

Background

Overview of the ACTwatch Research Project

In 2008, Population Services International (PSI) in partnership with the London School of Hygiene and Tropical Medicine (LSHTM) launched a five-year multi-country research project called *ACTwatch*. The project is designed to provide a comprehensive picture of the antimalarial market to inform national and international antimalarial drug policy evolution. The research is designed to detect changes in the availability, price and use of antimalarials over time and between sectors, and to monitor the effects of policy or intervention developments at country level. *ACTwatch* addresses both the supply and demand side of the market. The supply side is evaluated by collecting level and trend data on antimalarials and rapid diagnostic tests (RDTs) in public/not for profit and private sector outlets and wholesalers of antimalarial drugs. To evaluate demand, data are collected at the household level on consumer treatment-seeking behaviour and knowledge. In combination, the research components thread together the antimalarial market and consumer behaviour. Findings can help determine where and to what extent interventions may positively impact access to and use of quality-assured ACTs and RDTs as well as resistance containment efforts.

The project is being conducted in seven malaria-endemic countries: Benin, Cambodia, the Democratic Republic of Congo (DRC), Madagascar, Nigeria, Uganda and Zambia between 2008 and 2012. Countries were selected with the aim of studying a diverse range of markets from which comparisons and contrasts could be made. The research in Benin was implemented as follows: three outlet surveys (2008, 2009 and 2011); supply chain research (2009); and two household surveys (2009 and 2011).

This report presents the results of a cross-sectional survey of outlets conducted in Benin between the 8th and 30th April 2011. Indicators to address the research questions were developed in consultation with partners and the *ACTwatch* Advisory Committee. Indicators were selected to provide relevant information for policy makers in relation to price, availability, market share, mark-ups and treatment seeking behaviour, including type of treatment and source.

Information on other *ACTwatch* studies can be found at www.actwatch.info.

Country background

Overview of the country

Benin is located in the West Africa sub-region and is bordered by Niger and Burkina Faso to the north, Nigeria to the east and Togo to the west (Figure 8).



In 2010 the population was estimated at 8.8 million, with 1.5 million children under 5 years of age (Population Division, 2011). Approximately 60% of people live in rural areas (Population Division, 2010). There are over 40 ethnic groups in Benin, including Fon, Asja, Yoruba, Goun, Bariba and Fulani tribes. The official language is French; Fon, Goun and Yoruba are widely spoken in the south of the country, and Bariba and Fula are most common in the north.

The south of Benin is characterized by low-lying, marshy coastal plains which give way to flat plains and savanna in the north. The principal rainy season lasts from April to July and covers the whole country, while shorter rains also occur in the south during October and November. Between December and March Benin experiences the Harmattan, winds blowing south from the Sahara.

The country was governed by a Marxist-Leninist dictatorship during the 1970s and 1980s, transitioning to democratic government in the early 1990s. The most recent multiparty elections were held in March 2011.

Benin's gross domestic product (GDP) growth rate was highly volatile during the dictatorship, but stabilized during the 1990s. Annual GDP growth averaged a respectable 4.1% in the 5 years prior to 2010. A steady population growth rate of around 3% per annum puts a check on the country's per capita growth figures. In the past decade per capita GDP has increased from \$1,300 to just over \$1,400¹; 47% of the population still live below the standard poverty line of \$1.25 a day. In 2011 Benin was ranked 167th out of 187 countries in the Human Development Index. One in eight children dies before reaching their fifth birthday (INSAE, 2007), and life expectancy at birth in 2009 was 54 years for men and 60 years for women (WHO, 2011a).

Malaria is considered to be the leading cause of morbidity and mortality among children under five, accounting for 41% of outpatient visits and 29% of hospitalizations for this age group (INSAE, 2007). Government figures for 2010 report 900,000 confirmed malaria cases across all age groups, and a further 350,000 probable cases² (WHO, 2010).

Benin is divided into 12 departments, 77 communes or autonomous areas (the cities of Cotonou, Porto Novo, and Parakou), and 546 *arrondissements*. *Arrondissements* are sub-divided into villages (more commonly called *quartiers* in urban areas).

¹ Prices in purchasing power parity-adjusted 2005 US\$.

² Reporting completeness for 2009 was estimated at 88%

Description of health care system

The public health system operates through three tiers, linked to the three levels of health care and their associated structures. At the highest level lies the Ministry of Health (MoH), and the National Referral Hospital in Cotonou. This is the *Centre National Hospitalier et Universitaire* which also serves as a teaching hospital. The second tier is at department level, whose main structures are the department referral hospitals. Although there are 12 departments in Benin, in mid-2009 there were only 6 functional referral hospitals nationwide (PMI, 2009). The third tier comprises 34 health zones. Health zones are administratively separate from communes, with each zone containing between one and four communes. Health structures at this level are zone-level hospitals (*hôpital de zone*); commune-level health centres (*centre de santé de commune*); smaller, *arrondissement*-level health centres (*centre de santé d'arrondissement*); and village health units. In addition to government-run facilities, the health sector includes private-for-profit facilities, NGO- and faith-based clinics and hospitals, licensed pharmacies, and unlicensed drug vendors selling from permanent sites or hawking their products from site to site.

In 2006 there were an estimated 442 *arrondissement*-level health centres and 75 commune-level health centres across the whole country (PMI, 2009). Figures for the private sector suggest 305 licensed private health facilities (in 2006) and 202 registered pharmacies (as of early 2011). However, many clinics in the private sector are not registered with the MoH and the true number of facilities may be as much as ten times greater (Tougher et al., 2009).

Healthcare consumers at government facilities are expected to pay for consultations, diagnostic tests, procedures and medicines. Patients must also purchase a *carnet de santé* in order to access care in public facilities. Fees are kept at the facility-level and cover, on average, 43% of the operating costs of the facilities. In-line with the general policy at the time of data collection, treatment of uncomplicated malaria is provided at public facilities for a fee³: blister packs of 6, 12, 18, and 24 artemether-lumefantrine (AL) tablets are sold for 150CFA, 300CFA, 450CFA, and 600CFA, respectively (PMI, 2009). In 2011 150CFA was on average equivalent to \$0.33. Note that prior to October 2009 proceeds from ACT sales were exempt from the system described above and all monies were deposited directly into a central account. Following the policy change in late 2009, health facilities now retain one third of the ACT sale proceeds and an increase in the use of ACTs by public facilities has been noted (PMI, 2010).

Epidemiology of malaria

Malaria epidemiology in Benin can be characterized as stable endemic and, as such, the risk of an epidemic is considered to be low. The entire population is at risk of infection. Transmission is more intense in the (more populated) southern third of the country, while a single seasonal peak is observed in the north. The predominant parasite species is *P. falciparum*.

³ Data collection for the 2011 *ACTwatch* outlet survey took place during April 2011. In May 2011 the government announced plans to drop the fees associated with the *carnet de santé* for all users, and additionally provide consultation, diagnosis and malaria treatment for free for children under five and pregnant women. These changes were implemented in October 2011.

Antimalarial Policies and Regulatory Environment

Faced with growing resistance to chloroquine and sulfadoxine-pyrimethamine (SP), Benin adopted AL as the first-line treatment for uncomplicated malaria in March 2004 (PNLP, 2005). Artesunate-amodiaquine (ASAQ) is recommended for children under six months of age, when AL is not available or when patients cannot tolerate AL. Parenteral quinine is recommended for the treatment of severe malaria and as pre-referral treatment. Artesunate injection and suppositories are included in the national policy as a pre-referral treatment for severe malaria. Oral artemisinin monotherapies have been banned in Benin since 2008 (WHO, 2010).

Although the political policy change to ACT occurred in 2004, it was a further 4 years before this policy was truly active at the national level, and ACT only became widely available in the public sector in 2009 (PMI, 2009). Prior to 2009 ACT was most commonly available through the private sector, which has historically been an important distribution channel of antimalarials in Benin (Tougher et al, 2009). Procurement of ACT is currently supported by a number of donors, including the Global Fund, President's Malaria Initiative (PMI) and UNICEF.

Inefficiencies in the public sector supply management system hindered initial distribution of ACTs to public health facilities, despite 2.7 million treatments being delivered to the government during 2009 (WHO, 2010). PMI identified the Central Medical Stores (CAME) as an area requiring support and has worked to implement legal reforms on governance and transparency of CAME operations, and to upgrade the information system (PMI, 2011). Despite these successes, old problems continue. Limited means of transportation from CAME's central and regional warehouses to public health facilities, insufficient space and inappropriate storage conditions, and (until recently) an inadequate information management system to monitor consumption of antimalarials at public health facilities have been identified as weaknesses at CAME (Ndoye et al, 2009). Intervention by external partners was recently required to conduct an emergency roll-out of ACTs to public and private health facilities to avoid the expiration of around 400,000 doses of AL (PMI, 2011).

At the time of data collection the operational treatment policy for children under five was presumptive⁴, while treatment for older patients was recommended only for those with a positive diagnostic test. With donor support rapid diagnostic tests (RDTs) have been extensively scaled-up alongside ACTs, although implementation and commodity management have been similarly challenging. In mid-2010 the government had 460,000 RDTs for use in the public health system, divided between health facilities and the central medical stores. However, a health facility survey conducted in early 2011 estimated that 30% of facilities had expired RDTs in their stocks (cited in PMI, 2011). RDTs are to be used at all levels of the health system except the community level, and to be provided free of charge. In addition to RDTs, hospitals and larger health centres are supposed to provide microscopy, although such facilities often lack functional equipment and laboratory worker's skills are often sub-optimal.

The NMCP Strategic Plan for 2005-2010 viewed treatment of uncomplicated malaria by community agents using ACT as an important strategy in case management (PNLP, 2005). It is expected that this will continue during the next five-year plan, which additional emphasis on diagnostic testing. Through two Global Fund malaria grants (see below), funding is being provided for community-based treatment of malaria at the national-level.

⁴ In line with WHO standards, the malaria case management guidelines changed in February 2011 to recommend universal diagnostic testing for malaria. Although signaled in February 2011, the change was not widely implemented until late 2011.

Medicine sales pharmaceutical sector are regulated by the *Direction des Pharmacies et du Médicament* (DPM), which falls under the umbrella of the MoH. Registered private sector outlets are subject to strict pricing regulations, the intention of which is to ensure that patients pay the same price for medicines, regardless of where they are in the country. Qualitative research conducted in 2009 found that this pricing structure is well-respected by private sector operators (Tougher et al, 2009). Data from previous *ACTwatch* survey rounds in Benin indicate that prices of AL in pharmacies are around 5 times more expensive than in public health facilities.⁵

Malaria control strategy

2010 was the final year in the NMCP's five-year National Malaria Strategic Plan 2005-2010. At the time of data collection for this survey the review process for the 2011-2015 Plan was ongoing, though the core vision for the next five years was to continue promotion of universal access to prevention and treatment by achieving nationwide scale-up of interventions.

