaria drug treatment policy. Health Policy And Planning; 2004 19(6)**), so these programmes are unlikely to act as beacons of progress on HSS issues. However, national malaria strategy plans are generally developed, and insofar as these are coordinated with broader health strategic plans and any sub-sector plans such as HRH, procurement, then they will strengthen the planning process and accountability.

There has long been recognition in the literature of the importance of HSS, including drug policies, for the success of malaria control, e.g. **Moerman et al. 2003. The contribution of health-care services to a sound and sustainable malaria control policy. The Lancet Infectious Diseases 3**. But the net effect of malaria-related activities on HSS seems to vary across the many facets of such activities and contexts in which they take place. Examples might include how the development of drug resistance has stimulated cross-border cooperation on health policy (Samarasekera et al 2009), though this is still likely to be the exception (**Kaul I, Faust M. 2001. Global public good and health: taking the agenda forward. Bulletin of the World Health Organization 79**); occasions where an activity has strengthened a broader health service, such as free ITN distribution via ANC (**Guyatt et al. Free bednets to pregnant women in antenatal clinics: a cheap, simple and equitable approach to delivery. Trop Med and Int Hlth 2002; 7**); but not those where activities have established parallel systems, such as with surveillance (Feachem, 2009); the large size of the malaria market may have stimulated distribution of fake drugs (**Dondorp et al Fake antimalarials in Southeast Asia are a major impediment to malaria control: multinational cross-sectional survey on the prevalence of fake antimalarials. Trop Med Int Health 2004, 9(12)**), especially where borders are fluid (Williams et al, 2004); but the recent extension of ITNs (Yukich et 2009) and subsidised ACTs to private retailers (**Oliver Sabot et al, Distribution of Artemisinin-Based Combination Therapies through Private-Sector (AmFm, 2008)**) and focus on resistance to antimalarials will also have helped develop rare public-private linkages. Such interaction with the private sector also delivers care without the need for further investment in public sector infrastructure and staff.

Level of Health Workers Suitable For Malaria Care Delivery

Malaria control programmes must necessarily be multi-faceted and require a wide range of skills, beginning with effective programme management, with a culture of performance and accountability for meeting targets. In particular, most control programmes tend to be weak in entomology, surveillance and data management (Feachem, 2009).

Within prevention, additional education and training is often required regarding use of ITNs. **Deribew et al. Effect of training on the use of long-lasting insecticide-treated bed nets on the burden of malaria among vulnerable groups, south-**

west Ethiopia: baseline results of a cluster randomized trial. Malar J. 2010 May 10;9(1):121 found that only 28-30% observed LLITN were hung properly. Community workers can cost-effectively perform a range of functions successfully, e.g. free retreatment of ITNs in Eritrea, with training by nurses (Yukich et al 2009) or various diagnosis and treatment roles in Cambodia, though there is certainly also room for improvement (**Yasouka et al. Assessing the quality of service of village malaria workers to strengthen community-based malaria control in Cambodia. Malar J. 2010 Apr 23;9:109**). Yukich also found that IRS may require a high level of expertise in entomology and management, which might be excessively demanding in many endemic settings. However, such a programme can also help to develop local capacity in these areas (e.g. South Africa). Microscopy makes great human resource demands (Consultation on Technical and Operational Recommendations, 2008), but RDT can be effectively carried out by community workers, an important step forward in cost-effectiveness (**Eke & Enwereji. Diagnosis of malaria by community health workers in Nigeria. East Afr J Public Health. 2009 Apr;6(1):15-6**). For a broad review of CHWs, see http://www.who.int/healthsystems/round9_7.pdf (link). For innovative ways of using RDT-obtained data for surveillance, **Kamanga et al. Rural health centres, communities and malaria case detection in Zambia using mobile telephones: a means to detect potential reservoirs of infection in unstable transmission conditions. Malar J. 2010 Apr 15;9:96**.

Effective public sector staff may also be already available outside of the health sector. **Afenyadu et al. Improving access to early treatment of malaria: a trial with primary school teachers as care providers. Trop Med Int Health. 2005 Oct;10(10)** found high levels of diagnostic accuracy and user compliance with treatment. This may contrast with the treatment skills of primary care providers. **Al tair (2009) Knowledge and practices for preventing severe malaria in Yemen: the importance of gender in planning policy Hlth Pol and Plan Sept** found 57% of non-hospital health worker contacts led to ineffective treatment. (**Buabeng et al Knowledge of medicine outlets' staff and their practices for prevention and management of malaria in Ghana. Pharm World Sci. 2010 May 22**) found a most of range of public and private providers to be proficient at recognising malaria but poorly informed on national policy and only 21% able to case manage appropriately. The Global Health Workforce Alliance website contains various resources, including on costing health worker needs (<http://www.who.int/entity/workforcealliance/knowledge/publications/taskforces/ftfproducts/en/index.html>) and scaling up health worker education (http://www.who.int/entity/workforcealliance/about/taskforces/education_training/en/index.html)

