



Household Survey

The Democratic Republic of the Congo

2010 Survey Report



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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.

Artemisinin monotherapy (AMT) – A monotherapy (see below) in which the single active compound is an artemisinin derivative.

First-line treatment – The government recommended treatment for uncomplicated malaria. DRC's first-line treatment for malaria is artesunate-amodiaquine, 50mg/153mg.

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.

Legend for tables –

Symbol	
--	No data available
ACT	Artemisinin-based combination therapy
AMT	Artemisinin monotherapy
AQ	Amodiaquine
ASAQ	Artesunate-Amodiaquine
CQ	Chloroquine
QN	Quinine
SP	Sulfadoxine-Pyrimethamine
\$	US dollars
AOR	Adjusted odds ratio
OR	Odds ratio
CI	Confidence interval
(R)	Negatively phrased statement that is reversed coded

Executive Summary

Background:

The household survey is one of three *ACTwatch* research components. The objective of the household survey component is to monitor consumer treatment-seeking behaviour including choice of antimalarial, and price paid for treatment. Data from the household survey are also used to identify determinants of prompt, appropriate treatment behaviour.

This report presents indicators on knowledge, beliefs, experiences and behaviour with respect to seeking treatment for fever in children under five. A set of core indicators related to prompt and effective treatment and cost of antimalarials for treatment of children is presented first. A second expanded section contains indicators on treatment-seeking behaviour; caregiver knowledge, practices and beliefs; and information on acquired antimalarials including source and relative numbers of treatments received. Indicators are presented at the caregiver, child, and treatment (antimalarial drug) levels. Core indicators are presented across household wealth quintiles, geographic strata, caregiver education categories and child's age.

Household inclusion criteria for this study included presence of a household member under five who experienced fever in the 2 weeks prior to the survey date. However, data were collected on treatment-seeking behaviour and experiences for fevers that occurred among household members of all ages in the past 2 weeks (within eligible households.) Data are presented for children under five in the main body of the report, and for people age five and above in Appendix A. Results for people age five and above should be interpreted with caution given the sampling design.

Methods:

This study used data from a cross-sectional household survey of children's caregivers. A nationally-representative sample of households from all areas of DRC was drawn with equal allocation stratification for 4 geographic regions, and three-stage cluster sampling using probability proportional to size (PPS). The survey was conducted in the same first-stage clusters as those selected for the *ACTwatch* Outlet Survey, where 76 health areas (*aires de santé*) were selected PPS from a list of 7,590 health areas. Health areas typically have a population of 5,000 to 10,000, although 10% had a population size greater than 15,000. At the second stage 185 enumeration areas (EA) were sampled PPS from a total of 363 areas listed in the selected sub-districts. EA populations typically ranged from 1,000 to 6,500. EAs in Kinshasa were significantly larger in terms of population coverage. At the third stage a random sample of 28 households within each EA was drawn. All households included in the study had at least one child under the age of five with fever in the past two weeks. Among eligible households, children's caregivers completed two questionnaire modules: 1) Treatment Seeking and Case Management regarding fever episodes among children under 5; and 2) Caregiver Knowledge, Beliefs and Attitudes. In eligible households containing a member aged five and above that had fever within the past two weeks, the Treatment Seeking and Case Management module was completed by the relevant household member or his/her caregiver on this episode of fever. Household heads provided information on the household including asset ownership and dwelling characteristics.

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). Stata 11.0 (Stata Corp, College Station, TX) was used for all analyses. To obtain the national estimates provided in this report, data were weighted to account for equal allocation stratified sampling from four geographic domains. Standard error estimation in logistic regression analysis accounted for clustering at the sub-district and enumeration area levels.

Results:

Data was collected during the annual rainy season, between 27th April and 21st June 2010. A total of 8,426 households were screened and 2,259 households met the inclusion criteria for the study and agreed to participate. In 23 of these households, interviewers were interrupted before the Treatment Seeking module was reached. Among the 2,236 households in which the Treatment Seeking module was administered, 2,331 caregivers were interviewed regarding 2,665 children under five with fever in the past two weeks preceding the survey. Additionally, caregivers and other household members were interviewed on episodes of fever among 583 people age five and above.

ANTIMALARIALS ACQUIRED FOR CHILDREN UNDER FIVE WITH FEVER

Antimalarials in the household survey are categorized as follows: quinine, amodiaquine (AQ), sulfadoxine-pyrimethamine (SP), chloroquine (CQ), artemisinin monotherapy (AMT), any ACT, and national first-line (ASAQ). In Figure 1, *Other* antimalarials comprise SP and CQ.

Quinine is the most commonly reported drug for treatment of fever in children under five; 61% of the n=1,229 antimalarials acquired for children under five were quinine. 18% of the antimalarials were amodiaquine, and only 10% were ACT. 68% of these ACT treatments were ASAQ, and thus ASAQ represented 7% of all antimalarials acquired for children under five.

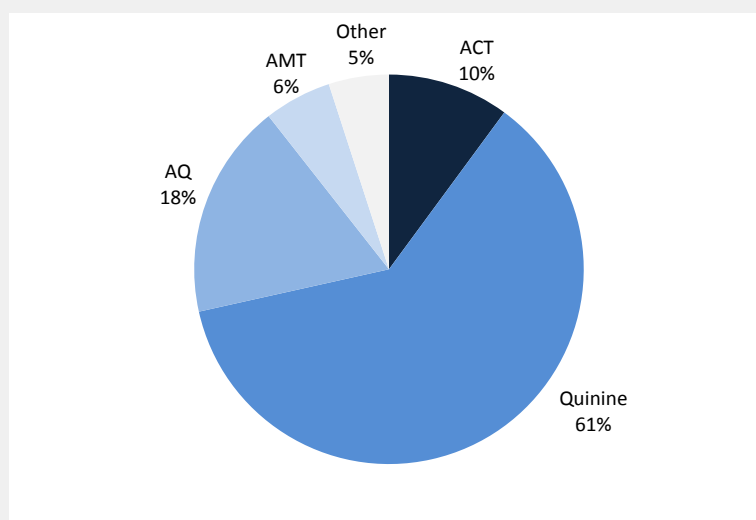
SP comprised 4% of all antimalarials acquired for children, while chloroquine made up 1% of all treatments.

Among ACT treatments, 73% were ASAQ, the government recommended first-line treatment for uncomplicated malaria in DRC; 21% were artemether-lumefantrine.

FORMULATIONS

62% of antimalarials acquired were in the form of tablets; 23% as syrups or suspensions; 10% as drops, and 4% were injections. All drops were quinine products.

Figure 1. Antimalarials acquired for children under five with fever



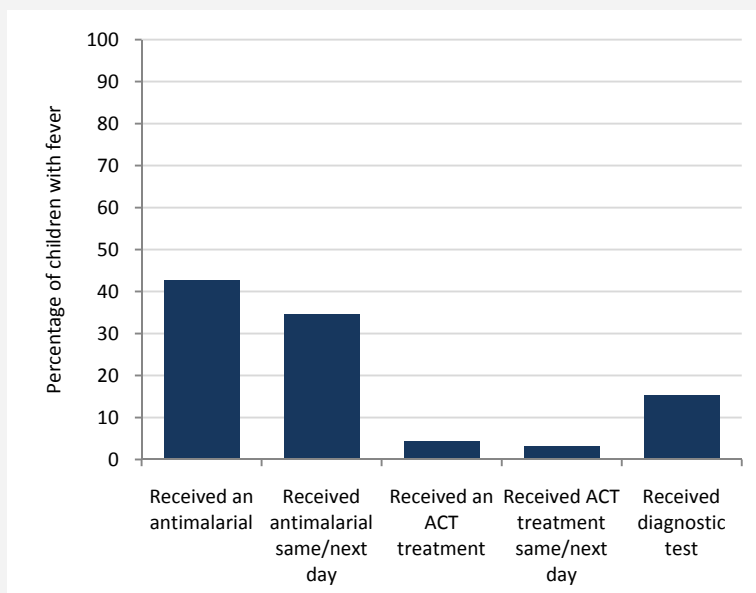
TREATMENT AND DIAGNOSIS OF CHILDREN UNDER FIVE WITH FEVER

Over 40% of the n=2,665 children under five with fever received an antimalarial, according to caregivers interviewed. 35% of children with fever were treated with an antimalarial the same or next day after onset of fever.

However, only 4.5% of children received an ACT (the class of antimalarials recommended by WHO for treatment of uncomplicated malaria), and only 3.1% of children with fever received prompt treatment with ACT (compared to the World Health Assembly target of 80%).

15% of children received a malaria diagnosis.

