

Availability, Price and Volume of antimalarials in Seven Malaria Endemic Countries

A Summary of Results from Multi-Country
Outlet Survey Research 2009-2010



www.ACTwatch.info

ACTwatch is a Population Services International (PSI) research project in partnership with the London School of Hygiene & Tropical Medicine (LSHTM).

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Introduction



Artemisinin-based combination therapy (ACT) is recommended by the WHO as the first-line treatment of *Plasmodium falciparum* malaria. By 2006 most malaria endemic countries had changed their national treatment guidelines to follow these recommendations [1], but despite increased financing for malaria control over the last decade [2], the global target of at least 80% of children under five with malaria receiving an effective antimalarial is far from being met [3]. Today, the use of ineffective monotherapies remains widespread [4], and the development of artemisinin resistance [5] has raised specific concerns around how to reduce the use of artemisinin monotherapies in order to contain resistance to this drug, largely seen as the only effective treatment option currently available [6].

Many countries are accelerating their efforts to increase coverage of ACT, with support from funders including the Global Fund to Fight AIDS, Tuberculosis and Malaria, the President's Malaria Initiative and the World Bank Booster Programme. In 2010 alone, more than 200 million doses of ACT were forecasted to enter the market [7]. The most significant recent intervention is the Affordable Medicines Facility – malaria (AMFm), launched in 2010, that aims to increase access to high-quality ACT in the public and private sectors through a novel co-payment fund worth \$216 million in Phase 1 [8]. To date, orders for over 150 million treatments have been placed mainly by the private sector in the nine pilot programmes operating in eight countries. [9].

Despite these and other on-going efforts to increase access, robust evidence on the availability and use of the different antimalarials is scarce. Policy makers, governments and donors are faced with an information gap when trying to determine how to improve access to high quality ACT and reduce the use of artemisinin monotherapies; and rigorous approaches are needed to evaluate interventions such as the AMFm [10]. Furthermore, following the WHO recommendation that antimalarials be restricted to patients with a confirmed malaria diagnosis [11], information on the availability of diagnostic services and tools such as rapid diagnostic tests (RDTs) in the market has become crucial.

To help address some of these gaps, Population Services International (PSI) in partnership with the London School of Hygiene and Tropical Medicine (LSHTM) launched a five-year, seven country research project in 2008 called *ACTwatch*. The project aims to provide a comprehensive picture of the antimalarial market to inform national and international policymakers. The project is designed to detect changes in the availability, price and utilization of antimalarials over time and between sectors, and to monitor the effects of policy or interventions at a national level. Findings can help determine where and to what extent interventions have positively impacted access to and use of quality-assured ACT and RDTs, as well as inform artemisinin resistance containment efforts. This report presents key findings from the outlet survey data.



Additional ACTwatch resources can be found: on the website (www.actwatch.info) and in the following thematic series:

Shewchuk et al., (2011) **The ACTwatch project: methods to describe antimalarial markets in seven countries**, *Malaria Journal*, 10:325

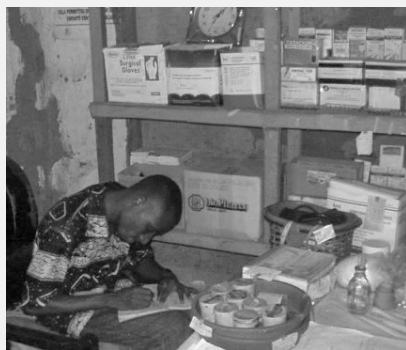
O'Connell et al., (2011) **Got ACTs? Availability, price, market share and provider knowledge of antimalarial medicines in public and private sector outlets in six malaria-endemic countries**, *Malaria Journal*, 10:326

Littrell, et al., (2011) **Monitoring fever treatment behaviour and equitable access to effective medicines in the context of initiatives to improve ACT access: baseline results and implications for programming in six African countries**, *Malaria Journal*, 10:327

Littrell, et al., (2011) **Case management of malaria fever in Cambodia: results from national antimalarial outlet and household surveys**, *Malaria Journal*, 10:328

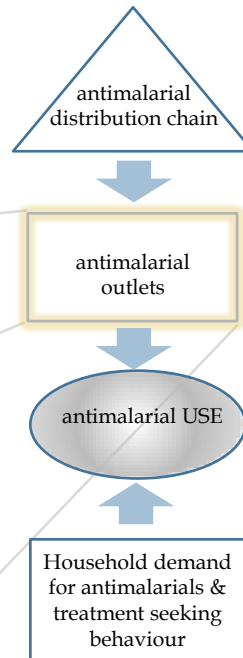
Objectives

ACTwatch addresses both the supply and demand sides of the market. The supply side is evaluated by collecting data in public and private sector outlets and wholesalers of antimalarial drugs. To evaluate demand, data on consumer treatment-seeking behaviour and knowledge are collected at the household level. In combination, the research components thread together antimalarial provider and consumer behaviour to provide this comprehensive overview.



This report summarizes findings from ACTwatch's outlet study across 7 countries, where data were collected in 2009 & 2011.

antimalarial MARKET



RESEARCH METHODS

Supply chain research
Structured survey of wholesalers and in-depth interviews with wholesalers and other key informants.

Outlet survey
Nationally representative survey of public and private sector outlets with potential to sell/provide antimalarials.

Household survey
Nationally representative population-based survey.

ACTwatch countries

The project runs from 2008 to 2012 and is being conducted in seven malaria-endemic countries: Benin, Cambodia, the Democratic Republic of Congo, Madagascar, Nigeria, Uganda and Zambia. Countries were selected with the aim of studying a diverse range of markets from which comparisons and contrasts could be made considering factors such as demand for antimalarials (reflected by malaria burden), size of the population at risk, pharmaceutical regulation levels (high/low), nature of pharmaceutical regulation (Francophone versus Anglophone), public sector capacity and coverage, existence of local antimalarial manufacturing, existence of antimalarial subsidy interventions and the feasibility of receiving necessary country level authorization to conduct the research.

