The private commercial sector distribution chain for antimalarial drugs in Benin

Findings from a rapid survey

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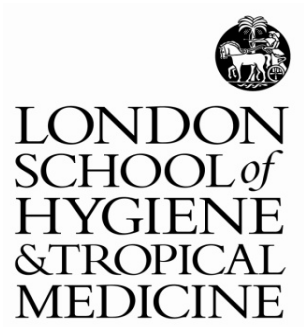
Sarah Tougher
Edith Patouillard
Ben Palafox
Catherine Goodman
Kara Hanson



Executive Summary

In November 2008, the Global Fund to Fight HIV/AIDS, TB and Malaria announced that it would administer the first phase of an ambitious scheme to increase the availability of effective treatment for malaria, the Affordable Medicines Facility – malaria (AMFm). Artemisinin-based combination therapies (ACTs) are highly-effective, but remain prohibitively expensive for those who are most vulnerable to malaria infection. AMFm aims to reduce significantly the price of ACTs by offering a co-payment for ACTs purchased by eligible buyers at the top of the supply chain.

Recognizing that the public and private sectors are important sources of antimalarials in most endemic countries, both public and private sector buyers will be entitled to purchase subsidized ACTs. The involvement of the private sector is an innovative element of AMFm, as many countries already have experience distributing ACTs in the public sector. To ensure that subsidized ACTs reach patients at the lowest possible cost, it is necessary to gain a better understanding of the private sector supply chains for antimalarials in each country participating in AMFm.

The objective of the rapid supply chain survey was therefore to assist Benin, which is one of the 11 countries invited to apply to the first phase of AMFm, in the development of an effective implementation plan by providing an understanding of the current supply chain for antimalarials, and the way in which subsidised ACTs are likely to travel through this chain to reach patients. This report presents the findings of a series of semi-structured interviews conducted with government officials and private suppliers of malaria treatment operating at the various levels of the chain.

At the time of the survey, antimalarial products sold in the private commercial sector were procured from international and domestic manufacturers by 3 active registered wholesalers and Benin's public sector procurement agent: the Centrale d'Achat des Médicaments Essentiels et des Consommables médicaux (CAME). Manufacturers do not have sole distributorship agreements for registered pharmaceuticals, or other special relationships with particular wholesalers. Consequently, each wholesaler regularly stocks a large proportion of the antimalarials registered in Benin. CAME is responsible for procuring the generic medicines on the National Essential Medicines List. In practice CAME procures and supplies antimalarials not included on the National Essential Medicines List, as it is currently out of date.

Patients in Benin access treatment for malaria in a diverse range of outlets. In the private commercial sector, these include 180 registered pharmacies, 279 pharmaceutical depots (as of 2008), and for-profit and non-profit private health clinics. Informal outlets, that is, unregistered stalls or shops that sell pharmaceuticals (often along with fast moving consumer goods), are the most common type of outlet that regularly stock antimalarials. The first round of the ACTwatch Outlet Survey found that informal outlets account for 74% of all outlets. Using this data, it can be estimated that there are 8,774 informal outlets selling antimalarials in Benin.

The prices of pharmaceutical products in the private sector are regulated to ensure that the entire population can buy medicines for the same price regardless of where they live. There was widespread agreement among key informants interviewed for the rapid analysis that the fixed price structure is well respected by registered wholesalers, pharmacies, and pharmaceutical depots.

With regards to the market share of antimalarial treatment types, sales records from Benin's registered private wholesalers describe the mix of products entering the formal private sector distribution chain. Wholesalers' sales are dominated by non-artemisinin monotherapies, which account for 56% of adult equivalent doses sold, while ACTs comprise 43% of the market share. Artemisinin monotherapies and non-artemisinin combination therapies respectively constitute only 1.0 and 0.3% of the volume of adult equivalent treatment courses sold.

Data from the ACTwatch outlet survey conducted in October 2008 shows the market share of antimalarials dispensed at the level of the outlet. Similar to the estimates of volumes produced from the records of the registered wholesalers, non-artemsinin monotherapies comprise the largest share of antimalarials sold by private sector outlets. Non-artemisinin monotherapies account for a total of 91% of full treatment courses sold. ACTs account for 8% of adult equivalent doses sold, while artemisinin monotherapies account for a very small proportion of adult equivalent doses sold in private sector outlets (0.8%). The outlet survey data has shown that Chloroquine dominates sales volumes at the outlet level. However, these antimalarials have an insignificant market share according to the wholesaler's sales records. The fact that these antimalarials are found primarily in informal outlets provides evidence that informal outlets use alternative supply sources.

Although the current distribution chain for antimalarials in the private formal sector is perceived to be well-organized and efficient, there are three potential barriers that could inhibit the distribution of subsidized ACTs in the private sector commercial sector in Benin. First, there is widespread concern among registered wholesalers and pharmacies that the mark-ups mandated under Benin's fixed price structure would be too low on a subsidized ACT to cover costs. Second, there is a relatively high risk that subsidized ACTs would leak into the informal market or be illegally exported into neighboring countries. Third, there are insufficient registered pharmacies and depots in rural areas to ensure that subsidized ACTs are accessible throughout Benin.

Based on current sales volumes and market shares, a range of scenarios were devised to estimate the uptake of an ACT subsidy under the AMFm. In all scenarios, there is a considerable reduction in the market share of ineffective antimalarial treatments, even in the cases where the overall volume of these treatments has increased. The most conservative scenarios, which assume a 30% substitution of all treatment types towards the subsidized product, resulted in a 30% market share of subsidized ACT; while the most ambitious scenario, which assumes a 70% substitution of ACTs, a 60% substitution of artemisinin monotherapies and a 40% substitution of non-artemisinin monotherapies towards the subsidized product, resulted in a 53% market share of subsidized ACT.

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This study was undertaken as part of ACTwatch, a collaboration between Population Services International and the London School of Hygiene and Tropical Medicine, and funded by the Bill and Melinda Gates Foundation (www.actwatch.info). It draws on data collected by PSI for the first round of the Outlet Survey, conducted in October 2008. We are grateful to Kate O'Connell, ACTwatch Principal Investigator and Martine-Esther Tassiba, the Benin Country Programme Coordinator for facilitating use of these data.

The views expressed in the reports remain those of the authors. Any questions, comments or data requests should be directed to the research team based at the London School of Hygiene & Tropical Medicine (LSHTM), by contacting Sarah Tougher (sarah.tougher@lshtm.ac.uk).

Abbreviations

ACT	Artemisinin-based Combination Therapy
AETD	Adult Equivalent Treatment Dose
AL	Artemether Lumefantrine
AM	Antimalarial drugs
AMFm	Affordable Medicine Facility For malaria
AMT	Artemisinin Monotherapy
CAME	Centrale d'Achat des Médicaments Essentiels et des Consommables médicaux
CF	Clinton Foundation
CFA	Franc de la Communauté financière africaine
CIF	Clearance, Insurance and Freight
CQ	Chloroquine
DHA	Dihydroartemisinin
DPAV	Dépôt paiement après vente
DPM	Direction des Pharmacies et du Médicament
LSHTM	London School of Hygiene and Tropical Medicine
Mef.	Mefloquine
nACT	Non-Artemisinin Combination Therapy
nAMT	Non-Artemisinin Monotherapy
NGO	Non-Governmental Organisation
OS	ACTwatch Outlet Survey
Pip.	Piperaquine
PGHT	Prix départ usine hors taxe
PNLP	Programme National de Lutte Contre le Paludisme
PSI	Population Services International
SP	Sulphadoxine Pyrimethamine

1. Context

In November of 2008, the Global Fund to Fight HIV/AIDS, TB and Malaria announced that it would administer the first phase of an ambitious scheme to increase the availability of effective treatment for malaria, the Affordable Medicines Facility – malaria (AMFm). Artemisinin-based combination therapies (ACTs) are highly-effective, but remain prohibitively expensive for those who are most vulnerable to malaria infection.[1] AMFm aims to significantly reduce the price of ACTs by offering a co-payment for ACTs purchased by eligible buyers at the top of the supply chain.

