Access to Quality Medicines and Other Technologies Task Force

Market landscape for anti-malaria commodities

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Executive Summary

The market landscape for anti-malaria commodities is highly changeable in the Asia-Pacific region with new malaria control strategies, reduced demand as malaria declines but the risk of epidemics and increased mortality and resurgence if resistance is not controlled. As well as aiming to create an efficient and good value market, it is important that attention is paid to equity issues, related to price and distribution strategies to ensure the most marginalised people in the region have access to protection from malaria.

Some major challenges for access to quality malaria technologies in parts of the region are (1) the weakness of the institutions regulating the manufacture and sale of medicines and other technologies, resulting in poor control of medicines and the availability of fake or substandard products; (2) poor supply and delivery channels, especially in remote areas. One of the major challenges for the antimalarial commodity market in Asia is that of maintaining a healthy market for a dwindling problem, as malaria becomes an increasingly uncommon problem in some areas. Responses to this challenge will range from exploiting a broader customer base encompassing Africa to strategies to integrate markets for antimalarial commodities with markets for similar commodities for other purposes especially the control of non-malaria fevers and neglected tropical diseases such as dengue. Currently, there is a mismatch between the supply of diagnostics and that of drugs with far fewer RDTs supplied compared to treatments, particularly in the private sector, and this can lead to presumptive treatment based on clinical diagnosis and irrational use of drugs. Possible strategies to align diagnostic supply with drug supply for different levels of test positivity need further exploration.

On the other hand there are major opportunities to build on the Asia-Pacific region’s leading role as a manufacturer of malaria medicines and other technologies.

**New tools** create opportunities for developing new markets. There are a wealth of potential malaria commodities that could be introduced, refined and promoted in the Asia-Pacific, and could serve a larger market in Africa. These include:

- **Drugs**: Transmission-blocking drugs, semi-synthetic artemisinin based combinations new drugs not based on artemisinins which target different areas of the parasite
- **Diagnostics for case management**: G6PD deficiency point-of-care tests, LAMP, positive control wells for RDT quality control, multi-cause fever rapid diagnostics, point of care PCR
- **Diagnostics for surveillance**: serological diagnostic tools, molecular marker detection systems,
- **Vector control commodities**: spatial repellents, topical repellents, insecticide or repellent treated clothing, non-pyrethroid insecticide treated wall linings
New customers. With the continuing growth of extractive industries and infrastructure development projects throughout the region, there is scope for suppliers to create new markets among the owners and managers of these enterprises. This will require clear guidance and communication with relevant industries.

There is a need for improving the efficiency of prequalification of drug manufacturers and WHOPES processing of vector control products without compromising on quality.

Options for Action

1. **Emphasise harmonisation.** Beyond general coordination AQMTF can play a critical role in promoting harmonisation both within the Asia-Pacific region and between regions, so that all stakeholders in malaria commodity marketing contribute to common overall objectives.
2. **Explore development of regional tracking and forecasting systems** that provide open access market intelligence for potential suppliers on likely orders, potential product shortfalls and regular price and availability data.
3. **Work through markets to build demand and incentivise manufacturers to improve the quality of the processes for medicines and other technologies.**
4. **Build the capacity of malaria programme staff** so that countries can better anticipate patterns of supply and demand of medicines and other technologies, and so better manage the ‘supply chain’ from manufacturers to users.
5. **Develop robust financing mechanisms** which use public policy to steer the market towards high quality outputs, and ensure access for the very poor.
6. **Halt the production and use of oral artemisinin monotherapy** in the countries of the region where it is still available to contain artemisinin resistance.
7. **Push for real improvements in the private retail market** – we need enforceable regulations, better reporting by private providers, we need diagnosis, and we need quality.
8. **Encourage research and development** defining priority new tools and market gaps.
1 Introduction

This paper provides a brief description and analysis of the market landscape for anti-malaria commodities as a resource for the first meeting of the Access to Quality Medicine and Technology Task Force (AQMTF) of the Asia Pacific Leaders Malaria Alliance (APLMA) on 12 – 13 March 2014 in Sydney. It summarises important supply chain issues affecting access to medicines, diagnostics, mosquito nets, insecticides and other products used in the control of malaria in the region. It highlights critical factors affecting price/affordability, availability, efficacy and quality of key commodities, and discusses barriers and enablers for innovation in these markets. It considers issues of the region both as a consumer of these products but also a major supplier to the rest of the world.

The paper’s main focus is on the Greater Mekong Sub-Region (GMS), because of the global significance of artemisinin resistance, but other parts of the region are also discussed. The options for action at the end of the paper are aligned with the objectives of the AQMTF, and aim to help reach global malaria targets.

This summary paper draws extensively on a paper presented at the Sydney Malaria 2012 conference and recent comprehensive market landscape analyses carried out by UNITAID, although the latter focus more on Africa. It also draws on findings of a joint assessment of the response to artemisinin resistance in 2012.

2 Special features of malaria in the Asia-Pacific Region: their market implications

The market for malaria commodities is shaped by four key features of the Asia-Pacific region.