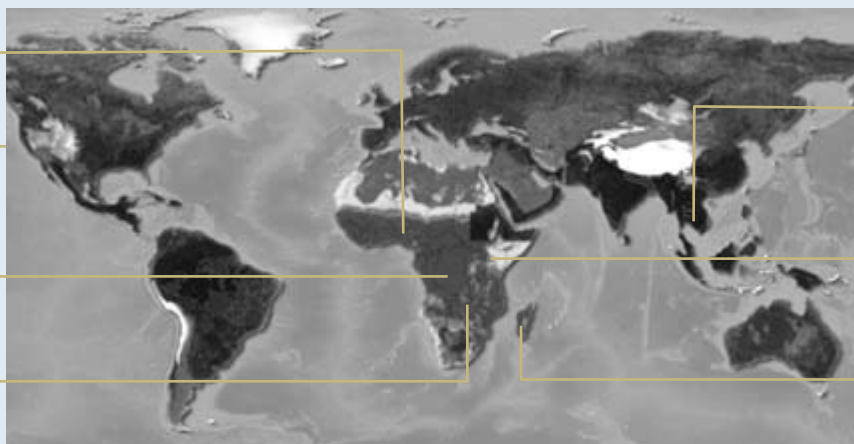
Malaria Hospital Admissions and Mortality among children under 5

Nigeria
50.4% of admissions
39.4% of deaths

Benin
43.3% of admissions
31.5% of deaths

the DRC
31.1% of admissions
43.7% of deaths

Zambia
23.1% of admissions
18.9% of deaths



Cambodia
3.3% of admissions
2.9% of deaths

Uganda
48.0% of admissions
29.8% of deaths

Madagascar
16.7% of admissions
18.0% of deaths

Methods

The sample is based on a one-stage cluster design using probability proportion to population size, that provides nationally representative data sufficiently powered to allow for comparisons over time, between the public and private sectors and across sub-populations where stratified. The sampling strategy was designed to detect a 20 percentage point change in the primary outcome measure, availability of ACT. The cluster selected was an administrative unit with on average 10,000 to 15,000 inhabitants.

In order to capture the market as a whole rather than some of its segments, all outlet types with the potential to dispense antimalarials were included in a census of outlets within each selected cluster. Field workers were provided with a list of selected clusters and maps that illustrated administrative boundaries, in addition to lists of public health facilities and pharmacies obtained from relevant authorities. Snowball sampling was also used by field workers to identify facilities that were not on official lists. Outlets were administered the full questionnaire if they had antimalarials in stock at the time of survey or in the last three months. As public health facilities and pharmacies are important providers of antimalarials but are relatively uncommon, over-sampling was conducted for these outlet types. The main types of outlets sampled in the survey are listed below. Outlets were classified into one of two sectors: Public/Not-for-Profit Sector or the Private Sector.

Outlet Descriptions

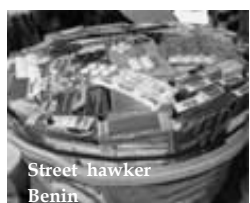
Public/Not for Profit Sector	
Public Health Facilities	Primary, secondary and tertiary health facilities generally managed and controlled by the government; provide prescription medicine following medical consultation or diagnosis.
Not for profit Facilities	A public hospital or clinic operated by a non-governmental organization or affiliated with a religious organization.
Community Health Workers	An individual who is an extension the public health system; may be located in a health facility or mobile in the community.
Private Sector	
Private clinics	Non-governmental for-profit health facilities, such as private hospitals or clinics, offering a range of health services.
Pharmacies	Privately-owned businesses that mainly sell medicines, licensed and registered by a national authority such as the Ministry of Health.
Drug stores	Privately-owned businesses that sell a range of medicines but are not registered as pharmacies. May be licensed or unlicensed depending on the country context.
General Retailers	Small, unlicensed businesses which sell food, beverages, household goods, and some health products.
Other outlets	Varies from country to country and includes businesses such as boutiques (sell fast moving consumer goods), villages shops (smaller grocery stores), kiosks (smaller businesses with non-permanent structures), bars (sell alcoholic beverages), and hawkers (itinerant salesmen that sell a variety of goods).



Public health facility
Cambodia



Drug store
Zambia



Street hawker
Benin

All antimalarials found within an outlet are captured in the survey. This means that drugs are captured regardless of whether they are registered in the country or recommended by the WHO. Given the large number of different antimalarials available on the market, drugs recorded through the surveys are classified into the following policy-relevant categories when presenting results:

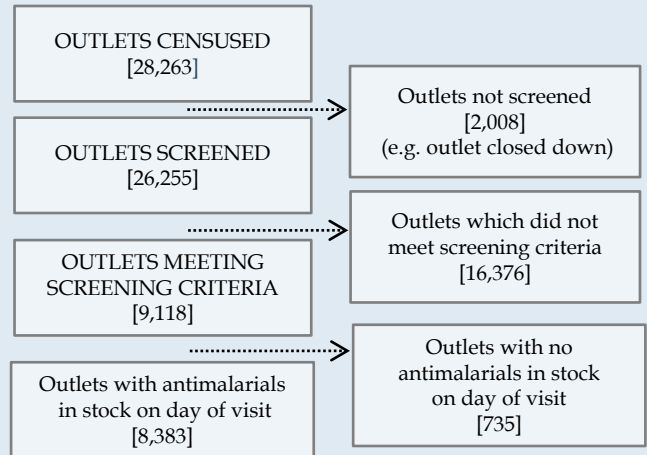
Quality-assured ACT (QAACT)	ACTs that either have been pre-qualified by the WHO or appear in UNICEF procurement records. This category of ACT is considered to meet international quality standards. First-line quality-assured ACT (FAACT) forms a subgroup within this category, defined by a county's first-line antimalarial. For Cambodia, QAACT is defined as the artesunate+mefloquine brands <i>A+M</i> (in the public sector) and <i>Malarine</i> (private sector).
Non-artemisinin monotherapy	This includes monotherapies that do not contain artemisinin, such as amodiaquine, chloroquine, halofatrine, quinine, sulfadoxine-pyrimethamine, etc.
Oral artemisinin monotherapy	All oral formulations of artemisinin monotherapy. WHO recommend that this class of antimalarial be banned due to the potential to cause artemisinin resistance.
Non-oral artemisinin monotherapy	Non-oral formulations of artemisinin including suppositories and injectables that are recommended by WHO for the management of severe malaria, including pre-referral treatment.