Recognizing that the public and private sectors are important sources of antimalarials in most endemic countries, both public and private sector buyers will be entitled to purchase subsidized ACTs. The involvement of the private sector is an innovative element of AMFm, as many countries already have experience distributing ACTs in the public sector. To ensure that subsidized ACTs reach patients at the lowest possible cost, it is necessary to gain a better understanding of the private sector supply chains for antimalarials in each country participating in AMFm.

This report presents the findings of a rapid assessment of the private sector supply chain for antimalarials in Benin, which is one of the 11 countries invited to apply to the first phase of AMFm. It seeks to identify the strengths and weaknesses of Benin's supply chain, and describe how the private sector would respond to subsidized ACTs. The results of the rapid analysis are presented in three sections. First, the report explains the structure of the private sector supply chain for antimalarials in Benin, including a description of the business practices of key actors along the distribution chain. Second, it identifies potential barriers that could inhibit the distribution of subsidized ACTs in the private sector. Third, the rapid analysis concludes by estimating the level of uptake in the private sector.

This assessment was undertaken within the broader set of activities of ACTwatch, a collaboration between PSI and LSHTM which aims to provide evidence-based recommendations for policy makers on how to increase the availability of quality-assured artemisinin-based combination therapies for malaria. ACTwatch involves 3 main data collection activities: national level household and outlet surveys, both led by PSI; and a supply chain analysis which is led by the London School of Hygiene and Tropical Medicine. The analysis presented below draws on data collected in the first round of the Outlet Survey and data collection instruments developed for the supply chain analysis.

2. Methods

The rapid analysis of the private sector antimalarial supply chain in Benin used a mix of qualitative and quantitative methods.

First, primary data were collected during 18 semi-structured qualitative interviews with stakeholders operating at different levels of the supply chain. The interviewees were selected purposively through discussions with PSI-Benin and the Clinton Foundation staff working in Benin. Of the 18 interviews, 6 were conducted with key informants from governmental and non-governmental agencies that play an important role at the top of the supply chain. Key informants were asked questions about the overall supply chain for antimalarials in Benin; their perceptions of the effectiveness of regulations

[1] Nicholas White, "Malaria – Time to Act," *The New England Journal of Medicine.* 355 (2006): 1956-1957.

and other factors affecting the price and availability of antimalarials; and their view on the impact of AMFm on the market for antimalarials in Benin.

The remaining 12 in-depth interviews were conducted with private sector wholesalers and retailers[2] operating at all levels of the pharmaceutical supply chain. These respondents were asked questions about the structure of the market for antimalarials and their business practices, including their relationships with their suppliers and customers, stocking decisions, the level of competition and collusion in the market for antimalarials, and their perception of the appropriateness of regulations. In addition, respondents were questioned about how their businesses and the market for antimalarials would respond to subsidized antimalarials through the AMFm.

Second, the qualitative primary data collected for the purpose of the rapid analysis were supplemented with secondary data where possible. Data collected in October 2008 during the first round of the ACTwatch Outlet Survey (OS) in Benin were used to estimate key variables such as the number of informal outlets selling antimalarial drugs in the private sector. In addition, Benin's three registered private pharmaceutical importers provided sales volumes over a 1-year period to estimate the volume of antimalarials entering the top of the distribution chain.

3 Antimalarials in the private sector in Benin

3.1 The structure of the antimalarial supply chain

The general structure of the private sector pharmaceutical supply chain in Benin is illustrated in Figure 1 (refer to page 38). It is organized like a pyramid with a small number of wholesalers located at the top of the supply chain. Benin's pharmaceutical regulations define how pharmaceuticals should be distributed from wholesalers to the private sector outlets located at the bottom of the chain. The solid arrows in Figure 1 demarcate the distribution relationships permitted by legislative texts. Evidence suggests that these regulations are not adhered to in practice. The dotted arrows in Figure 1 show the unauthorized distribution relationships identified during the rapid analysis. In addition, Benin has a large informal private sector that plays a significant role in the distribution of medicines.

3.1.1 The importation of antimalarials in the private sector

Antimalarial products sold to private sector buyers are procured from international and domestic manufacturers by private sector wholesalers and Benin's public sector procurement agent; the Centrale d'Achat des Médicaments Essentiels et des Consommables médicaux (CAME).

Business practices of private sector wholesalers

In order to import and distribute antimalarials and other pharmaceutical products in Benin, wholesalers must be registered with the Direction des Pharmacies et Médicaments (DPM). Registered wholesalers must be owned and managed by pharmacists (at least 70% of capital held by pharmacists). Other conditions for registration include registration with the Registre de Commerce

[2] In-depth interviews were conducted with 3 private wholesalers, 5 registered pharmacies, 1 private clinic, 1 faith-based non-profit clinic, and 2 pharmaceutical depots.

et du Credit, the completion of a technical feasibility study, and the payment of a fee of 550 000 CFA (US$ 1,227.68).[3] Regulatory requirements also stipulate that registered wholesalers must maintain an operating capital of 100 000 000 CFA (US$ 223,214.28), which can be reviewed every five years.[4]

Three of the four wholesalers registered with the DPM actively supply antimalarials in the private sector.[5] Antimalarials purchased by the private sector wholesalers are primarily imported from international manufacturers. Supplies of unbranded generic formulations (quinine and SP) are also purchased from a domestic manufacturer.[6] No domestic manufacturing capacity for artemisinin-based combination therapies (ACTs) exists in Benin.

All three registered wholesalers that supply antimalarials reported that they regularly stock a large proportion of registered antimalarials.[7] This may be explained by the fact that regulatory requirements stipulate that wholesalers must hold stock of 90% of the pharmaceuticals registered in Benin.[8] Consequently, manufacturers do not have sole distributorship agreements for registered pharmaceuticals, or other special relationships with particular importers. The manufacturers also do not have rules pertaining to sale prices, order volumes or embedded sales teams. (Refer to Annex 1 for a list of antimalarials sold by the private sector wholesalers).

Each wholesaler reported employing a logistician responsible for quantifying purchase volumes. Orders for antimalarials are not placed at specific intervals, but instead are based on sales volumes over the past 15 days to three months. All three wholesalers endeavor to maintain an inventory sufficient to cover sales for three months. One wholesaler stated that they adjust their order volumes so that they have a larger inventory of antimalarials in July and August to account for the high-transmission period. The lead time between placing an order and the receipt of antimalarials ranges from one to three months, depending on how quickly the manufacturer can fill the order and

[3] The average official exchange rate for 2008 (448 CFA per US$) was used to convert prices expressed in CFA to US$.
World Bank, *World Bank Development Indicators 2008*. Washington, DC: World Bank, 2009.

[4] Décret n° 2000-450 du 11 Septembre 2000. *Recueil des textes législatifs et réglementaires du secteur pharmaceutique.* 2e édition. Decembre 2007.

[5] At the time of research, the fourth wholesaler was inactive due to financial difficulties, and a fifth wholesaler had submitted an application for registration.

[6] Only one of the two domestic pharmaceutical manufacturers registered with the DPM produces antimalarial treatments.