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3 UNITAID Malaria Medicines Landscape 2013, UNITAID Malaria Diagnostics Market Landscape Update, 2013, UNITAID Malaria Vector Control Commodities Landscape 2013
5 Burden of malaria in the region is described in AQMTF Background Paper A- Asia-Pacific Burden, Success and Challenges 2014
2.1 Extreme diversity of environments and habitat specific vectors

The distribution of malaria in the Asia-Pacific is very patchy both among countries and within countries, ranging from highly efficient transmission by outdoor-resting *Anopheles dirus* restricted to forested areas in the Greater Mekong subregion to urban transmission by *Anopheles stephensi* in parts of India, so that distribution strategies and quantifications are complex. Human populations are highly mobile with significant movement within and among countries for employment from malaria-free to highly endemic areas and back. The cost of strategies to reach the hardest to reach populations can add substantially to programme costs, so a compromise between equity and efficiency needs to be determined. Decisions on when it is safe to stop provision of preventive tools in areas of lower risk are difficult. On the other hand, there is an untapped market for personal protection commodities that can be used outside the house.

2.2 Moving towards elimination

In recent years several countries in the region have set long term goals for elimination, three (Malaysia, Republic of Korea and Sri Lanka) have already entered the pre-elimination phase, 12 have set goals for elimination, and 6 continue to scale up their control activities. The impact of elimination planning on the commodities market is complex. On the one hand, elimination requires much more intensive action and high coverage of interventions, whilst on the other hand, fewer treatments are needed as malaria declines, and suppliers can predict that in the longer term the market for prevention tools and even diagnostics will wane. For the Asian suppliers to the global market, the expected demand from Africa is unlikely to decline as quickly and the scope for scaling up coverage is greater. A second important effect of elimination programming is that a new market is emerging for different commodities. For instance, as diagnosis moves from only detecting symptomatic cases to trying to detect asymptomatic and very low parasite density infections, where results may not be needed for immediate treatment, a market for newer highly sensitive diagnostics is developing. Similarly, as fewer fevers are caused by malaria, the demand for companion diagnostic tests for non-malaria fevers is emerging. For treatment, two new categories of drug use increase: one is for transmission blocking drugs for *Plasmodium falciparum*, and one is potentially for drugs that could be both safe and effective for mass drug administration. As *P. falciparum* incidence declines the proportion of other species, particularly *P. vivax* rises, so attention to the more challenging task of its control and elimination is growing. This requires introduction of drugs active against the dormant liver-stage hypnozoites. The only drug currently available for this purpose carries a risk of causing severe adverse effects in patients with an enzyme deficiency (glucose 6 phosphate dehydrogenase, G6PD, deficiency) common in parts of the region, opening up a potentially significant, though not huge, market for improved tests for G6PD deficiency. The decline in cases does not immediately lead to a decline in the market for preventive tools, although countries do need to develop criteria for deciding when the risk of transmission becomes too low to justify blanket coverage with long-lasting insecticidal nets. A series of papers developed in 2010 to set out the research agenda for global
malaria eradication described the target product profiles of several commodities needed for malaria eradication⁶.

2.3 Artemisinin resistance
The shadow cast by the detection of artemisinin resistance in countries of this region on ambitions for malaria elimination is sobering. Its effect on the market for antimalarial commodities is also complex. It has thrown into sharper focus 1) the necessity for enforcing an absolute halt to oral artemisinin monotherapies, 2) the importance of high quality drugs; 3) the need for rational use of drugs by insistence on confirming diagnosis before treatment and emphasis on taking full and correct courses. It has also increased the urgency to discover new effective antimalarial drugs. There was some complacency in the early years of artemisinin combination therapy (ACT) use that resistance would not be a problem for years due to the short half-life and impressive action of artemisinin and the solid strategy of combination therapy. Now the need for new drugs soon is real. In Western Cambodia, particularly, the prospect of untreatable malaria has returned to a small area in Pailin, where failure of DHA-piperaquine and atovaquone proguanil has prompted a return to a seven day course of quinine and doxycycline for uncomplicated *P. falciparum* malaria, but now with hospitalization to ensure full adherence. Such a strategy is only viable where the number of cases is small. Resistance creates uncertainty among manufacturers on the long term viability of artemisinin based products, but also opens the field to considering new antimalarials. Strategies to respond to artemisinin resistance revolve around rapid and complete elimination in areas where it is known to occur, leading to a rapid expansion in the market not only for quality assured drugs and diagnostics but also mosquito control products. It is unlikely that countries in the region would have the level of success in public funding proposals, if it were based on burden, but it is justified by the need for rapid elimination in areas of resistance.

Some recommendations from the Joint Assessment⁷ relevant to improving the market were the following:

Engaging with the pharmaceutical sector

- Work to overcome current bottlenecks in prequalification that would allow regional producers of ACT to supply the international market (and stop producing artemisinin monotherapy);
- Work towards an enforceable regional agreement banning the sale and export of artemisinin monotherapy;

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⁶ malERA – a research agenda for malaria eradication, PLOS Medicine January 2011
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- Lobby for artemisinin resistance containment in the context of growing regional interest in ensuring access to quality medicines and rational use of antimicrobials.