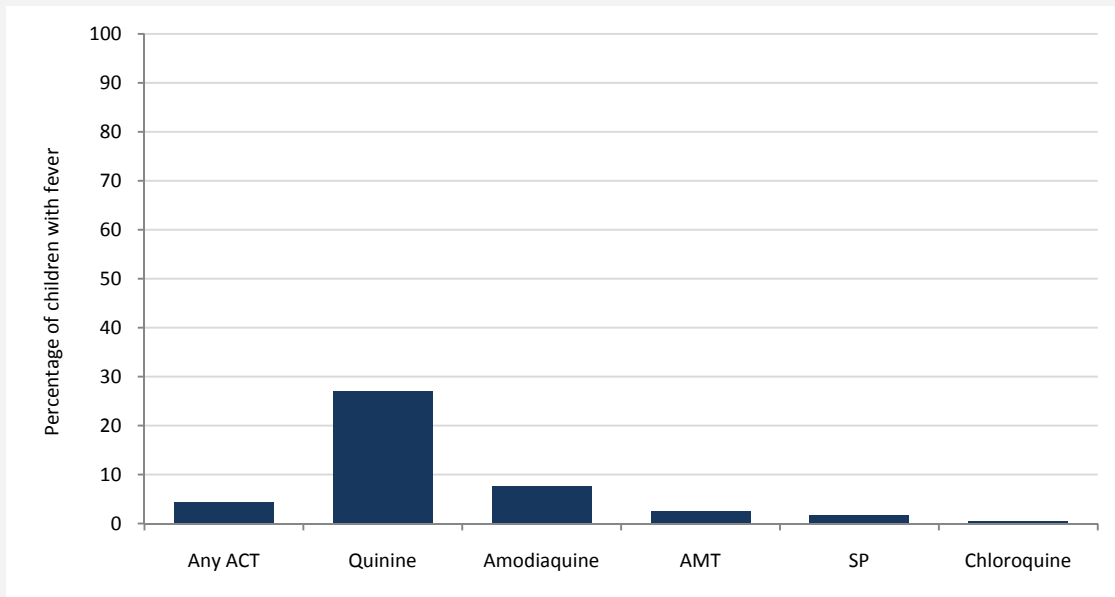
Figure 2. Percentage of children under five with fever that received any antimalarial treatment, an ACT, and diagnostic testing



ANTIMALARIAL TREATMENT FOR CHILDREN UNDER FIVE WITH FEVER, BY ANTIMALARIAL TYPE

More than a quarter of children with fever (27%) were treated with quinine, according to caregiver responses. The next most popular treatments were amodiaquine (8%) and ACT (5%). Only 2% of children with fever received SP; less than 1% received chloroquine.

Figure 3. Percentage of children under five with fever that received an antimalarial, by type of antimalarial



SOURCE OF ANTIMALARIAL AND ACT TREATMENT

Antimalarials were most commonly sourced from drug stores and pharmacies, according to caregiver responses. Over half of all antimalarials (51%) were from this source. By comparison, 27% of all antimalarials were sourced from public health facilities. The pattern in Figure 4 holds when restricted to quinine and, separately, amodiaquine, the two most commonly sourced antimalarials. However, this pattern is reversed for ACTs: 42% of ACTs were sourced from public health facilities and 36% from drug stores and pharmacies (Figure 5).

Figure 4. Source of antimalarial treatment, among children who received an antimalarial

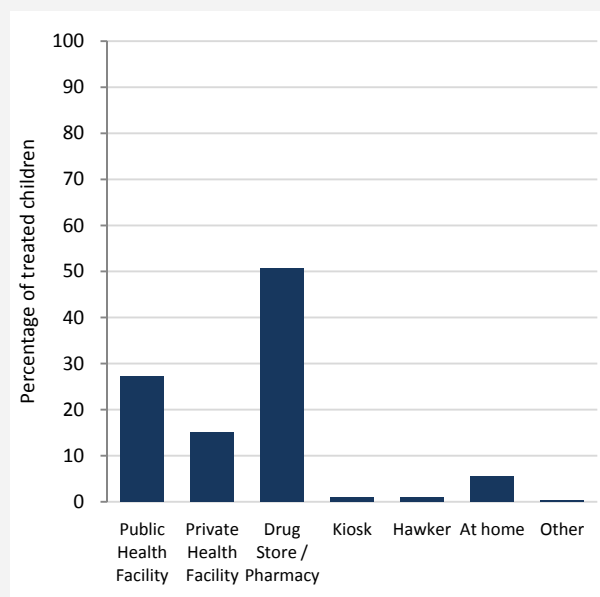
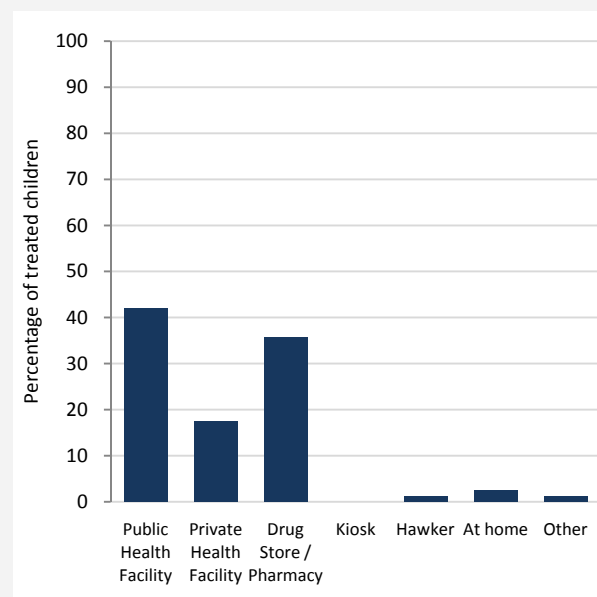


Figure 5. Source of ACT treatment, among children who received an ACT

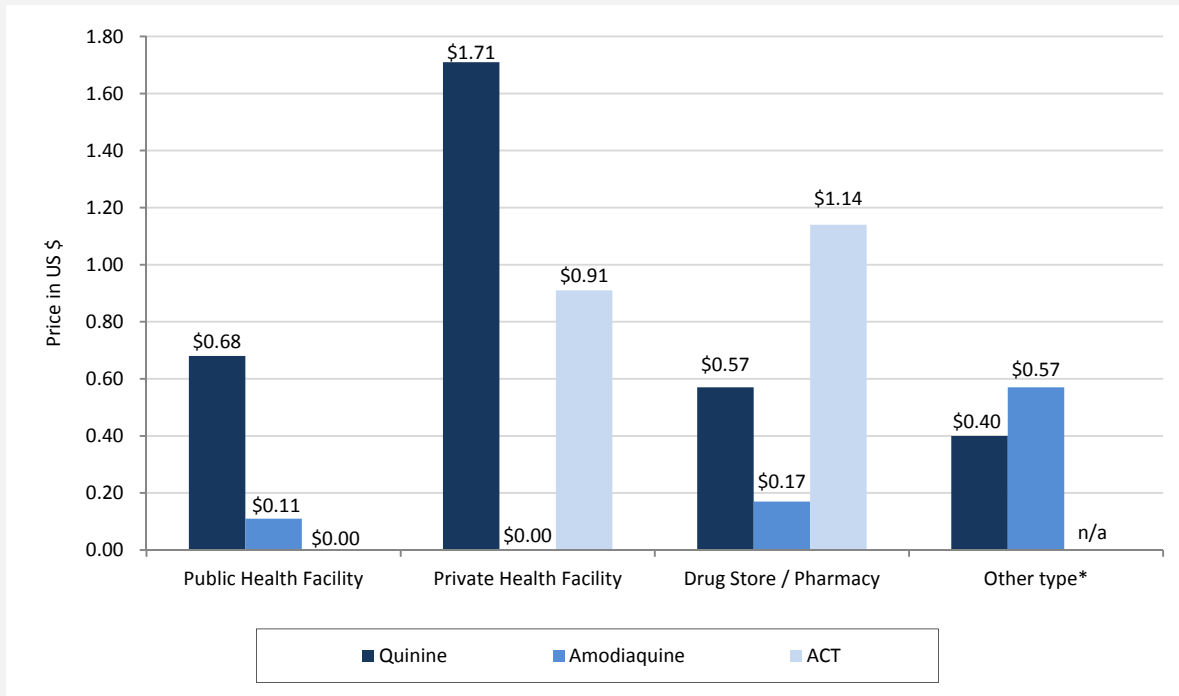


COST OF ANTIMALARIAL TREATMENT FOR CHILDREN UNDER FIVE

Substantial variation exists in reported prices paid for antimalarial treatments in different outlet types. Drug stores charged a median price of \$1.14 for ACT, compared to \$0.00 paid by caregivers in public facilities. Amodiaquine, the second-most popular antimalarial, was the cheapest product, with a median price of \$0.17 across all outlets.

The formulation of an antimalarial affects the product's price. Restricting to tablets, the median price of quinine across all outlets was \$0.40, compared to \$0.57 for ACT products. The relatively high price of quinine in private health facilities shown below is driven by non-tablet formulations: the median tablet-only price for quinine in private facilities was \$0.80.

Figure 6. Price in USD of common antimalarial treatments acquired for children under five, by outlet type



*Other includes hawkers, kiosks, and traditional healers.

TREATMENT-SEEKING BEHAVIOUR FOR FEVER IN CHILDREN UNDER FIVE

Caregivers of 91% of children with fever sought treatment for the child’s fever. The primary treatment source for most children (37%) was a drug store or pharmacy. 23% of children were initially treated at home, while a similar number (26%) were treated at a formal health facility. Among children whose caregivers sought treatment (n=2,423), most caregivers selected the primary treatment source because it was close to home (34%). Caregivers of 25% of children with fever made their initial choice due to having “no money to go elsewhere”.