[7] All imported and domestically manufactured antimalarials must be registered by the Service d'Enregistrement, de Statistique et de Controle de Qualité (SESCQ) of the DPM. Each dosage form and presentation of an antimalarial product must be registered individually. Moreover, if a manufacturer would like to register an antimalarial that is essentially identical to one that is already registered, it must be at least 15% less expensive than the antimalarial already registered. The fee for registering a new product is 250 000 CFA (US$ 558.04). Registrations must be renewed every 5 years for a fee of 100 000 CFA (US$223.21).

Décret n° 97-632 du 31 December 1997. *Recueil des textes législatifs et réglementaires du secteur pharmaceutique.* 2e édition. Decembre 2007.

[8] Décret n° 2000-450 du 11 Septembre 2000. *Recueil des textes législatifs et réglementaires du secteur pharmaceutique.* 2e édition. Decembre 2007.

the type of transportation used (air versus sea). To clear imported antimalarials through customs, the wholesaler must present authorization from the DPM, and pay clearance taxes totaling 2.5%.[9]

All three wholesalers use their own fleet of vehicles to deliver antimalarials to registered pharmacies, while one wholesaler reported having contracts with inter-city public taxis to reach certain remote pharmacies. Supplies are delivered free of charge to all registered pharmacies regardless of where they are located. The frequency of deliveries ranges from 4 times per day in Cotonou and Porto Novo to three times per week for pharmacies located in more remote areas. Two wholesalers have regional warehouses (in Bohicon and Parakou) to facilitate distribution to pharmacies located outside of Cotonou and Porto Novo.

With regards to the private wholesalers' sales strategy, each wholesaler explained that they do not undertake activities to promote specific products. Instead, pharmaceutical manufacturers employ medical delegates either directly or through a third-party agency. The delegates are typically responsible for a specific territory and visit health facilities and other retail outlets (such as registered pharmacies) to promote the manufacturer's products. Several of the registered pharmacies visited for the purpose of this rapid analysis postulated that the medical delegates have a significant impact on doctor's prescription practices. The manufacturers previously offered free units when a minimum volume was purchased. However, this practice has since been banned, because it was believed to be an important source of leakage into the informal sector.

To attract and keep customers, the private wholesalers occasionally send staff to verify that their clients are satisfied with the service provided (for example, to check if orders are filled accurately and delivered promptly). To preserve customer loyalty, rebates are sometimes offered to customers that pay for orders in cash, repay credit on time, or purchase large volumes. Rebates of approximately 3-10% of the total value of an order or the total value of orders over a defined period of time (such as orders placed over the past year) are offered to these customers, since the unit costs of pharmaceuticals are fixed in Benin (refer to Section 3.2).

The rapid analysis identified three factors that limit the number of registered wholesalers in Benin. First, Benin's relatively small population (and consequently small market) is perceived to limit the number of importers that could be profitable. Existing wholesalers have well-established distribution networks and relationships with their customers.

Second, the segmentation of the private commercial sector for pharmaceuticals between the formal and informal is perceived to further limit the number of registered importers. Key informants at all levels of the supply chain cited the informal sector as a significant competitor for antimalarial drug sales. Informal providers are perceived as taking potential customers from the formal sector, and consequently reducing the demand for the products procured by the registered importers.

Third, regulations requiring wholesalers to have a minimum operating capital of 100 000 000 CFA (US$ 223,214.28), maintain sufficient inventory for three months, and stock 90% of registered pharmaceuticals make an important contribution to ensuring that all registered pharmaceuticals are

[9] The clearance tax is broken down as follows: Redevance Statistique: 1%, Prélèvement Communitaire de Solidarité: 1%; Prélèvement Communitaire: 0.5%. Medicines are exempt from the following taxes : Droit de Douane, Taxes sur Valeur Ajoutée, Droit fiscal, and Commission CNCB.

available in the private sector. However, these same requirements discourage the formation of smaller wholesalers.

The role of CAME in the importation of antimalarials for the private sector

As Benin's public procurement and distribution agent, CAME is responsible for procuring the generic medicines on the National Essential Medicines List.[10] In principle, this list should dictate which antimalarial products are purchased by the public sector. However, the list has not been updated since 2003, and does not include the first- and second- line treatments for uncomplicated malaria currently recommended in Benin's national treatment guidelines for malaria.[11] CAME consequently procures and holds stocks of antimalarials not included on the National Essential Medicines List.

Since 1994, medicines procured by CAME may be purchased by private sector buyers. However, stock that is funded by donors, such as products intended for vertical disease control programs, cannot be purchased by private sector buyers. For example, CAME is responsible for storing and managing large volumes of Coartem financed by the World Bank and other donors on behalf of the National Malaria Control Program (PNLP). These stocks of Coartem cannot be purchased by private sector buyers. [12]

According to CAME's standard operating procedures, competitive tendering (opened or closed) should be the standard method for procuring supplies. However, CAME's antimalarial stocks that can be purchased by private sector buyers, in particular ACTs, are procured through consignment (DPAV). Under this practice, manufacturers deliver antimalarials or other pharmaceuticals to CAME's storage facilities. Supplies are not paid for until after they are sold, and unsold inventories are the property of the manufacturer, not CAME. Concern has been raised that these procedures are not transparent, and do not ensure that supplies are purchased at the lowest possible cost.[13] Refer to Annex 2 for a list of antimalarials available at CAME for purchase by private sector buyers.

Pharmaceuticals procured by CAME are stored at the central level warehouse located in Cotonou. Medicines are delivered directly from the central warehouse to two major public health facilities located in Cotonou and two regional depots located in Parakou and Natitingou. CAME does not distribute pharmaceutical products beyond its regional depots.[14] Private sector buyers collect orders directly from the central or regional warehouses. Orders must be paid for in cash, as credit is not available. The buyer must pay for any costs incurred to transport pharmaceuticals from the warehouse to their facilities.

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[10] Ministère de la santé. 2003. *Liste Nationale des Médicaments Essentiels sous Noms Génériques.* 5e Edition. République du Bénin

[11] Diara, M., Derosena, M., Ndoye, T. 2008. *Revue de la Gestion des Produits Antipaludiquess et Mise à Echelle des Combinaisons Thérapeutiques à Base d'Artémisinine au Bénin. Soumis à l'Agence des Etas-Unis pour la Développement International par le programme Renforcement des Systèmes Pharmaceutiques. Arlington, V: Management Sciences for Health.*

[12] A significant portion of the stock of Coartem currently being stored by CAME is at risk of expiry. To prevent these supplies from being wasted, the National Malarial Control program is considering distributing it to non-profit private health centers, particularly faith-based organisations.

[13] Ndoye, T. et al. 2009. *Évaluation de la gouvernance, de la transparence et des opérations de la Centrale d'Achats des Médicaments Essentiels du Bénin, décembre 2008.* Arlington, VA: Management Sciences for Health.