The core interventions for malaria control in Benin include long lasting insecticide-treated net (LLIN) distribution through antenatal care clinics (ANC) and immunization visits, universal campaigns, and subsidized and at-cost sales in the private sector; intermittent preventive treatment for pregnant women (IPTp); case management (following diagnosis) at all levels of health care; and, to a more-limited extent, indoor residual spraying (IRS). Benin has removed import tariffs on mosquito nets, antimalarials and RDTs; as of August 2010 tariffs still apply to pumps and insecticides used for IRS (M-Tap, 2010).

In 2007 a national campaign distributed 1.4 million LLINs to households across Benin. This followed survey estimates that although 56% of households owned a mosquito net, only 25% of households reported owning an ITN, and only 20% of children under five had slept under an ITN the previous night (INSAE, 2007). The NMCP's universal coverage campaign envisions one net for every two people. A second-round of mass distribution (of almost 5 million nets) was planned for 2010 but this was delayed and did not begin until July 2011. Routine distribution of LLINs occurs through ANC and immunization visits, where they form part of a kit that includes two doses of SP, one dose of mebendazole, folic acid and iron. These kits cost around \$1, although the nets and SP are 'free' and provided by funds from PMI, UNICEF and the World Bank. A woman who opts for only the net and SP during an ANC visit receives these items free of charge. A partnership between PMI and PSI-Benin also plans to sell highly subsidized, socially-marketed LLINs in the private sector.

The 2006 DHS found that 84% of pregnant women accessed an ANC clinic at least twice during their last pregnancy, but less than 1% of women received two doses of SP from ANC visits. IPTp was officially introduced at a national level in 2005, though training and implementation at the health facility level were not continued until 2010. In addition, problems with the public sector supply chain described above would have impacted the distribution of SP in the public sector. Recent research at selected maternity hospitals shows that coverage for two doses of IPTp has increased in some facilities from 3% in 2005 to 68% in 2009 (d'Almeida et al, 2011). More recently there is anecdotal evidence of major stock outs of SP in the public sector beginning in late 2010 (ABMS, personnel communication; PMI, 2011).

IRS has been recommended by the NMCP since 2006, and spraying rounds have been funded by PMI in 4 communes in Ouémé in 2008 and 2009, covering more than 520,000 people. LLINs were distributed to households following each round of spraying. By 2015, the NMCP aims to scale up IRS

⁵ The public health facility price excludes the cost of the *carte to santé*, consultation, and any diagnostic tests.

to 20 of the 77 communes in Benin. Additional communes will be selected on the basis of malaria epidemiology and other vector control activities; they are most likely to come from the north of the country where LLIN coverage is lower than the south and malaria transmission is seasonal (PMI, 2009)⁶.

Malaria financing

Financing for malaria control activities has increased dramatically in recent years, from less than \$5 million annually between 2001 and 2005, to over \$22 million in 2009 (WHO, 2011b). The main sources are the PMI, World Bank, Government of Benin, and Global Fund. The NMCP received funding from the Global Fund Round 3 Grant (\$2.14 million) which was channeled to a project providing 458 villages with ACTs, with the aim (among others) of improving case management of malaria in children under five through health facilities and community-based management. The project was implemented in Mono and Couffo, two departments with high malaria transmission. A Round 3 Rolling Continuation Channel (RCC) to the implanting partner will provide \$94 million to expand this project (as well as financing net distribution campaigns). A Round 7 (\$22.6 million) grant launched in July 2008 is providing community-level ACT distribution for 14 of the 34 health zones (approximately 40% of the population) not already covered by the RCC. Thus, together, these awards will finance community case management of malaria countrywide.

In 2007 a four-year grant (\$31 million) from the World Bank Malaria Booster Program commenced covering an important portion of ACT and LLIN needs, and the bulk of RDTs required up to 2010. In 2010 funds from the Booster Program were also used to train public health facility workers on ACT policy, achieving 87% coverage of staff in the country. The World Bank grant has now ended, putting additional financial pressure on the NMCP and its external partners. Benin continues to receive increasing funding from the PMI for malaria control activities: \$13.8 million in 2008/2009 and \$21 million in 2009/2010. Funds from 2009/2010 were used to procure 1 million LLINs and 1.2 million ACT treatments. In addition, PMI funds supported the training and supervision of laboratory staff, and public and private health workers.

⁶ Indeed, in May 2011, following the data collection period for this survey, PMI-funded IRS activities moved from targeting areas in southern Benin to those in the North, based on malaria epidemiology and frequency of rainy seasons. With the withdrawal of IRS activities in the south, the NMCP has the goal of universal LLIN coverage in areas previously covered by IRS (PMI, 2011).

Methods

Sampling approach

The outlet survey was designed to allow reliable estimations of key indicators for the country as whole.

Sample units

The target sampling units were all types of outlets that have the potential to sell or provide antimalarials in Benin. Determined on the basis of a pilot study prior to the main *ACTwatch* survey, the following outlet types were included in the sample:

- public health facilities at all levels of the health system;
- community health workers;
- private not-for-profit health facilities (NGO and Mission health facilities);
- private for-profit health facilities (private clinics and hospitals);
- registered pharmacies;
- general retail outlets: supermarkets, boutiques, market stalls; and
- itinerant vendors (hawkers).

Outlets such as diagnostic centres; wholesale medical supply stores; eye, skin, dental and other similarly specialized clinics; and veterinary clinics were all excluded from the sample. In addition, a limitation of the survey is the omission of rural pharmaceutical depots (*dépôts pharmaceutiques*) from the sample. In 2008 there were 279 rural depots registered in Benin (Tougher et al., 2009). The list of registered depots was not available prior to data collection and they were excluded from the booster sample (see below) for logistical reasons.

Sample size determination

The proportion of outlets with any ACT, estimated to be 40%, was used as the primary outcome measure for sample size estimation. A minimum of 290 outlets with antimalarials in stock were needed to provide detectable changes in ACT availability between sectors in a single stratum. With this number, 19 clusters provided a representative sample to detect 20% increase at 80% power, setting the level of significance at 5% and adjusting for an estimated design effect of 3.

Sampling frame

Administratively, Benin is divided into 12 departments and subdivided into 77 communes. Communes are further divided into *arrondissements*. The desired cluster size for the outlet survey was approximately 10,000 to 15,000 inhabitants, which corresponds most closely to an *arrondissement* in Benin. The 2002 population census was used as a sample frame for the 2011 outlet survey.

In addition, a facility listing of 202 registered pharmacies was used to confirm the location of pharmacies in each department, and to inform the pharmacy booster sample. The list of registered pharmacies was sourced from the *Direction des Pharmacies et Medicaments* in early 2011 and included the name of the proprietor, and the address and phone number of each pharmacy, grouped by commune.

Selection procedure of the sub-districts

Nineteen *arrondissements* were selected from the 2002 census frame using a one-stage cluster design, with probability of selection proportional to *arrondissement* population size. All

arrondissements in the country were included in the sampling frame. In each selected *arrondissement*, a census of all outlet types listed above was conducted. All outlets that stocked antimalarials at the time of the survey or in the past 3 months were eligible for interview.

Selection procedure of the booster sample

The main sample was supplemented by a booster sample to ensure adequate representation of the relatively rare but important antimalarial outlet types: public health facilities and registered pharmacies. All public health facilities located in the commune in which a selected *arrondissement* fell were included. The booster sample of pharmacies comprised a full census of all registered pharmacies in Benin.

Questionnaire

The outlet survey questionnaire comprised 3 modules: a screening module for all outlets; an audit module (the antimalarial audit sheets and RDT audit sheets) for outlets with antimalarials in stock on the day of interview; and a provider module for all eligible outlets, including those with no antimalarials in stock on the day of interview but who had stocked antimalarials in the past three months. Audit sheets were based on the Health Action International questionnaire for essential medicines, developed with the World Health Organization.

The **screening module** was used to record the type and location of all outlets and to identify outlets that were eligible for the audit and provider modules. The **audit module** was used to collect data relating to each antimalarial product an eligible outlet had in stock on the day of interview. This information came from the antimalarial packaging: brand name, generic name and strengths, package type and size; and from provider recall: amount sold or distributed in the last 7 days, retail selling price, and the outlet's wholesale purchase price. Audit sheets in the audit module were also used to collect the characteristics, retail and wholesale prices, and sales/use data on RDTs, in outlets that had RDTs in stock on the day of interview. The **provider module** was used to collect information on outlet demographics (e.g. number of staff, health qualifications of staff), provider knowledge of the first line treatment, and provider perceptions.

Paper questionnaires were administered during data collection. The questionnaire was finalised in French and local language translations produced in Fon, Goun and Bariba. During training (see below) fieldworkers discussed appropriate local-language terminology and reached a consensus within language groups on how questions would be administered. During data collection, questionnaires were administered either in French or in a local language. Prior to finalisation and training, the questionnaire was pilot-tested to assess the appropriateness of question wording as well as to verify the skip patterns and interviewer instructions.

Data collection

Preparatory Phase

Experienced research assistants from the ABMS/Benin pool of consultants were recruited by a data collection agency to be trained as interviewers and team leaders for this study. Final selection of study personnel was made after a rigorous seven-day training program, which included a practical fieldwork exercise.

Standardised training materials developed by *ACTwatch* were adapted to the national setting, and sessions were facilitated by staff from ABMS/Benin and the *ACTwatch* core team. Training consisted of a review of how to fill out the screening, audit, and provider modules; mock interviews; and sessions covering interviewing techniques, how to conduct a census, and how to identify different outlet types. A key element of the training focused on the identification of antimalarial medicines, including the differences between ACTs and non-ACTs; the difference between brand names and generic names; how to correctly record medicine strengths; how to record packaged and loose tablets; and the various formulations in which medicines are available. Role plays and exercises using antimalarial packages occurred throughout the sessions. Interviewers were also trained how to introduce the study, answer questions a respondent may have; and seek informed consent for participation. During the fieldwork exercise, interviewers followed the full survey methodology in one *arrondissement* not included in the sample. Trainees were local to the region in which they would work and travelled to Cotonou for the training.

Team leaders were identified from among the strongest candidates during the initial training and participated in an additional two-day training program. This training covered team management and supervision techniques, but mainly focussed on methods for ensuring data quality in the field.

Fieldwork

Fieldwork was conducted by 34 staff, divided into 7 teams of differing sizes depending on the departments to which they were assigned. Generally, teams in the south of Benin comprised more interviewers than those in the northern departments. Quality control and oversight was provided at two levels: firstly by the team leaders, and secondly by staff from ABMS/Benin and the *ACTwatch* core team.

Data collection started on the 8th April, with all teams in Cotonou where progress and quality could most easily be monitored. The last team finished data collection on the 30th April. During this time all 19 selected *arrondissements* were censused and the booster sample conducted.

Upon arrival in a study area, field teams first met with local leaders to introduce themselves and seek permission to carry out the study. *Arrondissement* boundaries (and commune boundaries for the booster sample) were identified in consultation with local leaders and guides; team leaders then assigned interviewers to a particular area.

During fieldwork, interviewers systematically canvassed the *arrondissement*, approaching every outlet with the potential to sell antimalarials, according to the outlet type definitions designated for this study. Some of these outlets had been signalled in advance through discussions with local authorities and guides. In addition a snowball technique was used, with visited outlets asked to identify other outlets in the locality with the potential to stock medicine.