Figure 7. First source of treatment for children with fever

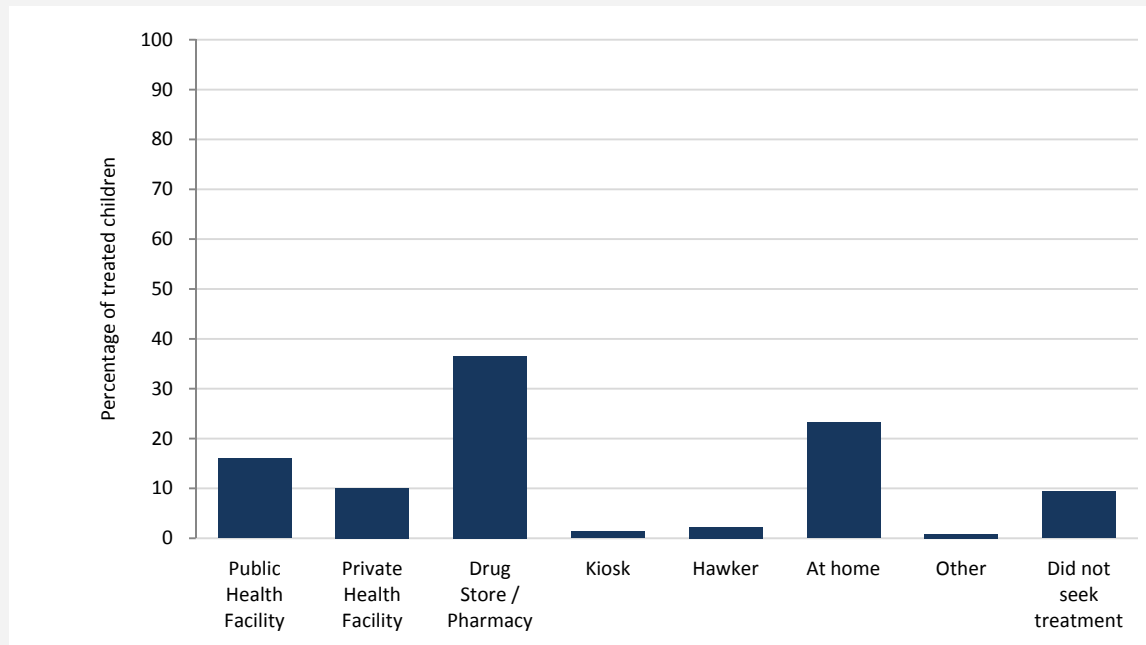
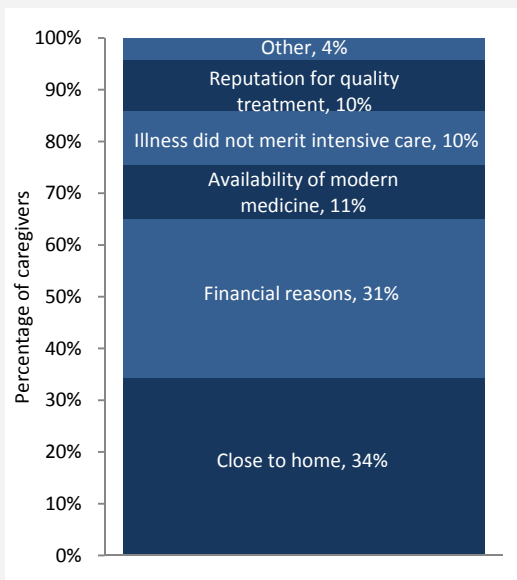


Figure 8. Reason for first treatment source among caregivers who sought treatment

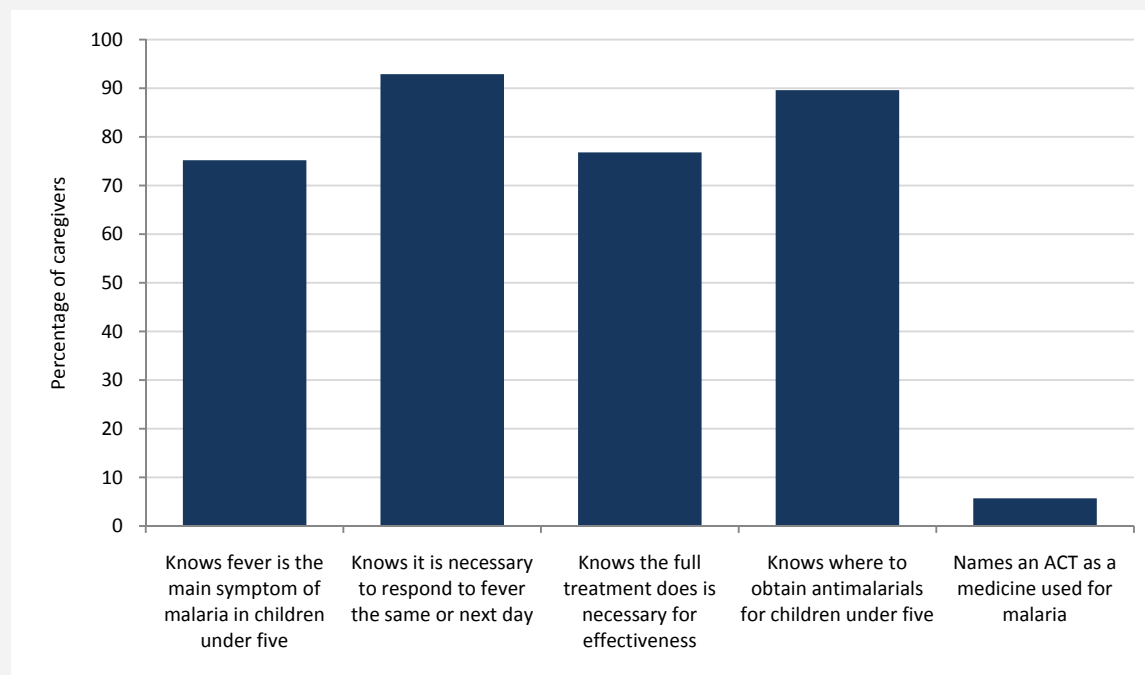


CAREGIVER KNOWLEDGE, PRACTICES AND BELIEFS

General knowledge of malaria and treatment of fever is moderately high among caregivers of children under five. 93% know that fever in children requires a prompt response, although fewer caregivers know that fever is the main symptom of malaria in children under five (75%), and that the full treatment dose is required for drug efficacy (77%).

90% of caregivers report knowing where to obtain antimalarials for children under five. However, when asked to name medicines used for treating malaria, only 6% of caregivers spontaneously named an ACT.

Figure 9. Caregiver knowledge, practices and beliefs



DETERMINANTS OF PROMPT TREATMENT OF FEVER IN CHILDREN UNDER FIVE

A full model examining prompt treatment of fever included the following determinants: household residence and wealth, caregiver education and age, child age, and psychometric scales measuring opportunity, ability and motivation to treat fever with an antimalarial.

Determinants with significant adjusted associations with prompt (same/next day) antimalarial treatment include: treatment beliefs that favour the use of modern medicines (AOR=1.66, $p<0.01$); perceived affordability of antimalarial treatment (AOR=1.18, $p<0.05$); knowledge of fever as the main symptom of malaria in children under five (AOR=1.74, $p<0.001$). In addition, caregiver's level of education was significantly associated with a child receiving prompt treatment (AOR=1.52, $p<0.05$ for caregivers who have completed primary education, compared to caregivers with incomplete primary or no education). There was also evidence that older children were more likely to receive prompt treatment (AOR=1.07, $p<0.05$ for a one-year increase in child's age between 0 and 4 years).

Country Background

The Democratic Republic of Congo (DRC) has a population of 70.9 million and is the third largest country in Africa.¹ The per capita gross domestic product is \$300 (2010 estimate), ranking DRC joint lowest in the world, and an estimated 71% of the population live below the national poverty line (2005 estimate).² The country has experienced two decades of civil war and there is continuing violence in the east of the country that can be characterized as a humanitarian crisis.³ The health system has been practically destroyed and the government currently has limited capacity to rebuild the social sector. The country's support infrastructure, including road and rail networks, is equally weak.⁴

It is estimated that one in five children dies before reaching their fifth birthday.⁵ Malaria is one of the leading causes of mortality in DRC and the country has one of the highest malaria burdens in Africa. There were an estimated 23.6 million malaria cases in 2006, and annually 96,000 deaths are attributed to malaria.⁶

Epidemiology and Malaria Control Strategies

97% of the population lives in areas with stable, perennial malaria transmission (with seasonal peaks in the country's tropical zone) while the remaining 3% lives in areas with unstable malaria. The mountainous regions in the east of the country, including parts of Katanga, the Kivus and Ituri, are generally considered unstable and at risk of malaria epidemics. *P. falciparum* is the predominant parasite species, responsible for 95% of infections.⁷

In mid-2007, the country adopted a new national malaria control plan (*Faire Reculer le Paludisme Plan Strategique 2007–2011*) that encompasses the main WHO-recommended malaria control interventions. The challenge is to operationalize the plan across DRC's 11 provinces given the large distances involved, poor infrastructure, limited capacity and financial resource constraints.

National Treatment Policy

In 2005, the national malaria control program adopted artesunate-amodiaquine (ASAQ) as the first-line treatment for uncomplicated malaria. Quinine is the recommended treatment should the first-line treatment fail, and for the treatment of severe malaria. Sulfadoxine-pyrimethamine (SP) is used for Intermittent Preventive Treatment of malaria in pregnancy. The MOH introduced community case management guidelines in 2007 which included community-level deployment of ACTs.