Targeting migrant and mobile populations and engage with relevant employment sectors

- Rationale: All countries of the GMS have identified certain populations as being the main reservoirs of malaria cases and/or of being particularly difficult to address with control measures. The populations are linked to particular socio-economic activities such as mining, forestry, plantation work, construction of roads, dams, hydro-power, etc., that employ many (both border-crossing and internal) migrant workers.

- Focus on migrants and mobile populations (including seasonal workers) and other groups exposed by occupation (including military);

- Seek to understand who gets malaria, where and why (occupational or living style risks) engaging not just epidemiologists but also social scientists;

- Proactively test innovative approaches to malaria prevention and treatment in these populations, including through transit route or work site interventions working with labour organizers, employers and others;

- Engage other sectors (e.g. mining, forestry, labour) for effective control of malaria among migrant workers to reduce the risk of emergence and spread of artemisinin resistance.

2.4 The Asia Pacific Region as provider of anti-malaria commodities

A large proportion of the ACTs and LLINs for the global scale-up over the last ten years have originated in the Asia-Pacific region. In 2011, more than 42 per cent of reported expenditures on all malaria technologies, including medicines and LLINs, by the Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund) benefited manufacturers in Asia while approximately 80 per cent of the global supply of the plant source for artemisinin was cultivated in Asia, mainly PRC and Viet Nam. Out of 35 ACTs on WHO’s list of prequalified products in March 2014 16 were from Indian companies (Ajanta, CIPLA, IPCA, Macleods and Strides), 10 from Guilin in PRC, 1 from Shin Poong in Republic of Korea, and 9 from European companies. It is notable, however, that only one company in PRC has any prequalified ACTs. Until recently, much of the focus of the Chinese pharmaceutical market was on domestic consumption. This is beginning to change, but the other companies are not yet familiar with prequalification processes. Beyond its central role in medicine supply chains, the Asia-Pacific region is also home to four of the ten

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WHO-approved LLIN manufacturers. It is clear that the region is a key engine for the production of malaria medicines and other technologies, not only for countries in the Asia-Pacific region but for the world. Strengthening the links between manufacturers in the region and the global market for malaria technologies has the potential to bring economic benefits to the region while addressing the global gap in commodity availability.

3 The Commodities

3.1 Antimalarial medicines

3.1.1 Current products
Among the countries in the region a wide range of different artemisinin based combinations have been selected as first line treatment of uncomplicated falciparum malaria (the biggest share of the market) including artemether-lumefantrine (AL) in 11 of 18 countries, artesunate- mefloquine (AS-MQ) in 4 countries, dihydroartemisinin-piperaquine (DHA-PPQ) in 5 countries. Selection depends in part on national results of efficacy monitoring. Approximately half the countries include primaquine (PQ) in addition to block transmission. India’s first line is artesunate-sulfadoxine-pyrimethamine (AS-SP) with primaquine, and PRC has the widest range of accepted first line drugs. Four of the countries have more than one listed first-line treatment. Fourteen of 19 countries have chloroquine (CQ) plus PQ as first line for P. vivax.

There are smaller markets for special uses such as treatment of severe malaria and malaria in pregnancy and second-line treatments for treatment failures. Fixed dose combinations (FDCs) are recommended as the preferred ACT formulation wherever possible to improve patient adherence. Considerable progress has been made in improving the accessibility of FDCs, especially as more prequalified FDCs have become available.

Until recently, the use of artemisinin monotherapies has been a major challenge. For instance, they were found in 73% of pharmacies in a study in India, and in Myanmar a large proportion of market in 2011-12

was for artesunate monotherapy, mainly originating from a single supplier. Efforts to enforce a stop to their import are beginning to bear fruit.

3.1.2 Pipeline products
A major transformation of the market for artemisinin based products is starting with the development of synthetic or semi-synthetic artemisinin (SSA), which until now, has only been available by extraction from the plant *Artemisia annua*. Whilst this advance offers great prospects of a more reliable supply and a shorter lead-time for production (the plant takes 12 to 18 months from planting to medicine), it does raise issues of further uncertainty for the plant-based market. It is expected that 35 tonnes will come to market in 2013 and 50–60 metric tonnes in 2014. The current price estimate is US$ 350–400/kg. While SSA could help to secure the required levels of artemisinin to meet ACT requirements and smooth out the boom and bust cycles of natural artemisinin supply, concerns have been raised over its entry into the market. Given that significant volumes of both SSA and agricultural artemisinin will be needed to meet demand for ACTs, a careful rollout of SSA will be required to ensure that it does not trigger agricultural suppliers to exit the market.