For each outlet that was identified during the census, the outlet type and location were noted, along with its longitude and latitude coordinates (obtained from hand-held GPS units). Screening questions were administered to an available member of staff, and if the outlet was eligible for the audit and/or

provider modules, the fieldworker identified the senior staff member currently present at the outlet before proceeding. The fieldworker then read the information sheet to the senior staff member, answered any questions they may have, and obtained oral consent to conduct the interview. A maximum of three call backs were made to outlets that were either closed at the time of interview, or where interviews were interrupted.

During the audit, interviewers requested to see one example of each antimalarial product that was in stock on that day. This included different formulations and age/weight categories of the same 'brand', as these were all considered different products and required separate entries in the audit.

Pilot tests conducted prior to starting the survey identified hawkers as a potential source of medicines in Benin. Hawkers were screened and administered the questionnaire in the same manner as any stationary point of sale. Longitude and latitude coordinates were taken from the point where the interview was conducted.

Team leaders, ABMS/Benin research staff and *ACTwatch* core staff accompanied interviewers during data collection. Team leaders were responsible for the review and field editing of questionnaires on a daily basis and conducted spot checks and back checks to verify completed questionnaires. Second reviews of questionnaires, and additional back checks, were conducted by ABMS/Benin and *ACTwatch* core staff.

Team leaders worked with senior agency staff to follow data safeguarding procedures during data collection. Team leaders collected questionnaires from interviewers at the end of each day and ensured their safe storage. Senior agency staff made regular field visits to collect field questionnaires and return them to Cotonou.

A memorandum of understanding was obtained from the Ministry of Health to conduct the survey.

Data processing

Double data entry was performed in Kenya by an external agency, using Microsoft Access. A member of the *ACTwatch* core team trained data entry clerks on the use of the Access database and then made regular visits to the agency to monitor progress. A trained ABMS/Benin research staff member was responsible for validating the double data entry. After the first round of data entry a core team member validated the double data entry, and errors were corrected by the agency with reference to the hard-copy questionnaires. This process continued until the two data entry files were identical.

Data analysis

Data were analyzed by the *ACTwatch* core team following the *ACTwatch* analysis plans. These plans outline the steps to take in summarizing and analyzing the data, and contain detailed guidance on data cleaning, weighting, numerators and denominators for calculation of key indicators, definition and calculation of AETDs, and a set of blank tables (a tabulation plan).

Indicators were presented by outlet type and nationally. Price, availability and volumes are derived from the audit modules. Additional analyses, derived from provider modules, examine outlet characteristics, provider knowledge, and availability of microscopic testing for malaria. RDT indicators are derived from the RDT audit sheets in the audit module.

Research associates cleaned data in Stata, documenting all decisions and steps in a 'do' file. During analyse, statistical tests and means, medians and proportions were calculated using Stata. Sample weights applied to the data to allow for: 1) the oversampling of the booster sample; and, 2) the sampling strategy which involved a full census of outlets in *arrondissements* of varying size selected using probability proportional to size sampling. Weights were calculated specific to outlet and analysis type but generally involved the inverse of selection probability and corresponding population size. Survey settings were used to account for the clustered design. Data analysis included descriptive summaries, presented with 95% confidence intervals (CIs). All analysis was reviewed by the senior research associate. A summary of the analysis is presented in this section.

Availability and stock-outs

The availability of any antimalarial was measured as the proportion of surveyed outlets that had at least one antimalarial in stock among all surveyed outlets. Only outlets with at least one antimalarial (of any type and dose) were considered to have antimalarials available. Drugs intended solely for malaria chemoprophylaxis were not included. Cotrimoxazole was also excluded, as it is very rarely used as an antimalarial.

Stock-out information was collected through both the drug audit and provider interviews. For each drug found in stock, providers were asked if the drug, specific to the brand, and dose, had been out of stock at any point over the past three months. Providers were also asked to list all drugs that were not currently in stock, but had been in stock during the previous 3 months. These two measures were combined to calculate the proportion of outlets with a reported stock-out of at least one drug, amongst those that had recently stocked such drugs (defined as stocking today or in the last 3 months). This information measures the ability of outlets to maintain supply rather than provide a particular treatment at a given point in time.

Volumes and price

The volume and price of the antimalarials recorded in the audit module were standardized using the adult equivalent treatment dose (AETD) to allow meaningful comparisons between antimalarials with different treatment courses. One AETD is defined as the amount of the drug, in milligrams (mg), that a 60kg adult would need in order to receive a full course of treatment, based upon WHO, peer reviewed, or/and manufacturer guidelines, in that order. The price per package was scaled to be equivalent to one full AETD course, while the number of packages distributed (volumes) was scaled to the equivalent number of AETD courses sold in the previous week. For combination antimalarials, one drug in the combination was selected for these calculations. For ACTs, this was always the artemisinin-derivative component (e.g. the artesunate component of artesunate-amodiaquine).

The *ACTwatch* project typically calculates volume (market share) indicators by dividing the number of AETDs sold for a given antimalarial category-outlet type pair, by the total number of AETDs of all antimalarials sold. This allows the total market for antimalarials to be presented by antimalarial

category and outlet type. Due to the scale and pattern of missing values in the Benin OS3 data for *quantity sold/distributed in the past 7 days*, the standard *ACTwatch* market share indicator is not presented in this report. Information on quantity sold/distributed was missing for 11% of antimalarials audited in PHFs and 14% of antimalarials in general retailers; but among pharmacies 71% of antimalarials audited were missing this information. Further analysis of the data shows that when the quantity sold/distributed is missing, it is almost always missing for all antimalarials within an outlet. Given the disproportionate number of missing values from pharmacies we have opted to present relative market share by antimalarial categories restricted to each outlet type (Table B.1). In keeping with the standard analysis procedures, in cases where outlets stocked antimalarials but some or all sales volumes were missing, we did not impute missing values.

Price data were collected in local currencies and converted to their US\$ equivalent using the average interbank rate for the data collection period (1 US\$ = 445.2 Franc CFA [XOF], source www.oanda.com). Price data are reported using the median and inter-quartile range, which are appropriate for describing distributions likely to be skewed. Price measures include only tablet formulations in order to ensure meaningful comparisons. We have elected to exclude the price of non-tablet formulations from the price analysis as these formulations (powders for reconstitution, suspensions, syrups, suppositories and injections) tend to be far more expensive per AETD than their tablet equivalents and this would skew the price results and make interpretation difficult. The most popular non-ACT was defined as the generic antimalarial that comprised the greatest market share of AETD across all outlets.

Classification of antimalarials

For the purpose of analysis, antimalarials were split into three policy-relevant categories: non-artemisinin therapy, artemisinin monotherapy, and artemisinin combination therapy (ACT). ACTs were further sub-divided as follows:

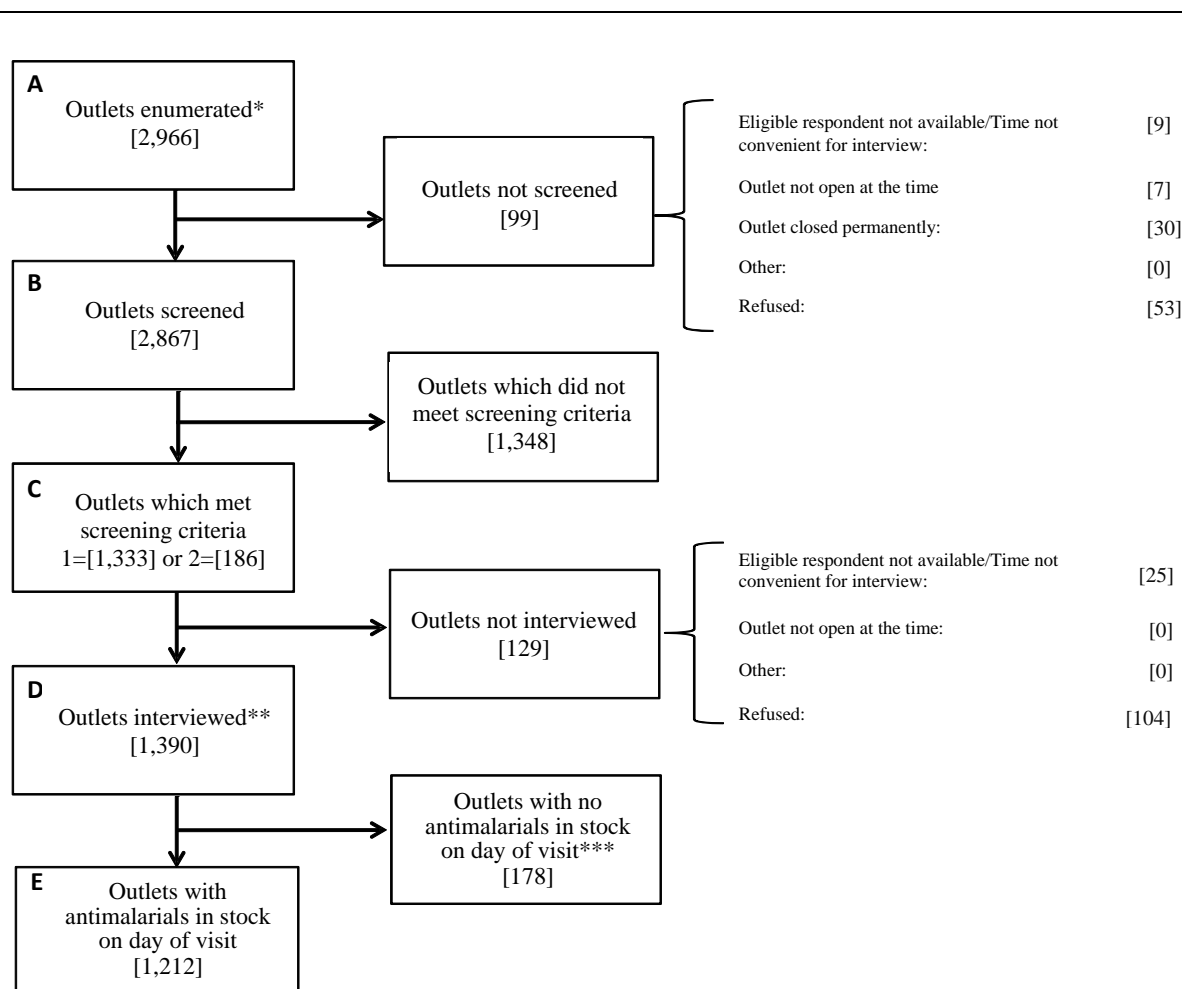
- quality assured ACTs (QAACTs), which divide into:
 - first-line, quality assured ACTs (FAACTs),
 - non first-line quality assured ACTs (NAACTs)
- non quality assured ACTs

These categories are described in more detail on page V. Indicators were also calculated for *nationally registered* ACTs – those ACTs registered with the national drug authority. Due to difficulties sourcing and verifying a list of nationally registered ACTs from the time of data collection, we have used the list as of September 2008. This is the same list used for the 2009 survey (the previous survey) and thus allows direct comparison across survey rounds of this important subset of ACTs. Nationally registered ACTs are also either quality assured or non-quality assured.

