



Outlet Survey Report (Baseline) Federal Republic of Nigeria 12/08



Assistant Manager, Research & Evaluation

Mrs. Ekundayo D. Arogundade
Society for Family Health/Nigeria
8, Portharcourt Crescent
Area 11, Garki
Abuja, Nigeria
Phone: + 234 8023622674
Fax: +234 09 4618830
Email: earogundade@sfnigeria.org

Principal Investigator

Dr. Kathryn O'Connell
ACTwatch, Malaria Control & Child Survival Department
Population Services International
Regional Technical Office
Whitefield Place, School Lane, Westlands
P.O. Box 14355-00800 Nairobi, Kenya
Phone: + 254 20 4440125/6/7/8
Email: kate@ACTwatch.info



Acknowledgements

ACTwatch is funded by the Bill and Melinda Gates Foundation. This study was implemented by Society for Family Health (SFH), coordinated by Kolo Yaro Yakubu, *ACTwatch* Country Program Coordinator, SFH/Nigeria, in collaboration with Dr. T. O. Sofola and Dr. Audu Bala Mohammed, National Malaria Control Program, Federal Ministry of Health; Kolapo Usman, National Population Commission; and Pharm. Ubale Yusuf Hashim, National Agency for Food Drug Administration and Control (NAFDAC), Nigeria. Survey implementation was conducted by the Research and Evaluation Division, and Maternal and Child Health Division, SFH/Nigeria: Ekundayo Arogundade, Dr. Jennifer Anyanti, Dr. Samson Adebayo, Richard Fakolade, Jamilah Mohammed-Jantabo, Chinazo Ujuju and Dr. Uzo Gilpin.

Project support was provided by Population Services International (PSI) from the following individuals: Dr. Kathryn O'Connell, Principal Investigator, *ACTwatch*; Dr. Desmond Chavasse, Project Director, *ACTwatch*, Vice President, Malaria Control and Child Survival; Dr. Steven Chapman, Chief Technical Officer; Tsione Solomon, Erik Munroe, Stephen Poyer, *ACTwatch* Research Associates; Dr. Abdinasir Amin, Malaria Principal Investigator; and Megan Kays, Associate Researcher.

A technical review of the outlet survey study design was provided by the following *ACTwatch* partners, *ACTwatch* Advisory Committee members and other stakeholders:

Dr. Kara Hanson	Reader, Health System Economics, Health Policy Unit, London School of Hygiene and Tropical Medicine (LSHTM)
Dr. Catherine Goodman	Senior Lecturer, Health Economics & Policy, Health Policy Unit, LSHTM
Mr. Suprotik Basu	Advisor to the UN Secretary General's Special Envoy for Malaria
Mr. Rik Bosman	Supply Chain Expert, Former Senior Vice President, Unilever
Ms. Renia Coghlan	Global Access Associate Director, Medicines for Malaria Venture
Dr. Thom Eisele	Assistant Professor, Tulane University
Mr. Louis Da Gama	Malaria Advocacy & Communications Director, Global Health Advocates
Dr. Paul Lalvani	Executive Director, RaPID Pharmacovigilance Program
Dr. Ramanan Laxminarayan	Senior Fellow, Resources for the Future
Dr. Matthew Lynch	Project Director, VOICES, Johns Hopkins University Centre for Communication Programs
Dr. Bernard Nahlen	Deputy Coordinator, President's Malaria Initiative (PMI)
Dr. Jayesh M. Pandit	Head, Pharmacovigilance Department, Pharmacy and Poisons Board-Kenya
Dr. Melanie Renshaw	Former Senior Health Advisor for Malaria, UNICEF
Mr. Oliver Sabot	Director, Malaria Control Team, Clinton Foundation
Ms. Rima Shretta	Senior Program Associate, Strengthening Pharmaceutical Systems Program, Management Sciences for Health
Dr. Rick Steketee	Science Director, Malaria Control and Evaluation Partnership in Africa (MACEPA)
Dr. Warren Stevens	Health Economist
Dr. Gladys Tetteh	CDC Resident Advisor, President's Malaria Initiative (PMI)-Kenya
Prof. Nick White, OBE	Professor of Tropical Medicine at , Mahidol and Oxford Universities
Prof. Prashant Yadav	Professor of Supply Chain Management, MIT-Zaragoza International Logistics Program
Dr. Shunmay Yeung	Paediatrician & Senior Lecturer, LSHTM

Table of Contents

LIST OF FIGURES	4
DEFINITIONS	5
KEY INDICATOR DESCRIPTIONS	6
EXECUTIVE SUMMARY	7
COUNTRY BACKGROUND	12
RESULTS	14
Study-wide Trends	14
Availability of Antimalarials and Diagnostic Tests	14
Price of Antimalarials	15
Volumes of Antimalarials Sold/Distributed	16
Provider Knowledge and Perceptions	17
Comparisons by Outlet Type.....	18
Availability of Antimalarials	18
Availability of Antimalarials and Diagnostic Tests	19
Price of Antimalarials	20
Volumes of Antimalarials Sold/Distributed	21
Provider Knowledge and Perceptions	22
Comparisons by Stratum.....	23
Availability of Antimalarials	23
Price of Antimalarials	24
Volumes of Antimalarials Sold/Distributed	25
Provider Knowledge and Perceptions	26
Comparisons by Urban vs. Rural Areas	27
Availability of Antimalarials	27
Price of Antimalarials	28
Volumes of Antimalarials Sold/Distributed	29
Provider Knowledge and Perceptions	30
Staff and Outlet Characteristics	31
APPENDIX A: NIGERIA OUTLET TYPE DESCRIPTIONS	32
APPENDIX B: FIRST-LINE ACT AND REGISTERED ACTS	34

List of Figures

Figure 1. Availability of Antimalarials by Outlet Type.....	8
Figure 2. Proportion of Outlets with Microscopic Blood Testing Facilities & Rapid Diagnostic Tests.....	8
Figure 3. Median Price of a Full Adult Course Antimalarial Treatment.....	9
Figure 4. Relative Volumes of Full Course Adult Treatments Sold/Distributed in the Past Week.....	10
Figure 5. Provider Knowledge of Recommended First-line Treatment.....	11
Figure 6. Provider Knowledge of First-line Dosing Regimens.....	11

Definitions

Antimalarial combination therapy – The simultaneous use of two or more drugs with different modes of action to treat malaria.

Artemisinin and its derivatives – Artemisinin is a plant extract used in the treatment of malaria. The most common derivatives of artemisinin used to treat malaria are artemether, artesunate, and dihydroartemisinin.

Artemisinin-based Combination Therapy (ACT) – A combination of artemisinin or one of its derivatives with a partner drug. The partner drug is an antimalarial(s) of a different class.

First-line treatment – The government recommended treatment for uncomplicated malaria. Nigeria’s first-line treatment for malaria is artemether-lumefantrine, 20mg/120mg. (See Appendix B for adult and child dosing regimens.)

Monotherapy – Antimalarial treatment with a single medicine: either a single active compound or a synergistic combination of two compounds with related mechanisms of action, such as sulfadoxine-pyrimethamine.

Nationally registered ACTs – ACTs registered with a country’s national drug regulatory authority and permitted for sale or distribution in-country. Each country determines its own criteria for placing a drug on its nationally registered listing. (See Appendix B for a complete list of Nigeria’s nationally registered ACTs.)

Non-artemisinin therapy – An antimalarial treatment that does not contain artemisinin or any of its derivatives.

Non-WHO/Nationally registered ACTs – ACTs that neither appear on the WHO list of ACTs approved for procurement nor are registered with a given country’s national drug regulatory authority.

Oral artemisinin monotherapy – Artemisinin or one of its derivatives in a dosage form with an oral route of administration. These include tablets, suspensions, and syrups and exclude suppositories and injections.

Second-line treatment – The government recommended second-line treatment for uncomplicated malaria. Nigeria’s second-line treatment for malaria is quinine. Second-line treatment indicators include all dosage forms.

WHO approved ACTs – ACTs that appear on the WHO list of antimalarials approved for procurement.

Legend for tables –

Symbol	
--	No data was available
n/a	Not applicable: Indicates ratios cannot be calculated as the numerator is zero
***	Undefined ratio as a non-zero value is being divided by a value of zero
AM	Antimalarial
AL	Artemether-Lumefantrine
ACT	Artemisinin-based Combination Therapy
SP	Sulfadoxine-Pyrimethamine

Key Indicator Descriptions

Acceptable storage conditions for medicines – An outlet is considered to have acceptable storage conditions for medicines if it is in compliance with all the following three standards: (1) medicines are stored in a dry area; (2) medicines are protected from direct sunlight; and (3) medicines are not kept on the floor.

Availability of antimalarials – The proportion of outlets in which an antimalarial medicine was found on the day of the survey, based on an audit conducted by the interviewer. For indicators of availability, all outlets surveyed are included in the denominator.

Credit to consumers – An outlet is considered to provide credit to consumers based on response of the provider. Providers in public health facilities were not asked this question.

Disruption in stock – An outlet is considered to have a disruption in stock where any drug is reported to have been out of stock in the three months prior to interview, or where a drug is not in stock at the time of the visit but was stocked at some point in the previous three months.

Expired stock – Indicators of expired stock are based upon the expiry information from one sample of each drug audited in an outlet; a full examination of all packages in stock was not conducted.

Health danger signs – Indications considered health danger signs are taken from the World Health Organization, (2005). Handbook: IMCI integrated management of childhood illness. Available at <http://whqlibdoc.who.int/publications/2005/9241546441.pdf>. Questions assessing knowledge of health danger signs were not asked of providers at public health facilities.

International reference price – International reference price information taken from: Management Sciences for Health, (2007). International Drug Price Indicator Guide. Available at <http://erc.msh.org/mainpage.cfm?file=1.0.htm&module=DMP&language=English>. The international reference price for AL 20mg/120mg is US\$2.12 for a full adult treatment.

Minimum legal daily wage – Minimum daily wage information taken from: United States Department of State, (2007). Country Reports on Human Rights Practices. Available at <http://www.state.gov/g/drl/rls/hrrpt/2007/index.htm>. In Nigeria, the minimum legal daily wage is US\$2.20.

Microscopic blood or rapid diagnostic testing – An outlet is considered to have microscopic or rapid diagnostic blood testing based on provider response. Functionality of the diagnostic test was not observed by the interviewer.