3.1.3 Market size
While the total value of donor-funded ACTs is unknown, data from the GFATM and AMFm can give some indication as these sources represented approximately 73% in 2010, 86% in 2011 and 62% in 2012 of the ACT donor market by volume (excluding PMI volumes) (Table 5). Using this data, the value of all ACTs (AL, ASAQ, ASMQ, ASSP and DHA PPQ) procured in the donor market has grown since 2008, where the value of ACTs procured by the international community was approximately US$ 26M, hitting a peak in 2011 of a total market value of more than US$ 200 million. This represents an average compound annual growth rate (CAGR) of 96% between 2008 and 2011.
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CAGR of the value of the prequalified ACT market, 2008–2011

![Graph showing CAGR of the value of the prequalified ACT market, 2008–2011.](image)

Notes: The figures represented are indicative of all ACTs and all pack-types procured via GFATM and AMFm from 2008 to 2012. This includes: AL, ASAQ, ASMQ, ASSP and DHA PPQ

Sources: UNITAID Malaria Medicines Landscape 2013 – calculated from GFATM PQR and AMFm data

Market share of manufacturers supplying GFATM and AMFm, 2008–2012

![Graph showing market share of manufacturers supplying GFATM and AMFm, 2008–2012.](image)

Notes: Includes all ACTs available for procurement in the donor-funded market: AL, ASAQ, ASMQ and ASSP. Originator medicines are in red and generic medicines are in grey.

Sources: Calculated from transactions reported in GFATM PQR data and AMFm data.
3.1.4 Price and affordability,

Even though these indices show that competition technically is increasing, a corresponding trend has not been seen in decreasing pricing levels, where ACT prices should be reducing to equilibrium levels. Instead, prices have aggregated around a certain price point. As more manufacturers are supplying prequalified ACTs, in general, there has been only a marginal difference in the procurement price of ACTs between originator and generic products that are purchased through the GFATM and AMFm.

3.1.5 Availability

**Artemisia planting areas and artemisinin production in 2012 (2013 supply)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Planting area (ha)</th>
<th>Artemisinin (kg/ha)</th>
<th>Estimated production (MT) in 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRC</td>
<td>16,000 – 18,000</td>
<td>11kg/ha</td>
<td>200-220</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>1,700 – 2,000</td>
<td>12kg/ha</td>
<td>20-25</td>
</tr>
<tr>
<td>East Africa</td>
<td>400-500</td>
<td>10kg/ha</td>
<td>4-5</td>
</tr>
<tr>
<td>Madagascar</td>
<td>800</td>
<td>15kg/ha</td>
<td>12</td>
</tr>
<tr>
<td>India</td>
<td>170</td>
<td>12kg/ha</td>
<td>2</td>
</tr>
<tr>
<td>Sub-total natural artemisinin</td>
<td>19,070 – 21,470</td>
<td></td>
<td>238 – 264</td>
</tr>
<tr>
<td>Semi-synthetic (for use by Sanofi)</td>
<td>Not applicable</td>
<td></td>
<td>10*</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>248-274</td>
</tr>
</tbody>
</table>

* To be used for regulatory processes

Source: Assured Artemisinin Supply System (A2S2) Y13Q1 Market Intelligence Update. February 2013.

3.1.6 Efficacy

As malaria incidence declines it is becoming increasingly difficult to find enough cases for in vivo efficacy testing, but this is essential to determine which products to have on the market. The recently discovered molecular marker for artemisinin resistance\(^1\) promises to provide a far greater amount of clarity on patterns of spread or independent emergence of artemisinin resistance, which will have an impact on the antimalarial market.

\(^1\) **Ariey F et al.** (2013) A molecular marker of artemisinin resistant Plasmodium falciparum malaria. Nature 12876
3.1.7 Quality

Malaria can be a fatal disease, so counterfeit and substandard\textsuperscript{13} drugs will kill people. Knowingly using fake drugs needs to be seen as a serious crime. Fake drugs may have a major role in promoting expansion of drug resistance. Some patients will be taking inadequate doses which could allow more resistant parasites to survive. We have a very limited choice of drugs to treat malaria at present. If we lose any of them we are going to lose much of the progress towards reducing the burden and eliminating malaria. Southeast Asia and parts of Africa have had a major problem with fake drugs for years, and a study in 2012 reported that roughly a third of all anti-malarial drugs being sold were falsified or substandard, and we do not seem to be making headway in tackling the problem.\textsuperscript{14}

Response

A lot has been done to try and understand the extent of the problem and the sources of the fake drugs, even involving Interpol, but it is clearly not enough. As part of the drug resistance containment efforts in Southeast Asia, Cambodia made major efforts to increase drug inspections and to enforce the laws by training justice police and giving them more authority.

Needs

1. Much more surveillance for fake drugs – the number of surveys performed and published is notably small
2. More serious dialogue with leaders in key source countries which include PRC, India and possibly some countries in Africa
3. Much stronger regulation in countries and resources to enforce it
4. More support to the countries with the least ability to tackle the problem; eg Myanmar
5. Greatly increased effort to build local capacity to test drugs and take action

\textsuperscript{13} Counterfeit or fake drugs are produced deliberately and may have some or no active ingredient; substandard drugs are not deliberately false but are of inadequate quality.