Results - Outlet survey

Characteristics of the sample

Figure 3.1.1: Survey flow diagram



Screening Criteria:

1: Antimalarials in stock on day of visit; 2: No antimalarials in stock on day of visit, but antimalarials in stock in previous 3 months

* Enumerated means were visited and filled in at a minimum basic descriptive information (questions C1-C9 of questionnaire)

** Interviewed means that final interview status was *completed* or *interview interrupted*

*** but had stock in previous 3 months

Outlet type was recorded for 2,960 of the 2,966 outlets enumerated. Outlets missing outlet type fell into the following categories: did not meet screening criteria (3 cases); antimalarials in stock on day of visit (2 cases); no antimalarials in stock on day of visit but had stocked antimalarials in previous 3 months (1 case). These 6 cases are excluded from the analysis.

Table A.1: Availability of antimalarials, by outlet type

| | Public Health Facility | Community Health Worker | Private not for profit HF | TOTAL Public / Not for profit | Private for profit HF | Pharmacy | General retailer | Itinerant drug vendor | TOTAL Private | TOTAL Outlets |
|--|------------------------|-------------------------|---------------------------|-------------------------------|-----------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|
| | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) |
| Proportion of outlets that had: | N=198 | N=50 | N=75 | N=323 | N=146 | N=193 | N=1,971 | N=99 | N=2,409 | N=2,732 |
| Antimalarials in stock at the time of survey visit | 93.7 (80.1, 98.2) | 83.7 (62.4, 94.1) | 86.2 (70.0, 94.4) | 86.5 (72.6, 94.0) | 82.1 (67.9, 90.8) | 100.0 -- | 30.6 (24.6, 37.3) | 57.0 (34.0, 77.3) | 34.0 (28.5, 40.0) | 39.9 (33.0, 47.3) |
| Any ACT | 74.4 (62.3, 83.7) | 83.7 (62.4, 94.1) | 53.2 (28.6, 76.3) | 78.0 (64.0, 87.6) | 39.9 (24.1, 58.2) | 99.5 (98.3, 99.8) | 5.7 (4.1, 7.9) | 16.4 (7.7, 31.7) | 8.1 (5.9, 10.9) | 16.0 (11.7, 21.4) |
| Quality Assured ACT (QAACT) | 74.4 (62.2, 83.6) | 83.7 (62.4, 94.1) | 42.8 (20.9, 67.9) | 76.8 (62.8, 86.6) | 36.8 (19.9, 57.7) | 90.7 (83.8, 94.8) | 5.6 (4.1, 7.8) | 16.4 (7.7, 31.7) | 7.8 (5.7, 10.6) | 15.6 (11.3, 21.2) |
| First-line (FAACT) | 64.9 (50.8, 76.8) | 83.7 (62.4, 94.1) | 42.8 (20.9, 67.9) | 74.4 (61.3, 84.2) | 36.1 (19.0, 57.7) | 89.1 (81.9, 93.7) | 5.6 (4.1, 7.8) | 16.4 (7.7, 31.7) | 7.8 (5.7, 10.6) | 15.3 (11.1, 20.8) |
| Non first-line (NAACT) | 43.2 (29.7, 57.8) | 0.0 -- | 0.0 -- | 10.9 (6.0, 19.2) | 0.6 (0.1, 3.6) | 66.5 (57.7, 74.3) | 0.0 -- | 0.0 -- | 0.5 (0.3, 0.9) | 1.7 (1.2, 2.5) |
| Non-quality Assured ACT | 1.9 (0.7, 4.8) | 0.0 -- | 10.4 (1.9, 41.3) | 1.6 (0.4, 5.8) | 6.0 (2.0, 16.7) | 99.5 (98.3, 99.8) | 0.4 (0.1, 1.1) | 0.7 (0.1, 3.3) | 1.3 (0.8, 2.2) | 1.4 (0.9, 2.1) |
| Other ACT Classifications | | | | | | | | | | |
| Nationally Registered ACT | 74.4 (62.2, 83.6) | 83.7 (62.4, 94.1) | 52.6 (28.0, 76.0) | 77.9 (63.8, 87.5) | 38.1 (21.5, 58.0) | 99.5 (98.3, 99.8) | 5.7 (4.1, 7.9) | 16.4 (7.7, 31.7) | 8.0 (5.9, 10.8) | 15.9 (11.6, 21.3) |
| Any non-artemisinin therapy | 91.9 (80.0, 97.0) | 0.0 -- | 81.6 (64.4, 91.5) | 32.4 (18.6, 50.0) | 77.1 (65.9, 85.5) | 90.6 (84.6, 94.5) | 29.5 (23.6, 36.2) | 56.7 (33.7, 77.1) | 32.7 (27.3, 38.7) | 32.7 (27.5, 38.4) |
| Chloroquine | 0.4 (0.1, 3.0) | 0.0 -- | 5.6 (2.1, 14.1) | 0.7 (0.2, 2.9) | 2.0 (0.6, 6.1) | 3.2 (1.6, 6.2) | 23.8 (17.3, 31.9) | 41.4 (19.8, 66.9) | 23.5 (16.9, 31.6) | 20.9 (15.6, 27.4) |
| Sulfadoxine-pyrimethamine (SP) | 17.3 (13.2, 22.3) | 0.0 -- | 20.8 (9.3, 40.0) | 6.7 (3.5, 12.5) | 16.2 (5.6, 38.7) | 75.3 (67.3, 81.8) | 7.4 (5.2, 10.4) | 13.9 (6.9, 26.2) | 8.5 (6.5, 11.0) | 8.3 (6.3, 10.7) |
| Second-line treatment (Quinine) | 91.5 (80.0, 96.6) | 0.0 -- | 81.6 (64.4, 91.5) | 32.3 (18.6, 49.8) | 76.3 (65.5, 84.5) | 69.3 (63.5, 74.5) | 8.9 (6.3, 12.4) | 19.3 (5.6, 48.9) | 12.3 (8.8, 17.1) | 14.6 (11.4, 18.5) |
| Any artemisinin monotherapy | 16.8 (9.6, 27.7) | 0.0 -- | 1.8 (0.4, 7.5) | 4.5 (2.1, 9.3) | 15.9 (7.2, 31.3) | 70.0 (61.6, 77.2) | 0.2 (<0.1, 1.2) | 0.0 -- | 1.3 (0.7, 2.5) | 1.7 (1.0, 2.6) |
| Oral artemisinin monotherapy | 0.0 -- | 0.0 -- | 0.0 -- | 0.0 -- | 0.2 (<0.1, 1.2) | 2.1 (1.0, 4.6) | 0.0 -- | 0.0 -- | <0.1 (<0.1, 0.1) | <0.1 (<0.1, 0.1) |
| Non oral artemisinin monotherapy | 16.8 (9.6, 27.7) | 0.0 -- | 1.8 (0.4, 7.5) | 4.5 (2.1, 9.3) | 15.9 (7.2, 31.3) | 69.5 (60.6, 77.1) | 0.2 (<0.1, 1.2) | 0.0 -- | 1.3 (0.7, 2.4) | 1.6 (1.0, 2.6) |

Source: ACTwatch Outlet Survey, Benin, 2011.

Table A.2: Availability of antimalarials among outlets stocking at least one antimalarial, by outlet type

| | Public Health Facility | Community Health Worker | Private not for profit HF | TOTAL Public / Not for profit | Private for profit HF | Pharmacy | General retailer | Itinerant drug vendor | TOTAL Private | TOTAL Outlets |
|---|------------------------|-------------------------|---------------------------|-------------------------------|-----------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|
| | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) |
| Proportion of outlets that had: | N=198 | N=50 | N=75 | N=323 | N=146 | N=193 | N=1,971 | N=99 | N=2,409 | N=2,732 |
| Antimalarials in stock at the time of survey visit | 93.7 (80.1, 98.2) | 83.7 (62.4, 94.1) | 86.2 (70.0, 94.4) | 86.5 (72.6, 94.0) | 82.1 (67.9, 90.8) | 100.0 -- | 30.6 (24.6, 37.3) | 57.0 (34.0, 77.3) | 34.0 (28.5, 40.0) | 39.9 (33.0, 47.3) |
| Among outlets with an antimalarial in stock, proportion of outlets that had: | N=189 | N=42 | N=62 | N=293 | N=127 | N=193 | N=537 | N=57 | N=914 | N=1,207 |
| Any ACT | 79.5 (66.9, 88.1) | 100.0 -- | 61.7 (34.8, 82.9) | 90.1 (80.6, 95.2) | 48.7 (25.7, 72.4) | 99.5 (98.3, 99.8) | 18.6 (14.2, 24.0) | 28.8 (17.5, 43.6) | 23.7 (17.9, 30.8) | 40.0 (33.0, 47.4) |
| Quality Assured ACT (QAACT) | 79.4 (66.8, 88.1) | 100.0 -- | 49.6 (24.8, 74.6) | 88.8 (78.5, 94.5) | 44.9 (21.0, 71.3) | 90.7 (83.8, 94.8) | 18.4 (14.0, 23.8) | 28.8 (17.5, 43.6) | 23.1 (17.3, 30.0) | 39.1 (31.8, 47.1) |
| First-line (FAACT) | 69.3 (53.9, 81.3) | 100.0 -- | 49.6 (24.8, 74.6) | 86.0 (75.6, 92.4) | 44.1 (20.0, 71.3) | 89.1 (81.9, 93.7) | 18.4 (14.0, 23.8) | 28.8 (17.5, 43.6) | 22.9 (17.2, 29.9) | 38.4 (31.0, 46.3) |
| Non first-line (NAACT) | 46.1 (32.1, 60.8) | 0.0 -- | 0.0 -- | 12.6 (7.2, 21.4) | 0.8 (0.1, 4.1) | 66.5 (57.7, 74.3) | 0.0 -- | 0.0 -- | 1.6 (0.8, 3.0) | 4.3 (3.0, 6.0) |
| Non-quality Assured ACT | 2.0 (0.8, 5.0) | 0.0 -- | 12.0 (2.2, 45.4) | 1.9 (0.5, 6.6) | 7.3 (2.6, 18.9) | 99.5 (98.3, 99.8) | 1.2 (0.4, 3.2) | 1.2 (0.2, 5.7) | 4.0 (2.3, 6.8) | 3.4 (2.0, 5.8) |
| Other ACT Classifications | | | | | | | | | | |
| Nationally Registered ACT | 79.4 (66.8, 88.1) | 100.0 -- | 61.0 (34.0, 82.6) | 90.0 (80.4, 95.2) | 46.5 (22.8, 71.9) | 99.5 (98.3, 99.8) | 18.6 (14.2, 24.0) | 28.8 (17.5, 43.6) | 23.5 (17.7, 30.5) | 39.8 (32.7, 47.4) |
| Any non-artemisinin therapy | 98.1 (94.0, 99.4) | 0.0 -- | 94.6 (72.4, 99.1) | 37.4 (21.7, 56.2) | 94.0 (76.5, 98.7) | 90.6 (84.6, 94.5) | 96.6 (92.3, 98.5) | 99.6 (96.8, 99.9) | 96.4 (93.0, 98.2) | 82.0 (69.3, 90.2) |
| Chloroquine | 0.5 (0.1, 3.2) | 0.0 -- | 6.5 (2.4, 16.9) | 0.9 (0.2, 3.3) | 2.4 (0.8, 7.0) | 3.2 (1.6, 6.2) | 78.1 (66.1, 86.7) | 72.7 (40.6, 91.2) | 69.3 (55.0, 80.6) | 52.5 (43.9, 60.9) |
| Sulfadoxine-pyrimethamine (SP) | 18.4 (14.2, 23.5) | 0.0 -- | 24.1 (9.7, 48.3) | 7.7 (4.0, 14.3) | 19.8 (7.3, 43.7) | 75.3 (67.3, 81.8) | 24.3 (17.8, 32.1) | 24.5 (16.5, 34.7) | 25.0 (19.6, 31.4) | 20.8 (15.3, 27.6) |
| Second-line treatment (Quinine) | 97.7 (93.8, 99.1) | 0.0 -- | 94.6 (72.4, 99.1) | 37.3 (21.7, 56.0) | 92.9 (77.0, 98.1) | 69.3 (63.5, 74.5) | 29.2 (19.2, 41.9) | 33.9 (8.5, 73.9) | 36.3 (23.8, 50.9) | 36.5 (25.8, 48.8) |