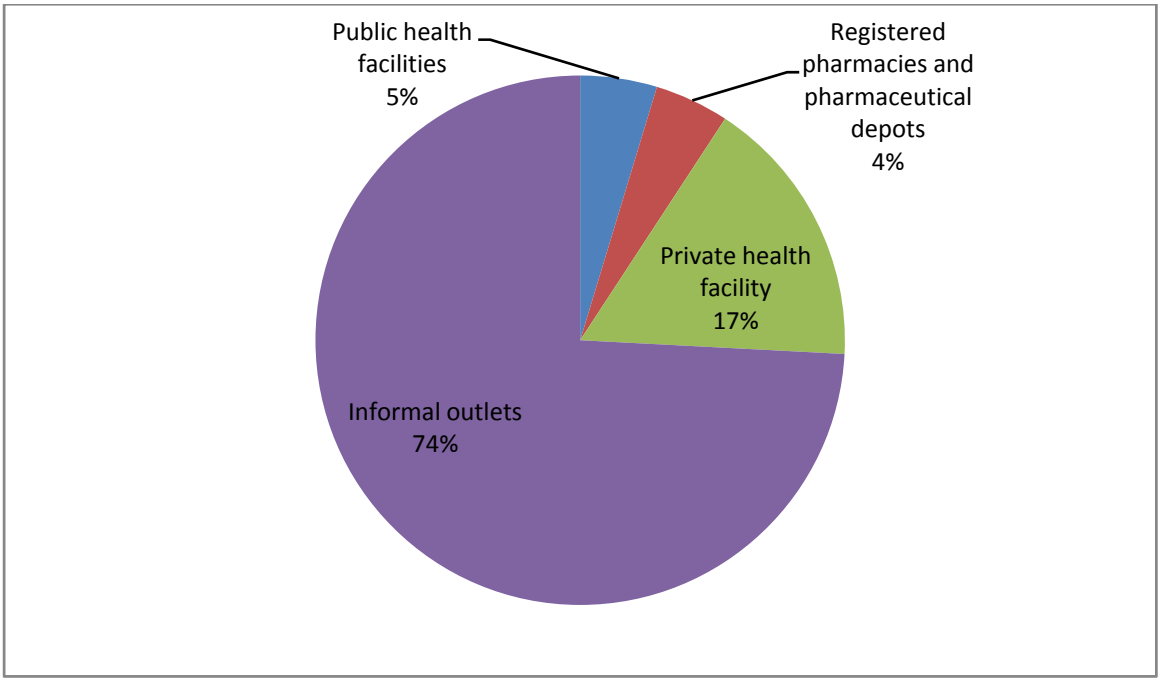
[14] On request CAME can make its vehicular fleet available to buyers that place large orders on a cost-recovery basis.

3.1.2 The distribution of antimalarials from wholesalers to patients in the private sector

Patients in Benin access treatment for malaria in a diverse range of outlets in the public and private sectors.

Round 1 of the ACTwatch Outlet Survey conducted by PSI in October 2008 confirmed that private formal and informal outlets are a significant source of antimalarial treatment in Benin. The ACTwatch Outlet Survey used a census approach in 19 Arrondissements to identify all outlets that provide antimalarials. A total of 1,096 outlets were identified, of which 752 had antimalarials in stock at the time of the survey. An additional 93 outlets had no antimalarials in stock at the time of the survey, but had antimalarials in stock in the past three months.[15] Figure 2 shows the distribution of outlets that had antimalarials in stock when visited by the ACTwatch Outlet Survey.

Figure 2: Providers of antimalarials by type in 19 arrondissements[16]



Source: ACTwatch Group. 2009. Outlet Survey Report (Baseline), Benin 2008.

From this figure, it is evident that public health facilities represent a small portion of the locations where antimalarials are available in Benin. The role and business practices of the main types of providers in the private commercial sector, namely registered pharmacies, pharmaceutical depots, private clinics, and informal outlets will now be discussed

Registered Pharmacies

There are a total of 180 registered pharmacies in Benin. Registered pharmacies are owned and managed by a pharmacist. They sell a variety of prescription and over-the-counter pharmaceuticals, as well as nutritional supplements and cosmetic products. Registered pharmacies are concentrated

[15] ACTwatch Group. 2009. Outlet Survey Report (Baseline), Benin 2008. http://www.actwatch.info/results/

[16] In the ACTwatch Outlet Survey Report, the informal outlets are classified as 'other outlets,' which is made up of 762 outlets located in a stall or shop located in or outside of a market, 86 itinerant medicine seller, and 13 'other' outlets that could not otherwise be classified.

in urban centers. For example, 48% of registered pharmacies are in Cotonou, and a further 8.3% are located in Porto Novo.[17]

The registered pharmacies visited for this rapid analysis stock a wide-range of antimalarial products, including ACTs, non-artemisinin combination therapies, and monotherapies. Pharmacies stock multiple brands, strengths and dosage forms of most compounds. Pharmacies decide whether or not to stock a particular antimalarial based on demand. Interviewed pharmacists indicated that demand for specific antimalarials depends largely on the prescribing patterns of nearby health facilities, consumer preferences, as well as individual pharmacist's preferences. These pharmacies maintain a small inventory of antimalarials that is sufficient to cover their sales for one week to one month.

Registered pharmacies procure antimalarials directly from private wholesalers or CAME. Respondents indicated that the quantification of their orders is based on recent sales volumes (sales of the past day to the past two weeks). The frequency of placing orders depends on the business practices of each individual pharmacy, but ranges from twice per day to two times per month among the pharmacies visited for this study. For orders placed with private wholesalers, lead times range from two hours (for pharmacies located in Cotonou or Porto Novo) to two days (for pharmacies further North). Pharmacies located in Cotonou indicated that most orders are filled the same day or early the next morning if the order was placed late in the afternoon. Orders placed with CAME are also often ready for pick-up the same day. Pharmacies purchasing stocks from CAME must pay cash for their orders, and cover transportation costs. In contrast, private wholesalers provide credit for 15-30 days on all orders, and do not charge pharmacies for deliveries.

Registered pharmacists indicated that they typically purchase most of their antimalarials from one preferred private wholesaler, but will buy stock from other wholesalers in cases of stock outs. This preference is not based on competition in terms of prices or available products, because wholesalers stock the same products at the same price (Benin's system for fixing prices will be explained in greater detail in Section 3.2). Instead, owners of registered pharmacies are often shareholders in a private wholesaler, and consequently prefer to purchase supplies from that wholesaler. The quality of a wholesaler's customer service and the speed that they can fill orders were also mentioned as important factors that influence the selection of supply sources. Most registered pharmacies also purchase supplies of generic antimalarials from CAME.

Pharmaceutical depots

Since registered pharmacies are almost exclusively located in large centers, antimalarials may also be purchased at pharmaceutical depots. Pharmaceutical depots were created to increase the geographical accessibility of pharmaceuticals. As of 2008, there are 279 depots registered in Benin. They must be located at least 10 km away from a registered pharmacy, and must close if a pharmacy opens in the area. Depots must sign a memorandum of understanding with a registered pharmacy. The depot must purchase pharmaceuticals[18] directly from this pharmacy, rather than purchase supplies from public or private sector wholesalers.

[17] Calculated from the list of registered pharmacies provided by the Ordre des Pharmaciens du Benin

[18] Depots are not permitted to sell all registered pharmaceutical products; they are banned from selling narcotic and psychoactive drugs.

Depots stock fewer antimalarials and hold much smaller inventories relative to registered pharmacies. The depots visited for this rapid analysis reported that they often have stock outs of antimalarials. They explained that they are not able maintain larger inventories, because they do not have access to credit. The length of these stock-outs may be exacerbated by the fact that suppliers do not deliver stock to depots.

In practice, depots often procure antimalarials from multiple sources. To take advantage of lower purchase prices, depots sometimes buy antimalarials directly from private wholesalers or CAME. Since depots are not authorized to purchase supplies from either private or public wholesalers, the depots interviewed explained these purchases were facilitated by personal connections. Depots also purchase supplies from registered pharmacies with whom they have not signed a memorandum of understanding.