Key Findings

Data collection lasted from one to five months in each country and took place between 2009 and 2010. Data were collected during peak malaria transmission seasons. Among outlets stocking antimalarials on the day of survey, 51,158 individual antimalarial products were audited (66% tablets).



Benin: April - May 2009
 Cambodia: June - July 2009
 DRC: August - October 2009
 Madagascar: April - June 2010
 Nigeria: Sept - Nov. 2009
 Uganda: March - April 2009
 Zambia: April - July 2009

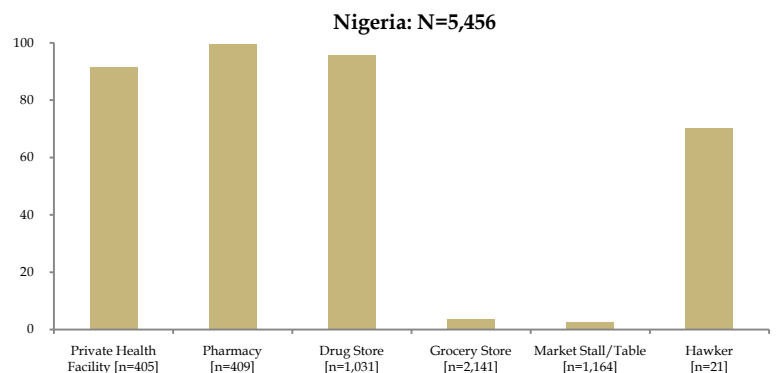
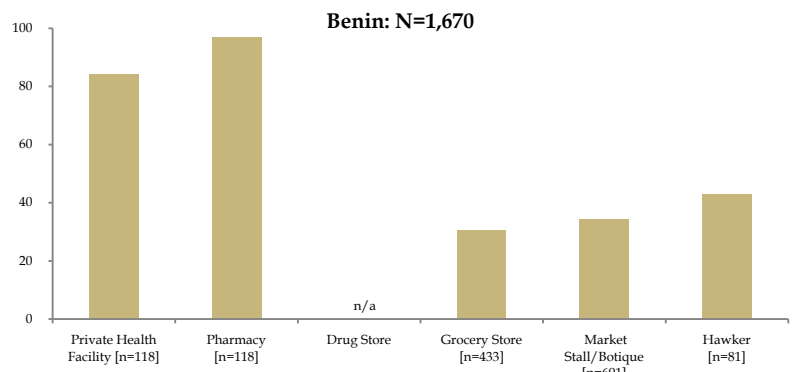


OUTLETS WITH AT LEAST ONE antimalarial IN STOCK

The table below shows the availability of antimalarials across countries, for public health facilities and by sector (public/not-for-profit sector and private). Availability is calculated as the proportion of outlets with at least one antimalarial in stock, among all censused outlets. The proportion of outlets with any antimalarials in stock at the time of the interview varied considerably by outlet type, particularly in the private sector. For example, in Benin the drug store category was deemed redundant as, strictly, there were no unregulated private-sector medicine vendors operating from formal structures (such as permanent buildings). Such medicine-selling outlets should be registered and appear on the list of pharmacies. Unregulated vendors do operate however, often in markets, and were thus captured by the market stall and market shop classifications. In Nigeria, few grocery or market stalls stocked antimalarials, yet more than 95% of drug stores stocked antimalarials.

	Public / Not-for-Profit Sector		Private Sector
	Public Health Facility	Total Public/Not-for-Profit	Total Private
Benin	95.4 (182)	94.0 (229)	36.3 (1,441)
Cambodia	85.0 (211)	88.4 (414)	7.2 (7,013)
DRC	96.8 (111)	96.9 (144)	24.9 (3,571)
Madagascar	96.8 (531)	40.4 (764)	33.9 (6,005)
Nigeria	91.8 (255)	89.2 (285)	25.7 (5,171)
Uganda	95.4 (525)	69.6 (626)	13.9 (4,641)
Zambia	97.4 (165)	97.8 (181)	6.3 (3,197)

Private sector antimalarial availability: two country examples



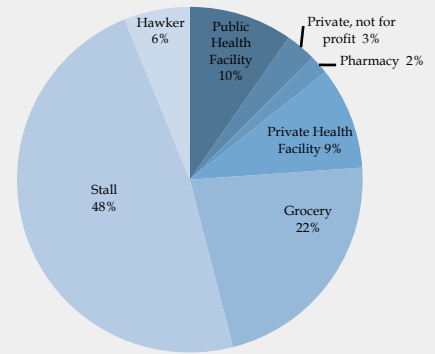
For example, in Uganda 70% of public/not-for-profit outlets stocked antimalarials on the day of interview (N=626), compared to 14% of private outlets (N=4,641) censused.

Key Findings

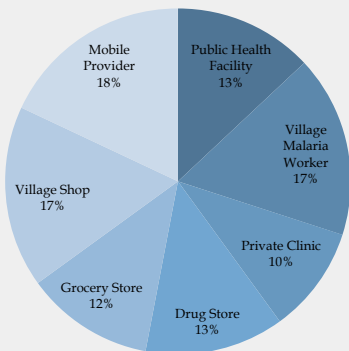
OUTLETS STOCKING antimalarials

The pie charts show the relative distribution of all outlets that had at least one antimalarial in stock, by country. Results show the diversity in the distribution of outlet types stocking antimalarials. For example, public health facilities varied from 4% of all outlets stocking antimalarials in Nigeria to 31% in Zambia. In Madagascar, grocery stores constituted 73% of all outlets stocking antimalarials, compared to 2% in Uganda. Drug stores were the most common type of outlet stocking antimalarials in Nigeria, Uganda and the DRC; grocery stores and stalls were most common in Madagascar and Benin respectively; and public health facilities were the most common outlets stocking antimalarials in Zambia.