Continued on following page

Table A.2: Availability of antimalarials among outlets stocking at least one antimalarial, by outlet type

| | Public Health Facility | Community Health Worker | Private not for profit HF | TOTAL Public / Not for profit | Private for profit HF | Pharmacy | General retailer | Itinerant drug vendor | TOTAL Private | TOTAL Outlets |
|---|------------------------|-------------------------|---------------------------|-------------------------------|-----------------------|----------------------|-------------------|-----------------------|--------------------|--------------------|
| | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) |
| Among outlets with an antimalarial in stock, proportion of outlets that had: | N=189 | N=42 | N=62 | N=293 | N=127 | N=193 | N=537 | N=57 | N=914 | N=1,207 |
| Any artemisinin monotherapy | 17.9 (10.6, 28.8) | 0.0 -- | 2.1 (0.5, 8.7) | 5.2 (2.4, 10.7) | 19.4 (7.9, 40.3) | 70.0 (61.6, 77.2) | 0.6 (0.1, 3.7) | 0.0 -- | 3.8 (2.0, 7.1) | 4.1 (2.5, 6.6) |
| Oral artemisinin monotherapy | 0.0 -- | 0.0 -- | 0.0 -- | 0.0 -- | 0.3 (<0.1, 1.5) | 2.1 (1.0, 4.6) | 0.0 -- | 0.0 -- | 0.1 (<0.1, 0.2) | 0.1 (<0.1, 0.1) |
| Non oral artemisinin monotherapy | 17.9 (10.6, 28.8) | 0.0 -- | 2.1 (0.5, 8.7) | 5.2 (2.4, 10.7) | 19.4 (7.9, 40.3) | 69.5 (60.6, 77.1) | 0.6 (0.1, 3.7) | 0.0 -- | 3.8 (2.0, 7.0) | 4.1 (2.5, 6.6) |

Source: ACTwatch Outlet Survey, Benin, 2011.

Table A.2b: Availability of QAACTs with the AMFm logo, by outlet type

| | Public Health Facility | Community Health Worker | Private not for profit HF | TOTAL Public / Not for profit | Private for profit HF | Pharmacy | General retailer | Itinerant drug vendor | TOTAL Private | TOTAL Outlets |
|---|------------------------|-------------------------|---------------------------|-------------------------------|-----------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|
| | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) |
| Among outlets with an antimalarial in stock, proportion of outlets that had: | N=189 | N=42 | N=62 | N=293 | N=127 | N=193 | N=537 | N=57 | N=914 | N=1,207 |
| Quality Assured ACT (QAACT) | 79.4 (66.8, 88.1) | 100.0 -- | 49.6 (24.8, 74.6) | 88.8 (78.5, 94.5) | 44.9 (21.0, 71.3) | 90.7 (83.8, 94.8) | 18.4 (14.0, 23.8) | 28.8 (17.5, 43.6) | 23.1 (17.3, 30.0) | 39.1 (31.8, 47.1) |
| QAACT with AMFm Logo ⁷ | 0.3 (0.1, 1.8) | 0.0 -- | 8.2 (3.6, 17.6) | 1.0 (0.3, 3.4) | 1.2 (0.5, 3.3) | 0.5 (0.1, 4.6) | 2.0 (0.9, 4.5) | 10.9 (2.8, 34.4) | 2.4 (1.2, 4.7) | 2.1 (1.0, 4.2) |
| Among outlets with QAACT in stock, proportion of outlets that had: | N=145 | N=42 | N=28 | N=215 | N=38 | N=169 | N=108 | N=17 | N=331 | N=546 |
| QAACT with AMFm Logo | 0.4 (0.1, 2.2) | 0.0 -- | 16.5 (5.4, 40.7) | 1.1 (0.3, 4.1) | 2.7 (0.6, 11.5) | 0.6 (0.1, 5.0) | 10.7 (4.6, 23.0) | 37.9 (6.6, 84.0) | 10.4 (5.0, 20.5) | 5.3 (2.2, 12.1) |

Source: ACTwatch Outlet Survey, Benin, 2011.

⁷ In 2010, Nigeria (Benin's eastern neighbour) signed a Global Fund grant for the AMFm Phase 1. The AMFm initiative in Nigeria officially launched on the 31st March 2011 and by the 28th April, 7.6 million co-paid ACT treatments had been delivered to the country.

Table A.3: Disruption in stock, expiry and storage conditions of antimalarials, by outlet type

| | Public Health Facility | Community Health Worker | Private not for profit HF | TOTAL Public / Not for profit | Private for profit HF | Pharmacy | General retailer | Itinerant drug vendor | TOTAL Private | TOTAL Outlets |
|---|------------------------|-------------------------|---------------------------|-------------------------------|-----------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|
| | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) |
| Proportion of outlets that had: | N=193 | N=49 | N=66 | N=308 | N=135 | N=193 | N=688 | N=63 | N=1,079 | N=1,387 |
| No disruption in stock in the past 3 months | 35.3 (26.6, 44.9) | 45.4 (36.9, 54.3) | 36.8 (13.9, 67.9) | 42.0 (36.0, 48.3) | 26.1 (11.2, 49.7) | 30.0 (24.8, 35.8) | 39.9 (31.8, 48.7) | 51.9 (21.5, 81.0) | 39.2 (31.3, 47.7) | 39.9 (33.2, 46.9) |
| | N=172 | N=49 | N=40 | N=261 | N=74 | N=175 | N=183 | N=28 | N=460 | N=721 |
| No disruption in stock of first-line quality assured ACT (FAACT) in the past 3 months, among outlets that have stocked FAACT in the past 3 months | 44.4 (32.9, 56.5) | 45.4 (36.9, 54.3) | 52.2 (21.6, 81.2) | 45.7 (40.4, 51.0) | 15.1 (3.8, 44.8) | 81.7 (77.2, 85.4) | 25.8 (14.1, 42.3) | 61.9 (36.6, 82.1) | 29.0 (15.6, 47.4) | 36.8 (28.5, 46.0) |
| | N=50 | N=0 | N=35 | N=85 | N=67 | N=151 | N=253 | N=31 | N=502 | N=587 |
| No disruption in stock of SP in the past 3 months, among outlets that have stocked SP in the past 3 months | 63.5 (51.2, 74.3) | -- | 51.8 (23.1, 79.4) | 59.0 (41.1, 74.7) | 49.2 (26.9, 71.8) | 80.5 (72.5, 86.7) | 41.5 (28.9, 55.5) | 47.9 (20.9, 76.2) | 44.5 (33.0, 56.6) | 45.8 (34.7, 57.4) |
| | N=189 | N=42 | N=62 | N=293 | N=127 | N=193 | N=537 | N=57 | N=914 | N=1,207 |
| Expired stock of any antimalarial ⁸ | 8.3 (3.2, 19.9) | 0.0 -- | 1.6 (0.3, 7.1) | 2.4 (0.7, 7.4) | 0.3 (0.1, 1.6) | 5.9 (3.4, 10.2) | 0.7 (0.2, 3.0) | 0.0 -- | 0.7 (0.2, 2.4) | 1.2 (0.5, 2.6) |
| | N=131 | N=42 | N=28 | N=201 | N=37 | N=172 | N=108 | N=17 | N=334 | N=535 |
| Expired stock of first-line quality assured ACT (FAACT) | 1.5 (0.3, 8.4) | 0.0 -- | 0.0 -- | 0.3 (<0.1, 2.6) | 0.0 -- | 0.0 -- | 0.0 -- | 0.0 -- | 0.0 -- | 0.2 (<0.1, 1.4) |
| | N=193 | N=49 | N=66 | N=308 | N=135 | N=193 | N=688 | N=63 | N=1,079 | N=1,387 |
| Acceptable storage conditions for medicines ⁹ | 99.0 (95.9, 99.8) | 100.0 -- | 100.0 -- | 99.7 (98.8, 99.9) | 98.9 (96.5, 99.7) | 99.0 (97.1, 99.6) | 84.7 (75.0, 91.0) | 35.5 (17.3, 59.2) | 83.3 (74.3, 89.5) | 86.9 (78.2, 92.4) |

Source: ACTwatch Outlet Survey, Benin, 2011.

⁸ Information on expired stock was missing for 13% of cases [n=1,056]. Missing values were particularly common for pharmacies (21%, n=152) and private not-for-profit facilities (21%, n=49).