The public health system relies on a cost-recovery model and antimalarial treatment is available to patients for a fee that varies across public health facilities. Recent studies suggest that the use of ACTs for treating malaria is rare. According to the 2007 DHS, among children under five with suspected malaria less than one percent (0.6%) were treated with ACTs.⁸ Oral artemisinin monotherapies (AMTs) were banned in DRC in 2007,⁹ however anecdotal evidence suggests that enforcement of the ban did not begin until late 2009.

The policy on diagnosis is quite narrow, restricting its focus to treatment failure and complicated malaria. At the peripheral level (health centre), there is generally no diagnostic capacity and suspected malaria cases are treated based on clinical signs. At the referral level, the guideline states that laboratory confirmation is obligatory where there is no response to first-line treatment of clinically diagnosed malaria and for complicated malaria cases. Pilot testing of rapid diagnostic tests at the health centre level is taking place in 11 health zones in patients over the age of five.

¹ CIA (2009). CIA World Factbook: Democratic Republic of Congo. <https://www.cia.gov/library/publications/the-world-factbook/geos/cg.html>.

² World Bank Group (2011). World Bank Data Catalog: Democratic Republic of Congo. <http://data.worldbank.org/country/CD>.

³ International Crisis Group (2010). DR Congo homepage. <http://www.crisisgroup.org/en/regions/africa/central-africa/dr-congo.aspx>.

⁴ Programme National de Lutte contre le Paludisme, Ministère de la Santé RDC (2007). *Faire Reculer le Paludisme Plan Strategique 2007–2011*.

⁵ UNICEF (2009). *State of the World's Children 2009*. pages 118 – 121.

⁶ WHO (2008). *World Malaria Report 2008*. WHO/HTM/GMP/2008.1, page 66-68.

⁷ Programme National de Lutte contre le Paludisme, Ministère de la Santé RDC (2007). *Faire Reculer le Paludisme Plan Strategique 2007–2011*.

⁸ Ministère du Plan et Macro International. 2008. *Enquête Démographique et de Santé, République Démocratique du Congo 2007*.

⁹ WHO (2009). *World Malaria Report 2009*, WHO/HTM/GMP/2009.1, page 97.

Antimalarial Treatment Distribution and Delivery

The health sector in DRC is largely unregulated and scant information exists regarding the private sector. The public sector is built around the health zone (*zone de santé*), an administrative area at the periphery that typically covers a population of 100,000 people. Each health zone is organized around a central office, which includes a general referral hospital and is divided into health areas where health centres operate. There are currently more than 6,000 health centres scattered across 515 health zones covering the country.¹⁰

Similarly, the pharmaceutical sector in DRC has little or no governmental oversight. No database of registered products exists, which makes determining the list of products registered and authorized for sale challenging. The pharmaceutical sector is highly fragmented, and in the public sector there are multiple parallel pharmaceutical supply systems driven largely by the specific donor providing support for a given region. The unregulated private sector generally does not comply with the national treatment policies.¹¹

The introduction of the new treatment policy in the public sector has been hindered by the low availability of ASAQ although the scale-up of ASAQ introduction is underway through funding from various external donors. In recent years, ACTs have been procured through funding from the Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM) Round 3 grant, USAID, and the World Bank. Rapid diagnostic tests have been introduced at the peripheral level through a pilot project in 11 health zones that was supported by the GFATM Round 3. It is anticipated that use of RDTs will be expanded through the GFATM Round 8 grant.

Malaria Financing

Malaria control is largely financed by external donors and has grown substantially since 2008, including funding for ACTs. DRC secured a \$53 million Round 3 grant from the GFATM which ran until mid-2009 and provided ACTs to approximately 25% of health zones in the country. Through a World Bank Malaria Booster grant (\$130 million over 5 years), DRC is receiving a further 6.6 million ACT treatments. The World Bank is currently providing treatments to 31% of health zones in the country. USAID provided approximately \$7 million annually through the AXxes Project (2007-2009) which included ACTs for 57 health zones in 4 provinces. USAID funding increased to \$18 million in 2010, and most recently \$37 million has been announced under the President's Malaria Initiative (PMI) for 2011. The PMI plan includes increasing the number of health zones supported by USAID, from 80 to 112, across 4 provinces. From 2008 to 2010, African Development Bank funding covered ACT procurement for 26 health zones in eastern DRC. At the same time, UNICEF is covering the ACT requirements of 40 health zones across the country.

¹⁰ Programme National de Lutte contre le Paludisme, Ministère de la Santé RDC (2007). Faire Reculer le Paludisme Plan Stratégique 2007 – 2011

¹¹ Adeya, G. et al (2009). "Assessing the Procurement, Distribution, and System-Strengthening Needs for the Pharmaceutical System in the Democratic Republic of the Congo, October 2008". Submitted to the USAID. Arlington, VA: Management Sciences for Health.

Results:

Core Indicators

Table 1. Prompt treatment of fever among children under five

Percentage of children under five with fever in the two weeks preceding the survey who reportedly took an antimalarial drug, took an antimalarial drug the same/next day, and received a diagnosis, by background characteristics.

	Percentage who took an antimalarial	Percentage who took an antimalarial the same/next day	Percentage who received a diagnosis	Number of children with fever
Age (in years)	%	%	%	n
<1	41.3	34.0	18.4	498
1	39.9	31.4	15.3	547
2	38.5	31.0	15.4	570
3	45.8	37.3	14.1	555
4	48.7	40.1	13.9	495
Strata				
Centre-South	44.8	39.3	12.0	804
Kinshasa	52.6	32.4	39.3	675
North-East	32.0	24.9	13.7	638
North-West	48.7	40.9	12.4	548
Caregiver's education				
No education	33.1	27.2	10.9	272
Some primary	30.2	24.5	10.8	556
Primary completed, plus	49.1	39.8	17.9	1,830
Wealth index				
Poorest	39.5	34.2	7.3	521
Second	33.5	29.6	11.3	506
Middle	45.3	36.5	15.4	531
Fourth	45.8	36.1	19.3	530
Richest	55.2	38.6	31.9	538
All children	42.7	34.6	15.4	2,665*

* n=2,659 children under five with fever contribute to the diagnosis results; education status is missing for 7 caregivers, thus for this category n=2,658 (took an antimalarial) and n=2,652 (received a diagnosis); wealth classification is missing for 39 cases, thus for this category n=2,626 (took an antimalarial) and n=2,620 (received a diagnosis).

Table 2. Type and timing of antimalarial drugs among children under five

Percentage of children under five with fever in the two weeks preceding the survey who took a given antimalarial treatment, and percentage who took a given antimalarial treatment on the same day or the next day after developing fever, by background characteristics.

	Percentage who took:							Percentage who took the drug on the same or the next day:							Number of children with fever
	SP	CQ	QN	AQ	AMT	First Line (ASAQ)	Any ACT	SP	CQ	QN	AQ	AMT	First Line (ASAQ)	Any ACT	
Age (in years)	%	%	%	%	%	%	%	%	%	%	%	%	%	%	n
<1	0.6	0.2	30.5	4.5	2.7	2.5	3.8	0.6	0.2	24.6	3.9	2.2	1.6	2.6	498
1	0.7	0.9	26.3	7.7	1.6	3.5	4.6	0.5	0.6	20.9	5.8	1.6	2.3	3.0	547
2	1.3	0.2	24.3	8.5	1.9	2.7	3.6	1.1	0.0	19.1	7.4	1.4	2.3	2.8	570
3	2.6	0.0	27.1	9.4	3.9	2.6	3.8	2.1	0.0	23.2	7.5	2.7	2.0	2.6	555
4	3.7	1.0	27.4	8.2	2.3	4.0	6.8	3.0	0.9	23.0	6.2	2.3	3.4	4.7	495
Strata															
Centre-South	0.9	0.8	29.1	8.8	3.6	1.4	2.6	0.8	0.8	25.6	7.5	3.1	1.1	2.1	804
Kinshasa	0.7	0.2	33.9	6.8	4.3	1.8	7.6	0.3	0.0	21.5	4.4	2.8	0.4	3.4	675
North-East	1.6	0.5	19.9	3.9	1.4	5.0	6.0	1.6	0.3	15.4	2.7	0.9	3.9	4.4	638
North-West	3.5	0.2	29.9	11.1	1.6	3.3	3.8	2.6	0.0	25.6	9.4	1.6	2.6	2.7	548
Caregiver's education															
No education	1.6	0.4	15.8	10.1	1.6	5.2	5.6	1.2	0.4	12.4	8.5	1.2	4.4	4.4	272
Some primary	1.0	0.8	19.8	5.9	1.1	2.0	2.3	1.0	0.6	16.0	4.7	0.9	1.7	1.8	556
Primary completed, plus	2.1	0.4	31.9	8.0	3.2	3.0	5.0	1.6	0.3	26.2	6.3	2.6	2.1	3.4	1,830
Wealth index															
Poorest	2.1	0.6	23.0	10.3	1.9	3.3	3.5	1.9	0.4	19.6	8.7	1.4	3.0	3.3	521
Second	0.6	0.5	21.6	6.4	0.9	3.9	4.1	0.4	0.5	18.7	5.5	0.9	3.3	3.5	506
Middle	1.9	0.4	31.0	7.7	1.6	2.5	3.5	1.3	0.2	26.3	5.3	1.5	2.0	2.3	531
Fourth	1.4	0.4	29.4	6.3	4.0	3.0	4.9	1.3	0.3	23.9	5.2	3.0	1.4	2.8	530
Richest	3.2	0.3	33.7	7.4	6.0	1.6	7.2	2.3	0.3	23.0	5.8	4.9	0.2	3.4	538
All children	1.8	0.5	27.0	7.7	2.5	3.0	4.5	1.4	0.3	22.1	6.2	2.0	2.3	3.1	2,665*

* Information on the timing of treatment is missing for 25 cases where antimalarial treatment was received, thus for these indicators n=2,640; education status is missing for 7 caregivers, thus for this category n=2,658 (took an antimalarial) and n=2,633 (took an antimalarial same/next day); wealth classification is missing for 39 cases, thus for this category n=2,626 (took an antimalarial) and n=2,602 (took an antimalarial same/next day).