Most popular antimalarial – The antimalarial with the largest volume of full adult courses sold or distributed in the past week.

Price – Prices are calculated in terms of purchases required for a full-course treatment. Only adult tablet formulations are included these calculations. Prices are shown in US dollars. The average exchange rate during the data collection period (2nd to 17th December 2008) was 130.70 Nigerian Naira (NGN) to US\$1 (www.oanda.com).

Statistical significance – Mood's median test is used to compare medians and chi-square tests are used to compare proportions between categories. P values are based on the standard type 1 error rate of 0.05, divided by the number of comparisons, to determine a type 1 error rate that is no more likely to produce a false positive across multiple tests than a single test with a $p < 0.05$.

Volumes – Volumes are calculated in terms of purchases required for a full-course treatment. Only adult tablet formulations are included.

Executive Summary

Background:

The outlet survey is one of the ACTwatch research components. The objective is to monitor levels and trends in the availability, price and volumes of antimalarials, and providers' perceptions and knowledge of antimalarial medicines at different outlets.

This report presents indicators on availability, price, volumes, affordability in outlets and provider knowledge of antimalarials. National trends are presented first, followed by indicators presented across outlet categories, geographical areas and urbanisation.

Methods:

A nationally representative sample of all outlets that could sell or provide antimalarials to a consumer was taken through a census approach in 76 sub-districts across four geographic strata in Nigeria. Sampling was conducted using a one-stage probability proportional to size (PPS) cluster design, with the measure of size being the relative sub-district population.

Outlet inclusion criteria for this study included outlets which stocked an antimalarial at the time of survey or in the previous three months. An outlet is defined as any point of sale or provision of commodities for individuals. Outlets included in the survey are as follows: 1) public health facilities (university and general hospitals, health centres, and community health extension workers); 2) Part One pharmacies (pharmacies registered by the Pharmacy Council of Nigeria and National Drug Authority and regulated by the National Agency for Food and Drug Administration and Control); 3) drug stores (Proprietary Patent Medicine Vendors [PPMV]); and 4) private health facilities (private clinics) [see Appendix A for definitions and numbers of each type of outlet].

Among outlets, three questionnaires were administered: 1) Screening Questionnaire 2) Audit sheet and 3) Provider Questionnaire. For all outlets, trained interviewers administered the screening questionnaire to collect information on the outlet type; location, including the outlet's longitude and latitude; and information on availability of antimalarials. Among those outlets that stocked antimalarials at the time of survey, the audit sheet was administered. For each antimalarial, information was recorded on the brand and generic names, strength, expiry, amount sold in the last week and price to the consumer. Among outlets that stocked antimalarials at the time of interview, or in the past three months, the interviewer collected information on provider demographics, knowledge, and perceptions. Interviewers observed outlet licensing and storage conditions of medicines using the provider questionnaire.

Several validation and data checking steps occurred during and after data collection. Double data entry was conducted using Microsoft Access (Microsoft Cooperation, Seattle, WA, USA). Data was analysed using SPSS 17.0 (SPSS Inc., Chigaco, IL, USA).

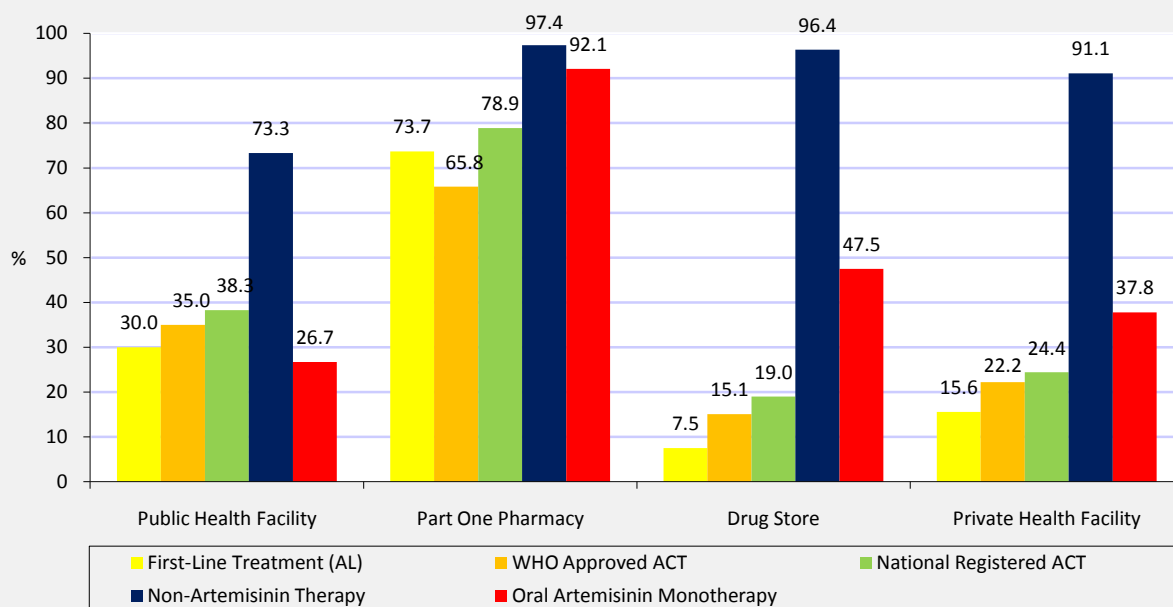
For more information on the study design log on to www.ACTwatch.info.

Results:

Data were collected from 2nd to 17th December 2008. A total of 607 outlets were sampled. 24 providers refused to be interviewed; 13 outlets were permanently closed; 50 outlets were closed at the time of the visits (up to three visits before exclusion); and in 52 outlets, providers were not available for interview at the time of data collection. These outlets were excluded from the analysis. Overall, 468 providers agreed to participate in the ACTwatch outlet survey. Of these, all 468 outlets stocked antimalarials at any point in the three months prior to the interview, and 444 outlets stocked antimalarials at the time of the interview.

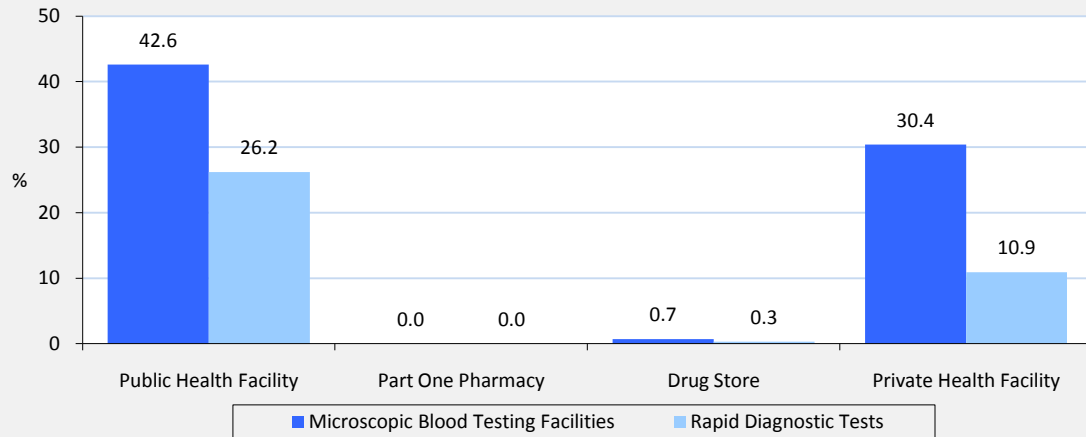
AVAILABILITY OF ANTIMALARIALS: The census of outlets found that 94.9% had antimalarials in stock. 16.7% of outlets stocked the recommended first-line treatment for uncomplicated malaria, artemether-lumefantrine (AL), 20mg/120mg. Less than one-third of public health facilities (30.0%) stocked the first-line treatment, compared to almost three-quarters (73.7%) of Part One pharmacies. The proportion of outlets stocking WHO-approved ACTs were similar to those stocking the first-line treatment. Across all outlet types, non-artemisinin therapies, such as chloroquine and SP, were more commonly stocked than the first-line treatment: 92.5% of all outlets surveyed had non-artemisinin therapies in stock. Oral artemisinin monotherapies were available at nearly half (47.0%) of outlets, including more than one-quarter (26.7%) of public health facilities.

Figure 1. Availability of Antimalarials by Outlet Type



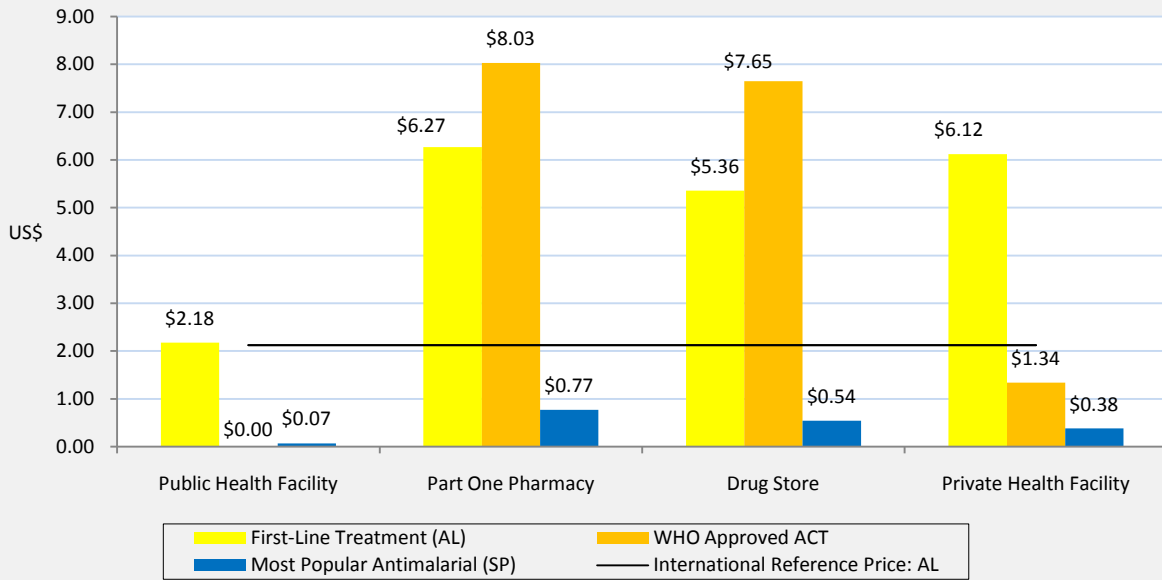
AVAILABILITY OF DIAGNOSTIC BLOOD TESTING: Of outlets stocking antimalarials in the last three months, 9.8% offered diagnostic testing services of some kind. 9.1% of outlets had microscopic blood testing while 4.8% offered rapid diagnostic tests (RDTs). Diagnostic testing was available at 45.9% of public health facilities and at 32.6% of private health facilities, mostly through microscopy. Availability of diagnostic tests in Part One pharmacies and drug stores was very low (<1%).