⁹ Information on acceptable storage condition was unavailable or missing for 6% of cases [n=1,312]. Missing values were particularly common for private-for-profit facilities (26%, n=100) and private not-for-profit facilities (24%, n=50).

| | Public Health Facility | Community Health Worker | Private not for profit HF | TOTAL Public / Not for profit | Private for profit HF | Pharmacy | General retailer | Itinerant drug vendor | TOTAL Private | TOTAL Outlets |
|---|--|---------------------------------------|--|--|--|---|--|---------------------------------------|--|--|
| | % | % | % | % | % | % | % | % | % | % |
| Proportion of first-line quality assured ACT distributed free of cost (by volumes of AETDs) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Median price of a tablet AETD:¹¹ | Median [IQR] (N of Antimalarials) | Median [IQR] (N of Antimalarials) | Median [IQR] (N of Antimalarials) | Median [IQR] (N of Antimalarials) | Median [IQR] (N of Antimalarials) | Median [IQR] (N of Antimalarials) | Median [IQR] (N of Antimalarials) | Median [IQR] (N of Antimalarials) | Median [IQR] (N of Antimalarials) | Median [IQR] (N of Antimalarials) |
| Any ACT | \$1.35 [1.35-1.80] ⁽⁴¹²⁾ | \$1.35 [1.35-1.35] ⁽⁵³⁾ | \$2.25 [1.35-3.37] ⁽⁶⁴⁾ | \$1.35 [1.35-1.35] ⁽⁵²⁹⁾ | \$1.35 [1.35-3.59] ⁽⁸⁹⁾ | \$8.86 [7.87-10.03] ^(3,145) | \$2.25 [1.57-2.70] ⁽¹⁸⁶⁾ | \$2.47 [2.25-3.59] ⁽²⁹⁾ | \$5.89 [2.25-8.86] ^(3,449) | \$2.25 [1.35-7.87] ^(3,978) |
| Quality Assured ACT (QAACT) | \$1.35 [1.35-1.80] ⁽⁴¹⁰⁾ | \$1.35 [1.35-1.35] ⁽⁵³⁾ | \$1.80 [1.35-2.70] ⁽⁶⁰⁾ | \$1.35 [1.35-1.35] ⁽⁵²³⁾ | \$1.35 [1.35-2.70] ⁽⁶⁷⁾ | \$9.18 [8.74-12.49] ⁽⁵³⁰⁾ | \$2.25 [1.57-2.70] ⁽¹⁸³⁾ | \$2.47 [2.25-3.59] ⁽²⁹⁾ | \$2.25 [1.57-3.59] ⁽⁸⁰⁹⁾ | \$1.35 [1.35-2.70] ^(1,332) |
| First-line (FAACT) | \$1.35 [1.35-1.35] ⁽³¹¹⁾ | \$1.35 [1.35-1.35] ⁽⁵³⁾ | \$1.80 [1.35-2.70] ⁽⁶⁰⁾ | \$1.35 [1.35-1.35] ⁽⁴²⁴⁾ | \$1.35 [1.35-2.70] ⁽⁶⁶⁾ | \$9.18 [3.93-9.18] ⁽²⁸⁵⁾ | \$2.25 [1.57-2.70] ⁽¹⁸³⁾ | \$2.47 [2.25-3.59] ⁽²⁹⁾ | \$2.25 [1.50-3.14] ⁽⁵⁶³⁾ | \$1.35 [1.35-2.25] ⁽⁹⁸⁷⁾ |
| Non first-line (NAACT) | \$2.70 [1.80-2.70] ⁽⁹⁹⁾ | \$ [-] ⁽⁰⁾ | \$ [-] ⁽⁰⁾ | \$2.70 [1.80-2.70] ⁽⁹⁹⁾ | \$3.59 [n/a] ⁽¹⁾ | \$12.49 [8.74-21.92] ⁽²⁴⁵⁾ | \$ [-] ⁽⁰⁾ | \$ [-] ⁽⁰⁾ | \$12.49 [8.74-21.92] ⁽²⁴⁶⁾ | \$2.70 [1.80-8.74] ⁽³⁴⁵⁾ |
| Non-quality Assured ACT | \$2.70 [2.70-2.70] ⁽²⁾ | \$ [-] ⁽⁰⁾ | \$8.65 [8.65-8.65] ⁽⁴⁾ | \$8.65 [8.09-8.65] ⁽⁶⁾ | \$7.87 [5.91-8.85] ⁽²²⁾ | \$8.66 [7.87-9.70] ^(2,615) | \$5.39 [3.82-5.39] ⁽³⁾ | \$ [-] ⁽⁰⁾ | \$8.66 [7.87-9.70] ^(2,640) | \$8.66 [7.87-9.70] ^(2,646) |
| Other ACT Classifications | | | | | | | | | | |
| Nationally Registered ACT | \$1.35 [1.35-1.80] ⁽⁴¹⁰⁾ | \$1.35 [1.35-1.35] ⁽⁵³⁾ | \$2.25 [1.35-3.37] ⁽⁶³⁾ | \$1.35 [1.35-1.35] ⁽⁵²⁶⁾ | \$1.35 [1.35-3.37] ⁽⁸¹⁾ | \$8.92 [8.13-10.49] ^(2,680) | \$2.25 [1.57-2.70] ⁽¹⁸⁵⁾ | \$2.47 [2.25-3.59] ⁽²⁹⁾ | \$4.49 [2.25-8.86] ^(2,975) | \$2.25 [1.35-6.95] ^(3,501) |
| Any non-artemisinin therapy | \$4.25 [3.77-4.72] ⁽²⁹⁹⁾ | \$ [-] ⁽⁰⁾ | \$4.25 [3.15-5.66] ⁽¹¹⁷⁾ | \$4.25 [3.77-4.72] ⁽⁴¹⁶⁾ | \$3.93 [2.83-7.08] ⁽²⁰⁷⁾ | \$2.30 [1.10-12.26] ⁽⁵⁷²⁾ | \$0.56 [0.51-1.12] ⁽⁸⁸⁴⁾ | \$0.56 [0.54-3.77] ⁽⁹⁴⁾ | \$0.68 [0.54-2.83] ^(1,757) | \$0.68 [0.54-3.77] ^(2,173) |
| Chloroquine | \$0.41 [n/a] ⁽¹⁾ | \$ [-] ⁽⁰⁾ | \$0.68 [0.54-0.82] ⁽⁶⁾ | \$0.54 [0.41-0.82] ⁽⁷⁾ | \$0.82 [0.54-1.09] ⁽⁴⁾ | \$1.01 [n/a] ⁽²⁾ | \$0.54 [0.54-0.68] ⁽⁴⁰⁶⁾ | \$0.54 [0.54-0.54] ⁽²¹⁾ | \$0.54 [0.54-0.68] ⁽⁴³³⁾ | \$0.54 [0.54-0.68] ⁽⁴⁴⁰⁾ |
| Sulfadoxine-pyrimethamine (SP), the most popular antimalarial ¹² | \$0.00 [0.00-0.00] ⁽³³⁾ | \$ [-] ⁽⁰⁾ | \$0.45 [0.45-0.67] ⁽²⁵⁾ | \$0.00 [0.00-0.45] ⁽⁵⁸⁾ | \$0.67 [0.45-0.90] ⁽⁵²⁾ | \$1.10 [1.04-2.30] ⁽³⁰³⁾ | \$0.45 [0.34-0.56] ⁽¹⁹⁰⁾ | \$0.56 [0.45-0.67] ⁽¹⁷⁾ | \$0.45 [0.45-0.67] ⁽⁵⁶²⁾ | \$0.45 [0.36-0.67] ⁽⁶²⁰⁾ |
| Second-line treatment (Quinine) | \$4.25 [3.82-4.72] ⁽²⁶⁵⁾ | \$ [-] ⁽⁰⁾ | \$4.72 [4.04-5.66] ⁽⁸⁶⁾ | \$4.25 [3.82-4.91] ⁽³⁵¹⁾ | \$4.72 [2.83-7.08] ⁽¹⁵⁰⁾ | \$16.03 [6.27-28.83] ⁽²²⁹⁾ | \$4.72 [3.77-4.72] ⁽²⁷⁹⁾ | \$4.72 [3.77-7.08] ⁽⁵⁶⁾ | \$4.72 [3.77-5.66] ⁽⁷¹⁴⁾ | \$4.72 [3.77-5.66] ^(1,065) |
| Any artemisinin monotherapy | | | | | | | | | | |
| Oral artemisinin monotherapy | \$ [-] ⁽⁰⁾ | \$ [-] ⁽⁰⁾ | \$ [-] ⁽⁰⁾ | \$ [-] ⁽⁰⁾ | \$6.16 [n/a] ⁽¹⁾ | \$9.93 [8.42-11.85] ⁽⁴⁾ | \$ [-] ⁽⁰⁾ | \$ [-] ⁽⁰⁾ | \$8.30 [6.16-11.32] ⁽⁵⁾ | \$8.30 [6.16-11.32] ⁽⁵⁾ |

Source: ACTwatch Outlet Survey, Benin, 2011.

¹⁰ The US\$ conversion in this table is equivalent to the interbank rate for the period of data collection. In the AMFm approach the 2011 prices are adjusted to 2010 (to be in line with the baseline year for the pilot) using the ratio of the average national consumer price index for 2011 to the national average consumer price index for 2010 (IMF, International Financial Statistics). The adjusted 2010 prices are then converted to their US\$ equivalent using the average interbank rate for 2010(USD=LCU 486.42, source www.oanda.com). With this approach the price of QAACTs in the total private is 2.00[1.40,3.20]

¹¹ A total of 8,704 antimalarials were found in 1,209 outlets. Of these, 6,159 antimalarials are included in the pricing analysis; price indicators are based on tablet-formulation AETDs. Free antimalarials were found in 3.2% of outlets with antimalarials, and 45 of the 8,592 antimalarials for which price information was recorded were available for free.

¹² Sulfadoxine-pyrimethamine was the most popular non-ACT antimalarial by volume sold/distributed in the past week.

Table A.5: Affordability of antimalarials, by outlet type

| | Public Health Facility | Community Health Worker | Private not for profit HF | TOTAL Public / Not for profit | Private for profit HF | Pharmacy | General retailer | Itinerant drug vendor | TOTAL Private | TOTAL Outlets |
|---|------------------------|-------------------------|---------------------------|-------------------------------|-----------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|
| Median price of a tablet AETD relative to SP, the 'most popular' antimalarial treatment in Benin: | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio |
| Any ACT | *** | -- | 5.0 | *** | 2.0 | 8.1 | 5.0 | 4.4 | 13.3 | 5.0 |
| First-line quality assured ACT (FAACT) | *** | -- | 4.0 | *** | 2.0 | 8.3 | 5.0 | 4.4 | 5.0 | 3.0 |
| Median price of a tablet AETD relative to CQ: | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio |
| Any ACT | -- | -- | 3.3 | 2.5 | 1.6 | 8.8 | 4.2 | 4.6 | 11.1 | 4.2 |
| First-line quality assured ACT (FAACT) | -- | -- | 2.6 | 2.5 | 1.6 | 9.1 | 4.2 | 4.6 | 4.2 | 2.5 |
| Median price of a tablet AETD relative to the minimum legal daily wage (\$2.22)¹³: | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio |
| Any ACT | 0.6 | 0.6 | 1.0 | 0.6 | 0.6 | 4.0 | 1.0 | 1.1 | 2.7 | 1.0 |
| First-line quality assured ACT (FAACT) | 0.6 | 0.6 | 0.8 | 0.6 | 0.6 | 4.1 | 1.0 | 1.1 | 1.0 | 0.6 |
| | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio | Ratio |
| Median price of a first-line quality assured tablet AETD relative to the international reference price (\$1.42) ¹⁴ | 1.0 | 1.0 | 1.3 | 1.0 | 1.0 | 6.5 | 1.6 | 1.7 | 1.6 | 1.0 |
| | % | % | % | % | % | % | % | % | % | % |
| Proportion of outlets that: | -- | N=49 | N=66 | N=115 | N=135 | N=193 | N=688 | N=63 | N=1,079 | N=1,194 |
| Offer credit to consumers for antimalarials ¹⁵ | | 9.9 (2.8, 29.6) | 43.3 (19.0, 71.3) | 14.4 (5.4, 32.9) | 56.9 (37.7, 74.2) | 31.8 (26.9, 37.0) | 39.1 (29.7, 49.5) | 49.3 (31.4, 67.4) | 41.1 (31.5, 51.4) | 36.2 (28.5, 44.7) |

Source: ACTwatch Outlet Survey, Benin, 2011.