Private clinics

In addition to registered pharmacies and pharmaceutical depots, antimalarials are also available in clinics in the private sector. Private clinics include both private for-profit clinics and non-profit religious health centers. Many clinics in the private sector are not registered with the Ministry of Health. A 2005 study of private health practices in Borgou, Alibori, Mono, and Couffou found that only 12% were authorized by the Ministry of Health.[19]

Private clinics are not supposed to sell pharmaceuticals to patients, but are able to charge patients for medicines used during hospitalization. For outpatient visits, the clinic should write a prescription to be filled at a registered pharmacy or pharmaceutical depot. However, there is a widespread perception that some private clinics, particularly those that are unregistered, do not follow this rule and supply pharmaceuticals directly to patients.

Larger private clinics primarily procure antimalarials from CAME. Some private clinics also buy supplies from private wholesalers,[20] but the private wholesalers do not deliver products or offer credit to private clinics. Horizontal trading among private clinics is common. Small clinics that do not have access to a public or registered private wholesaler buy their antimalarials supplies from larger clinics. This is especially true for small faith-based health centers. Private clinics also purchase antimalarials from registered pharmacies or pharmaceutical depots.

Informal outlets

While the exact size of the informal sector in Benin is unknown, it is widely believed that a large proportion of patients acquire antimalarials from informal drug sellers. A 2003 study in Cotonou by the Fondation Pierre-Fabre found that 40% of the 600 households interviewed had purchased medicines from informal sellers.[21] Outlets include mobile drug sellers, stalls and stores in markets, and stalls and stores outside of markets. Informal outlets often sell fast moving consumer goods, as

[19] Cited in Adeya, G. et al. 2007. *Évaluation rapide du système de santé du Bénin.* Arlington, VA: Management Sciences for Health.

[20] Private wholesalers are not authorized to sell medicines to private health facilities.

[21] Bernagou, P. 2008. La contrefaçon des médicaments et les moyens d'y remédier au Benin. *C. R. Biologies.* 986-990.

well as some medicines (primarily antipyretics). Re-analysis of ACTwatch Outlet Survey data indicates that there are 8,774[22] informal outlets selling antimalarials in Benin.

Not much is known about the distribution channels that supply medicines sold in the informal sector. The ACTwatch Supply Chain Study in Benin will address this gap by mapping out the formal and informal private sector distribution chains for antimalarials. Nevertheless, key informants interviewed for the rapid analysis identified two possible distribution networks for antimalarials sold in the informal sector. First, the informal sector is supplied by illegal imports from neighboring countries. Benin's porous borders and proximity to Lomé and Lagos are perceived to exacerbate this problem. Second, the informal sector is supplied by leakages from the formal public and private pharmaceutical supply chains. For example, ACTs designated for the public sector were recently found in the informal market.[23]

Moreover, additional analysis of data from Round 1 of the ACTwatch Outlet Survey emphasizes the importance of Benin's open-air markets in the distribution networks that supply antimalarials to Benin's informal outlets. Each outlet visited during the Outlet Survey was asked to provide details on their two most important supply sources for antimalarials. Of the informal outlets that provided information on their suppliers,[24] 85% identified one of Benin's informal markets as their top supply source, while the Marché Dantokpa located in Cotonou was named the most frequently.[25] Preliminary evidence from the ACTwatch Supply Chain Survey indicates that the wholesalers operating in these markets do not deliver medicines to the outlets that they serve.

3.2 Antimalarial products in the private sector

3.2.1 Antimalarial prices and mark-ups

The prices of pharmaceutical products in the private sector are regulated to ensure that the entire population can buy medicines for the same price regardless of where they live.

The basis for calculating the prices of antimalarials bought from private wholesalers is the manufacturer's price before taxes (PGHT). This price excludes all taxes, transportation and insurance costs. The wholesaler's selling price is calculated by multiplying the PGHT by a coefficient of 1.36. Similarly, the retail price is calculated by multiplying the PGHT by a coefficient of 1.78. Pharmaceutical depots are able to purchase products from registered pharmacies at a discount of 8% from the retail price. Public health facilities are able to purchase products from wholesalers at a

[22] This estimate was produced by multiplying the number of informal outlets found to have antimalarials in stock at the time of the ACTwatch Outlet Survey by the inverse of the survey's sampling fraction. The first round of the ACTwatch Outlet Survey identified 862 informal outlets or other outlets, of which, 64.3% (554) were found to have antimalarials in stock at the time of the survey.
Refer to Annex 3 for the calculation of the ACTwatch Outlet Survey's sampling fraction.
ACTwatch Group. 2009. Outlet Survey Report (Baseline), Benin 2008. http://www.actwatch.info/results/

[23] Ndoye, T. et al. 2009.

[24] In the 19 sub-districts visited during Round 1 of the ACTwatch Outlet Survey, 20% of the informal outlets surveyed either did not know their top supplier for antimalarials or refused to answer the question.

[25] ACTwatch Group. 2009.

discount of 13% from the retail price.[26] To ensure that prices are stable, at the time a pharmaceutical is registered the manufacturer must provide a detailed explanation of product's cost structure and set the PGHT for a period of five years.[27] After five years, the manufacturer can apply to the Commission Tarifaire des medicaments et spécialités pharmaceutiques to adjust the PGHT.[28]

Tables 1-3 shows a range of wholesaler purchase prices, wholesaler selling prices, and retail prices for a selection of antimalarials (in tablet form) sold by private sector wholesalers. The prices presented in these tables were calculated from sales records provided by the three registered wholesalers, and adjusted to express the price per adult equivalent treatment dose (AETD).

Annex 1 provides the wholesale selling price per package and volumes for all antimalarials sold by the registered private wholesalers.

Table 1: Wholesale and retail selling prices per AETD[29] of common artemisinin monotherapies in CFA and (US$)

	PGHT			Wholesaler's selling price			Retail price		
	Low	High	Mean[30]	Low	High	Mean[30]	Low	High	Mean[30]
Artemether	2256 ($5.04)	4019 ($8.97)	3112 ($6.95)	3068 ($6.85)	5466 ($12.20)	4233 ($9.45)	4015 ($8.96)	7154 ($15.97)	5540 ($12.37)
Artesunate	735 ($1.64)	1982 ($4.42)	1465 ($3.27)	999 ($2.23)	2696 ($6.02)	1992 ($4.45)	1308 ($2.92)	3529 ($7.88)	2608 ($5.82)

Table 2: Wholesale and retail selling prices per AETD[29] of common ACTs in CFA and (US$)

	PGHT			Wholesaler's selling price			Retail price		
	Low	High	Mean[30]	Low	High	Mean[30]	Low	High	Mean[30]
Artemether – Lumefantrine	1300 ($2.90)	2426 ($5.42)	1669 ($3.73)	1768 ($3.95)	3345 ($7.47)	2270 (5.06)	2314 ($5.17)	4378 ($9.77)	2970 ($6.63)
Artemisinine – Napthoquine	1482 ($3.31)	1482 ($3.31)	1482 ($3.31)	2016 ($4.50)	2016 ($4.50)	2016 ($4.50)	2639 ($5.89)	2639 ($5.89)	2639 ($5.89)
Artesunate – Amodiaquine	1148 ($2.56)	9971 ($22.26)	2648 ($5.91)	1561 ($3.48)	13560 ($30.27)	3601 ($8.04)	2043 ($4.56)	17748 ($39.62)	4714 ($10.52)
Artesunate – Mefloquine	2165 ($4.83)	3279 ($7.32)	2276 ($5.08)	2944 ($6.57)	4460 ($9.96)	3095 ($6.91)	3853 ($8.60)	5837 ($13.03)	4051 ($9.04)
Artesunate – SP	1968 ($4.39)	2794 ($6.24)	2095 ($4.68)	2676 ($5.97)	3800 ($8.48)	2849 ($6.36)	3502 ($7.82)	3228 ($7.21)	3728 ($8.32)
DHA - Piperaquine	1804 ($4.03)	2617 ($5.84)	2377 ($5.31)	2453 ($5.48)	3559 ($7.94)	3232 ($7.21)	3211 ($7.17)	4658 ($10.40)	4231 ($9.44)
DHA – SP	800 ($1.79)	800 ($1.79)	800 ($1.79)	1088 ($2.43)	1088 ($2.43)	1088 ($2.43)	1424 ($3.18)	1424 ($3.18)	1424 ($3.18)