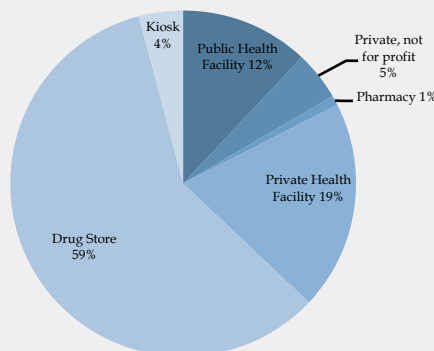
Benin
N = 844



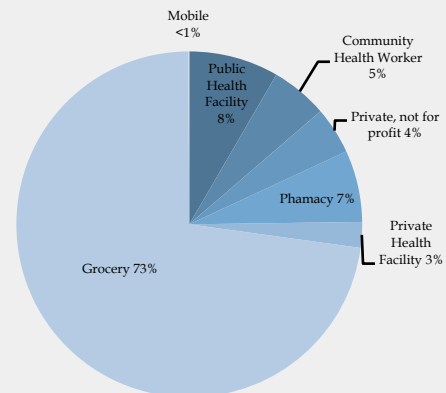
Cambodia
N = 868



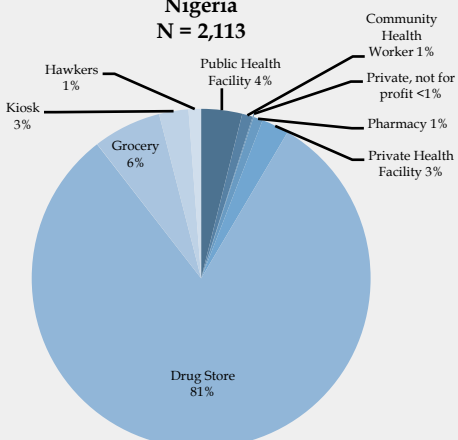
DRC
N = 1,375



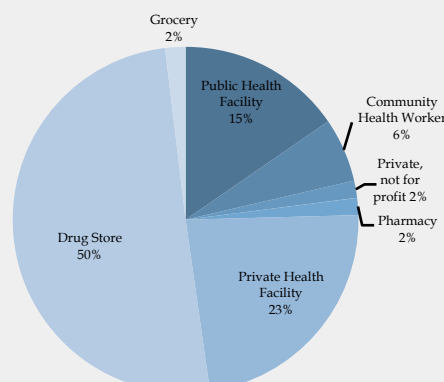
Madagascar
N = 2,414



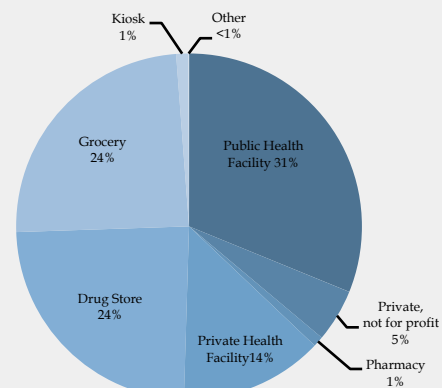
Nigeria
N = 2,113



Uganda
N = 1,225

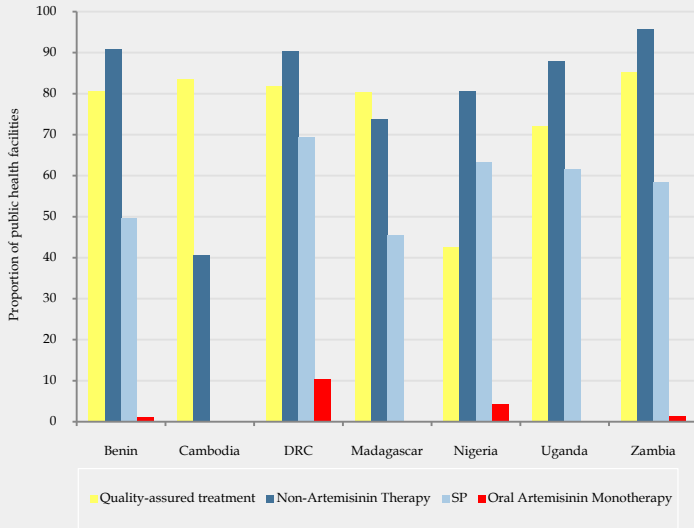


Zambia
N = 435



AVAILABILITY OF antimalarials

...among all public health facilities

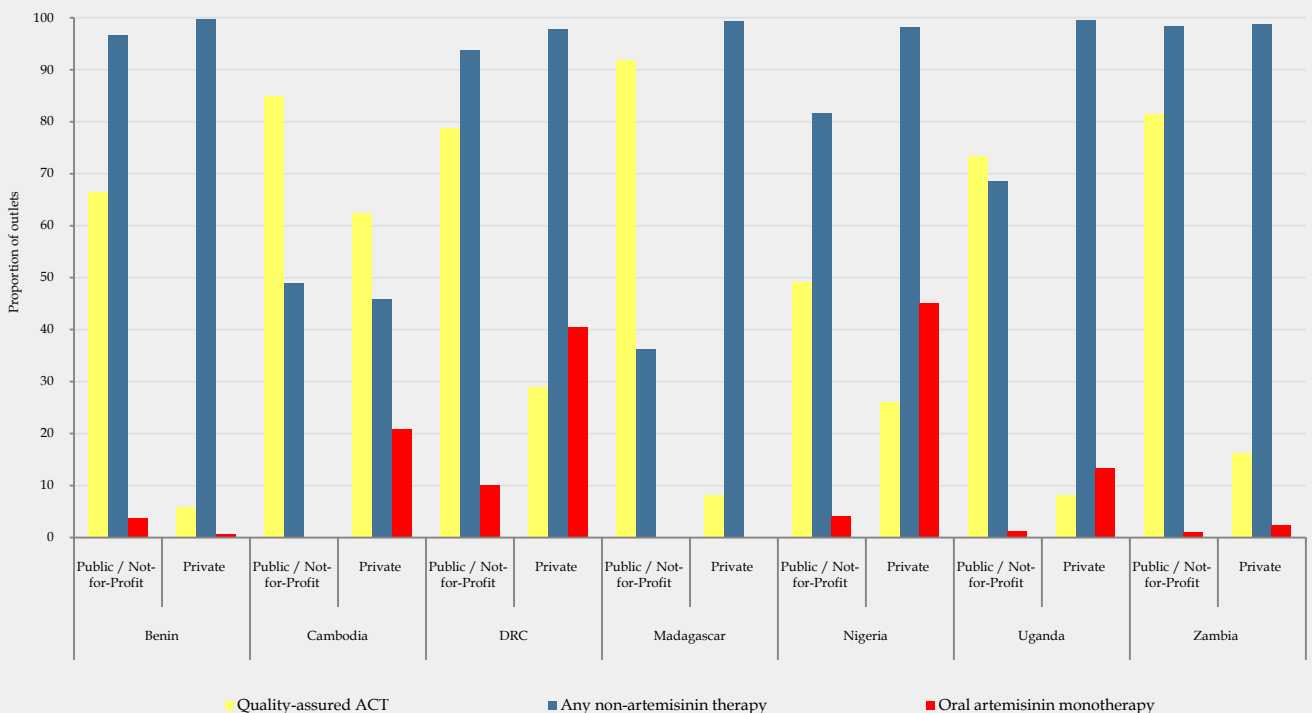


AVAILABILITY IN PUBLIC HEALTH FACILITIES was measured as the proportion of facilities with different categories of antimalarials in stock, among all censused public health facilities. This confirmed the expectation that public health facilities should stock antimalarials.

Results show that stockage rates of quality-assured ACT and SP (used in intermittent preventive treatment of pregnant women) varied by country. Availability of QAACT was around 80% in most countries surveyed, although in Nigeria less than half of facilities had a quality assured ACT in stock. Maintaining a consistent supply to public health facilities may be difficult.

.... by sector

AMONG OUTLETS STOCKING ATLEAST ONE antimalarial, non-artemisinin therapies were generally the most commonly stocked category of antimalarial in both the public/not-for-profit sector and private sector. Overall availability of ACT was low, particularly in the private sector. In the private sector, non-artemisinin therapies - typically