Barriers to Access

[see accompanying annotated bibliography on malaria, poverty and exclusion for further sources]

How to Reach Poorest

[see accompanying annotated bibliography on malaria, poverty and exclusion for further sources]

Evidence re User Fees

There is evidence that user fees (and a range of related costs, such as transport) act to reduce utilisation of malaria prevention and treatment, especially by the poor, for whom they represent a larger proportion of income, e.g. **Uguru et al. Inequities in incidence, morbidity and expenditures on prevention and treatment of malaria in southeast Nigeria. BMC Int Health Hum Rights. 2009 Sep 5;9:21.** On the other hand, health facilities depend on revenues from user fees to maintain the quality of services. User fee abolition does not necessarily lead to the provision of equivalent alternative funds. Subsequent declining quality (e.g. stockouts) and the continuation of other related costs at public health facilities mean that making public services 'free' does not prevent most utilisation continuing to take place in the private sector, e.g. **Rutebemberwa et al. Utilization of public or private health care providers by febrile children after user fee removal in Uganda. Malar J. 2009 Mar 14;8:45.** In some cases, e.g. **Mubyazi et al. User charges in public health facilities in Tanzania: effect on revenues, quality of services and people's health-seeking behaviour for malaria illnesses in Korogwe district. Health Serv Manage Res. 2006 Feb;19(1):23-35,** public sector utilisation is unaffected by imposition of user fees, demonstrating that there though cost barriers may be substantial, there are many aspects to this and other factors also influence usage. There is no consensus in the international malaria community on whether user fees should be removed or sustained for malaria treatment, especially for children under five.

Commodity-related Issues

There are a wide range of commodity-related issues in connection to malaria. A particularly dynamic and influential area is the bulk purchase and subsidised provision of ACT by donors, including via the Affordable Medicine Facility for malaria, managed by the GFATM (see <http://www.rollbackmalaria.org/psm/amfm.html>). This provides ACT to countries at the price of chloroquine, around \$0.05/course, and is funded by UNITAID, DFID and the Gates Foundation.

The market for artemisinin is turbulent. The initial demand surge when the WHO approved it and a subsequent rush to expand production led to its price fluctuating between \$170 and \$1,200/kg during 2004-7. WHO expects increased demand to produce further price rises during 2010-12 (World Malaria Report 2009). There are criticisms of GFATM's focus on price leading to stockouts (e.g. **Tren et al. Drug procurement, the Global Fund and misguided competition policies. Malar J. 2009 Dec 22;8(1):305**) and fears that quality may be compromised (Bate & Hess, 2009). Accurate demand forecasting will be important for obtaining optimum price and supply conditions (**Cohen. Predicting Global Fund grant disbursements for procurement of artemisinin-based combination therapies Malar J. 2008; 7: 200**), as well as challenging (**Arrow K, Panosian C, Gelband H., (eds) Saving Lives, Buying Time: Economics of Malaria Drugs in an Age of Resistance. Washington (D.C.): Institute of Medicine, National Academies Press; 2004**). However, there are also other anti-malarials recommended by the WHO (http://www.who.int/malaria/am_drug_policies_by_region_afro/en/index.html), as well as issues related to the purchase and supply of ITNs, IRS materials, diagnostics, etc as well as to their storage, maintenance, prescription/use, environmental issues and waste management.

Taxes and tariffs are an important and often overlooked issue in relation to commodities, e.g.:

<http://www.malariaconsortium.org/userfiles/file/Malaria%20resources/Tax%20and%20Tariff%20Reduction%20on%20Nets,%20Netting.pdf>

Roles for Private Providers

Recent years have seen better recognition by policymakers of the potential dangers and opportunities in the large, complementary role played by the private sector in the provision of preventive care and treatment to populations at risk of malaria. **Hanson et al. Expanding access to priority health interventions: a framework for understanding the constraints to scaling-up. J Int Dev 2003; 15** discusses the need to address the private sector from a broader systems perspective. In the context of malaria, **Patouillard et al. Retail sector distribution chains for malaria treatment in the developing world: a review of the literature Malar J. 2010; 9: 50** describes private provider advantages of greater proximity to populations, greater availability of drugs and sometimes lower prices than public counterparts.

Kilian et al (2009) gives six sources as examples of evidence that 'commercial delivery mechanisms, in particular the informal retail channels, represent the most important source of nets in many countries and settings' – though there are few sources other than social marketers for LLINs. Commercial distribution allowed coverage increases of 3-5% annually, cf 6-25% p.a. when retailers were used for subsidised nets. **Khatib et al. Markets, voucher subsidies and free nets combine to achieve high bed net coverage in rural Tanzania. Malar J. 2008 Jun 2;7:98** describes how different delivery strategies may work in a complementary manner, while **Brentlinger et al. Lessons learned from bednet distribution in Central Mozambique. Health Policy Plan;22(2):103-10, 2007 Mar** recounts how shopkeepers may distribute more effectively than community leaders.