3.2 Diagnostics

Universal diagnostic testing in the public and private sectors is expected to reduce the number of fever cases requiring antimalarial treatment and according to the World Malaria Report 2013, the marked increase in number of cases tested for malaria is attributed to increased use of rapid diagnostic tests (RDTs)\textsuperscript{15}.

Some key market gaps that could be filled with the increased roll-out of RDTs include:

i) improved RDTs, particularly for non-falciparum species.

ii) new tools to perform quality control tests and evaluate RDT performance, to ensure their usability and efficacy. Without these tools, patients may be tested with ineffective RDTs that have been affected by climatic conditions or transportation, leading to misdiagnosis and inappropriate treatment.

iii) a point-of-care ‘fever’ test to detect or rule out other common illnesses and guide management in malaria-negative cases.

In addition to microscopy and RDTs for case management, there is growing interest in a range of new technologies for diagnosis of low parasitaemias for surveillance, tools for active case detection, diagnosis in pregnant women, novel non-blood diagnostics and systems for remote reading and data collection from RDTs.

3.2.1 Price and affordability,

According to the Global Fund price and quality reporting (PQR) system, the procurement cost of RDTs varies slightly from region to region with the costs being lowest in West and Central Africa (median cost is $0.57) and second lowest in Asia (median cost $0.61-0.63) (Table 1). The source also shows a significant decline in the price of RDTs between 2005 and 2012. Another survey assessing the price of the RDTs in the private sector in six endemic countries found the overall price ranging from $1.0 to as high as $16.81 with the median price of $7.3 and a variety of different brands were available\textsuperscript{16}. The presence of several RDTs on the market may create challenges of training especially in the communities where the health providers have limited training.


Median & inter-quartile costs of RDTs by Global Fund region between years 2005 – 2012

<table>
<thead>
<tr>
<th>Global fund region</th>
<th>Number of purchases</th>
<th>Median cost (inter-quartile range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Asia/Pacific</td>
<td>59</td>
<td>0.63 (0.55 – 0.76)</td>
</tr>
<tr>
<td>Eastern Europe/ Central Asia</td>
<td>1</td>
<td>0.80 (0.80 – 0.80)</td>
</tr>
<tr>
<td>Latin America/ Caribbean</td>
<td>29</td>
<td>1.1 (0.82 – 1.6)</td>
</tr>
<tr>
<td>North Africa/Middle East</td>
<td>22</td>
<td>0.64 (0.56 – 0.81)</td>
</tr>
<tr>
<td>South Asia</td>
<td>59</td>
<td>0.61 (0.32 – 0.83)</td>
</tr>
<tr>
<td>East Africa</td>
<td>72</td>
<td>0.87 (0.56 – 1.1)</td>
</tr>
<tr>
<td>Southern Africa</td>
<td>23</td>
<td>0.68 (0.55 – 0.77)</td>
</tr>
<tr>
<td>West and Central Africa</td>
<td>57</td>
<td>0.57 (0.46 – 0.97)</td>
</tr>
</tbody>
</table>

According to the UNITAID market analysis 2013, malaria RDT competition remains intense, characterized by: (i) buyers who have limited ability to monitor and differentiate product quality; (ii) strategic pricing by suppliers to gain market share/penetrate new markets; and (iii) competition around price, lead times and logistics. The declining margins for malaria RDTs are increasing the relative importance of economies of scale. The first signs of supplier exit are emerging, with at least one supplier reporting capacity reductions.

Although it may appear desirable that competition continues to drive prices lower, the sustainability of these prices (e.g. US$ .25) is a risk to the RDT market. Cost reduction efforts by suppliers have limits, and there is risk of product quality deterioration and of quality suppliers exiting the market.

3.2.2 Availability and Uptake

At present, parasite-based diagnosis for malaria is rapidly being scaled up and implemented in many malaria-endemic countries resulting in large-scale procurement of RDTs. Most of this procurement is targeting the public healthcare sector leaving a gap in the private sector, yet the majority of febrile patients who seek care outside their homes first visit drug shops and private clinics before going to public health facilities. One factor affecting availability is funding and although malaria RDTs present a much smaller funding challenge than other malaria products due to their lower production costs and shorter development time, they remain relatively underfunded. From 2008 to 2011, funding for malaria diagnostics increased by $8 million; however, this was far less than what was recommended by the 2011

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malaria R&D funding report\textsuperscript{20}. The low funding for diagnostics results in limited availability of the tests in the public sector where they are provided free of charge to the patients.

The scale-up of parasite-based diagnosis is in an early stage especially in Africa (it is already higher in Asia, particularly India\textsuperscript{21}, but offers great opportunities to suppliers, given the policy change to universal parasite-based diagnosis for better management of fevers in areas of malaria risk as well as the interest in diagnostic tools for better surveillance. Whilst availability is in part related to funding, it is also affected by demand and uptake. The figure below shows that there is a long way to go to achieve the levels of diagnosis needed, especially in Africa. However numbers of RDTs sold globally have risen from less than 50 million in 2008 to more than 200 million in 2012\textsuperscript{22} Uptake is higher in Asia, but the large potential growth in the African market is also of great interest to Asian manufacturers and distributors. The figure also illustrates the even lower uptake in the private sector. Several initiatives are underway in Africa, particularly with support from UNITAID, to incentivise private providers to offer diagnosis, which may deprive them of the opportunity to charge for treatment, where results are negative. More experience of this is needed in Asia including strategies to promote appropriate treatment or referral for non-malaria fevers.