Table 3. Source of antimalarials, among children under five who received an antimalarial treatment[†]

Source of antimalarial and ACT treatment for children under five with fever in the two weeks preceding the survey, among children who received an antimalarial (and an ACT) treatment, by background characteristics.

	Source of antimalarial (AM) treatment among treated children:								Source of ACT among children treated with ACT:							
	Public Health Facility	Private Health Facility	Drug Store	Kiosk	Hawker	At home	Other	# of children treated with AM	Public Health Facility	Private Health Facility	Drug Store	Kiosk	Hawker	At home	Other	# of children treated with ACT
Age (in years)	%	%	%	%	%	%	%	n	%	%	%	%	%	%	%	n
<1	27.6	14.2	49.7	0.6	0.6	7.3	0.0	214	53.1	19.1	19.1	0.0	0.0	8.8	0.0	24
1	32.6	11.7	50.9	0.6	0.6	4.8	0.6	223	49.9	14.4	30.7	0.0	0.0	0.0	5.1	26
2	27.3	14.8	50.0	1.6	1.2	5.6	0.2	233	25.3	22.0	46.4	0.0	0.0	6.3	0.0	25
3	23.7	19.2	49.3	1.0	1.9	5.5	0.0	261	28.8	25.9	45.3	0.0	0.0	0.0	0.0	21
4	25.5	15.2	52.9	0.6	0.6	5.1	0.6	255	48.2	10.7	37.1	0.0	4.0	0.0	0.0	35
Strata																
Centre-South	15.4	22.4	56.3	0.8	0.6	5.0	0.0	360	28.6	33.3	38.1	0.0	0.0	0.0	0.0	21
Kinshasa	6.3	6.5	81.3	0.0	0.0	6.5	0.3	355	13.7	11.8	72.6	0.0	0.0	2.0	0.0	51
North-East	35.0	17.5	40.0	1.5	1.0	5.5	0.5	204	51.4	16.2	27.0	0.0	2.7	2.7	0.0	38
North-West	43.6	8.7	39.1	0.8	1.9	6.0	0.4	267	60.0	10.0	20.0	0.0	0.0	5.0	5.0	21
Caregiver's education																
No education	45.8	18.1	29.8	0.0	2.5	5.0	0.0	91	61.5	0.00	23.1	0.0	7.7	7.7	0.0	14
Some primary	32.8	17.9	40.6	2.0	2.7	3.9	0.0	170	44.0	17.8	38.2	0.0	0.0	0.0	0.0	14
Primary completed, +	23.7	14.0	55.5	0.7	0.4	6.1	0.4	921	38.6	19.6	38.4	0.0	0.0	2.0	1.5	102
Wealth index																
Poorest	53.4	7.2	28.7	2.0	3.0	5.8	0.5	206	72.8	5.6	4.8	0.0	5.6	11.2	0.0	18
Second	29.7	13.8	50.5	2.4	0.6	3.6	0.6	170	56.2	14.6	24.1	0.0	0.0	0.0	5.1	20
Middle	20.4	20.0	56.5	0.0	0.9	2.6	0.0	236	37.0	11.9	51.1	0.0	0.0	0.0	0.0	18
Fourth	14.4	13.8	62.1	0.0	0.0	9.5	0.2	249	33.9	22.9	41.2	0.0	0.0	2.0	0.0	26
Richest	11.5	22.6	60.5	0.0	0.0	6.4	0.0	307	7.3	32.9	59.7	0.0	0.0	0.0	0.0	45
All children	27.2	15.1	50.6	0.9	1.0	5.6	0.3	1,186*	42.1	17.4	35.7	0.0	1.1	2.5	1.1	131*

[†]Information on treatment source is missing for 11 antimalarial cases (2 ACT cases), thus for all children n=1,175 and n=129 respectively; education status is further missing for 4 antimalarial cases (1 ACT case), thus for this category n=1,171 (antimalarial source) and n=128 (ACT source); wealth classification is missing for 18 antimalarial cases (4 ACT cases), thus for this category n=1,157 (antimalarial source) and n=125 (ACT source).

Table 4. Cost of antimalarial treatment for children under five[†]Median price in USD[‡] paid for a single antimalarial drug regimen acquired for a child under five with fever.*

	SP	Chloroquine	Quinine	Amodiaquine	Artemisinin monotherapy	First-line (ASAQ)	Any ACT	All antimalarials
Source of treatment	\$	\$	\$	\$	\$	\$	\$	\$
Public health facility	0.29 ⁽⁸⁾	-	0.68 ⁽⁸¹⁾	0.11 ⁽¹⁹⁾	1.37 ⁽⁸⁾	0.17 ⁽¹²⁾	0.00 ⁽¹⁶⁾	0.57 ⁽¹³²⁾
Private health facility	-	0.43 ⁽²⁾	1.71 ⁽⁴³⁾	0.00 ⁽¹⁸⁾	0.00 ⁽¹³⁾	1.14 ⁽¹²⁾	0.91 ⁽¹⁶⁾	0.80 ⁽⁹²⁾
Drug Store/Pharmacy	0.57 ⁽¹⁷⁾	0.23 ⁽⁵⁾	0.57 ⁽³⁶⁰⁾	0.17 ⁽⁸⁷⁾	2.51 ⁽¹⁷⁾	0.46 ⁽¹⁴⁾	1.14 ⁽⁴⁵⁾	0.57 ⁽⁵³¹⁾
Kiosk	-	-	0.34 ⁽⁴⁾	1.71 ⁽⁴⁾	-	-	-	0.40 ⁽⁸⁾
Hawker	-	-	0.55 ⁽⁵⁾	0.11 ⁽¹⁾	-	0.17 ⁽¹⁾	0.17 ⁽¹⁾	0.17 ⁽⁷⁾
Other	-	-	0.40 ⁽²⁾	-	-	0.00 ⁽¹⁾	0.00 ⁽¹⁾	0.40 ⁽³⁾
All Sources**	0.57⁽²⁵⁾	0.23⁽⁷⁾	0.68⁽⁴⁹⁵⁾	0.17⁽¹³⁰⁾	1.37⁽³⁸⁾	0.55⁽⁴⁰⁾	0.57⁽⁷⁹⁾	0.57⁽⁷⁷⁴⁾

[†] This table reports the median price paid for an antimalarial drug regimen only. In particular, it does not reflect additional costs to the household such as subscriptions; consultation fees; non-antimalarial medicines bought to treat the fever; and travel costs incurred to reach the source of treatment.

[‡] 1 USD = 925.17 CDF at the time of data collection.

* Price for n=375 antimalarials was reported as "Don't know"; prices for a further 27 cases were excluded due to inconsistencies between different values recorded during the interview; 70 antimalarials (53 with non-missing price information) were reported as being sourced "At home", these are excluded from the analysis above as it is not possible to determine the original source of these cases.

** Including n=1 antimalarial (amodiaquine) without source information.

Table 4a. Cost of tablet-formulation antimalarial treatment for children under five[†]

Median price in USD[‡] paid for a single tablet-formulation antimalarial drug regimen acquired for a child under five with fever.*

	SP	Chloroquine	Quinine	Amodiaquine	Artemisinin monotherapy	First-line (ASAQ)	Any ACT	All antimalarials
Source of treatment	\$	\$	\$	\$	\$	\$	\$	\$
Public health facility	0.29 ⁽⁸⁾	-	0.57 ⁽⁴²⁾	0.11 ⁽¹⁴⁾	0.00 ⁽⁴⁾	0.17 ⁽¹²⁾	0.00 ⁽¹⁴⁾	0.34 ⁽⁸²⁾
Private health facility	-	0.86 ⁽¹⁾	0.80 ⁽¹³⁾	0.34 ⁽⁶⁾	1.14 ⁽⁶⁾	1.14 ⁽¹²⁾	0.91 ⁽¹³⁾	0.86 ⁽³⁹⁾
Drug Store/Pharmacy	0.57 ⁽¹⁷⁾	0.23 ⁽⁵⁾	0.34 ⁽²¹²⁾	0.14 ⁽⁵¹⁾	2.00 ⁽⁴⁾	0.46 ⁽¹⁴⁾	0.57 ⁽²²⁾	0.34 ⁽³¹¹⁾
Kiosk	-	-	0.34 ⁽⁴⁾	0.40 ⁽²⁾	-	-	-	0.34 ⁽⁶⁾
Hawker	-	-	0.55 ⁽⁴⁾	0.11 ⁽¹⁾	-	0.17 ⁽¹⁾	0.17 ⁽¹⁾	0.17 ⁽⁶⁾
Other	-	-	0.40 ⁽¹⁾	-	-	0.00 ⁽¹⁾	0.00 ⁽¹⁾	0.48 ⁽²⁾
All Sources**	0.57⁽²⁵⁾	0.23⁽⁶⁾	0.40⁽²⁷⁶⁾	0.11⁽⁷⁵⁾	1.14⁽¹⁴⁾	0.55⁽⁴⁰⁾	0.57⁽⁵¹⁾	0.34⁽⁴⁴⁷⁾

[†] This table reports the median price paid for an antimalarial drug regimen only. In particular, it does not reflect additional costs to the household such as subscriptions; consultation fees; non-antimalarial medicines bought to treat the fever; and travel costs incurred to reach the source of treatment.