Figure 2. Proportion of Outlets with Microscopic Blood Testing Facilities & Rapid Diagnostic Tests



PRICE OF ANTIMALARIALS: In public health facilities in Nigeria, the first-line treatment is mostly available free of cost. Among all outlets that sold ACTs for a price, the median price of the first-line treatment was \$6.12. In comparison, the median price of the most popular antimalarial, SP, was \$0.54, less than one-tenth the price of AL. Similarly, WHO approved and nationally registered ACTs were over 10 times more expensive than SP. The first-line treatment was also around 2.5 times more expensive than the international reference price for AL 20mg/120mg of \$2.12. More than half of all outlets (59.3%) offered credit to consumers for the purchase of antimalarials.

Figure 3. Median Price of a Full Adult Course Antimalarial Treatment

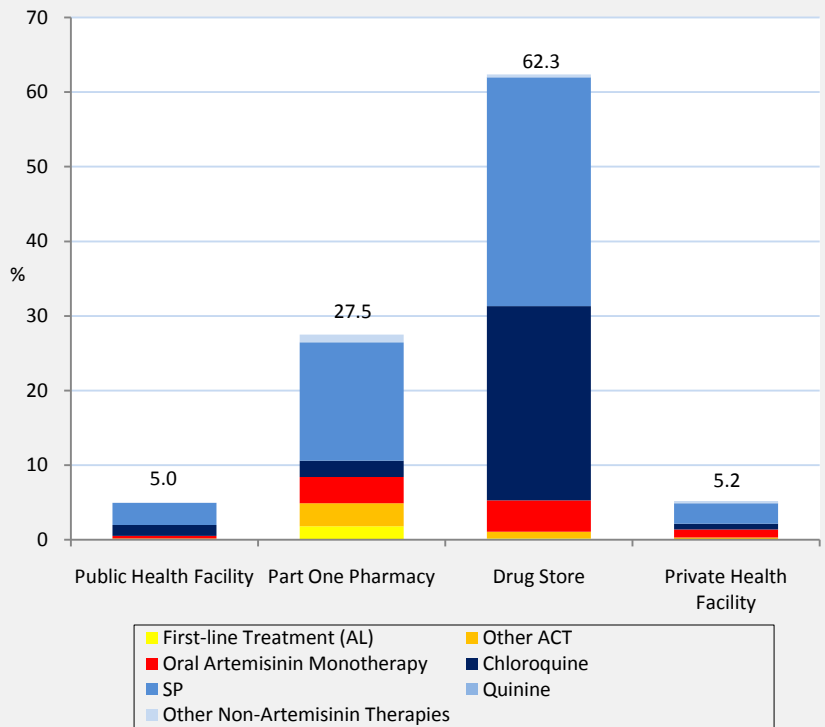


VOLUMES OF ANTIMALARIALS SOLD/DISTRIBUTED:

The most frequently sold or distributed class of antimalarials was non-artemisinin therapies (84.5%), the majority of which were distributed by drug stores. Overall, only 6.4% of all AM distribution was ACTs, and the first-line treatment accounted for only 2.1% of total AM distribution. Across all outlet types, oral artemisinin monotherapies accounted for larger relative volumes than the first-line treatment; in total oral artemisinin monotherapies comprised 9.1% of total AM distribution.

The public sector accounted for only 5% of AM distribution in Nigeria. The private sector dominated the market, with Part One pharmacies and drug stores distributing nearly 90% of all antimalarials.

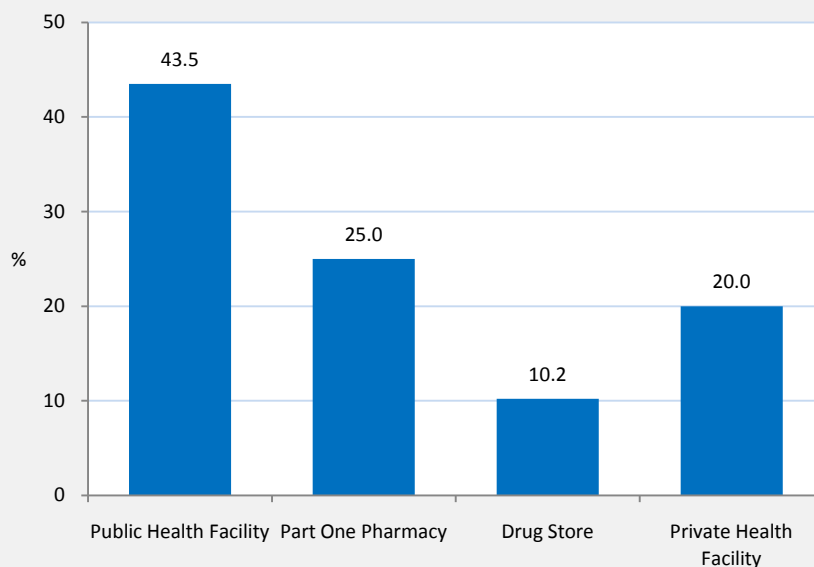
Figure 4. Relative Volumes of Full Course Adult Treatments Sold/Distributed in the Past Week



PROVIDER KNOWLEDGE: Overall, 17.0% of providers were able to correctly state that AL is the recommended first-line treatment for uncomplicated malaria in Nigeria. Knowledge was highest among providers at public health facilities, however less than half (43.5%) were able to correctly identify the first-line treatment.

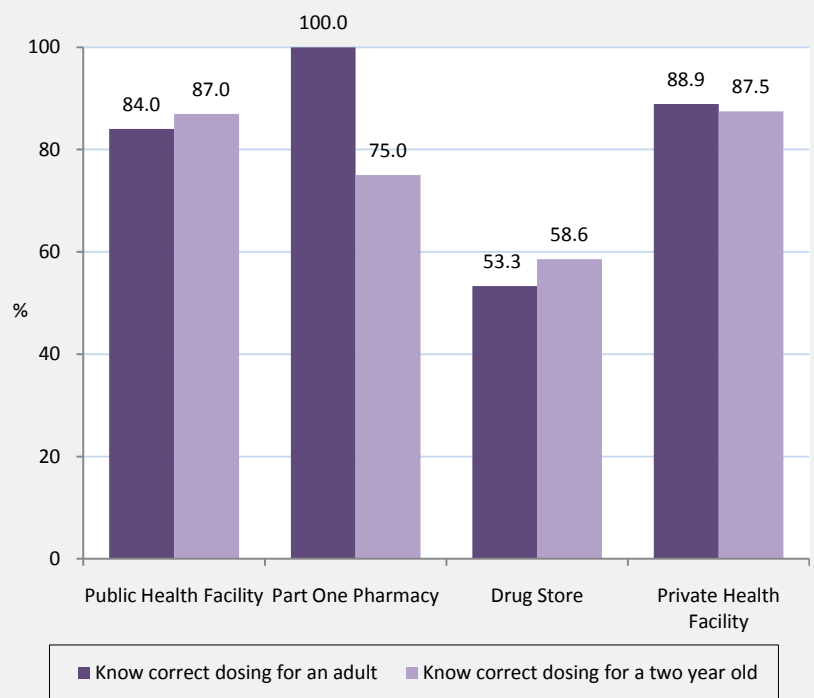
Knowledge at drug stores – the outlets responsible for over 60% of AM distribution – was only 10.2%.

Figure 5. Provider Knowledge of Recommended First-line Treatment



Among those providers who knew AL was the recommended first-line treatment for uncomplicated malaria, 74.7% were able to correctly state the dosing regimen of AL for an adult; 72.9% were able to correctly state the dosing regimen for a two-year old child. Similar levels of knowledge were found at public and private health facilities, while knowledge of first-line dosing regimens was lowest among drug store providers.

Figure 6. Provider Knowledge of First-line Dosing Regimens



Country Background

Nigeria is located in Western Africa, bordering the Gulf of Guinea and sharing a border with Benin, Cameroon, Chad and Niger. It is the most populous nation in Africa with 149.2 million (2009 estimates) inhabitants of which approximately 48% live in urban areas. Seventy percent of the population lives below the poverty line (2007 estimates) and the per capita gross domestic product is \$2,300 (2008 estimates).¹ One in five children die before reaching their fifth birthday² with malaria as one of the leading causes of death. It is estimated that 300,000 children die from malaria each year.

Epidemiology and Malaria Control Strategies

Malaria is characterized by a stable, perennial transmission in all parts of Nigeria with a seasonal difference most striking in the northern part of the country. Malaria is endemic throughout most of Nigeria with approximately 97% of the population at risk of infection. Current estimates are that 110 million cases of malaria occur annually in Nigeria accounting for 63% of all outpatient clinic visits and 30% of all hospital admissions. The predominant parasite species is *P.falciparum*, which accounts for about 98% of malaria cases in Nigeria.³

National Treatment Policy

In 2005 Nigeria adopted artemether-lumefantrine (AL) as the first line treatment for uncomplicated malaria for both public and private health facilities⁴. Artesunate + amodiaquine (ASAQ) was included at a later date as an alternative where AL is not available. The policy states that ACTs are to be given to children under five free of charge through the public sector and the health facilities of non-profit organizations. According to the treatment policy, severe malaria is to be treated at tertiary health facilities whilst lower level health facilities may provide pre-referral treatment with artesunate suppositories. The approved treatment for severe malaria is quinine, artesunate or artemether injection. Oral artemisinin monotherapy has been banned in Nigeria since 2006.⁵

The treatment policy includes parasitological confirmation for suspected cases of malaria with the exception of children-under-five who should be treated on a clinical basis. Parasitological confirmation is not required as a pre-condition for initiating treatment for those with suspected severe malaria. Although the treatment policy indicates that laboratory facilities are not available at lower level health facilities, and RDTs are not yet available nationwide.