\textsuperscript{21} WHO 2013, World Malaria Report 2013

\textsuperscript{22} WHO 2013, World Malaria Report 2013
Proportion of febrile children who had a blood test, by place of care in nine African countries 2010-2011

3.2.3 Quality

The WHO FIND Malaria RDT Product Testing Programme has been an essential means to guide purchasers on which products meet necessary standards. Improvements to this programme are underway to make it affordable and to keep up with the high number of new products to test. There is also a programme required by many donors for lot quality testing in-country, and soon it is hoped to have a point of service test for RDTs. These positive control wells are undergoing field trials.

UNITAID has noted that most donors, policy-makers and RDT suppliers believe that the market would benefit from additional quality standards; but the current format of WHO prequalification is problematic due to: (i) uncertainty about when prequalification will be required by major RDT buyers; (ii) lack of clarity on the processes and standards; and (iii) limited experience of RDT manufacturers with rigorous quality reviews. The uncertainty, along with the lengthy timelines for both prequalification and product testing, create disincentives for innovation as well as investment in new capacity.
3.3 Mosquito nets and other vector control commodities

Long-lasting insecticidal nets (LLINs) remain the mainstay of anti-mosquito products in the region, but the strategies are affected by the complex and patchy epidemiology of malaria in the Asia-Pacific. Key resources on market analysis for nets are the recent landscape analysis from UNITAID and an extensive landscaping of nets in the public and private sectors in the Greater Mekong Subregion undertaken by Malaria Consortium for the US President's Malaria Initiative in 2012 through the Networks project.

According to the UNITAID analysis, 483 million insecticide-treated nets (ITNs) were delivered from 2009 to 2012, and the global market could range from 225 to a maximum of 610 million nets per year. Because the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) and the United States Agency for International Development (USAID)/President’s Malaria Initiative (PMI) are such huge funders of LLINs, the market aims to provide the specifications they want. There are rather few manufacturers of products fulfilling their specifications, so the market is dominated by Vestergaard Frandsen (55%) and Sumitomo (18%) followed by BASF (7%) and Bestnet (6%). The average cost to buy and deliver a net has reduced by approximately 40% over the past 10 years to US$ 4.80, of which 70–85% is the cost of the net. Whether entry of new manufacturers could lead to a lower price is not clear, as the low price is partly due to the extremely large value of institutional tenders.

Procurement decisions are often made based on price, rather than on cost-effectiveness, quality or durability, which may be suppressing manufacturers from pursuing innovative products. The most recent guidance from WHO is to focus more on continuous distribution systems alongside large-scale campaigns, and this could change the shape of the market away from extremely large tenders, and also may create more opportunities for the commercial sector.

Insecticides for nets are limited to pyrethroids because of their good safety profile and long half-life, but there are real concerns on their future, as pyrethroid resistance is increasingly reported in Africa, though less so in Asia so far. Some new nets combining pyrethroids and another insecticide are in development, and manufacturers are searching for alternatives.

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24 UNITAID (December 2013) Malaria Vector Control Commodities Landscape
The WHO Pesticide Evaluation Scheme (WHOPES) evaluates products in existing technology categories and is now accepting new product concepts, and WHO has a new Vector Control Advisory Group (VCAG) to promote innovation in new tools and strategies.

In the Networks assessment, the key findings from desk reviews, interviews, discussions, and field visits conducted in Burma, Cambodia, and Thailand were the importance of supporting complementary roles of the public sector, civil society and private sector. Cambodia was found to have a vibrant commercial market for nets with wholesale markets in three towns, untreated B-52s being the biggest seller with nets sewn in Phnom Penh and Viet Nam. Both hammocks and nets were available in the markets, and high import taxes and transport fees were an issue. A market challenge is how to transform the strong market for untreated nets often better meeting people’s tastes in terms of colours and texture to a market for long-lasting insecticidal nets providing greater protection.

As malaria transmission in the Greater Mekong Subregion (GMS) is steadily reduced to border areas and forest-fringes, prevention of outdoor malaria transmission is of particular focus in the region. Alternative personal protection measures, complementary and in addition to LLINs, are recommended for further exploration, including the use of topical repellents and other insecticide treated materials. In order to further define special risk groups, a brief analysis of additional mobile target groups susceptible to outdoor transmission and the roles that various sectors can play in supporting these hard-to-reach groups with malaria prevention efforts is presented.

Since engagement with the private sector has been fairly limited to date, considerations to improve collaboration with the private sector include approaching and working with manufacturers, retail sectors, and employer organizations to increase synergies at all stages from product development to product delivery. From this brief assessment, the private sector in the three countries seems to be able to supply adequate conventional nets to households that can afford to purchase them. However, innovative solutions are needed to convert these conventional nets into insecticide treated nets, including various options to harness the private sector to provide LLINs or insecticide treated nets (ITNs) for at-risk groups.