[‡] 1 USD = 925.17 CDF at the time of data collection.

* Price for n=178 antimalarials was reported as "Don't know"; prices for a further 18 cases were excluded due to inconsistencies between different values recorded during the interview; 39 antimalarials (28 with non-missing price information) were reported as being sourced "At home", these are excluded from the analysis above as it is not possible to determine the original source of these cases.

** Including n=1 antimalarial (amodiaquine) without source information.

Supplementary Indicators

Table 5. Treatment-seeking behaviour

Caregiver's primary treatment source, and reason for seeking treatment at this source among those who sought treatment, among children with fever in the two weeks preceding the survey.

	Percentage of children
Source of treatment	%
Public health facility	16.0
Private health facility	10.1
Drug Store/Pharmacy	36.5
Kiosk	1.3
Hawker	2.3
Treatment at home	23.2
Other source (neighbour or traditional healer)	0.9
Did not seek treatment	9.4
Number of children	2,661
Reason for treatment source	
Close by or easy to reach	34.3
Reputation for quality treatment	10.0
Availability of inexpensive treatment	5.7
"No money to go elsewhere" [†]	25.1
Availability of modern medicine	10.5
Felt illness did not merit more intensive care	10.3
Other	4.2
Number of children that sought treatment	2,423

[†] This option was included on the questionnaire as a complement to "Availability of inexpensive treatment".

Table 6. Demand for specific antimalarial drugs

Percentage of children with fever in the two weeks preceding the survey whose caregiver reportedly requested an antimalarial treatment by name, among children that received an antimalarial treatment, by type of antimalarial acquired.

	Percentage of treated children who received an antimalarial requested by their caregiver	Number of treated children with request information available
Type of antimalarial acquired	%	n
First-line (ASAQ)	21.6	69
Any ACT	33.3	124
SP	50.3	36
Chloroquine	32.0	11
Quinine	41.1	701
Amodiaquine	34.0	187
Artemisinin monotherapy	21.3	69
All children	38.5*	1,102*

* Categories are not mutually exclusive, first-line treatment also falls within the ACT category; n=42 children received 2 antimalarial treatments and n=1 child received 3 antimalarial treatments: strictly, 38.5% of children with fever received at least one antimalarial requested by their caregiver.

Table 7. Relative number of antimalarial treatments acquired

Relative number of antimalarial treatments acquired for children under five with fever in the two weeks preceding the survey, by type of antimalarial.

	Relative number of treatments	Number of treatments
Type of antimalarial	%	n
First-line (ASAQ)	6.8	73
Any ACT	10.1	131
SP	4.0	41
Chloroquine	1.0	11
Quinine	61.5	760
Amodiaquine	17.9	210
Artemisinin monotherapy	5.6	76
Total		1,229*

* Categories are not mutually exclusive; first-line treatment also falls within the ACT category.

Table 8. Caregiver knowledge and practices

Percentage of caregivers of children under five with fever in the two weeks preceding the survey who have correct knowledge of malaria symptoms and treatment, know of an outlet where antimalarials can be obtained, and show knowledge of ACTs.

	Percentage of caregivers	Number of caregivers
Malaria knowledge	%	n
Knows that fever is the main symptom of malaria in children under five	75.2	2,328
Knows to respond to fever the same or next day	92.9	2,316
Knows the full treatment dose is necessary for effectiveness	76.8	2,327
Knowledge of treatment source		
Knows where to obtain antimalarials for children under five	89.6	2,327
Knowledge of ACTs		
Spontaneously names ASAQ or an ASAQ brand when asked to name medicines used for treating malaria	3.1	2,331

Table 9. Caregiver beliefs on the most effective antimalarial treatment

Type of antimalarial identified by caregivers of children under five with fever in the two weeks preceding the survey as most effective for malaria in children under five, pregnant women and adults.

	Percentage of caregivers who cite antimalarial type as most effective for treating:		
	Children under five	Pregnant women	Adults
Antimalarial type	%	%	%
First-line (ASAQ)	2.0	0.2	1.0
Any ACT	2.6	0.5	1.3
SP	1.4	12.9	3.1
Chloroquine	0.7	1.1	0.8
Quinine	47.8	9.3	46.2
Amodiaquine	8.0	2.4	8.4
Artemisinin monotherapy	3.1	3.2	4.3
Non-antimalarial [‡]	7.9	7.0	6.3
“Don’t know”	28.4	63.6	29.6
Number of caregivers	2,331	2,331	2,331

[‡] Medicines identified by the caregiver that are not antimalarials, including pain-relievers and fever-reducers.

Determinants of Prompt Treatment of Fever in Children under Five

Several potential determinants of prompt treatment seeking behaviour were explored in this study. Behavioural determinants were measured using scales or indices. Qualitative research among children's caregivers was conducted to identify behavioural determinants related to opportunity, ability and motivation to seek prompt and effective treatment for fever. Focus group discussions and individual in-depth illness narratives were conducted among children's caregivers to identify relevant determinants and develop scale and index items. Items were generated in the vernacular of the target group. Agreement with each scaled item statement was measured on a four-point likert scale (strongly agree, agree, disagree, strongly disagree). Determinants were pilot tested on 141 respondents and psychometric analyses were conducted to refine the scaled items further and ensure reliability of constructs. Scale development was guided by exploratory factor analysis (principal axis factoring with varimax rotation) and scale reliability was assessed using Cronbach's alpha. Mean scale item scores were created. Resulting determinants include:

- Perceived availability of antimalarial treatment in the community
- Perceived affordability of antimalarials
- Perceived quality of care at (formal) health facilities
- Beliefs and attitudes towards prompt and appropriate treatment-seeking behaviour
- Spousal support to seek treatment for fever in children
- Locus of control over requesting antimalarial treatment
- Financial Resources (the ability to raise money for treatment)
- Outcome expectations with respect to modern antimalarial treatments
- Perceived threat that malaria poses to child health and survival

Determinants were further refined based on responses from the 2,326 caregivers who completed the scale item questions during interview. A summary of final scale items and properties is provided in Appendix D.

An initial model included background characteristics of the household, caregiver and child. Adjusted associations for each additional determinant were examined. The final model includes only those determinants with significant ($p < 0.05$) or marginally significant ($p < 0.10$) adjusted associations (see Table 10).

Significant determinants include:

- **Outcome expectations:** measured with 3 items (see Appendix D) assessing beliefs about the benefits of treating malaria with modern medicines.
- **Affordability of antimalarials:** measured with 4 items (see Appendix D) assessing caregiver perceived affordability of antimalarials in the local community.
- **Main symptom of malaria:** measured with 1 question, "What is the main sign of malaria in a child under 5 years of age?"
- **Caregiver's education:** collected as a background characteristic of all caregivers, and for the model classified as none or incomplete primary; primary complete; started secondary and higher.
- **Child's age:** measured in years.

These results suggest that children with fever are significantly more likely to receive prompt antimalarial treatment for fever if their caregiver's 1) possesses beliefs and attitudes that are more conducive to treating fever with a modern medicine; 2) perceives antimalarial treatment as affordable; 3) knows that fever is the main symptom of malaria in children under five; and 4) has at least completed primary education. Furthermore, these results also suggest that older children are more likely to receive prompt treatment than younger children.

Table 10. Determinants of prompt treatment of fever in children under five

Adjusted odds ratios predicting treatment of fever with an antimalarial drug the same or next day after onset of fever in children under five with fever in the two weeks preceding the survey.

	Background		Opportunity, Ability & Motivation	
	AOR	95% CI	AOR	95% CI
Strata (Ref: Kinshasa)				
Centre-South	1.61*	(1.08-2.38)	1.70**	(1.17-2.48)
North-East	0.99	(0.59-1.68)	0.98	(0.57-1.67)
North-West	1.95*	(1.08-3.54)	1.78†	(0.98-3.24)
Residence (Ref: Urban)				
Rural	0.81	(0.51-1.31)	0.90	(0.56-1.43)
Wealth index (Ref: Lowest quintile)				
Second	0.74	(0.49-1.12)	0.73	(0.49-1.11)
Middle	0.87	(0.52-1.44)	0.81	(0.48-1.36)
Fourth	0.85	(0.51-1.42)	0.77	(0.46-1.28)
Highest	0.84	(0.49-1.43)	0.79	(0.47-1.34)
Age				
Caregiver	1.06*	(1.00-1.12)	1.05	(0.99-1.11)
Caregiver ²	1.00*	(1.00-1.00)	1.00	(1.00-1.00)
Child	1.08*	(1.01-1.15)	1.07*	(1.01-1.15)
Caregiver education (Ref: None/primary incomplete)				
Primary complete	1.66**	(1.17-2.36)	1.52*	(1.07-2.17)
Some secondary, or higher	1.89***	(1.43-2.51)	1.66***	(1.26-2.17)
Main symptom of malaria				
Names fever as the main symptom of malaria	-	-	1.74***	(1.32-2.28)
Affordability of antimalarials				
Higher perceived affordability	-	-	1.18*	(1.02-1.37)
Outcome expectations				
Greater belief in efficacy of modern treatments	-	-	1.66**	(1.22-2.24)
Observations	2592		2582	
Model F-test	F(13,60) = 2.74**		F(16,57) = 4.41***	

† p<0.10 * p<0.05 ** p<0.01 *** p<0.001

Appendix A. Treatment of Fever among People Age Five & Above

Table A 1. Treatment-seeking behaviour and price paid for antimalarials, among people age five and above

Percentage of people age five and above with fever in the two weeks preceding the survey who received an antimalarial treatment; the median price paid for acquired antimalarial regimens, by antimalarial type and age of recipient.