Antimalarial Treatment Distribution and Delivery

Patients access treatment for malaria through the public and a diverse range of private sectors outlets. ACTs are to be provided free of charge via the public sector and non-profit organizations' facilities including health facilities (hospitals, health centres) and community-based Community Health Worker/Extension Worker (CHEW) associated with the public health facilities. In seven states, Kano, Jigawa, Gombe, Bauchi, Akwa Ibom, Rivers, and Anambra, the World Bank Booster Project is supporting a pilot scheme commenced in 2008 using RDTs in the public sector. All three levels of government, the Federal, State and Local Government Areas (LGA), have responsibilities for the provision of health care. The 37 States⁶ and 774 LGA's are responsible for all financial aspects of Secondary Health Care (SHC) and Primary Health Care (PHC) departments whilst the Federal government is responsible for policy. The co-ordination of activities is generally poor⁷ with service provision differing by state.

As in many other developing countries, a large proportion of febrile children in Nigeria are thought to receive their first treatment from formal and informal private sector practitioners including pharmacists, doctors, nurses and

¹ CIA (2009). CIA World Factbook: Nigeria. <https://www.cia.gov/library/publications/the-world-factbook/geos/ni.html>.

² UNICEF (2009). State of the World's Children 2009.

³ Malaria and Vector Control Division, Federal Ministry of Health Nigeria (2005). Revised 5-Year Strategic Plan 2005-2010 [Malaria].

⁴ Malaria and Vector Control Division, Federal Ministry of Health Nigeria (2005). National Malaria Treatment Policy.

⁵ WHO (2008). World Malaria Report 2008. WHO/HTM/GMP/2008.1, page 99-101.

⁶ Nigeria is comprised of 36 states and the Federal Capital Territory (FCT), Abuja. In this report, FCT is considered a 37th state.

⁷ Health System Research Centre, UK Department for International Development.

midwives, as well as unqualified practitioners such as drug vendors, village doctors and traditional healers.^{8,9,10,11,12} Several studies have shown that treatment was most frequently sought from a type of drug vendor called proprietary patent medicine vendors (PPMVs) accounting for roughly one half of the sources of treatment in rural Nigeria^{13,14}, and for 36% of the cases in urban areas.¹⁵ The informal market is believed to play a very significant role in the distribution and delivery of antimalarials in Nigeria. A donor-supported subsidy has made ASAQ available since 2008 through private sector retailers in 18 states with an approved retail price of 30 Naira (\$0.20 USD).

Malaria Financing

Through Round 4 of the Global Fund to fight AIDS, Tuberculosis and Malaria, subsidized child doses of ASAQ (*Arsuamoon* and *Larimal*) have been made available since 2008 via the private sector in eighteen of Nigeria's 37 states. The subsidy includes the following private sector outlets: hospitals, pharmacy shops and PPMVs. Retailers in these 18 states may purchase the subsidized drug for 5 Naira (\$0.03 USD) per treatment with an approved retail price set at 30 Naira (\$0.20 USD).

⁸ Konde-Lule J, et al. (2006). "The Potential of the Private sector to improve health outcomes in Uganda. Kampala: Makerere University Institute of Public Health".

⁹ Goodman C, Kachur SP, et al. (2004). "Retail supply of malaria-related drugs in rural Tanzania: risks and opportunities". *Trop Med Int Health* 9(6): 655-63.

¹⁰ Berman P, Laura R. (1996). "The role of private providers in maternal and child health and family planning services in developing countries". *Health Policy and Planning*. 11(2): 142-155.

¹¹ McCombie SC. (1996). "Treatment seeking for malaria: a review of recent research". *Social Science Medicine* 43(6), 933-945.

¹² Tawfik Y, Nsungwa-Sabitii J, Greer G, Owor J, Kesande R, Prysor-Jones S. (2006). "Negotiating improved case management of childhood illness with formal and informal private practitioners in Uganda". *Trop Med Int Health*. 11(6):967-973.

¹³ Salako LA, Brieger WR, et al. (2001). "Treatment of childhood fevers and other illnesses in three rural Nigerian communities." *J Trop Pediatr*. 47(4): 230-8.

¹⁴ Onwujekwe O, Dike N, et al. (2006). "Consumers stated and revealed preferences for community health workers and other strategies for the provision of timely and appropriate treatment of malaria in southeast Nigeria." *Malar J*. 5: 117.

¹⁵ Brieger WR, Sesay HR, et al. (2001). "Urban malaria treatment behaviour in the context of low levels of malaria transmission in Lagos, Nigeria". *Afr J Med Med Sci*. 30 Suppl: 7-15.

Results

Study-wide Trends

Availability of Antimalarials and Diagnostic Tests	Dec. 2008	Sept. 2009	2011
	%		
Proportion of outlets that had:	N=468¹⁶		
Antimalarials in stock at the time of survey visit	94.9		
First-line treatment (AL)	16.7		
WHO approved ACT	22.4		
Nationally registered ACT	26.9		
Non-WHO/nationally registered ACT	25.0		
Non-artemisinin therapy	92.5		
• Chloroquine	82.3		
• Sulfadoxine-Pyrimethamine (SP)	76.3		
• Second-line treatment (Quinine)	11.5		
Artemisinin monotherapy	48.3		
• Oral artemisinin monotherapy	47.0		
	N=353		
A WHO approved or nationally registered ACT as the most distributed antimalarial, by volume of sales/distribution in the past week	0.8		
	N=467		
No disruption in stock in the past three months	26.3		
	N=106¹⁷		
No disruption in stock of first-line treatment in the past three months	47.2		
	N=413		
Expired stock of any antimalarial	4.8		
	N=77		
Expired stock of first-line treatment (AL)	0.0		
	N=429		
Acceptable storage conditions for medicines	92.3		
	N=460		
Microscopic blood testing facilities	9.1		
	N=461		
Rapid diagnostic tests	4.8		

¹⁶ Denominators vary for indicators due to skip patterns, small numbers of refused questions, or missing data. Fluctuations in denominators for reasons other than skip patterns range from 0 – 19.2%.

¹⁷ Denominators are among providers that had the first-line treatment in stock at any point in the last three months.

Price of Antimalarials	Dec. 2008	Sept.2009	2011
Distribution of free drugs:	%		
Proportion of first-line ACTs distributed free of cost (by volumes of adult treatments)	0.0		
Median price of a full course of an adult treatment of:	Median (N of AMs) ¹⁸		
First-line treatment (AL)	\$6.12 ⁽⁸⁰⁾		
WHO approved ACT	\$7.65 ⁽⁵⁰⁾		
Nationally registered ACT	\$5.74 ⁽¹¹¹⁾		
Non-WHO/nationally registered ACT	\$4.97 ⁽¹⁹¹⁾		
Non-artemisinin therapy	\$0.54 ^(1,389)		
Oral artemisinin monotherapy	\$3.12 ⁽³³¹⁾		
Sulfadoxine-Pyrimethamine (SP), the 'most popular' antimalarial treatment in Nigeria.	\$0.54 ^(1,001)		
Median price of a full course of an adult treatment of ACT relative to sulfadoxine-pyrimethamine (SP), the 'most popular' antimalarial treatment in Nigeria:	Ratio		
First-line treatment (AL)	11.3		
WHO approved ACT	14.2		
Nationally registered ACT	10.6		
Non-WHO/nationally registered ACT	9.2		
Median price of a full course of an adult treatment of ACT relative to the minimum legal daily wage (\$2.20):	Ratio		
First-line treatment (AL)	2.8		
WHO approved ACT	3.5		
Nationally registered ACT	2.6		
Non-WHO/nationally registered ACT	2.3		
	Ratio		
Median price of a full course adult first-line treatment relative to the international reference price (\$2.12)	2.9		
	%		
	N=378		
Proportion of outlets that offer credit to consumers for antimalarials	59.3		

¹⁸ A total of 3,808 antimalarials were found in 444 outlets. Of these, 2,024 antimalarials are included in the pricing analysis. Free antimalarials were found in 14.4% of outlets with antimalarials, and 130 of the total 3,716 antimalarials for which price information was recorded were available for free.

Volumes of Antimalarials Sold/Distributed	Dec. 2008			Sept.2009	2011
Volumes of full course adult treatments (sold or distributed in the past week):	Total number of full course adult treatments	Number of outlets that stocked each category of AM	Mean per outlet		
First-line treatment (AL)	384	78	4.9		
WHO approved ACT	210	105	2		
Nationally registered ACT	553	126	4.4		
Non-WHO/nationally registered ACT	634	117	5.4		
Non-artemisinin therapy	15,654	433	36.2		
• Chloroquine	5,622	385	14.6		
• Sulfadoxine-Pyrimethamine (SP)	9,694	357	27.2		
• Second-line treatment (Quinine)	31	54	0.6		
Oral artemisinin monotherapy	1,707	220	7.8		
Each antimalarial category as a proportion of the total volume of all antimalarials sold or distributed in the past week: ^{19, 20}	%				
First-line treatment (AL)	2.1				
WHO approved ACT	1.1				
Nationally registered ACT	3.0				
Non-WHO/nationally registered ACT	3.4				
Non-artemisinin therapy	84.4				
• Chloroquine	30.3				
• Sulfadoxine-Pyrimethamine (SP)	52.3				
• Second-line treatment (Quinine)	0.2				
Oral artemisinin monotherapy	9.2				

¹⁹ There were a total of 18,548 full adult course treatments of antimalarials sold or distributed in the past one week. This was the denominator used to calculate the proportion of each indicator.

²⁰ Percentages total more than 100% in each column because ACTs that are WHO approved, nationally registered, and the first-line treatment are not mutually exclusive.

Provider Knowledge and Perceptions	Dec. 2008	Sept. 2009	2011
	%		
Proportion of providers that:	N=452		
Correctly state the recommended first-line treatment for uncomplicated malaria	17.0		
	N=75		
Correctly state the dosing regimen of the first-line treatment for an adult ²¹	74.7		
	N=70		
Correctly state the dosing regimen of the first-line treatment for a two year old	72.9		
	N=406		
Can list at least one health danger sign in a child that requires referral to a public health facility:	69.7		
• Convulsions	32.0		
• Vomiting	37.2		
• Unable to drink/breastfeed	5.7		
• Excessive sleep/difficult to wake up	5.2		
• Unconscious/coma	15.0		
	N=453		
Agree with the statement, "Most customers request an antimalarial by brand name or generic name."	49.0		
	N=454		
Agree with the statement, "I decide which antimalarial medicine most customers receive."	69.2		

²¹ Questions on dosing regimens were only administered to those providers that correctly stated the recommended first-line treatment for uncomplicated malaria.