Monitoring and evaluation for malaria prevention activities primarily focus on the use of household surveys to capture the coverage and use of LLINs the previous night among household members. There may be a need, particularly in this region with critical issues of outdoor transmission and mobile populations, to expand monitoring and evaluation of personal protection tools beyond LLINs and ITNs and to explore other survey methods for mobile populations. Further considerations for improving monitoring and evaluation of malaria prevention in the GMS include but not limited to (1) conduct Rapid Coverage Monitoring (RCM) assessments following distribution campaigns in target areas to identify and address immediate gaps in coverage; (2) ensure large-scale, nationally representative surveys are complemented
with well-designed qualitative research; (3) consider indicators for monitoring of intra-household coverage, universal coverage, and net tracking; and (4) look for possible entry points for consumer preference, net durability and use studies.

Key recommendations for Private Sector Engagement were to:

1. Work with manufacturers for new product development;
2. Conduct Value Chain Analysis with the retail sector to identify areas where private sector can supply LLINs/ITNs more cost-effectively;
3. Partner with employer organizations to promote and to deliver malaria prevention commodities and messages
4. Undertake mapping and analysis of private sector employers and potential schemes
5. Maintain optimal coverage of nets following distribution campaigns with appropriate net replacement and continuous distribution strategies
6. Develop strategies and approaches for replacement of ITNs with LLINs

There would also be value in encouraging more manufacturers to produce acceptable quality products, and to understand better what would stimulate market entry. One of the bottlenecks has been the long time needed for new products to complete WHOPES evaluation. There is also some concern that, because WHOPES publishes all specifications of products it evaluates, the companies submitting products are inhibited from sufficient investment in research and development of improved products, for which they will not have time to recoup their investment. One of the products most needed is a more durable net of acceptable texture for comfort and convenience, which could lead to huge cost savings, if the frequency of replacement could be lowered.
4 Issues and Opportunities

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<tr>
<th>What are the most important elements that an ideal market for antimalarial commodities in the Asia-Pacific region would provide?</th>
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<tr>
<td>1. <strong>Availability</strong> of products in all areas where they are needed</td>
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<td>2. Prices that are <strong>affordable</strong> both to governments and individuals</td>
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<tr>
<td>3. Assurance that all products meet the <strong>quality</strong> standards needed to be effective and delay or prevent resistance developing</td>
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<td>4. <strong>Acceptability</strong> of products to users</td>
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<td>5. A diversity of suppliers to encourage <strong>competition</strong>, keeping up quality, driving down prices and ensuring availability</td>
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<tr>
<td>6. Active <strong>research and development</strong> to improve commodities according to evolving needs and allow replacement when they cease to be effective</td>
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Some major challenges for access to quality malaria technologies in parts of the region are (1) the weakness of the institutions regulating the manufacture and sale of medicines and other technologies, resulting in poor control of medicines and the availability of fake or substandard products; (2) poor supply and delivery channels, especially in remote areas. There may be unintended effects of project funding on market development – eg how to create a commercial market in face of free campaigns, and it is important to consider how to ensure donor funding is not suppressing domestic funding.

On the other hand there is a major opportunity to build on the Asia-Pacific region’s leading role as a manufacturer of malaria medicines and other technologies (for example 80 per cent of global supply of the plant source of artemisinin is produced in the region, mainly in PRC and Viet Nam).

**New tools** create opportunities for developing new markets. There are a wealth of potential malaria commodities that could be introduced, refined and promoted in the Asia-Pacific, and could serve a larger market in Africa. These include:

**Drugs**: Transmission-blocking drugs, semi-synthetic artemisinin based combinations new drugs not based on artemisinins which target different areas of the parasite

**Diagnostics for case management**: G6PD deficiency point-of-care tests, LAMP, positive control wells for RDT quality control, multi-cause fever rapid diagnostics, point of care PCR

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**Access to Quality Medicines and Other Technologies Task Force**

*Diagnostics for surveillance:* serological diagnostic tools, molecular marker detection systems,

*Vector control commodities:* spatial repellents, topical repellents, insecticide or repellent treated clothing, non-pyrethroid insecticide treated wall linings

**New customers.** With the continuing growth of extractive industries and infrastructure development projects throughout the region, there is scope for suppliers to create new markets among the owners and managers of these enterprises. This will require clear guidance and communication with relevant industries.

There is a need for improving the efficiency of prequalification of drug manufacturers and WHOPES processing of vector control products without compromising on quality

Demand forecasting is one of the most essential bases for attracting manufacturers and distributors to engage in a market.