	Percentage of children aged 5-15	Percentage of adults aged 16+
Treatment-seeking	%	%
Received an antimalarial	37.9	31.4
Number of children/adults	276	307
	Median price (n) among children aged 5-15	Median price (n) among adults aged 16+
Median price in USD[‡] paid for a single antimalarial drug regimen	\$	\$
Centre-South	0.91 ⁽¹⁵⁾	1.37 ⁽²³⁾
Kinshasa	0.91 ⁽³¹⁾	0.91 ⁽²³⁾
North-East	1.08 ⁽¹⁰⁾	0.46 ⁽⁹⁾
North-West	0.37 ⁽¹⁴⁾	0.57 ⁽¹¹⁾
First-line (ASAQ)	1.71 ⁽⁵⁾	1.54 ⁽⁴⁾
Any ACT	1.71 ⁽⁷⁾	2.05 ⁽⁹⁾
SP	0.34 ⁽⁷⁾	0.46 ⁽¹¹⁾
Chloroquine	-	0.46 ⁽¹⁾
Quinine	0.86 ⁽⁴²⁾	1.20 ⁽³⁴⁾
Amodiaquine	0.23 ⁽⁹⁾	0.46 ⁽⁸⁾
Artemisinin monotherapy	3.42 ⁽⁵⁾	4.96 ⁽³⁾
All antimalarials[*]	0.68⁽⁷⁰⁾	1.14⁽⁶⁶⁾

[‡] 1 USD = 925.17 CDF at the time of data collection.

^{*} Price for n=60 antimalarials was reported as "Don't know"; prices for a further 7 cases were excluded due to inconsistencies between different values recorded during the interview; for consistency with Table 4, 7 antimalarials with non-missing price information that were reported as being sourced "At home" were excluded from the analysis above.

Table A 2. Relative number of antimalarial treatments acquired for children age 5 to 15

Relative number of antimalarial treatments acquired for children age 5 to 15 with fever, by stratum and antimalarial type.

	Centre-South		Kinshasa		North-East		North-West		All strata	
	Relative number of TxS	Number of TxS	Relative number of TxS	Number of TxS	Relative number of TxS	Number of TxS	Relative number of TxS	Number of TxS	Relative number of TxS	Number of TxS
Antimalarial Type	%	n	%	n	%	n	%	n	%	n
First-line (ASAQ)	6.3	1	3.4	2	18.2	4	-	0	7.7	7
Any ACT	6.3	1	8.5	5	22.7	5	5.9	1	11.8	12
SP	6.3	1	1.7	1	-	0	29.4	5	8.6	7
Chloroquine	-	0	-	0	-	0	-	0	-	0
Quinine	68.8	11	71.2	42	54.6	12	23.5	4	54.2	69
Amodiaquine	-	0	5.1	3	13.6	3	41.2	7	15.3	13
Artemisinin monotherapy	18.8	3	13.6	8	9.1	2	-	0	10.0	13
Total		16*		59*		22*		17*		114*

Txs: Treatments

*Categories are not mutually exclusive; first-line treatment also falls within the ACT category.

Table A 3. Relative number of antimalarial treatments acquired for people age 16 and above

Relative number of antimalarial treatments acquired for people age 16 and above with fever, by stratum and antimalarial type.

	Centre-South		Kinshasa		North-East		North-West		All strata	
	Relative number of TxS	Number of TxS	Relative number of TxS	Number of TxS	Relative number of TxS	Number of TxS	Relative number of TxS	Number of TxS	Relative number of TxS	Number of TxS
Antimalarial Type	%	n	%	n	%	n	%	n	%	n
First-line (ASAQ)	6.9	2	3.2	1	18.8	3	15.0	3	11.4	9
Any ACT	13.8	4	12.9	4	18.8	3	15.0	3	15.1	14
SP	6.9	2	22.6	7	18.8	3	25.0	5	16.9	17
Chloroquine	-	0	-	0	-	0	5.0	1	1.4	1
Quinine	65.5	19	45.2	14	50.0	8	25.0	5	47.7	46
Amodiaquine	6.9	2	9.7	3	12.5	2	30.0	6	15.1	13
Artemisinin monotherapy	6.9	2	9.7	3	-	0	-	0	3.8	5
Total		29*		31*		16*		20*		96*

Txs: Treatments

*Categories are not mutually exclusive; first-line treatment also falls within the ACT category.

Appendix B. Antimalarials Acquired for Children under Five: Price and Relative Number of Treatments, by Strata

Table B1a. Cost of antimalarial treatment for children under five (Centre-South)

Median price in USD[†] paid for a single antimalarial (AM) drug regimen acquired for a child with fever in the Centre-South stratum.*

	SP	Chloroquine	Quinine	Amodiaquine	AMT	First-line (ASAQ)	Any ACT	All AMs
Source of treatment	\$	\$	\$	\$	\$	\$	\$	\$
Public health facility	0.63 ⁽²⁾	-	1.54 ⁽²⁶⁾	1.37 ⁽⁵⁾	2.28 ⁽³⁾	0.37 ⁽²⁾	0.74 ⁽³⁾	1.37 ⁽³⁹⁾
Private health facility	-	0.43 ⁽²⁾	1.71 ⁽²⁵⁾	0.00 ⁽¹³⁾	0.46 ⁽¹⁰⁾	0.34 ⁽³⁾	0.00 ⁽⁷⁾	0.57 ⁽⁵⁷⁾
Drug Store / Pharmacy	1.14 ⁽⁵⁾	0.34 ⁽²⁾	0.54 ⁽¹³⁷⁾	0.17 ⁽³¹⁾	1.57 ⁽⁶⁾	0.55 ⁽⁵⁾	0.57 ⁽⁸⁾	0.57 ⁽¹⁸⁹⁾
Kiosk	-	-	0.08 ⁽¹⁾	0.57 ⁽³⁾	-	-	-	0.40 ⁽⁴⁾
Hawker	-	-	2.28 ⁽¹⁾	-	-	-	-	2.28 ⁽¹⁾
Other	-	-	-	-	-	-	-	-
All Sources	0.68⁽⁷⁾	0.34⁽⁴⁾	0.74⁽¹⁹⁰⁾	0.17⁽⁵²⁾	1.37⁽¹⁹⁾	0.44⁽¹⁰⁾	0.56⁽¹⁸⁾	0.57⁽²⁹⁰⁾

[†] 1 USD = 925.17 CDF at the time of data collection.

* Price for n=58 antimalarials was reported as "Don't know"; prices for a further 9 cases were excluded due to inconsistencies between different values recorded during the interview; 18 antimalarials (15 with non-missing price information) were reported as being sourced "At home", these are excluded from the analysis above as it is not possible to determine the original source of these cases.

Table B1b. Cost of antimalarial treatment for children under five (Kinshasa)

Median price in USD[†] paid for a single antimalarial (AM) drug regimen acquired for a child with fever in Kinshasa.*

	SP	Chloroquine	Quinine	Amodiaquine	AMT	First-line (ASAQ)	Any ACT	All AMs
Source of treatment	\$	\$	\$	\$	\$	\$	\$	\$
Public health facility	-	-	0.00 ⁽⁶⁾	0.00 ⁽²⁾	0.00 ⁽¹⁾	0.34 ⁽³⁾	0.17 ⁽⁴⁾	0.00 ⁽¹³⁾
Private health facility	-	-	0.00 ⁽³⁾	1.25 ⁽¹⁾	0.00 ⁽¹⁾	0.00 ⁽³⁾	0.00 ⁽³⁾	0.00 ⁽⁸⁾
Drug Store / Pharmacy	0.40 ⁽¹⁾	-	1.60 ⁽¹²⁵⁾	1.14 ⁽²⁹⁾	2.51 ⁽⁹⁾	0.60 ⁽²⁾	3.02 ⁽²⁴⁾	1.60 ⁽¹⁸⁸⁾
Kiosk	-	-	-	-	-	-	-	-
Hawker	-	-	-	-	-	-	-	-
Other	-	-	2.51 ⁽¹⁾	-	-	-	-	2.51 ⁽¹⁾
All Sources	0.40	-	1.48⁽¹³⁵⁾	1.10⁽³²⁾	2.28⁽¹¹⁾	0.26⁽⁸⁾	2.05⁽³¹⁾	1.37⁽²¹⁰⁾

[†] 1 USD = 925.17 CDF at the time of data collection.