chloroquine or SP - were by far the most abundant antimalarial available; quality-assured ACT was available in less than one-quarter of the antimalarial stocking outlets, with the exception of Cambodia. Oral artemisinin monotherapies were available in more than 40% of private sector antimalarial-stocking outlets in the DRC and Nigeria. Within the public/not-for-profit sector, quality-assured ACT stockage rates ranged between 49-92% among outlets stocking antimalarials.



PRICE AND AFFORDABILITY

Public health facilities

Median price (IQR) of first-line quality-assured ACT in public health facilities (US \$)

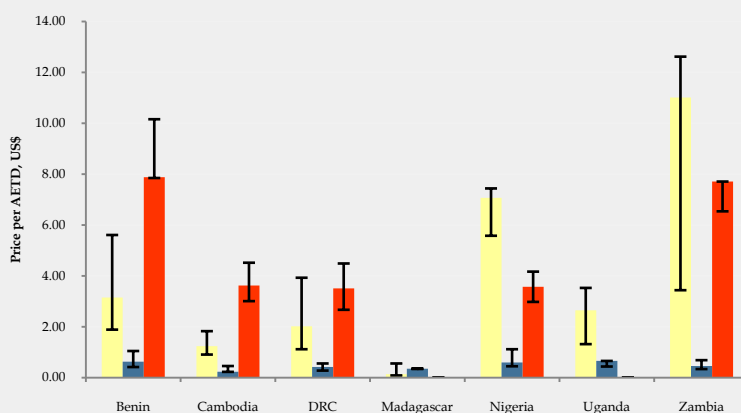
Country	Median price (IQR)	N
Benin	1.29 (1.29, 1.29)	473
Cambodia	0.00 (0.00, 0.00)	678
DRC	0.52 (0.00, 1.29)	184
Madagascar	0.00 (0.00, 0.10)	1,396
Nigeria	0.00 (0.00, 0.00)	55
Uganda	0.00 (0.00, 0.00)	693
Zambia	0.00 (0.00, 0.00)	508

FIRST-LINE QUALITY-ASSURED ACT WAS FREE AT PUBLIC SECTOR OUTLETS in four of the six countries.

In Benin and the DRC, where public-sector patients pay for antimalarials, the median prices were US\$1.29 and US\$0.52 respectively for an adult-equivalent treatment dose (AETD).

Private Sector Price

FIRST-LINE QUALITY-ASSURED ACT IS 5-24 TIMES MORE EXPENSIVE THAN NON-ARTEMISININ THERAPIES, and significantly more expensive than the most popular antimalarial in each country (SP or CQ). The exception was Madagascar, where subsidized ACT was distributed through a social marketing campaign.