[26] Arrêté Interministériel n^{0} 006/MICPE/MSP/MFE/DC/DCCI du février 2002 *Recueil des textes législatifs et réglementaires du secteur pharmaceutique.* 2^{e} édition. Décembre 2007.
[27] Décret n^{o} 97-632 du 31 December 1997
[28] Arrêté Interministériel année 2003 n^{0} du 029/MICPE/MSP/DC/SG/DC/DCCI/DPED 18 juin 2003. *Recueil des textes législatifs et réglementaires du secteur pharmaceutique.* 2^{e} édition. Décembre 2007.
[29] Refer to Annex 4 for the assumptions used to calculate AETD conversion factors.
[30] Figures in this column are the weighted mean of the price per AETD of all antimalarial products of a particular type sold in tablet dosage form.

Table 3: Wholesale and retail selling prices per AETD[29] of common non-artemisinin monotherapies in CFA and (US$)

	PGHT			Wholesaler's selling price			Retail price		
	Low	High	Mean[30]	Low	High	Mean[30]	Low	High	Mean[30]
Amodiaquine	152 ($0.34)	875 ($1.95)	326 ($0.73)	206 ($0.46)	1190 ($2.66)	443 ($0.99)	270 ($0.60)	1558 ($3.48)	580 ($1.29)
Chloroquine	57 ($0.13)	426 ($0.95)	410 ($0.92)	78 ($0.17)	580 ($1.29)	558 ($1.25)	101 ($0.23)	759 ($1.69)	730 ($1.63)
Halofantrine	1800 ($4.02)	3100 ($6.92)	2168 ($4.84)	2448 ($5.46)	4216 ($9.41)	2949 ($6.58)	3204 ($7.15)	5518 ($12.32)	3859 ($8.61)
Quinine	1100 ($2.46)	10323 ($23.04)	3749 ($8.37)	1495 ($3.34)	14039 ($31.34)	5099 ($11.38)	1957 ($4.37)	18375 ($41.01)	6673 ($14.89)
SP	54 ($0.12)	2100 ($4.69)	300 ($0.67)	74 ($0.17)	2856 ($6.38)	408 ($0.91)	97 ($0.22)	3738 ($8.34)	534 ($1.19)

There was widespread agreement among the key informants that this fixed price structure is well respected by the private wholesalers, registered pharmacies, and pharmaceutical depots.

Products bought from CAME have a different pricing structure. CAME's selling price is calculated by multiplying the total price of the product once it reaches the central warehouse (including freight, insurance, clearance, and other charges) by a coefficient of 1.2. The retail price is calculated by multiplying CAME's selling price by a coefficient of 1.5. If this is higher than the price that is obtained by multiplying the identical product's PGHT x 1.78, the final price must be reduced to this level. Refer to Table 4 for a comparison of the price structures for products purchased from CAME with products purchased from private wholesalers.

Table 4: Comparison of price and mark-up structures for antimalarials purchased from CAME and private wholesalers

	Medicines bought from private wholesalers	Medicines bought from CAME
Wholesale price	PGHT X 1.36	Price after taxes, international and local transport X 1.2
Retail price	PGHT X 1.78	Wholesale price X 1.5
Wholesaler mark-up	36%	20%
Pharmacist's mark-up	31%	50%

The pricing structure created for CAME's products is not applied uniformly. The regulation that established the pricing structure applies to public and private health facilities only.[31] There is ambiguity on how registered pharmacies and pharmaceutical depots should price products procured from CAME.

[31] Arrêté Interministériel n°11063/MS/MDEF/DC/SGM/CTJ/DPM/SA du 26 octobre 2006. *Recueil des textes législatifs et réglementaires du secteur pharmaceutique.* 2e édition. Décembre 2007.

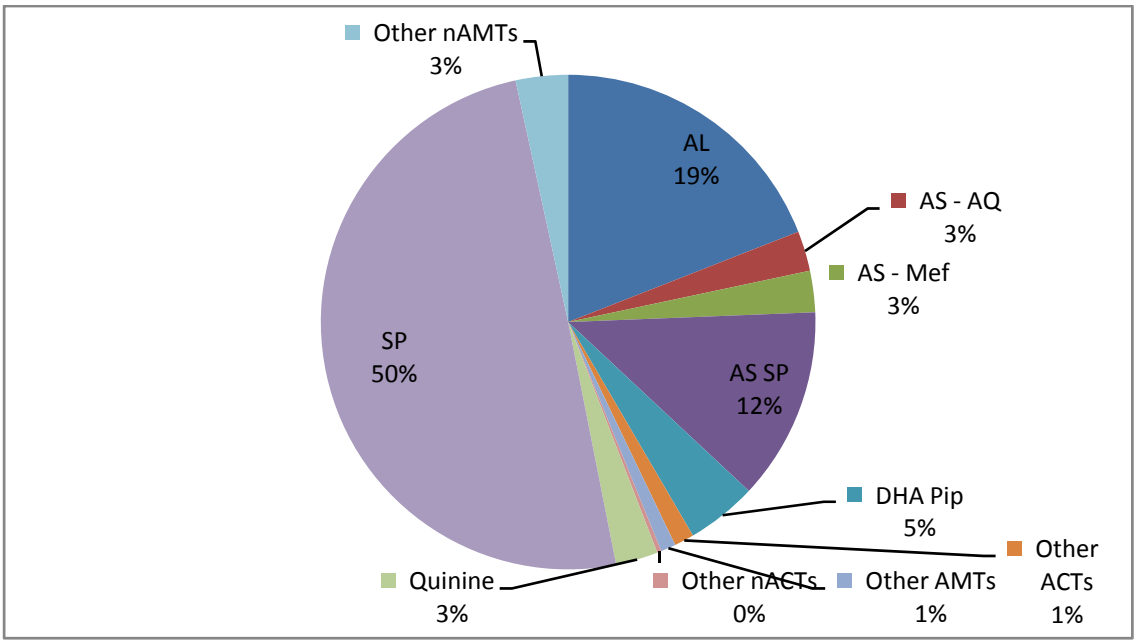
3.2.2 Volumes of antimalarial sales in the private commercial sector

Two sources of data are available to analyse the volumes of antimalarials in the private commercial sector in Benin. Sales records from Benin's registered private wholesalers collected during the rapid assessment describe the mix of products entering the private sector distribution chain, while data from the ACTwatch Outlet Survey show the market share of antimalarials across the range outlets from which patients access treatment. Both data sources were analyzed for the rapid survey to provide a thorough understanding of how antimalarials flow through the private sector distribution chain.