Comparisons by Outlet Type

In this section, availability, price, volumes and provider knowledge is compared across outlet type. A small number of outlets (N=20) are missing the identifying outlet classification information and therefore, throughout this section, the figures presented by outlet type do not add up to the national total.

Availability of Antimalarials ²²	Public Health Facility	Part One Pharmacy	Drug Store	Private Health Facility	Total
	%	%	%	%	%
Proportion of outlets that had:	N=60	N=38	N=305	N=45	N=468
Antimalarials in stock at the time of survey visit	90.0 ^a	97.4 ^a	96.4 ^a	93.3 ^a	94.9
First-line treatment (AL)	30.0 ^a	73.7 ^b	7.5 ^c	15.6 ^{ac}	16.7
WHO approved ACT	35.0 ^a	65.8 ^b	15.1 ^c	22.2 ^{ac}	22.4
Nationally registered ACT	38.3 ^a	78.9 ^b	19.0 ^c	24.4 ^{ac}	26.9
Non-WHO/nationally registered ACT	18.3 ^a	84.2 ^b	19.0 ^a	28.9 ^a	25.0
Non-artemisinin therapy	73.3 ^a	97.4 ^b	96.4 ^b	91.1 ^{ab}	92.5
• Chloroquine	51.7 ^a	81.6 ^b	91.1 ^b	64.4 ^{ab}	82.3
• Sulfadoxine-Pyrimethamine	48.3 ^a	94.7 ^b	83.0 ^b	53.3 ^a	76.3
• Second-line treatment (Quinine)	16.7 ^{ab}	28.9 ^a	6.2 ^b	31.1 ^a	11.5
• Quinine injection	15.0 ^a	13.2 ^a	0.7 ^b	24.4 ^a	5.8
Artemisinin monotherapy	33.3 ^a	92.1 ^b	47.9 ^a	37.8 ^a	48.3
• Oral artemisinin monotherapy	26.7 ^a	92.1 ^b	47.5 ^c	37.8 ^{ac}	47.0
• Injectable/suppository artemisinin monotherapy	11.7 ^a	36.8 ^b	1.0 ^c	11.1 ^a	6.4
	N=30	N=37	N=245	N=27	N=353
A WHO approved or nationally registered ACT as the most distributed antimalarial, by volumes of sales/distribution in the past week	0.0 ^a	2.7 ^a	0.8 ^a	0.0 ^a	0.8
	N=60	N=38	N=305	N=45	N=467
No disruption in stock in the past 3 months	18.3 ^a	26.3 ^a	28.2 ^a	22.2 ^a	26.3
	N=28	N=29	N=36	N=9	N=106
No disruption in stock of first-line treatment in the past 3 months	32.1 ^a	62.1 ^a	47.2 ^a	22.2 ^a	47.2

²² Statistical difference is labeled with a superscript, a, b, or c (p<0.0083). Proportions or medians with the same letter in their superscripts do not differ significantly from one another according to a chi-square or a Mood's median test, respectively, with a type 1 error rate of 0.0083. The significance level of p<0.0083 is used to account for the number of pair-wise tests being conducted. With four outlet types, 6 pair-wise comparisons are needed to test each type against the other three. If the standard p-value of 0.05 was used in each comparison, the probability of a false positive would increase from 5% to 26.5%. The standard type 1 error rate of 0.05 is thus divided by 6 (0.05 / 6 = 0.0083), the number of comparisons, to determine a type 1 error rate that is no more likely to produce a false positive across 6 tests than a single test with a p<0.05.

Availability of Antimalarials and Diagnostic Tests	Public Health Facility	Part One Pharmacy	Drug Store	Private Health Facility	Total
	%	%	%	%	%
Proportion of outlets that had:	N=52	N=36	N=269	N=40	N=413
Expired stock of any antimalarial	3.8 ^a	11.1 ^a	4.8 ^a	2.5 ^a	4.8
	N=17	N=28	N=23	N=7	N=77
Expired stock of first-line treatment (AL)	0.0 ^a	0.0 ^a	0.0 ^a	0.0 ^a	0.0
	N=43	N=34	N=269	N=39	N=401
Expired stock of non-artemisinin therapy	4.7 ^a	5.9 ^a	4.1 ^a	2.6 ^a	4.0
	N=20	N=35	N=146	N=17	N=226
Expired stock of artemisinin monotherapy	0.0 ^a	5.7 ^a	0.7 ^a	0.0 ^a	1.3
	N=45	N=37	N=288	N=45	N=429
Acceptable storage conditions for medicines	86.7 ^a	83.8 ^a	95.1 ^a	93.3 ^a	92.3
	N=61	N=37	N=301	N=46	N=460
Microscopic blood testing facilities	42.6 ^a	0.0 ^b	0.7 ^b	30.4 ^a	9.1
	N=61	N=38	N=301	N=46	N=461
Rapid diagnostic tests	26.2 ^a	0.0 ^{bc}	0.3 ^b	10.9 ^{ac}	4.8

Price of Antimalarials	Public Health Facility	Part One Pharmacy	Drug Store	Private Health Facility	Total
Distribution of free drugs:	%	%	%	%	%
Proportion of first-line ACTs distributed free of cost (by volumes of adult treatments)	100.0 ²³	0.0	0.0	0.0	0.0
Median price of a full course of an adult treatment of:	Median (N of AMs)	Median (N of AMs)	Median (N of AMs)	Median (N of AMs)	Median (N of AMs)
First-line treatment (AL)	\$2.18 ^{a(2) 24}	\$6.27 ^{a(45)}	\$5.36 ^{a(26)}	\$6.12 ^{a(5)}	\$6.12 ⁽⁸⁰⁾
WHO approved ACT	\$0.00 ^{a(2)}	\$8.03 ^{a(33)}	\$7.65 ^{a(12)}	\$1.34 ^{a(2)}	\$7.65 ⁽⁵⁰⁾
Nationally registered ACT	\$0.00 ^{a(7)}	\$6.12 ^{a(71)}	\$4.59 ^{a(25)}	\$0.00 ^{a(3)}	\$5.74 ⁽¹¹¹⁾
Non-WHO/nationally registered ACT	\$0.00 ^{ab(7)}	\$5.55 ^{a(102)}	\$4.59 ^{b(69)}	\$6.12 ^{ab(10)}	\$4.97 ⁽¹⁹¹⁾
Non-artemisinin therapy	\$0.08 ^{a(51)}	\$0.80 ^{b(286)}	\$0.54 ^{c(964)}	\$0.38 ^{abc(39)}	\$0.54 ^(1,389)
Oral artemisinin monotherapy	\$3.21 ^{ab(14)}	\$3.57 ^{a(110)}	\$2.68 ^{b(175)}	\$2.01 ^{ab(20)}	\$3.12 ⁽³³¹⁾
Sulfadoxine-Pyrimethamine (SP), the 'most popular' antimalarial treatment in Nigeria.	\$0.07 ^{a(33)}	\$0.77 ^{b(190)}	\$0.54 ^{c(715)}	\$0.38 ^{abc(25)}	\$0.54 ^(1,001)
Median price of a full course of an adult treatment of ACT relative to sulfadoxine-pyrimethamine (SP), the 'most popular' antimalarial treatment in Nigeria:	Ratio	Ratio	Ratio	Ratio	Ratio
First-line treatment (AL)	31.1	8.1	9.9	16.1	11.3
WHO approved ACT	n/a	10.4	14.2	3.5	14.2
Nationally registered ACT	n/a	7.9	8.5	n/a	10.6
Non-WHO/nationally registered ACT	n/a	7.2	8.5	16.1	9.2
Median price of a full course of an adult treatment of ACT relative to the minimum legal daily wage (\$2.20):	Ratio	Ratio	Ratio	Ratio	Ratio
First-line treatment (AL)	1.0	2.9	2.4	2.8	2.8
WHO approved ACT	n/a	3.7	3.5	0.6	3.5
Nationally registered ACT	n/a	2.8	2.1	n/a	2.6
Non-WHO/nationally registered ACT	n/a	2.5	2.1	2.8	2.3
	Ratio	Ratio	Ratio	Ratio	Ratio
Median price of a full course adult first-line treatment relative to the international reference price (\$2.12)	1.0	3.0	2.5	2.9	2.9
		%	%	%	%
		N=34	N=292	N=38	N=378
Proportion of outlets that offer credit to consumers for antimalarials	--	38.2 ^a	62.7 ^b	55.3 ^{ab}	59.3

²³ No first-line adult treatments were distributed in public health facilities. This indicator is based on the proportion of first-line child treatments distributed free of cost.

²⁴ Median price based on child first-line courses (N=16). Pricing for adult first-line treatment was only available in 2 cases within public health facilities: the prices recorded were \$0.00 and \$4.36, for a full course of adult treatment.

Volumes of Antimalarials Sold/Distributed	Public Health Facility		Part One Pharmacy		Drug Store		Private Health Facility		Total	
	Total number of full course adult treatments	Number of outlets that stocked each category of AM	Total number of full course adult treatments	Number of outlets that stocked each category of AM	Total number of full course adult treatments	Number of outlets that stocked each category of AM	Total number of full course adult treatments	Number of outlets that stocked each category of AM	Total number of full course adult treatments	
Volumes of full course adult treatments sold or distributed in the past week:										
First-line treatment (AL)	0	18	327	28	33	23	16	7	384	
WHO approved ACT	0	21	195	25	14	46	1	10	210	
Nationally registered ACT	20	23	470	30	47	58	13	11	553	
Non-WHO/nationally registered ACT	10	11	419	32	147	58	43	13	634	
Non-artemisinin therapy	819	44	3,491	37	10,441	294	696	41	15,654	
• Chloroquine	272	60	402	38	4,765	305	137	45	5,622	
• Sulfadoxine-Pyrimethamine (SP)	539	29	2,884	36	5,608	253	505	24	9,694	
• Second-line treatment (Quinine)	0	10	25	11	4	19	2	14	31	
Oral artemisinin monotherapy	61	16	645	35	767	145	196	17	1,707	
Each antimalarial category as a proportion of the total volume of all antimalarials sold or distributed in the past week:²⁵										
		%		%		%		%		
First-line treatment (AL)		0.0		6.5		0.3		1.7		2.1
WHO approved ACT		0.0		3.9		0.1		0.1		1.1
Nationally registered ACT		2.2		9.4		0.4		1.4		3.0
Non-WHO/nationally registered ACT		1.1		8.3		1.3		4.5		3.4
Non-artemisinin therapy		89.9		69.5		91.6		76.4		84.4
• Chloroquine		29.9		8.0		41.8		14.4		30.3
• Sulfadoxine-Pyrimethamine (SP)		59.2		57.4		49.2		53.3		52.3
• Second-line treatment (Quinine)		0.0		0.5		0.0		0.2		0.2
Oral artemisinin monotherapy		6.7		12.8		6.7		20.7		9.2

²⁵ Percentages total more than 100% in each column because ACTs that are WHO approved, nationally registered, and the first-line treatment are not mutually exclusive.