* Price for n=134 antimalarials was reported as "Don't know"; prices for a further 6 cases were excluded due to inconsistencies between different values recorded during the interview; 23 antimalarials (17 with non-missing price information) were reported as being sourced "At home", these are excluded from the analysis above as it is not possible to determine the original source of these cases.

Table B1c. Cost of antimalarial treatment for children under five (North-East)

Median price in USD[‡] paid for a single antimalarial (AM) drug regimen acquired for a child with fever in the North-East stratum.*

	SP	Chloroquine	Quinine	Amodiaquine	AMT	First-line (ASAQ)	Any ACT	All AMs
Source of treatment	\$	\$	\$	\$	\$	\$	\$	\$
Public health facility	0.14 ⁽²⁾	-	0.34 ⁽¹²⁾	0.00 ⁽⁴⁾	0.00 ⁽³⁾	0.17 ⁽³⁾	0.00 ⁽⁵⁾	0.00 ⁽²⁶⁾
Private health facility	-	-	2.28 ⁽⁹⁾	1.14 ⁽¹⁾	0.57 ⁽²⁾	1.03 ⁽⁴⁾	1.03 ⁽⁴⁾	1.14 ⁽¹⁶⁾
Drug Store / Pharmacy	0.46 ⁽³⁾	0.23 ⁽³⁾	0.57 ⁽⁴³⁾	0.14 ⁽⁷⁾	-	0.46 ⁽⁷⁾	0.51 ⁽²⁰⁾	0.46 ⁽⁶⁶⁾
Kiosk	-	-	0.40 ⁽¹⁾	1.71 ⁽¹⁾	-	-	-	1.05 ⁽²⁾
Hawker	-	-	0.86 ⁽¹⁾	-	-	0.17 ⁽¹⁾	0.17 ⁽¹⁾	0.51 ⁽²⁾
Other	-	-	0.40 ⁽¹⁾	-	-	-	-	0.40 ⁽¹⁾
All Sources[†]	0.29⁽⁵⁾	0.23⁽³⁾	0.57⁽⁶⁷⁾	0.11⁽¹⁴⁾	0.00⁽⁵⁾	0.57⁽¹⁵⁾	0.51⁽²⁰⁾	0.46⁽¹¹⁴⁾

[‡] 1 USD = 925.17 CDF at the time of data collection.

* Price for n=89 antimalarials was reported as "Don't know"; prices for a further 6 cases were excluded due to inconsistencies between different values recorded during the interview; 11 antimalarials (6 with non-missing price information) were reported as being sourced "At home", these are excluded from the analysis above as it is not possible to determine the original source of these cases.

[†] Including n=1 antimalarial (amodiaquine) without source information.

Table B1d. Cost of antimalarial treatment for children under five (North-West)

Median price in USD[‡] paid for a single antimalarial (AM) drug regimen acquired for a child with fever in the North-West stratum.*

	SP	Chloroquine	Quinine	Amodiaquine	AMT	First-line (ASAQ)	Any ACT	All AMs
Source of treatment	\$	\$	\$	\$	\$	\$	\$	\$
Public health facility	0.34 ⁽⁴⁾	-	0.57 ⁽³⁷⁾	0.15 ⁽⁸⁾	0.57 ⁽¹⁾	0.57 ⁽⁴⁾	0.57 ⁽⁴⁾	0.57 ⁽⁵⁴⁾
Private health facility	-	-	1.54 ⁽⁶⁾	0.34 ⁽³⁾	-	2.00 ⁽²⁾	2.00 ⁽²⁾	0.68 ⁽¹¹⁾
Drug Store / Pharmacy	0.40 ⁽⁸⁾	-	0.46 ⁽⁵⁵⁾	0.13 ⁽²⁰⁾	3.14 ⁽²⁾	-	3.42 ⁽³⁾	0.38 ⁽⁸⁸⁾
Kiosk	-	-	0.31 ⁽²⁾	-	-	-	-	0.31 ⁽²⁾
Hawker	-	-	0.17 ⁽³⁾	0.11 ⁽¹⁾	-	-	-	0.14 ⁽⁴⁾
Other	-	-	-	-	-	0.00 ⁽¹⁾	0.00 ⁽¹⁾	0.00 ⁽¹⁾
All Sources	0.40⁽¹²⁾	-	0.57⁽¹⁰³⁾	0.14⁽³²⁾	2.85⁽³⁾	1.14⁽⁷⁾	1.71⁽¹⁰⁾	0.46⁽¹⁶⁰⁾

[‡] 1 USD = 925.17 CDF at the time of data collection.

* Price for n=94 antimalarials was reported as "Don't know"; prices for a further 6 cases were excluded due to inconsistencies between different values recorded during the interview; 18 antimalarials (15 with non-missing price information) were reported as being sourced "At home", these are excluded from the analysis above as it is not possible to determine the original source of these cases.

Table B2. Relative number of antimalarial treatments acquired for children under five

Relative number of antimalarial treatments acquired for children under five with fever, by stratum and antimalarial type.

	Centre-South		Kinshasa		North-East		North-West		All strata	
	Relative number of TxS	Number of TxS	Relative number of TxS	Number of TxS	Relative number of TxS	Number of TxS	Relative number of TxS	Number of TxS	Relative number of TxS	Number of TxS
Antimalarial Type	%	n	%	n	%	n	%	n	%	n
First-line (ASAQ)	3.0	11	3.3	12	14.9	32	6.6	18	6.8	73
Any ACT	5.7	21	13.9	51	17.7	38	7.6	21	10.1	131
SP	1.9	7	1.4	5	4.7	10	6.9	19	4.0	41
Chloroquine	1.6	6	0.3	1	1.4	3	0.4	1	1.0	11
Quinine	63.4	236	62.9	231	60.0	129	59.6	164	61.5	760
Amodiaquine	19.6	73	13.6	50	12.1	26	22.2	61	17.9	210
Artemisinin monotherapy	7.8	29	7.9	29	4.2	9	3.3	9	5.6	76
Total		372*		367*		215*		275*		1,229*

* Categories are not mutually exclusive; first-line treatment also falls within the ACT category.

Appendix C. Sample Demographic Characteristics

Table C 1. Demographic characteristics			
Characteristics of children under five with fever in the two weeks preceding the survey, of children's caregivers, and of households.			
	Percentage of children under five	Percentage of caregivers of children under five	Percentage of people age five and above
Strata	%	%	%
Centre-South	30.2	30.4	20.8
Kinshasa	25.3	24.0	40.7
North-East	23.9	24.3	20.8
North-West	20.6	21.3	17.8
Household wealth index			
Lowest	19.8	20.3	-
Second	19.3	19.8	-
Middle	20.2	19.7	-
Fourth	20.2	20.0	-
Highest	20.5	20.2	-
Age in years			
Infants (<1 year)	18.7	-	-
1	20.5	-	-
2	21.4	-	-
3	20.8	-	-
4	18.6	-	-
5-15	-	-	47.3
16-24	-	26.4	14.2
25-34	-	44.3	21.3
35-44	-	22.3	11.7
45-54	-	5.0	2.6
55+	-	2.1	2.9
Sex			
Female	49.8	100.00	66.2
Education			
No education	-	10.45	-
Some primary	-	21.12	-
Primary or higher	-	68.43	-
Total Number	2,665*	2,331*	583

* Children under five: n=2,626 for wealth index; Caregivers: n=2,297 for wealth index, n=2,329 for age, n=2,325 for education

Appendix D. Behavioral Determinants, Scale Items, and Scale Properties

Scale Items	Scale Properties
Availability of Treatment	
There is a health centre that treats malaria close to your home	Cronbach's Alpha: 0.82 Range: 1-4 Mean (SD): 3.42 (0.74) Median: 3.75
There is somewhere close to your home that sells antimalarials	
You can find medicines to treat malaria in pharmacies close to your home	
There are many places close to your home where you can find medicines to treat malaria.	
Affordability	
You can find affordable antimalarial medicine in your local area	Cronbach's Alpha: 0.76 Range: 1-4 Mean (SD): 2.16 (0.80) Median: 2.0
You can find cheap antimalarial medicine in local health centres	
It is easy for you to find cheap antimalarial medicine in your local area	
Pharmacies in your local area sell affordable antimalarial medicine	
Spousal Support	
When your child has fever, his father pays the cost of any treatments	Cronbach's Alpha: 0.83 Range: 1-4 Mean (SD): 3.18 (0.85) Median: 3.5
Your husband accompanies you to the health centre when your child has a fever	
When you are away from home, your husband will look for a treatment if your child has a fever	
Your children's father often gives you money to pay for any health care needs	
Financial Resources	
You are able to go into debt in order to treat your child when they have malaria	Cronbach's Alpha: 0.82 Range: 1-4 Mean (SD): 3.56 (0.64) Median: 4.0
You are capable of working for money if you need to pay for treatment when your child has malaria	
When your child has malaria, you are able to pawn belongings if you need to raise money to pay for a treatment	
You are willing to borrow money to pay for treatment for your child when they have malaria	
Outcome expectations	
Modern medicines are effective for treating malaria in your child	Cronbach's Alpha: 0.73 Range: 1-4 Mean (SD): 3.69 (0.50) Median: 4.0
Antimalarial medicines cure malaria quickly in your child	
Using modern antimalarial medicine will cure malaria in your child	