Each registered wholesaler was asked to provide the total sales volume of each antimalarial product that they sell over a period of one year. Due to differences in the wholesalers' record management systems, it was not possible to get data for an identical timeframe from all three wholesalers (one wholesaler provided sales figures for 2008, while the others provided figures for the past 12 months). These sales figures were used to approximate the total volume of adult equivalent doses for each antimalarial sold in tablet form.[32]

In terms of volumes of adult equivalent doses sold, the wholesaler's sales are dominated by non-artemisinin monotherapies. Together, non-artemisinin monotherapies account for 56% of adult equivalent doses sold by Benin's registered wholesalers. Sales of ACTs account for 43% of adult equivalent doses sold. The most popular ACTs are Artemether + Lumefantrine, followed by Artesunate + SP, which respectively contribute to 19% and 12% of sales volumes. Artemisinin monotherapies account for 1% of adult equivalent doses sold, while non-artemisinin combination therapies account for 0.28% of adult equivalent doses sold. Refer to Figure 3.

Figure 3: Private wholesaler antimalarial sales volumes by treatment type



Source: Wholesaler sales records

[32] Refer to Annex 4 for the assumptions used to calculate AETD conversion factors.

During the ACTwatch Outlet Survey conducted by PSI-Benin in October of 2008, each outlet visited was asked to recall the volume of each antimalarial sold over the preceding week.[33] [34]

Similar to the estimates of volumes produced from the records of the registered wholesalers, non-artemisinin monotherapies comprise the largest share of volumes sold. Non-artemisinin monotherapies account for a total of 91% of full courses of adult treatment sold by these outlets. In contrast to the registered wholesalers' sales records, we find that at the level of the outlet Chloroquine emerges as the most popular treatment type. Chloroquine accounts for 54% of full courses of adult treatment, while Quinine and SP respectively make-up 29% and 8% of sales volumes. ACTs account for 8% of adult equivalent doses sold. Artemisinin monotherapies account for a very small proportion of adult equivalent doses sold in private sector outlets (0.8%).[35]

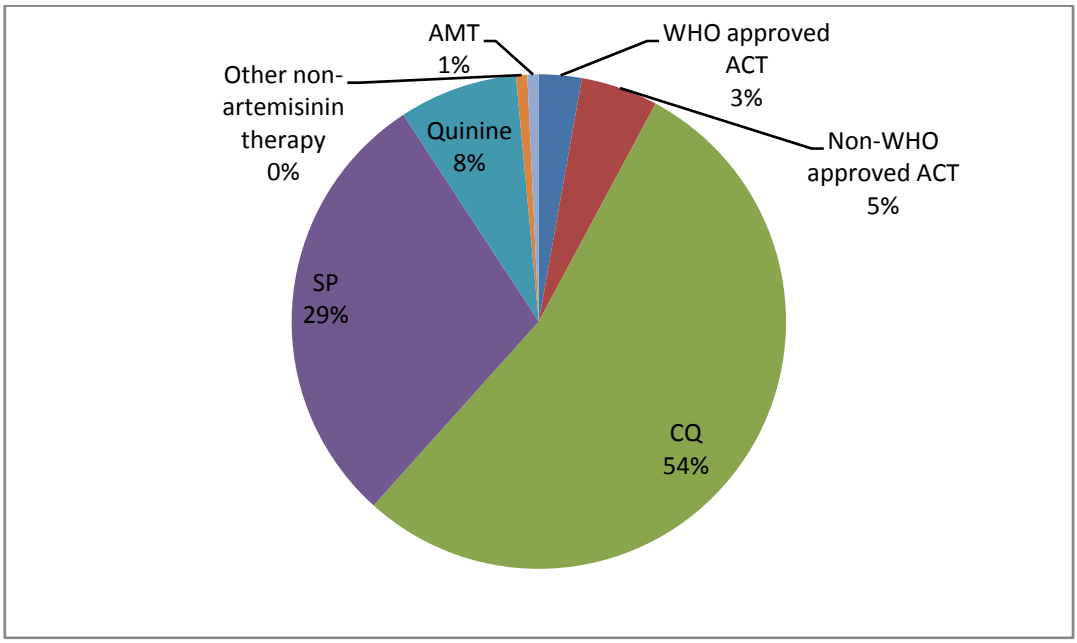
Figure 4 illustrates the share of recalled sales volumes by antimalarial type among outlets in the private sector.

[33] In this analysis, private outlets include: registered pharmacies, rural pharmaceutical depots, private clinics, health centres run by non-governmental organizations or faith-based organizations, stalls and shops located in or outside of markets, itinerant medicine sellers, and a small number of other outlets that could not be classified in the aforementioned categories (as reported in the Baseline ACTwatch Outlet Survey Report for Benin).

[34] The recalled sales volumes presented in the Baseline ACTwatch Outlet Survey Reports estimate the number of full courses of adult treatment distributed in the past week. These estimates exclude antimalarials that were not in a tablet dosage form, as well as tablet pediatric formulations.

[35] ACTwatch Group. 2009.

Figure 4: Private outlet antimalarial sales volumes by treatment type[36]



Source: ACTwatch Group. 2009. Outlet Survey Report (Baseline), Benin 2008.

In terms of volumes, the market share of antimalarials varies by outlet type. Figure 5 shows the distribution of recalled sales volumes collected from Round 1 of the ACTwatch Outlet Survey by antimalarial and outlet type.[37] Public health facilities are responsible for distributing 46% all ACTs,[38] but 68% of WHO-ACTs. Volumes of ACTs sold in Benin's numerous informal outlets have thus far been relatively low. [39]

In contrast, the market for non-artemisinin monotherapies is dominated by informal outlets. While the volumes of antimalarials sold in each individual outlet are on average very small, the sheer number of informal outlets implies that when combined these sales volumes are important. Informal outlets sold 76% of all chloroquine distributed in the previous week, and 60% of all non-artemisin monotherapies. [40] Artemisinin monotherapies were found to be sold almost exclusively in registered

[36] The ACTwatch November 2008 Outlet Survey report for Benin presents four ACT categories throughout: First line treatment, WHO approved ACT, Nationally registered ACT, Non-WHO/nationally registered ACT. Because first three categories are not mutually exclusive, for the purpose of the rapid assessment, we have retained the category of WHO approved ACT, as well as a second category, non-WHO approved ACT. The category of non-WHO approved ACT estimates the volume of ACTs distributed in the past week that are not approved by the WHO, regardless if they are nationally registered or not. We calculated volume of non-WHO approved ACTs by adding the volume of Nationally registered ACTs to the volume of Non-WHO/nationally registered ACTs and subtracting the volume of WHO approved ACTs distributed, as they were reported in the ACTwatch baseline Outlet Survey Report.

[37] Refer to footnote 34 and 36 for a description of the assumptions used to estimate the volumes of antimalarials sold over the previous week.