Provider Knowledge and Perceptions	Public Health Facility	Part One Pharmacy	Drug Store	Private Health Facility	Total
	%	%	%	%	%
Proportion of providers that:	N=62	N=36	N=295	N=45	N=452
Correctly state the recommended first-line treatment for uncomplicated malaria	43.5 ^a	25.0 ^{ab}	10.2 ^b	20.0 ^{ab}	17.0
	N=25	N=9	N=30	N=9	N=75
Correctly state the dosing regimen of the first-line treatment for an adult ²⁶	84.0 ^a	100.0 ^a	53.3 ^a	88.9 ^a	74.7
	N=23	N=8	N=29	N=8	N=70
Correctly state the dosing regimen of the first-line treatment for a two year old	87.0 ^a	75.0 ^a	58.6 ^a	87.5 ^a	72.9
		N=39	N=307	N=46	N=406
Can list at least one health danger sign in a child that requires referral to a public health facility:	--	64.1 ^a	69.4 ^a	73.9 ^a	69.7
• Convulsions	--	25.6 ^{ab}	30.0 ^a	50.0 ^b	32.0
• Vomiting	--	33.3 ^a	38.4 ^a	26.1 ^a	37.2
• Unable to drink/breastfeed	--	5.1 ^a	5.5 ^a	8.7 ^a	5.7
• Excessive sleep/difficult to wake up	--	5.1 ^a	4.9 ^a	4.3 ^a	5.2
• Unconscious/coma	--	12.8 ^a	14.0 ^a	23.9 ^a	15.0
	N=62	N=37	N=296	N=44	N=453
Agree with the statement, "Most customers request an antimalarial by brand name or generic name."	6.5 ^a	67.6 ^b	60.1 ^b	6.8 ^a	49.0
	N=62	N=37	N=297	N=44	N=454
Agree with the statement, "I decide which antimalarial medicine most customers receive."	82.3 ^a	59.5 ^a	65.7 ^a	79.5 ^a	69.2

²⁶ Questions on dosing regimens were only administered to those providers that correctly stated the recommended first-line treatment for uncomplicated malaria.

Comparisons by Stratum

Availability of Antimalarials ²⁷	Lower North	South East	Upper North	South West	Total
	%	%	%	%	%
Proportion of outlets that had:	N=132	N=115	N=85	N=136	N=468
Antimalarials in stock at the time of survey visit	97.0 ^{ab}	93.9 ^{ab}	88.2 ^a	97.8 ^b	94.9
First-line treatment (AL)	13.6 ^a	19.1 ^a	9.4 ^a	22.1 ^a	16.7
WHO approved ACT	19.7 ^a	32.2 ^a	16.5 ^a	20.6 ^a	22.4
Nationally registered ACT	22.7 ^a	37.4 ^a	23.5 ^a	24.3 ^a	26.9
Non-WHO/nationally registered ACT	28.0 ^a	25.2 ^a	20.0 ^a	25.0 ^a	25.0
Non-artemisinin therapy	96.2 ^a	90.4 ^a	87.1 ^a	94.1 ^a	92.5
Artemisinin monotherapy	53.0 ^{ab}	54.8 ^a	35.3 ^b	46.3 ^{ab}	48.3
• Oral artemisinin monotherapy	50.0 ^{ab}	53.9 ^a	34.1 ^b	46.3 ^{ab}	47.0
	N=98	N=100	N=60	N=95	N=353
A WHO approved or nationally registered ACT as the most distributed antimalarial, by volumes of sales/distribution in the past week	0.0 ^a	0.0 ^a	0.0 ^a	3.2 ^a	0.8
	N=131	N=115	N=85	N=136	N=467
No disruption in stock in the previous three months	22.1 ^a	43.5 ^b	14.1 ^a	23.5 ^a	26.3
	N=26	N=33	N=13	N=34	N=106
No disruption in first-line treatment stock in the previous three months	42.3 ^a	42.4 ^a	46.2 ^a	55.9 ^a	47.2
	N=115	N=107	N=75	N=116	N=413
Expired stock of any antimalarial	8.7 ^a	2.8 ^a	6.7 ^a	1.7 ^a	4.8
	N=118	N=101	N=82	N=128	N=429
Acceptable storage conditions for medicines	100.0 ^a	90.1 ^b	90.2 ^b	88.3 ^b	92.3
	N=129	N=112	N=86	N=133	N=460
Microscopic blood testing facilities	18.6 ^a	8.0 ^{ab}	8.2 ^{ab}	1.5 ^b	9.1
	N=129	N=112	N=86	N=134	N=461
Rapid diagnostic tests	7.8 ^a	6.3 ^a	3.5 ^a	1.5 ^a	4.8

²⁷ Statistical difference is labeled with a superscript, a, b, or c (p<0.0083). Proportions or medians with the same letter in their superscripts do not differ significantly from one another according to a chi-square or a Mood's median test, respectively, with a type 1 error rate of 0.0083. The significance level of p<0.0083 is used to account for the number of pair-wise tests being conducted. With four outlet types, 6 pair-wise comparisons are needed to test each type against the other three. If the standard p-value of 0.05 was used in each comparison, the probability of a false positive would increase from 5% to 26.5%. The standard type 1 error rate of 0.05 is thus divided by 6 (0.05 / 6 = 0.0083), the number of comparisons, to determine a type 1 error rate that is no more likely to produce a false positive across 6 tests than a single test with a p<0.05.

Price of Antimalarials	Lower North	South East	Upper North	South West	Total
Distribution of free drugs:	%	%	%	%	%
Proportion of first-line ACTs distributed free of cost (by volumes of adult treatments)	0.0	0.0	0.0	0.0	0.0
Median price of a full course of an adult treatment:	Median (N of AMs)	Median (N of AMs)	Median (N of AMs)	Median (N of AMs)	Median (N of AMs)
First-line treatment (AL)	\$6.89 ^{a(22)}	\$7.65 ^{ab(17)}	\$5.78 ^{ab(14)}	\$5.74 ^{b(27)}	\$6.12 ⁽⁸⁰⁾
WHO approved ACT	\$7.65 ^{a(18)}	\$8.89 ^{a(17)}	\$7.35 ^{a(5)}	\$7.65 ^{a(10)}	\$7.65 ⁽⁵⁰⁾
Nationally registered ACT	\$5.97 ^{a(32)}	\$6.12 ^{a(39)}	\$4.59 ^{a(20)}	\$4.95 ^{a(20)}	\$5.74 ⁽¹¹¹⁾
Non-WHO/nationally registered ACT	\$4.78 ^{a(56)}	\$5.74 ^{a(39)}	\$5.16 ^{a(52)}	\$4.59 ^{a(44)}	\$4.97 ⁽¹⁹¹⁾
Non-artemisinin therapy	\$0.61 ^{a(379)}	\$0.61 ^{a(401)}	\$0.38 ^{b(233)}	\$0.54 ^{a(376)}	\$0.54 ^(1,389)
Oral artemisinin monotherapy	\$3.12 ^{a(95)}	\$3.57 ^{b(97)}	\$3.12 ^{ab(47)}	\$2.68 ^{a(92)}	\$3.12 ⁽³³¹⁾
Sulfadoxine-Pyrimethamine (SP), the 'most popular' antimalarial treatment in Nigeria.	\$0.61 ^{ac(243)}	\$0.61 ^{ab(314)}	\$0.46 ^{c(152)}	\$0.54 ^{bc(292)}	\$0.54 ^(1,001)
Median price of a full course of an adult treatment of ACT relative to sulfadoxine-pyrimethamine (SP), the 'most popular' antimalarial treatment in Nigeria:	Ratio	Ratio	Ratio	Ratio	Ratio
First-line treatment (AL)	11.3	12.5	12.6	10.6	11.3
WHO approved ACT	12.5	14.6	16.0	14.2	14.2
Nationally registered ACT	9.8	10.0	10.0	9.2	10.6
Non-WHO/nationally registered ACT	7.8	9.4	11.2	8.5	9.2
Median price of a full course of an adult treatment of ACT relative to the minimum legal daily wage in Nigeria (\$2.20):	Ratio	Ratio	Ratio	Ratio	Ratio
First-line treatment (AL)	3.1	3.5	2.6	2.6	2.8
WHO approved ACT	3.5	4.0	3.3	3.5	3.5
Nationally registered ACT	2.7	2.8	2.1	2.3	2.6
Non-WHO/nationally registered ACT	2.2	2.6	2.3	2.1	2.3
	Ratio	Ratio	Ratio	Ratio	Ratio
Median price of a full course adult first-line treatment relative to the international reference price (\$2.12)	3.3	3.6	2.7	2.7	2.9
	%	%	%	%	%
	N=105	N=86	N=72	N=115	N=378
Proportion of outlets that offer credit to consumers for antimalarials	53.3 ^a	74.4 ^b	63.9 ^{ab}	50.4 ^a	59.3

Volumes of Antimalarials Sold/Distributed	Lower North		South East		Upper North		South West		Total
	Total number of full course adult treatments	Number of outlets that stocked each category of AM	Total number of full course adult treatments	Number of outlets that stocked each category of AM	Total number of full course adult treatments	Number of outlets that stocked each category of AM	Total number of full course adult treatments	Number of outlets that stocked each category of AM	Total number of full course adult treatments
Volumes of full course adult treatments (sold or distributed in the past week) of:									
First-line treatment (AL)	78	18	110	22	144	8	52	30	384
WHO approved ACT	41	26	83	37	73	14	13	28	210
Nationally registered ACT	91	30	164	43	262	20	36	33	553
Non-WHO/nationally registered ACT	152	37	133	29	271	17	78	34	634
Non-artemisinin therapy	4,984	127	3,969	104	4,537	74	2,164	128	15,654
Oral artemisinin monotherapy	464	66	599	62	371	29	274	63	1,707
Each antimalarial category as a proportion of the total volume of all antimalarials sold or distributed in the past week:²⁸	%		%		%		%		%
First-line treatment (AL)	1.4		2.3		2.6		2.0		2.1
WHO approved ACT	0.7		1.7		1.3		0.5		1.1
Nationally registered ACT	1.6		3.4		4.8		1.4		3.0
Non-WHO/nationally registered ACT	2.7		2.7		5.0		3.1		3.4
Non-artemisinin therapy	87.6		81.6		83.4		84.8		84.4
Oral artemisinin monotherapy	8.2		12.3		6.8		10.7		9.2

²⁸ Percentages total more than 100% in each column because ACTs that are WHO approved, nationally registered, and the first-line treatment are not mutually exclusive.