<http://www.netmarkafrica.org/Communications/FINAL%20NetMark%20Case%20Study%20102505.pdf> describes a USAID-funded total market project with demand creation that achieved high levels of ITN equity across several African countries.

Private retailers are equally important for diagnosis and treatment. Hetzel et al. Malaria treatment in the retail sector: knowledge and practices of drug sellers in rural Tanzania. BMC Public Health. 2008 May 9;8:157 serves as a reminder of quality assurance and pricing concerns and that such retailers need regulation and support. Tavrow et al. (2003) Vendor-to-vendor education to improve malaria treatment by private drug outlets in Bungoma District, Kenya. *Malaria Journal* 2, 10 **describes how this can be achieved.** Alba et al. **Improvements in access to malaria treatment in Tanzania after switch to artemisinin combination therapy and the introduction of accredited drug dispensing outlets - a provider perspective. Malar J. 2010 Jun 15;9(1):164** describes accreditation in the context of subsidised ACTs.

It may not always be clear cut whether the public or private sector is more efficacious. **Noor et al. Health service providers in Somalia: their readiness to provide malaria case-management Malaria Journal 2009, 8:100** describes poor private prescribing (53% chloroquine), but also that over 30% of private outlets also offered RDT or microscopy diagnosis. It may also not be easy to define public and private. **Garcia-Prado et al. Policy and regulatory responses to dual practice in**

the health sector. Health Policy. 2007 Dec;84(2-3) discusses how doctors, nurses, pharmacists and laboratory technicians will frequently work in both sectors. Patouillard et al. (2010) refers to examples of illicit sale of public medicines to private outlets.

Adaptations to Health Systems that have Worked in CAFS?

[see accompanying annotated bibliography on malaria and CAFS]

The Best Ways of Delivering Malaria Interventions?

The WHO's Guidelines for the Treatment of Malaria. 2010 is a standard source for consensus thinking on malaria interventions (use this link or ensure that you're not looking at the 2006 edition):

http://whqlibdoc.who.int/publications/2010/9789241547925_eng.pdf

Cochrane reviews are also a useful means of reviewing evidence, e.g. **Lengeler (2004). Insecticide treated bed nets and curtains for preventing malaria (review) or Pluess et al (2010) Indoor residual spraying for preventing malaria.** But also note that many debates continue, including ITN v IRS, the role of user fees and of the private sector. A conclusion about what is 'best' will depend on objectives and (often forgotten) local specificities of vector, parasite, weather, population and existing institutions and infrastructure.

Addendum re Email Questions 20/6/10

Community-based health insurance for primary care is a large topic. If it is to be sustainable (i.e. without a permanent donor subsidy) then CBHI works best for the 'poor but not poorest', who can pay some sort of premium. I'm not aware of any research focusing particularly on malaria and CBHI, though this looks at GFATM insurance subsidies to improve access for the poor: **Kalk et al. Health systems strengthening through insurance subsidies: the GFATM experience in Rwanda. Trop Med Int Health. 2010 Jan;15(1)** There are many examples around the world of successful CBHIs, improving access through financing treatment for malaria and other diseases (some of which I've worked on). The relatively modest treatment cost makes malaria a good candidate for CBHI coverage. It's more unusual for CBHIs to cover preventive interventions. Here's a good summary of many of the issues: http://pdf.dec.org/pdf_docs/PNACY501.pdf

There is strong evidence that user fees reduce utilisation, especially by the poor, though few studies have focused just on malaria. Evidence also suggests that removing such fees may lead to only a temporary increase in utilisation (until more fundamental funding insufficiency reasserts itself at facilities). There are many successful community based services (and many have not worked), and a great deal of self medication takes place, supplied through various retailers. Some refs above, but see also **Pagnoni. Malaria treatment: no place like home. Trends Parasitol. 2009 Mar;25(3).**

Community workers can be helpful in programmes which may target the poor, though there's a lack of evidence, and it doesn't always happen, e.g. **Onwujekwe Inequities**

in valuation of benefits, choice of drugs, and mode of payment for malaria treatment services provided by community health workers in Nigeria. *Am J Trop Med Hyg.* 2007 Jul;77(1), which found that when user fees are involved, coverage of the poorest can be affected by payment terms (e.g. instalments) and by offering a range of interventions at different prices – though this may mean they use less effective interventions than the less poor. Yet the poor often bypass free services on grounds of perceived quality, e.g. **Akin J& Hutchinson, 1999. Health-care facility choice and the phenomenon of by-passing. *Health Policy Plan* 14.**

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