Affordability

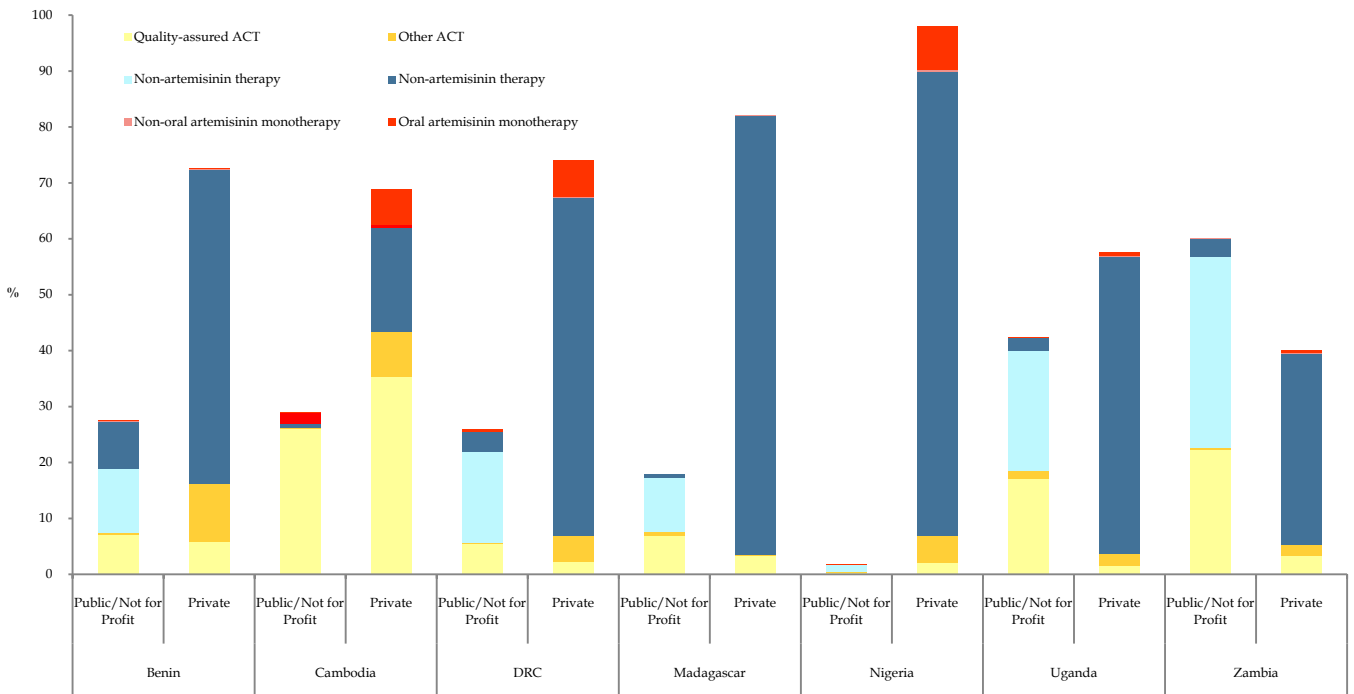
AN UNSKILLED LABOURER WOULD NEED TO WORK ALMOST FOUR DAYS to purchase a full course quality-assured ACT in Zambia, three and a half days in Uganda and Nigeria, and almost two days in Benin and the DRC. In Madagascar, where ACTs are socially marketed, less than a full day's work would be required.

	Zambia	Uganda	Nigeria	Benin	DRC	Cambodia	Madagascar
Median price of a tablet AETD in the private sector relative to the minimum legal daily wage	3.7	3.4	3.2	1.5	1.5	1.1	0.1

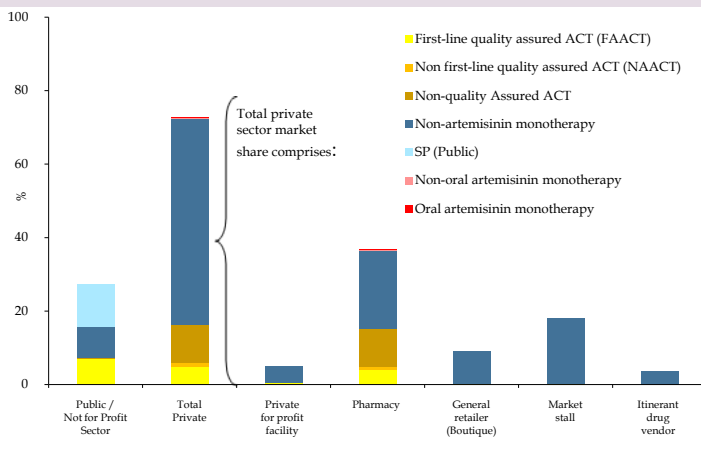
AETDs
ACTwatch price and market share calculations are based on a standardised measure called an *Adult Equivalent Treatment Dose*, effectively the amount of active ingredient required to treat a 60kg person. This allows for meaningful comparisons between antimalarials of different classes and different dosage forms, and with different treatment courses.

MARKET SHARE

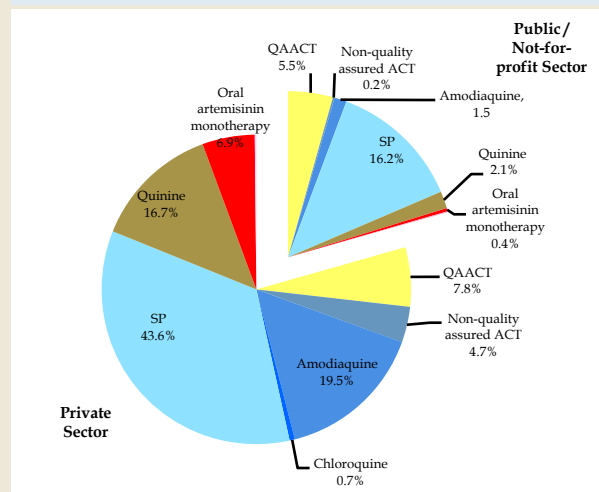
THE PRIVATE SECTOR PLAYS A LARGER ROLE THAN THE PUBLIC/NOT-FOR-PROFIT SECTOR in the distribution of antimalarials in all ACTwatch countries, with the exception of Zambia. This difference is most pronounced in Nigeria, where 98% of antimalarial volumes were delivered through the private sector; only 2% of these were quality-assured ACT. In six African countries, quality-assured ACT accounted for less than 25% of total antimalarial volumes, and private-sector quality-assured ACT volumes represented less than 6% of the total market share. By contrast, quality-assured ACT had over 60% market share in Cambodia. For most countries, non-artemisinin therapies dominate the overall market, followed by ACT and then oral artemisinin monotherapies. Exceptions to this finding were noted in Nigeria and the DRC where more oral artemisinin monotherapies were sold than ACT in the private sector. In Nigeria, oral artemisinin monotherapy is less expensive than first-line quality-assured ACT treatment, perhaps explaining why higher volumes of oral artemisinin monotherapies are found.