Provider Knowledge and Perceptions	Lower North	South East	Upper North	South West	Total
	%	%	%	%	%
Proportion of providers that:	N=126	N=110	N=84	N=132	N=452
Correctly state the recommended first-line treatment for uncomplicated malaria	7.1 ^a	30.0 ^b	11.9 ^{ac}	18.9 ^{bc}	17.0
	N=8	N=33	N=10	N=24	N=75
Correctly state the dosing regimen of the first-line treatment for an adult ²⁹	75.0 ^a	90.9 ^a	60.0 ^a	58.3 ^a	74.7
	N=8	N=33	N=9	N=20	N=70
Correctly state the dosing regimen of the first-line treatment for a two year old	75.0 ^{ab}	90.9 ^a	55.6 ^{ab}	50.0 ^b	72.9
	N=111	N=96	N=75	N=124	N=406
Can list at least one health danger sign in a child that requires referral to a public health facility:	62.2 ^a	80.2 ^{bc}	73.3 ^{ac}	66.1 ^{ab}	69.7
• Convulsions	22.5 ^a	36.5 ^a	34.7 ^a	35.5 ^a	32.0
• Vomiting	35.1 ^a	45.8 ^a	41.3 ^a	29.8 ^a	37.2
• Unable to drink/breastfeed	4.5 ^a	6.3 ^a	2.7 ^a	8.1 ^a	5.7
• Excessive sleep/difficult to wake up	3.6 ^a	6.3 ^a	8.0 ^a	4.0 ^a	5.2
• Unconscious/coma	11.7 ^a	18.8 ^a	14.7 ^a	15.3 ^a	15.0
	N=128	N=110	N=84	N=131	N=453
Agree with the statement, “Most customers request an antimalarial by brand name or generic name.”	30.5 ^a	60.9 ^b	20.2 ^a	75.6 ^b	49.0
	N=128	N=110	N=84	N=132	N=454
Agree with the statement, “I decide which antimalarial medicine most customers receive.”	76.6 ^a	76.4 ^a	28.6 ^b	81.8 ^a	69.2

²⁹ Questions on dosing regimens were only administered to those providers that correctly stated the recommended first-line treatment for uncomplicated malaria.

Comparisons by Urban vs. Rural Areas

Availability of Antimalarials ³⁰	Urban	Rural	Total
	%	%	%
Proportion of outlets that had:	N=242	N=226	N=468
Antimalarials in stock at the time of survey visit	97.5 ^a	92.0 ^b	94.9
First-line treatment (AL)	23.6 ^a	9.3 ^b	16.7
WHO approved ACT	28.9 ^a	15.5 ^b	22.4
Nationally registered ACT	34.3 ^a	19.0 ^b	26.9
Non-WHO/nationally registered ACT	35.1 ^a	14.2 ^b	25.0
Non-artemisinin therapy	94.6 ^a	90.3 ^a	92.5
Artemisinin monotherapy	57.0 ^a	38.9 ^b	48.3
• Oral artemisinin monotherapy	55.8 ^a	37.6 ^b	47.0
	N=193	N=160	N=353
A WHO approved or nationally registered ACT as the most distributed antimalarial, by volumes of sales/distribution in the past week	1.6 ^a	0.0 ^a	0.8
	N=242	N=255	N=467
No disruption in stock in the previous three months	25.6 ^a	27.1 ^a	26.3
	N=72	N=34	N=106
No disruption in first-line treatment stock in the previous three months	48.6 ^a	44.1 ^a	47.2
	N=215	N=198	N=413
Expired stock of any antimalarial	4.2 ^a	5.6 ^a	4.8
	N=226	N=203	N=429
Acceptable storage conditions for medicines	89.8 ^a	95.1 ^b	92.3
	N=238	N=222	N=460
Microscopic blood testing facilities	6.3 ^a	12.2 ^b	9.1
	N=239	N=222	N=461
Rapid diagnostic tests	3.3 ^a	6.3 ^a	4.8

³⁰ Statistical difference is labeled with a superscript, a or b (p<0.05). Proportions or medians that are both labeled with the superscript 'a' do not differ significantly from one another according to a chi-square or a Mood's median test, respectively, with a type 1 error rate of 0.05.

Price of Antimalarials	Urban	Rural	Total
Distribution of free drugs:	%	%	%
Proportion of first-line ACTs distributed free of cost (by volume of adult treatments)	0.0	0.0	0.0
Median price of a full course of an adult treatment of:	Median (N of AMs)	Median (N of AMs)	Median (N of AMs)
First-line treatment (AL)	\$6.12 ^{a(64)}	\$6.01 ^{a(16)}	\$6.12 ⁽⁸⁰⁾
WHO approved ACT	\$8.03 ^{a(38)}	\$6.89 ^{a(12)}	\$7.65 ⁽⁵⁰⁾
Nationally registered ACT	\$5.74 ^{a(87)}	\$5.30 ^{a(24)}	\$5.74 ⁽¹¹¹⁾
Non-WHO/nationally registered ACT	\$5.36 ^{a(157)}	\$4.59 ^{b(34)}	\$4.97 ⁽¹⁹¹⁾
Non-artemisinin therapy	\$0.61 ^{a(904)}	\$0.46 ^{b(485)}	\$0.54 ^(1,389)
Oral artemisinin monotherapy	\$3.12 ^{a(237)}	\$2.68 ^{b(94)}	\$3.12 ⁽³³¹⁾
Sulfadoxine-Pyrimethamine (SP), the 'most popular' antimalarial treatment in Nigeria.	\$0.57 ^{a(674)}	\$0.54 ^{a(327)}	\$0.54 ^(1,001)
Median price of a full course of an adult treatment of ACT relative to sulfadoxine-pyrimethamine (SP), the 'most popular' antimalarial treatment in Nigeria:	Ratio	Ratio	Ratio
First-line treatment (AL)	10.7	11.1	11.3
WHO approved ACT	14.1	12.8	14.2
Nationally registered ACT	10.1	9.8	10.6
Non-WHO/nationally registered ACT	9.4	8.5	9.2
Median price of a full course of an adult treatment of ACT relative to the minimum legal daily wage in Nigeria (\$2.20):	Ratio	Ratio	Ratio
First-line treatment (AL)	2.8	2.7	2.8
WHO approved ACT	3.7	3.1	3.5
Nationally registered ACT	2.6	2.4	2.6
Non-WHO/nationally registered ACT	2.4	2.1	2.3
	Ratio	Ratio	Ratio
Median price of a full course adult first-line treatment relative to the international reference price (\$2.12)	2.9	2.8	2.9
	%	%	%
	N=205	N=173	N=378
Proportion of outlets that offer credit to consumers for antimalarials	49.8 ^a	70.5 ^b	59.3

Volumes of Antimalarials Sold/Distributed	Urban		Rural		Total
	Total number of full course adult treatments	Number of outlets that stocked each category of AM	Total number of full course adult treatments	Number of outlets that stocked each category of AM	Total number of full course adult treatments
Volumes of full course adult treatments (sold or distributed in the past week) of:					
First-line treatment (AL)	309	57	75	21	384
WHO approved ACT	146	70	64	35	210
Nationally registered ACT	432	83	121	43	553
Non-WHO/nationally registered ACT	515	85	119	32	634
Non-artemisinin therapy	8,067	229	7,587	204	15,654
Oral artemisinin monotherapy	958	135	750	85	1,707
Each antimalarial category as a proportion of the total volume of all antimalarials sold or distributed in the past week:³¹	%		%		%
First-line treatment (AL)	3.1		0.9		2.1
WHO approved ACT	1.5		0.7		1.1
Nationally registered ACT	4.3		1.4		3.0
Non-WHO/nationally registered ACT	5.2		1.4		3.4
Non-artemisinin therapy	80.9		88.5		84.4
Oral artemisinin monotherapy	9.6		8.7		9.2

³¹ Percentages total more than 100% in each column because ACTs that are WHO approved, nationally registered, and the first-line treatment are not mutually exclusive.

Provider Knowledge and Perceptions	Urban	Rural	Total
	%	%	%
Proportion of providers that:	N=232	N=220	N=452
Correctly state the recommended first-line treatment for uncomplicated malaria	19.4 ^a	14.5 ^a	17.0
	N=43	N=32	N=75
Correctly state the dosing regimen of the first-line treatment for an adult ³²	76.7 ^a	71.9 ^a	74.7
	N=39	N=31	N=70
Correctly state the dosing regimen of the first-line treatment for a two year old	66.7 ^a	80.6 ^a	72.9
	N=223	N=183	N=406
Can list at least one health danger sign in a child that requires referral to a public health facility:	67.7 ^a	72.1 ^a	69.7
• Convulsions	33.2 ^a	30.6 ^a	32.0
• Vomiting	38.6 ^a	35.5 ^a	37.2
• Unable to drink/breastfeed	4.9 ^a	6.6 ^a	5.7
• Excessive sleep/difficult to wake up	3.6 ^a	7.1 ^a	5.2
• Unconscious/coma	15.7 ^a	14.2 ^a	15.0
	N=232	N=221	N=453
Agree with the statement, “Most customers request an antimalarial by brand name or generic name.”	60.8 ^a	36.7 ^b	49.0
	N=233	N=221	N=454
Agree with the statement, “I decide which antimalarial medicine most customers receive.”	73.0 ^a	65.2 ^a	69.2

³² Questions on dosing regimens were only administered to those providers that correctly stated the recommended first-line treatment for uncomplicated malaria.