¹³ Minimum daily wage information taken from United States Department of State, 2010. *Country Reports on Human Rights Practices*. Available at: <http://www.state.gov/g/drl/rls/hrrpt/2010/index.htm>

¹⁴ International reference price taken from Management Sciences for Health, 2010. *International drug price indicator guide*. Available at: http://erc.msh.org/dmguide/pdf/DrugPriceGuide_2010_en.pdf. \$1.42 is the median listed supplier price for 24 tablets of AL 20mg/120mg.

¹⁵ This question was not asked in Public Health Facilities. Information on outlets that offer credit to consumers for antimalarials was missing for 3% of cases [n=1,163]. Missing values were particularly common for general retailers (4%, n=660).

Table A.6: Availability of diagnostic tests and cost to patients, by outlet type

| | Public Health Facility | Community Health Worker | Private not for profit HF | TOTAL Public / Not for profit | Private for profit HF | Pharmacy | General retailer | Itinerant drug vendor | TOTAL Private | TOTAL Outlets |
|--|---------------------------------------|-------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|--------------------------------------|-------------------------------------|-------------------------------------|---------------------------------------|---------------------------------------|
| | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) |
| Proportion of outlets that had:¹⁶ | N=193 | N=49 | N=66 | N=308 | N=135 | N=193 | N=688 | N=63 | N=1,079 | N=1,387 |
| Any diagnostic test | 38.9 (27.4, 51.8) | 0.0 -- | 36.7 (18.1, 60.4) | 12.8 (8.2, 19.6) | 33.6 (24.0, 44.8) | 2.1 (0.7, 6.2) | 0.0 -- | 0.0 -- | 3.0 (1.4, 6.2) | 5.3 (3.4, 8.0) |
| Microscopic blood tests | 7.2 (4.4, 11.7) | 0.0 -- | 12.6 (4.9, 28.7) | 3.1 (1.5, 6.4) | 22.5 (14.4, 33.4) | 0.0 -- | 0.0 -- | 0.0 -- | 1.9 (0.8, 4.6) | 2.2 (1.1, 4.4) |
| Rapid diagnostic tests | 36.1 (24.7, 49.3) | 0.0 -- | 21.8 (5.5, 57.2) | 10.9 (7.2, 16.1) | 12.3 (3.0, 39.0) | 2.1 (0.7, 6.1) | 0.0 -- | 0.0 -- | 1.1 (0.3, 4.4) | 3.4 (1.9, 5.9) |
| Proportion of outlets that provided diagnostic tests for free, among outlets providing diagnostic tests | N=76 | N=0 | N=21 | N=97 | N=41 | N=4 | N=0 | N=0 | N=45 | N=142 |
| Any diagnostic test | 95.0 (84.8, 98.5) | | 47.1 (8.6, 89.4) | 84.1 (63.0, 94.3) | 16.2 (3.5, 50.8) | 20.0 (3.4, 64.1) | -- | -- | 16.3 (3.4, 52.2) | 56.0 (32.2, 77.3) |
| | N=19 | N=0 | N=15 | N=34 | N=31 | N=0 | N=0 | N=0 | N=31 | N=65 |
| Microscopic blood tests | 0.0 -- | | 0.0 -- | 0.0 -- | 0.0 -- | -- | -- | -- | 0.0 -- | 0.0 -- |
| | N=65 | N=0 | N=7 | N=72 | N=15 | N=4 | N=0 | N=0 | N=19 | N=91 |
| Rapid diagnostic tests | 100.0 -- | | 74.1 (22.0, 96.7) | 95.7 (82.8, 99.1) | 44.1 (33.1, 55.7) | 20.0 (3.4, 64.1) | -- | -- | 42.9 (30.7, 56.1) | 83.4 (65.0, 93.1) |
| Median price of: | Median US\$ [IQR] ^(N) | Median US\$ [IQR] ^(N) | Median US\$ [IQR] ^(N) | Median US\$ [IQR] ^(N) | Median US\$ [IQR] ^(N) | Median US\$ [IQR] ^(N) | Median US\$ [IQR] ^(N) | Median US\$ [IQR] ^(N) | Median US\$ [IQR] ^(N) | Median US\$ [IQR] ^(N) |
| Microscopic blood tests | \$2.25 [1.12-3.37] ⁽¹²⁾ | -- ⁽⁰⁾ | \$2.25 [2.25-3.37] ⁽¹²⁾ | \$2.25 [1.80-3.37] ⁽²⁴⁾ | \$4.49 [2.92-4.49] ⁽²⁷⁾ | -- ⁽⁰⁾ | -- ⁽⁰⁾ | -- ⁽⁰⁾ | \$4.49 [2.92-4.49] ⁽²⁷⁾ | \$3.37 [2.25-4.49] ⁽⁵¹⁾ |
| Rapid diagnostic tests | \$0.00 [0.00-0.00] ⁽⁷⁰⁾ | -- ⁽⁰⁾ | \$0.00 [0.00-1.80] ⁽⁹⁾ | \$0.00 [0.00-0.00] ⁽⁷⁹⁾ | \$2.70 [0.00-3.37] ⁽¹¹⁾ | \$3.23 [2.25-3.26] ⁽⁵⁾ | -- ⁽⁰⁾ | -- ⁽⁰⁾ | \$2.70 [0.00-3.37] ⁽¹⁶⁾ | \$0.00 [0.00-0.00] ⁽⁹⁵⁾ |

Source: ACTwatch Outlet Survey, Benin, 2011.

¹⁶ Information on proportion of outlets that had diagnostic tests was missing for 3% of cases [n=1,355].

Table A.7: Provider knowledge, by outlet type

| | Public Health Facility | Community Health Worker | Private not for profit HF | TOTAL Public / Not for profit | Private for profit HF | Pharmacy | General retailer | Itinerant drug vendor | TOTAL Private | TOTAL Outlets |
|--|------------------------|-------------------------|---------------------------|-------------------------------|-----------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|
| | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) |
| Proportion of providers that: | N=193 | N=49 | N=66 | N=308 | N=135 | N=193 | N=688 | N=63 | N=1,079 | N=1,387 |
| Correctly state the recommended first-line treatment for uncomplicated malaria ¹⁷ | 93.8 (88.0, 96.9) | 96.2 (83.8, 99.2) | 71.6 (34.5, 92.3) | 93.1 (84.3, 97.1) | 83.6 (66.6, 92.9) | 89.1 (84.9, 92.2) | 39.1 (30.2, 48.8) | 55.8 (28.7, 79.9) | 44.7 (36.4, 53.3) | 55.7 (45.6, 65.4) |
| Correctly state the dosing regimen of the first-line treatment for an adult | 88.0 (77.1, 94.1) | 54.8 (35.2, 73.0) | 53.3 (23.3, 81.1) | 63.1 (47.8, 76.1) | 77.2 (54.9, 90.4) | 84.4 (80.2, 87.8) | 22.8 (18.4, 27.9) | 42.0 (25.1, 60.9) | 29.5 (23.1, 36.8) | 37.2 (30.6, 44.2) |
| Correctly state the dosing regimen of the first-line treatment for a two-year old | 72.6 (62.0, 81.2) | 89.6 (65.9, 97.4) | 42.8 (20.6, 68.4) | 80.6 (63.2, 90.9) | 65.4 (41.4, 83.5) | 74.0 (68.3, 78.9) | 23.7 (16.4, 33.1) | 33.7 (19.4, 51.8) | 28.7 (21.1, 37.7) | 40.5 (29.7, 52.3) |
| | -- | N=49 | N=66 | N=115 | N=135 | N=193 | N=688 | N=63 | N=1,079 | N=1,194 |
| Can list at least one health danger sign in a child that requires referral to a public health facility ¹⁸ : | -- | 89.4 (69.8, 96.9) | 40.1 (19.0, 65.7) | 82.8 (63.4, 93.0) | 56.9 (45.4, 67.7) | 74.6 (69.3, 79.2) | 62.5 (52.6, 71.5) | 70.6 (55.2, 82.3) | 62.7 (53.3, 71.2) | 66.4 (56.5, 74.9) |
| • Convulsions | -- | 57.4 (30.6, 80.4) | 28.6 (11.7, 54.7) | 53.5 (29.1, 76.4) | 33.1 (20.8, 48.3) | 32.4 (24.8, 41.1) | 11.2 (5.8, 20.3) | 5.3 (1.4, 17.8) | 13.1 (7.5, 22.0) | 20.5 (11.6, 33.7) |
| • Vomiting | -- | 63.6 (47.2, 77.3) | 24.5 (8.1, 54.6) | 58.4 (42.8, 72.4) | 24.6 (10.5, 47.4) | 53.0 (47.1, 58.8) | 48.0 (39.3, 56.8) | 60.6 (46.6, 73.0) | 46.7 (38.1, 55.6) | 48.9 (39.8, 57.9) |
| • Unable to drink / breastfeed | -- | 20.0 (11.4, 32.6) | 4.8 (1.3, 15.8) | 17.9 (10.7, 28.6) | 8.7 (3.3, 20.8) | 20.5 (14.5, 28.4) | 15.6 (10.1, 23.2) | 22.1 (13.5, 34.1) | 15.4 (10.0, 22.9) | 15.9 (10.6, 23.0) |
| • Excessive sleep / difficult to wake up | -- | 8.3 (4.1, 16.1) | 0.7 (0.2, 2.9) | 7.3 (3.4, 14.8) | 4.5 (1.4, 13.4) | 10.8 (6.2, 18.2) | 5.9 (2.8, 12.1) | 1.2 (0.1, 8.7) | 5.6 (2.8, 10.9) | 5.9 (3.4, 10.1) |
| • Unconscious / coma | -- | 19.4 (7.2, 42.8) | 21.6 (5.6, 56.3) | 19.7 (8.8, 38.4) | 25.6 (16.2, 37.9) | 16.8 (12.1, 22.7) | 11.3 (6.3, 19.7) | 6.5 (1.0, 33.2) | 12.4 (7.1, 20.7) | 13.7 (8.8, 20.8) |

Source: ACTwatch Outlet Survey, Benin, 2011.

¹⁷ Information on proportion of providers that correctly state the recommended first-line treatment for uncomplicated malaria was missing for 1% of cases [n=1,375].

¹⁸ This question was not asked in Public Health Facilities. Information on proportion of providers that correctly state at least one health danger sign was missing for 3% of cases [n=1,156]. Providers could state multiple responses and totals may sum to more than 100%.