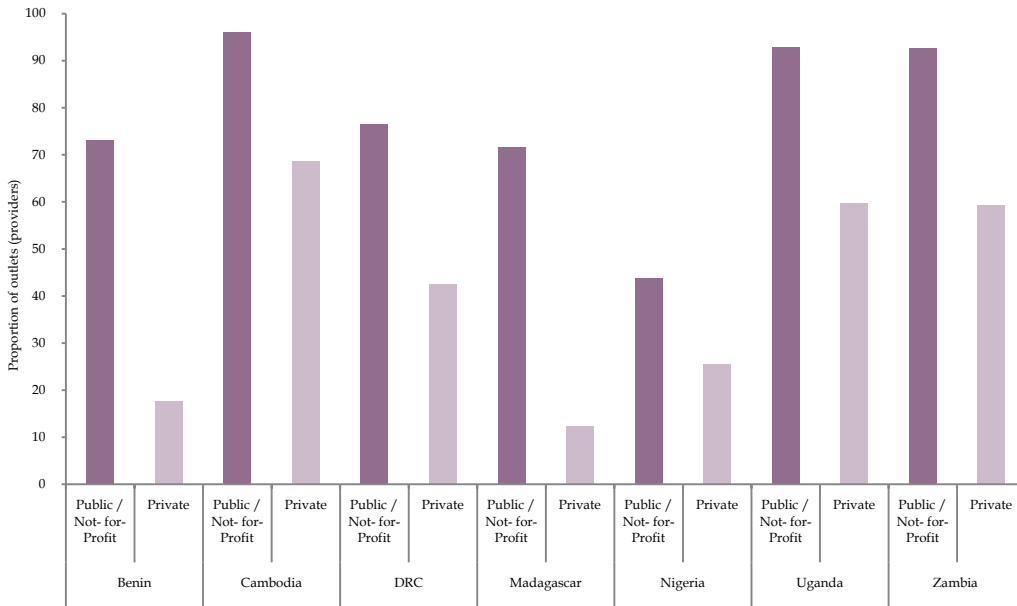
MARKET SHARE IN BENIN: relative volumes are shown by sector, and broken down by private-sector outlet type. Pharmacies accounted for more than one-third of total market share. Market stalls were the next highest contributor to market share in the private sector.



MARKET SHARE IN DRC: relative volumes are presented by class of antimalarial (including types of non-artemisinin monotherapies), and sector.



PROVIDER KNOWLEDGE

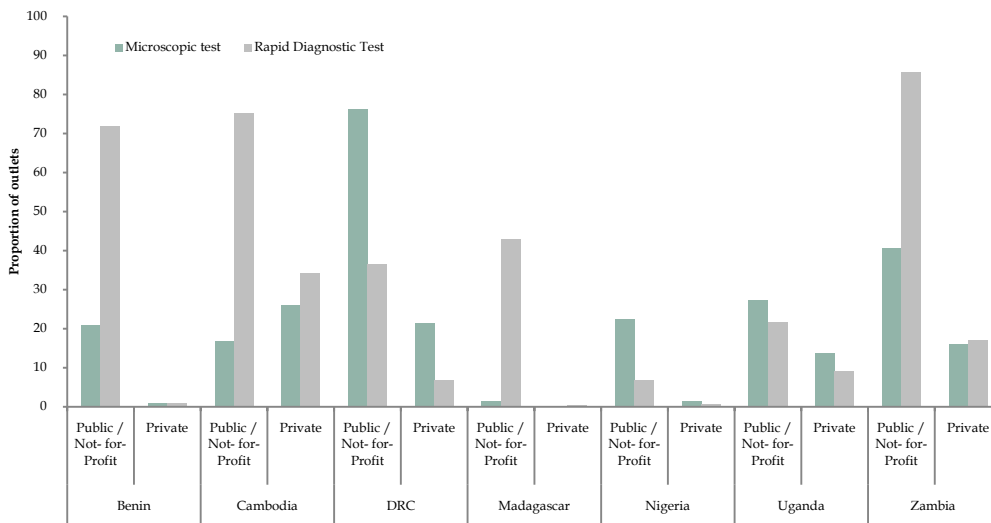


Knowledge of the first-line treatment was significantly higher in the public/not-for-profit sector than the private sector across all countries: 44% to 96% of providers in the public/not-for-profit sector could correctly state the first-line treatment, compared with 12% to 67% in the private sector.

Country highlights: Madagascar

Madagascar provides an interesting example of a setting where an ACT subsidy has been in operation since 2008. The subsidized ACT was open to all wholesalers in the country, registered or unregistered, and it was sold nationally through community health workers, pharmacies and rural drug stores. The ACT did not have over-the-counter status; its recommended retail price was \$0.05. In contrast to the other countries in the ACTwatch project, the price of quality-assured ACT in Madagascar was lower than that of non-artemisinin therapies. However, accessibility remained low: ACTwatch data show that less than 10% of private sector outlets stocked this type of ACT. Provider knowledge of the first-line treatment was also low (12%). As such, substantial gains in market share of ACT were not apparent, and rates of ACT use in febrile children remained less than 5%.

Microscopic Testing



In the public/not-for-profit sector, availability of rapid diagnostic tests varied considerably by country. In the private sector, availability was less than 30% and significantly lower across all countries than in the public/not-for-profit sector. Microscopic test availability ranged between 86% and 7% in the public/not-for-profit sector.