As efforts to control malaria have scaled up in the region and beyond, several resources and initiatives have been set up with funding from international organisations and foundations, which have collected data of great value to planners, including manufacturers, distributors, buyers and national governments. These resources include the UNITAID-funded ACT Forecasting Consortium, which issues a quarterly update on demand forecasts. In its 2013 fourth quarter update\(^{27}\) the most recent forecasts noted several implications for policymakers and market participants. Though some uncertainty exists around future funding streams for ACT procurement, increased clarity is expected once several important decisions are made at the Global Fund. This is essential to limit the risk of product shortages. Uncertainty on funding affects the prices of raw materials and finished products, and underscores the importance of effective policy and market coordination at both the global and country level. Longer-term commitments by donors could help stabilise the market, and allow market stakeholders to prepare effectively.

Other valuable sources of ongoing tracking of markets include A2S2, which supports global production of sufficient *Artemisia* and artemisinin to meet expanded ACT demand, and ACTWatch (BMGF-supported project) which has been tracking availability and price in 6 countries including one in Asia (Cambodia) as well as the HAI project for tracking pricing and availability.

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An important potential role of the AQMTF is to explore how the most useful elements of some of these tracking systems, which tend to be supported for finite short periods and managed by multiple organisations, could be more securely institutionalized within the Asia-Pacific region.

5 Market shortcomings and major challenges

One of the major challenges for the antimalarial commodity market in Asia is that of maintaining a healthy market for a dwindling problem, as malaria becomes an increasingly uncommon problem in some areas. Responses to this challenge will range from exploiting a broader customer base encompassing Africa to strategies to integrate markets for antimalarial commodities with markets for similar commodities for other purposes especially the control of non-malaria fevers and neglected tropical diseases such as dengue.

Currently, there is a mismatch between the supply of diagnostics and that of drugs with far fewer RDTs supplied compared to treatments, particularly in the private sector, and this can lead to presumptive treatment based on clinical diagnosis and irrational use of drugs. Possible strategies to align diagnostic supply with drug supply for different levels of test positivity need further exploration.

6 Options for Action

The creation of AQMTF as a high-level multi-sectoral working group on access to malaria medicines and products opens opportunities to facilitate inter-country coordination to improve access to antimalarial commodities in the region. Some of the ideas for consideration below arose from the Malaria 2012 meeting, whilst others have developed more recently.

1. **Emphasise harmonisation.** Beyond general coordination AQMTF can play a critical role in promoting harmonisation, so that all stakeholders in malaria commodity marketing contribute to common overall objectives. This will entail setting clear regional objectives to which countries hold themselves accountable. Greater harmonisation within the Asia-Pacific region would be a major advance, but reaching out to Africa would be even better. Although the two malaria-affected communities have been considered somewhat in isolation of each other in the past, the market issues discussed in this paper bring major areas of interdependence. The size of the African market can drive benefits to both users (through price reduction) and suppliers (a bigger market is a more stable market). A shared knowledge of needs can avoid shortages and oversupply and can stimulate innovation.

2. **Explore development of regional tracking and forecasting systems** that provide open access market intelligence for potential suppliers on likely orders, potential product shortfalls and regular price and availability data. An even more ambitious, but potentially highly valuable resource would be an online real-time gap analysis tool, so that, when countries need to make funding proposals they do not take
excessive time away from implementing their programmes to update outdated gap analysis information. This would require collaboration between countries and funders to make pipeline information available.

3. **Work through markets to build demand and incentivise manufacturers to improve the quality of the processes for medicines and other technologies**. Experience from other medicine markets shows this is possible.

4. **Build the capacity of malaria programme staff** so that countries can better anticipate patterns of supply and demand of medicines and other technologies, and so better manage the ‘supply chain’ from manufacturers to users. Part of this capacity will be to look at opportunities for greater integration of supply chains for different health programmes.

5. **Develop robust financing mechanisms** which use public policy to steer the market towards high quality outputs, and ensure access for the very poor. The pros and cons of a regional financing mechanism for malaria medicines for a subset of countries in the region should be explored. It is important also to recognise the opportunity costs of constant changes in proposal mechanisms and monitoring and evaluation requirements. The fund managers need to aim for efficiency in processing new mechanisms.

6. **Halt the production and use of oral artemisinin monotherapy** in the countries of the region where it is still available to contain artemisinin resistance. This will require coordination across the region to take a common approach; strong political commitment to de-register the medicines, repeal importation and marketing licenses; and human and financial resources to enforce the ban.

7. Push for real improvements in the **private retail market** – we need enforceable regulations, better reporting by private providers, we need diagnosis, and we need quality

8. **Encourage research and development**. There is a need to define priority new tools and market gaps.
7 Conclusions

The market landscape is highly changeable with changing procedures of the dominant global buyer (GFATM), new malaria control strategies and AMFm coming and going. There is also changing demand, as malaria epidemiology changes with reduced demand on one hand and the possible risk of epidemics and increased mortality and resurgence if resistance is not controlled on the other hand.

The fight to control and eventually eliminate malaria depends on two distinct and interdependent elements:

1) having enough of the right commodity at an affordable cost and being sure of their quality

2) having systems to deploy and use these tools at the right place and time and to measure and act on the results of our efforts

As well as aiming to create an efficient and good value market, it is important that attention is paid to equity issues, related to price and distribution strategies to ensure the most marginalised people in the region have access to protection from malaria.