Table A.8: Provider perceptions, by outlet type

| | Public Health Facility | Community Health Worker | Private not for profit HF | TOTAL Public / Not for profit | Private for profit HF | Pharmacy | General retailer | Itinerant drug vendor | TOTAL Private | TOTAL Outlets |
|--|------------------------|-------------------------|---------------------------|-------------------------------|-----------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|
| | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) |
| Proportion of providers that: | N=193 | N=49 | N=66 | N=308 | N=135 | N=193 | N=688 | N=63 | N=1,079 | N=1,387 |
| Agree with the statement, "Customers often request an antimalarial by name." ¹⁹ | 47.4 (34.6, 60.6) | 71.4 (49.6, 86.4) | 58.8 (31.6, 81.5) | 63.8 (47.7, 77.4) | 73.4 (47.9, 89.3) | 77.6 (66.9, 85.6) | 91.0 (83.4, 95.3) | 93.4 (83.7, 97.5) | 89.4 (83.7, 93.3) | 83.8 (78.2, 88.2) |
| Agree with the statement, "I generally decide which antimalarial medicine customers receive." | 53.3 (40.0, 66.1) | 83.5 (78.6, 87.4) | 98.0 (91.8, 99.5) | 77.4 (71.4, 82.4) | 99.5 (97.3, 99.9) | 72.8 (66.2, 78.5) | 50.3 (38.1, 62.5) | 67.5 (51.9, 80.0) | 55.8 (44.5, 66.5) | 60.7 (51.1, 69.6) |
| Report that an ACT is the most effective antimalarial medicine for an adult ²⁰ | 90.4 (85.5, 93.8) | 81.0 (58.2, 92.9) | 56.2 (31.1, 78.5) | 80.9 (65.8, 90.3) | 67.7 (43.6, 85.1) | 85.5 (79.8, 89.8) | 17.3 (12.7, 23.0) | 39.8 (23.0, 59.5) | 23.9 (18.1, 31.0) | 36.9 (28.7, 46.0) |
| Report that an ACT is the most effective antimalarial medicine for a child | 89.2 (85.5, 92.0) | 100.0 -- | 54.4 (30.4, 76.5) | 92.6 (85.6, 96.3) | 63.6 (49.2, 75.9) | 85.5 (80.8, 89.2) | 26.7 (19.4, 35.6) | 38.0 (21.6, 57.6) | 31.5 (23.8, 40.3) | 45.4 (34.8, 56.5) |
| Proportion of providers than state the following reasons for stocking antimalarials:²¹ | N=193 | N=49 | N=66 | N=308 | N=135 | N=193 | N=688 | N=63 | N=1,079 | N=1,387 |
| • Most profitable | 14.4 (7.2, 26.9) | 9.8 (5.1, 18.1) | 8.3 (2.1, 27.4) | 10.8 (6.0, 18.7) | 0.2 (<0.1, 1.4) | 12.5 (8.4, 18.2) | 14.8 (7.4, 27.4) | 6.4 (1.5, 23.2) | 13.1 (6.6, 24.5) | 12.6 (6.9, 21.8) |
| • Recommended by government | 53.8 (36.9, 69.8) | 64.6 (37.7, 84.6) | 27.6 (10.0, 56.7) | 58.1 (38.5, 75.4) | 30.0 (18.6, 44.5) | 18.2 (14.3, 22.9) | 4.3 (1.8, 10.3) | 0.8 (0.1, 5.8) | 6.6 (3.2, 12.9) | 18.3 (9.9, 31.3) |
| • Lowest priced | 15.4 (8.6, 26.0) | 0.9 (0.1, 7.3) | 36.6 (14.2, 66.9) | 8.2 (3.5, 18.0) | 14.1 (5.0, 34.0) | 16.7 (12.8, 21.5) | 31.6 (20.2, 45.7) | 21.9 (11.1, 38.6) | 29.3 (18.6, 42.9) | 24.5 (15.6, 36.3) |
| • Consumer demand | 32.6 (18.9, 50.1) | 10.4 (5.4, 19.3) | 18.8 (8.2, 37.5) | 16.9 (9.8, 27.4) | 45.3 (29.9, 61.8) | 77.1 (70.1, 82.9) | 78.6 (71.4, 84.4) | 73.2 (65.4, 79.7) | 75.5 (70.0, 80.3) | 62.1 (51.2, 72.0) |
| • Easily available | 9.1 (4.2, 18.5) | 16.6 (2.6, 60.3) | 3.4 (0.8, 13.3) | 13.4 (3.0, 43.6) | 19.4 (9.9, 34.5) | 14.1 (9.6, 20.1) | 17.7 (12.3, 24.8) | 19.2 (11.2, 30.8) | 17.9 (12.8, 24.3) | 16.8 (11.1, 24.8) |
| • Drug company | 1.1 (0.3, 4.1) | 4.7 (0.9, 20.6) | 3.4 (0.8, 13.3) | 3.7 (1.0, 12.8) | 1.0 (0.2, 5.3) | 3.1 (1.5, 6.6) | 1.1 (0.3, 4.1) | 0.0 -- | 1.1 (0.3, 3.5) | 1.7 (0.7, 4.0) |
| • Brand reputation | 4.7 (2.4, 9.0) | 0.0 -- | 10.5 (4.1, 24.3) | 2.2 (0.9, 5.6) | 2.7 (0.7, 9.3) | 10.4 (8.0, 13.5) | 5.4 (1.7, 15.7) | 1.1 (0.2, 5.0) | 5.0 (1.8, 13.2) | 4.4 (1.8, 10.2) |

Continued on following page

¹⁹ Information on this pair of indicators was missing for no more than 2% of cases [n=1,370, and n=1,366].

²⁰ Information on this pair of indicators was missing for no more than 1% of cases [n=1,380, and n=1,381].

²¹ Information on this indicator was missing for <1% of cases [n=1,380]. Providers could state multiple responses and totals may sum to more than 100%.

Table A.8: Provider perceptions, by outlet type

| | Public Health Facility | Community Health Worker | Private not for profit HF | TOTAL Public / Not for profit | Private for profit HF | Pharmacy | General retailer | Itinerant drug vendor | TOTAL Private | TOTAL Outlets |
|---|------------------------|-------------------------|---------------------------|-------------------------------|-----------------------|----------------------|---------------------|-----------------------|--------------------|-------------------|
| | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) | % (95% CI) |
| Proportion of providers than state the following reasons for stocking antimalarials: | N=193 | N=49 | N=66 | N=308 | N=135 | N=193 | N=688 | N=63 | N=1,079 | N=1,387 |
| • Dosage form | 2.6 (0.9, 7.5) | 0.0 -- | 3.0 (1.1, 8.0) | 1.0 (0.4, 2.6) | 3.9 (1.0, 13.8) | 3.7 (1.2, 10.5) | 0.1 (<0.1, 0.5) | 0.4 (<0.1, 3.0) | 0.5 (0.2, 1.4) | 0.6 (0.3, 1.4) |
| • Frequently prescribed | 19.8 (11.4, 32.1) | 1.6 (0.2, 11.5) | 46.0 (14.3, 81.2) | 10.7 (5.4, 20.3) | 26.6 (10.4, 53.0) | 32.8 (26.9, 39.3) | 2.0 (0.6, 6.6) | 0.0 -- | 4.5 (2.0, 9.8) | 6.0 (3.6, 9.7) |
| • Effectiveness | 5.2 (2.8, 9.6) | 0.7 (0.1, 5.7) | 12.5 (3.7, 34.9) | 3.1 (1.2, 7.9) | 13.6 (5.1, 31.2) | 6.3 (3.0, 12.6) | 2.9 (1.3, 6.3) | 12.5 (3.8, 34.0) | 4.3 (2.4, 7.8) | 4.1 (2.2, 7.3) |
| • Other reasons | 0.5 (0.1, 3.1) | 2.1 (0.3, 11.8) | 0.0 -- | 1.5 (0.3, 7.2) | 0.5 (0.1, 2.7) | 1.6 (0.4, 6.0) | <0.1 (<0.1, 0.2) | 0.4 (<0.1, 3.0) | 0.1 (<0.1, 0.6) | 0.4 (0.1, 1.7) |
| • Don't know | 0.6 (0.1, 3.9) | 0.0 -- | 5.7 (2.2, 14.2) | 0.7 (0.1, 3.7) | 2.9 (1.0, 8.5) | 3.7 (2.1, 6.3) | 2.5 (1.2, 5.4) | 1.1 (0.2, 5.0) | 2.5 (1.2, 5.1) | 2.1 (1.0, 4.6) |

Source: ACTwatch Outlet Survey, Benin, 2011.

Additional Tables

Table B.1: Market share by antimalarial category within each outlet type

| | Public Health Facility | Community Health Worker | Private not for profit HF | TOTAL Public / Not for profit | Private for profit HF | Pharmacy | General retailer | Itinerant drug vendor | TOTAL Private | TOTAL Outlets |
|--|------------------------|-------------------------|---------------------------|-------------------------------|-----------------------|-------------|------------------|-----------------------|---------------|---------------|
| Each antimalarial category as a proportion of the total volume of all antimalarials (AETDs) sold or distributed within a given outlet type in the past week: ²² | % | % | % | % | % | % | % | % | % | % |
| Any ACT | 43.2 | 100.0 | 43.4 | 49.3 | 30.2 | 78.3 | 11.7 | 33.1 | 24.3 | 34.6 |
| Quality Assured ACT (QAACT) | 43.2 | 100.0 | 41.7 | 49.1 | 28.1 | 14.3 | 11.6 | 33.1 | 16.7 | 30.1 |
| First-line (FAACT) | 41.7 | 100.0 | 41.7 | 47.9 | 27.9 | 13.0 | 11.6 | 33.1 | 16.5 | 29.5 |
| Non first-line (NAACT) | 1.5 | 0 | 0 | 1.2 | 0.2 | 1.3 | 0 | 0 | 0.2 | 0.6 |
| Non-quality Assured ACT | 0 | 0 | 1.7 | 0.2 | 2.1 | 63.9 | 0.1 | 0 | 7.6 | 4.6 |
| Other ACT Classifications | | | | | | | | | | |
| Nationally Registered ACT | 43.2 | 100.0 | 42.4 | 49.1 | 29.3 | 57.0 | 11.6 | 33.1 | 21.7 | 33.1 |
| Any non-artemisinin therapy | 56.7 | 0 | 56.5 | 50.7 | 69.7 | 20.5 | 88.3 | 66.9 | 75.5 | 65.3 |
| Chloroquine | <0.1 | 0 | 2.4 | 0.3 | 0.1 | 0 | 44.8 | 30.4 | 29.4 | 17.4 |
| Sulfadoxine-pyrimethamine (SP) | 9.3 | 0 | 17.4 | 9.2 | 46.1 | 18.1 | 34.0 | 21.2 | 34.1 | 23.8 |
| Second-line treatment (Quinine) | 47.4 | 0 | 36.7 | 41.2 | 20.1 | 1.2 | 7.9 | 15.3 | 10.2 | 23.0 |
| Any artemisinin monotherapy | 0.1 | 0 | <0.1 | 0.1 | 0.1 | 1.2 | 0 | 0 | 0.1 | 0.1 |
| Oral artemisinin monotherapy | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Non oral artemisinin monotherapy | 0.1 | 0 | <0.1 | 0.1 | 0.1 | 1.2 | 0 | 0 | 0.1 | 0.1 |

Source: ACTwatch Outlet Survey, Benin, 2011.

²² Any ACT subgroups are not mutually exclusive: Any ACT subdivides fully into QAACTs and Non-quality Assured ACT; QAACTs decompose fully into FAACTs and NAACTs; nationally registered ACTs are either QAACTs or non-QAACTs. Row and column totals exhibit minor rounding errors.

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