Summary

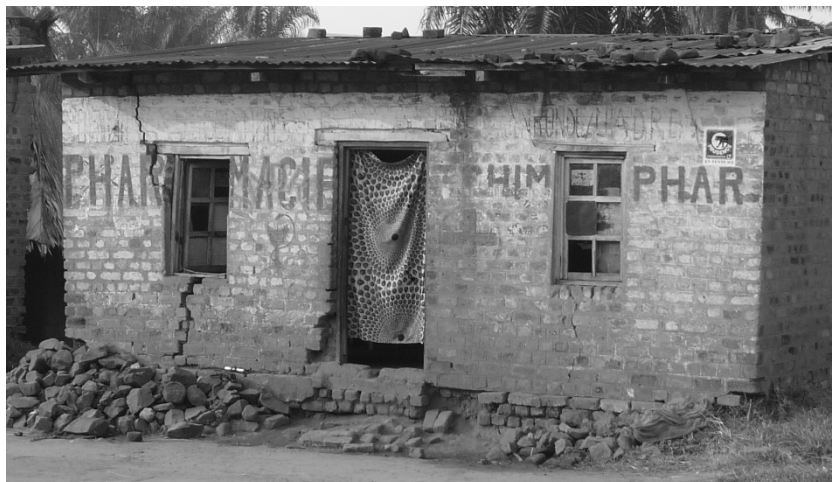
ACTwatch is a multi-country research project that threads together data on antimalarial supply and consumer behaviour to provide an evidence base to policy makers that can help determine where interventions may positively impact access to and use of quality-assured ACT and RDTs. Because of its ability to detect change over time, it is well suited to monitor the effects of policy or intervention developments in a country.

This report presents standardized, nationally representative data on the antimalarial market in six sub-Saharan African countries and Cambodia between 2009 and 2010. Data are presented for key, policy relevant indicators across countries. The data confirm the low market share of ACT, reflecting a combination of low ACT availability in both the public/not-for-profit and private sectors, high ACT prices in the private sector and low provider ACT knowledge, particularly in the private sector, with some exceptions.

- The proportion of public health facilities with at least one quality-assured ACT in stock ranged between 43% and 85%.
- Among private sector outlets stocking at least one antimalarial, non-artemisinin therapies - such as chloroquine and sulphadoxine-pyrimethamine - were widely available (>95% of outlets) as compared to quality-assured ACT (<25%) in sub-Saharan Africa. In Cambodia, quality assured ACT was generally available in public/not-for-profit and private sector outlets stocking at least one antimalarial.
- In the public/not-for-profit sector, first-line quality-assured ACT was available for free in all countries except Benin and the DRC (US\$1.29 [Inter Quartile Range (IQR): \$1.29-\$1.29] and \$0.52[IQR: \$0.00-\$1.29] per adult equivalent dose respectively).
- In the private sector, first-line quality-assured ACT was 5-24 times more expensive than non-artemisinin therapies. The exception was Madagascar where, due to national social marketing of subsidized ACT, the price of first-line quality-assured ACT (\$0.14 [IQR: \$0.10, \$0.57]) was significantly lower than the most popular treatment (chloroquine, \$0.36 [IQR: \$0.36, \$0.36]).
- Quality-assured ACT accounted for less than 25% of total antimalarial volumes, and private-sector quality-assured ACT volumes represented less than 6% of the total market share, in six African countries. In Cambodia, more than 60% of the antimalarial volumes comprised of quality assured ACT.
- Most antimalarials were distributed through the private sector, but often comprised non-artemisinin therapies, and in the DRC and Nigeria, oral artemisinin monotherapies.
- Provider knowledge of the first-line treatment was significantly lower in the private sector than in the public/not-for-profit sector.

Data from *ACTwatch* outlet surveys confirm that there is substantial room to improve availability and affordability of ACT treatment in six countries across sub-Saharan Africa, and in both the public/not-for-profit and private sectors. The data will also be useful for monitoring the impact of interventions such as the Affordable Medicines Facility for malaria.

More detailed, country specific findings can be found in country reports on the *ACTwatch* website: www.actwatch.info



References

1. Bosman A, Mendis K: **A major transition in malaria treatment: the adoption and deployment of artemisinin-based combination therapies.** *American Journal of Tropical Medicine and Hygiene* 2007, **77**(Supp 6): 193–197.
2. World Health Organization: *Progress & Impact Series 1, Malaria Funding & Resource Utilization: The First Decade of Roll Back Malaria.* Geneva, 2010.
3. World Health Organization: *World Malaria Report 2010.* Geneva, 2010.
4. Frosch A, Venkatesan M, Laufer M: **Patterns of chloroquine use and resistance in sub-Saharan Africa: a systematic review of household survey and molecular data.** *Malaria Journal* 2011, **10**:116.
5. Dondorp AM, Nosten F, Yi P, Das D, Phyto AP, Tarning J, Lwin KM, Arie F, Hanpithakpong W, Lee SJ, Ringwald RP, Silamut G, Imwong M, Chotivanich K, Lim P, Herdman T, An SS, Yeung S, Singhasivanon P, Day NPJ, Lindegardh N, Socheat D, White N.: **Artemisinin resistance in *Plasmodium falciparum* malaria.** *New England Journal of Medicine* 2009, **361**:455-467.
6. Schwartz E, Regev-Yochay G, Kurnik D. **Short report: a consideration of primaquine dose adjustment for radical cure of *Plasmodium vivax* malaria.** *American Journal of Tropical Medicine and Hygiene* 2000, **62**:393–395.
7. Woolsey AM, Chung J, Cohen JM: *CHAI Global ACT Demand Forecast.* Clinton Health Access Initiative, Boston, MA. 2010. [cited 2011 July 5] Available from: <http://www.clintonfoundation.org/what-we-do/clinton-health-access-initiative/information-center-resources/>
8. Adeyi O, Atun, R: **Universal access to malaria medicines: innovation in financing and delivery,** *Lancet* 2010, **376**: 1869-1871.
9. Global Fund. **Affordable Medicines Facility – malaria: Summary Report on co-paid ACTs.** [cited 2011 Aug 2]. Available from : <http://www.theglobalfund.org/programs/amfm/report.aspx>
10. Bloom R, Gelband H, and Laxminarayan R: *Consultative Forum Summary on AMFM – the Affordable Medicines Facility – Malaria (Draft).* Resources for the Future, 2008.
11. World Health Organization: *Guidelines for the treatment of malaria – 2nd edition.* Geneva, 2010.



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