Staff and Outlet Characteristics

	Study-wide
	%
Proportion of outlets:	N=453
with a staff member that has completed primary school education	99.8
	N=453
with a staff member that has completed secondary school education	94.7
	N=432
that have received government or NGO training within the past two years	60.2
	N=445
that have staff with a health related qualification	63.6
	N=431
that store medicines in dry areas	99.5
	N=431
that store medicines out of direct sunlight	98.6
	N=429
that do not keep medicines on the floor	93.9
	N=379
that report having a pharmacy, clinic, NGO or missionary license ³³	36.4
	N=373
where a license was observed by the interviewer	24.7

³³ Questions regarding licensing were not asked in public health facilities.

Appendix A: Nigeria Outlet Type Descriptions

Outlet Types	N	Description
Public Health Facilities	62	
University teaching hospitals/Federal medical centres	1	These tertiary level public health facilities are designated as referral hospitals. They have specialized clinics with qualified personnel, such as doctors and nurses; pharmacy section(s); dispensary unit(s); and also serve as centres for training medical personnel. The staff typically includes doctors, nurses, community health extension workers, and some support staff. This level of public health facility is generally managed and controlled by the federal government; however there are some that fall under the domain of the state government. Some teaching hospitals are privately owned and the distinction between government-owned and private-owned facilities has made during the survey.
General hospital	11	These secondary public health facilities are managed and controlled by state governments. They have a number of wards for admitting patients, pharmacy section(s), dispensary unit(s), an ambulance, and a few residential houses for staff on emergency duties. The staff typically includes doctors, nurses, community health extension workers and some support staff.
Health centre	49	These primary health facilities are managed and operated at the local government area level. They are the smallest of all government-owned health facilities and offer fewer services than those found at tertiary and secondary level facilities. Health centres are located in both urban and rural settings, but are located closer to the village/community level. They are usually manned by one or two nurses with some community health extension workers and a few auxiliary staff; however, some are operated by doctors, while others have doctors that periodically visit to make major decisions or run specialist clinics.
Community Health Extension Worker	1	This cadre of trained health workers is found mostly at the primary health care level and provides services directly to the communities in which they work. While most of them are attached to government facilities, some of them operate at privately owned outlets, such as PPMVs, or from their residential homes.
Part One Pharmacy	39	
Part One pharmacy	39	These are registered by the Pharmacy Council of Nigeria (PCN) and are authorized to sell all classes of medicines, including prescription medicines. They usually employ nurses and intern pharmacists. Part One pharmacies are highly regulated by the National Agency for Food and Drug Administration and Control (NAFDAC). They are privately owned, either by registered pharmacists or individuals who employ the services of a registered pharmacist. In Nigeria, Part One pharmacies are overwhelmingly located in urban areas in commercial zones.

Propriety Patent Medicine Vendors/Drug Store	307	
Propriety patent medicine vendors / Drug Store	307	These are small to medium sized outlets, equivalent to 'drug shops' in other countries. PPMVs may be registered by the Directorate of Pharmaceutical Services (DPS), but the majority of them are not registered. They are legally allowed to sell over the counter (OTC) medicines, however a number of them also illegally stock prescription medicines. (In 2006, NAFDAC de-classified ACTs from prescription-only to OTC; hence ACTs are legally available at PPMVs.) Some operate without a license, especially at the village level or remote areas. PPMVs are ubiquitous across Nigeria and, given the lack of Part One pharmacies in rural and community level settings, serve as accessible medicine outlets for consumers. The staffs are usually not trained in any health service delivery area. A small proportion of PPMVs are owned by nurses or other health workers, such as community health extension workers.
Private Health Facilities	46	
Private clinics	46	These are non-governmental health facilities. Just as with public health facilities, private hospitals and clinics are classified in terms of their capacity— tertiary, secondary, or primary. For this study, all three levels have been grouped into one category. Hence, they can range from offering comprehensive health services to being limited in scope. Likewise, staff range in qualification and size. There is usually a dispensing section, but in some cases, the doctors may dispense medications themselves.
Other Outlets	14	
Supermarkets	13	Private businesses that sell fast moving consumer goods, food and provisions.
Role Model Mothers	1	These are women who are selected by their communities to serve on a volunteer basis as community distributors of ACTs, specifically Coartem®. Although the Role Model Mother (RMM) program has not been officially adopted by the public health system, they have been trained by either the public or private sector on the home management of malaria, and are able to refer cases to health facilities and dispense Coartem®.

Appendix B: First-line ACT and Registered ACTs

Government recommended first-line treatment for uncomplicated malaria

Generic Name	Strength	Dosage Form
Artemether/Lumefantrine	20mg/120mg	Tablet

Recommended treatment regimen for the government recommended first-line treatment for uncomplicated malaria

Age or weight group / kg	# Tablets, Day 1	# Tablets, Day 2	# Tablets, Day 3
6 months-3 yrs/5-14 kg	1 tablet morning and 1 evening	1 tablet morning and 1 evening	1 tablet morning and 1 evening
4-8 yrs/15-24 kg	2 tablets morning and 2 evening	2 tablets morning and 2 evening	2 tablets morning and 2 evening
9-14 yrs/25-34 kg	3 tablets morning and 3 evening	3 tablets morning and 3 evening	3 tablets morning and 3 evening
15 yrs-above/35 kg-above	4 tablets morning and 4 evening	4 tablets morning and 4 evening	4 tablets morning and 4 evening

Complete list of nationally registered ACTs as of July 2006

Generic Name	Strength	Dosage Form	Brand Name	Manufacturer	Country of Manufacture
Amodiaquine/Dihydroartemisinin	135mg/60mg	Tablet	Amosinin	Adams Pharm	China
Amodiaquine/Dihydroartemisinin	270mg/120mg	Tablet Adult	Amosinin	Adams Pharm	China
Artemether/Lumefantrine	15mg/90mg	Powder	Co-Artesiane	MPF BV	Netherlands
Artemether/Lumefantrine	20mg/120mg	Tablet Child	Coartem	Novartis	Switzerland
Artemether/Lumefantrine	20mg/120mg	Tablet Adult	Coartem	Novartis	Switzerland
Artemether/Lumefantrine	40mg/240mg	Tablet	Tamether	Jiangsu Yixing	China
Artesunate/Amodiaquine	50mg/153mg	Tablet	Arsucam (under 7 years)	Sanofi	Morocco
Artesunate/Amodiaquine	50mg/153mg	Tablet	Arsucam (7-13 years)	Sanofi	Morocco
Artesunate/Amodiaquine	50mg/153mg	Tablet	Arsucam (After 13 years)	Sanofi	Morocco
Artesunate/Amodiaquine	50mg/153.1mg	Tablet	Arsuamoon	Guilin	China
Artesunate/Amodiaquine	50mg/153.1mg	Tablet	Larimal (Child Kit)	Ipca Pharma	India
Artesunate/Amodiaquine	50mg/153.1mg	Tablet	Larimal (Kid Kit)	Ipca Pharma	India
Artesunate/Amodiaquine	50mg/153.1mg	Tablet	Larimal (Adult)	Ipca Pharma	India
Artesunate/Amodiaquine	50mg/200mg	Tablet Child	DART	Swipha	Nigeria
Artesunate/Amodiaquine	50mg/200mg	Tablet Adult	DART	Swipha	Nigeria
Artesunate/Amodiaquine	50mg/200mg	Tablet	Quinsunat	Mekophar Chem Pharm	Vietnam
Artesunate/Amodiaquine	100mg/200mg	Tablet	Camosunate plus	Adams Pharma	China

Generic Name	Strength	Dosage Form	Brand Name	Manufacturer	Country of Manufacture
Artesunate/Amodiaquine	100mg/300mg	Tablet	Gsunate Kit	GVS-India/ Greenlife- Nigeria	India
Artesunate/Amodiaquine	100mg/400mg	Tablet	Malact	May and Baker	Nigeria
Artesunate/Amodiaquine	<i>Unknown</i> ³⁴	Suspension	Camosunate	Adams Pharma	China
Artesunate/Amodiaquine	<i>Unknown</i>	Tablet	Amodarte	Medicamen Biotech	India
Artesunate/Amodiaquine	<i>Unknown</i>	Tablet	Efonrex	Bond Chemicals	Nigeria
Artesunate/Amodiaquine	<i>Unknown</i>	Tablet Adult	Farinax	Swipha	Nigeria
Artesunate/Mefloquine	100mg/125mg	Tablet Child	Artequin	Mepha	Switzerland
Artesunate/Mefloquine	200mg/250mg	Caplets	Arfloquin	Mekophar Chem Pharm	Vietnam
Artesunate/Mefloquine	200mg/250mg	Tablet	Arsugin M	Vapicare Pharm	India
Artesunate/Mefloquine	200mg/250mg	Tablet Adult	Artequin	Mepha	Switzerland
Artesunate/Mefloquine	<i>Unknown</i>	Tablet	Amdin	Jiangsu Yixing	China
Artesunate/Sulphadoxine/ Pyrimethamine	50mg/500mg/ 25mg	Tablet	Artescope	Guilin	China
Artesunate/Sulphadoxine/ Pyrimethamine	100mg/500mg/ 25mg	Tablet	Malosunate	Adams Pharma	China
Artesunate/ Sulphamethoxypyrazine/ Pyrimethamine	200mg/500mg/ 25mg	Tablet	Co-arinate	Dafra	Brussels
Artesunate/Sulphadoxine/ Pyrimethamine	200mg/500mg/ 25mg	Tablet Child	Farenax	Swipha	Nigeria
Dihydroartemisinin/Piperaquine Phosphate	30mg/25mg	Tablet	Waipa	Kunimed Pharmachem	Nigeria
Dihydroartemisinin/Piperaquine Phosphate	40mg/320mg	Capsules	Combimal	Kunming Pharma	China
Dihydroartemisinin/Piperaquine Phosphate	40mg/320mg	Granules	Combimal	Adams Pharm	China
Dihydroartemisinin/Piperaquine /Trimethoprim	32mg/320mg/ 90mg	Tablet	Artecom	TONGHE PHARM	China
Dihydroartemisinin/Piperaquine Phosphate/Trimethoprim	32mg/320mg/ 90mg	Tablet	Axcin	Jiangsu Yixing	China

³⁴ Strength information is not available in some instances.