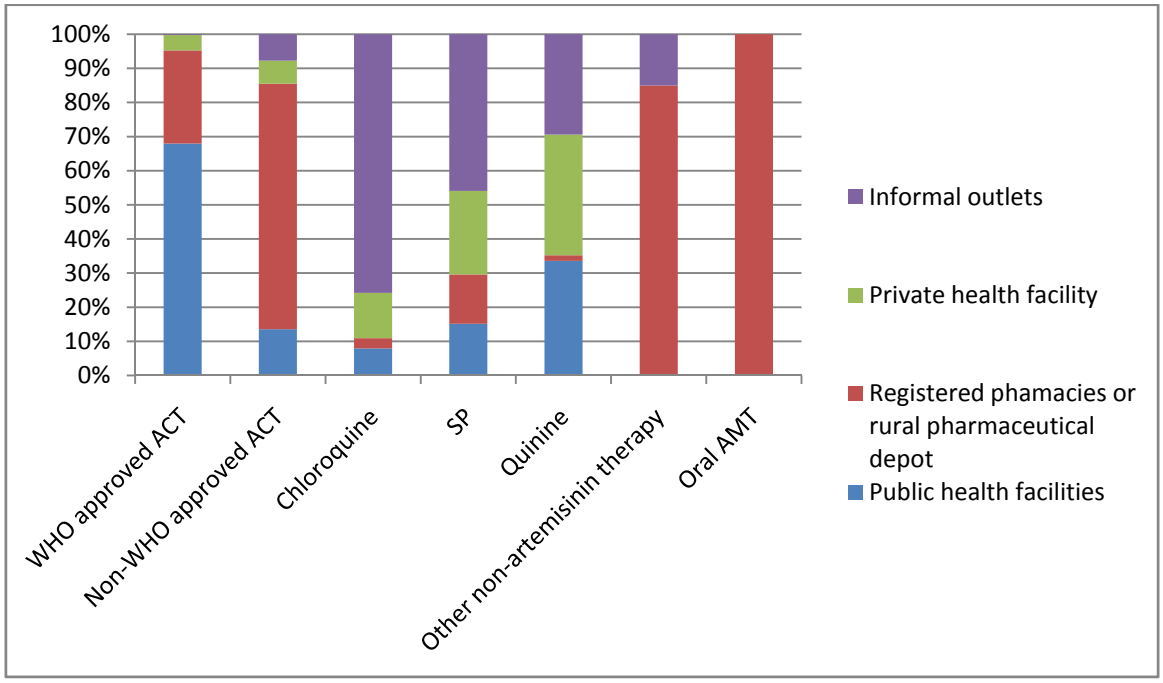
[38] For the purpose of this analysis, all ACTs refers to WHO-approved plus non-WHO approved ACTs. Refer to footnote 36 for a description of how the volume of non-WHO approved ACTs was calculated.

[39] ACTwatch Group. 2009.

[40] *Ibid.*

pharmacies and pharmaceutical depots. 100% of the recalled sales volumes of oral artemisinin monotherapies were from registered pharmacies and pharmaceutical depots.[41]

Figure 5: Market share of antimalarial sales volumes by outlet type and treatment type



Source: ACTwatch Group. 2009. Outlet Survey Report (Baseline), Benin 2008.

Analysis of volume data at the top and the bottom of the distribution chain has revealed that non-artemisinin monotherapies dominate antimalarial sales in the private commercial sector, followed by artemisinin combination therapies. Although the data sets are not directly comparable (they are from different time periods and use different measures of volumes), divergences between the data sets provide important insights into the distribution chain for antimalarials in the private sector. In particular, the outlet survey data has shown that Chloroquine dominates sales volumes at the outlet level. However, these antimalarials have an insignificant market share according to the wholesaler's sales records. The fact that these antimalarials are found primarily in informal outlets provides evidence that informal outlets use alternative supply sources.

4. Barriers to widespread distribution of ACTs in the private sector

Interviewees generally asserted that AMFm would positively impact the private-sector market for antimalarials in Benin. The current distribution chain for antimalarials in the private formal sector, especially between the private wholesalers and registered pharmacies, is perceived to be well-organized. Stock-outs of antimalarials in registered pharmacies were reported to be rare, because lead times on orders are short, wholesalers maintain relatively large inventories, and products can be sourced from multiple wholesalers. The wholesalers and registered pharmacists interviewed for this rapid analysis were consequently pleased that AMFm would operate within the structure of the current supply chain.

[41] *Ibid.*

Nevertheless, three potential challenges that could inhibit the availability of ACTs in the private sector were identified: the lack of financial incentives, leakages to the informal sector, and geographical accessibility of subsidized ACTs.

4.1 Financial incentives

The primary concern raised by wholesalers and pharmacies is that the absolute mark-ups on the subsidized product would be too low. It is currently estimated that a full treatment course for an adult would be made available to first-line buyers at a price of 25 CFA. If the current pricing structure is applied to this price, a private sector wholesaler's selling price would be 34 CFA, and the retail price would be 44.5 CFA. Private sector actors were concerned that these margins (9 CFA for wholesalers and 10.5 CFA for pharmacies) would not be sufficient to cover costs. They reasoned that the increase in volumes may not be sufficient to offset losses of revenue. There was considerable interest in adjusting margins to encourage the uptake by the private sector.

4.2 Leakage to the informal sector

There is also widespread concern that the subsidized ACTs would leak into the informal market in Benin and its neighboring countries. With regards to the domestic informal market, AMFm was seen as a potential opportunity to reduce the demand for medicines purchased in the informal sector. If a significant proportion of formal private sector outlets choose to participate in AMFm, the availability of low-cost treatment for malaria could attract patients into formal outlets. A widespread communication campaign was perceived as an important mechanism to reduce domestic demand for antimalarials purchased in the informal sector, and attract patients to formal structures to purchase subsidized ACTs. In addition, to reduce the supply of medicines available in the informal sector, a more active suppression of the informal drug markets, particularly the Dantokpa market in Cotonou, was frequently suggested as an important means to reducing leakages of subsidized ACTs into the informal market.

Illegal exports to neighboring countries are perceived to be much more difficult to control. Benin's borders are considered to be porous, and key informants postulated that individual exports would be small in size and difficult to trace. Many interviewees postulated that Nigeria's participation in AMFm would substantially reduce illegal exports of subsidized ACTs.

4.3 Geographical accessibility

The geographical accessibility of subsidized ACTs was seen as a final potential barrier to the widespread availability of ACTs in the private sector. Registered pharmacies have reliable supplies of antimalarials, and would likely participate in the AMFm if the absolute margin was sufficiently high. However, registered pharmacies are concentrated in urban areas. Pharmaceutical depots are an important mechanism to increasing the availability of ACTs in remote areas. However, Benin's 2001 Demographic and Health Survey found that 80% of urban populations, but only 15% of rural populations lived within 5 km of registered pharmacy or depot.[42] The number of pharmacies and depots has increased since 2001, but there are not enough depots and pharmacies to ensure complete coverage of subsidized ACTs.

[42] Cited in Adeya, G. et al. 2007. *Évaluation rapide du système de santé du Bénin.* Arlington, VA: Management Sciences for Health.

The margin on subsidized ACTs would be prohibitively low for depots. Under the current pricing structure, pharmaceutical depots would be able to purchase subsidized ACTs for approximately 40.94 CFA leaving a margin of 3.56 CFA per complete adult treatment sold. Moreover, the depots interviewed for the rapid analysis reported having problems maintaining sufficient inventories of stock, due to problems accessing credit.

5. Uptake of co-paid ACTs in the private commercial sector

Respondents were generally positive about participating, especially if Benin's pharmaceutical pricing structure is modified to create financial incentives for participation. Nevertheless, participants interviewed for the rapid analysis did not expect full substitution toward the subsidized product, because of consumer preferences for certain monotherapies, patient perceptions that higher prices signal higher quality products, and the fact that some patients report adverse reactions to ACTs. Pilot private sector ACT subsidy projects have found that substitution to the subsidized product is incomplete. Preliminary results from the ACT Leaf programme in Uganda show that the subsidised product has achieved approximately 30% share of the market for malaria treatment,[43] while in Tanzania, the Clinton Foundation pilot achieved nearly 50% market share in some of the studied areas.[44]

In addition, the decreased price of the subsidized product combined with the supporting interventions that are planned to accompany AMFm, are expected to lead to an increase in the aggregate demand for antimalarials in participating countries. Although no published studies estimate the own-price or cross-price elasticity of demand for antimalarial treatments, a modeling exercise by Laxminarayan, Over and Smith examining whether a subsidy for ACTs would delay the emergence of resistance to artemisinin assumes that a 10% decrease in the price of ACTs will result in a 2-5% increase in total antimalarial use.[45]

Using evidence from previous studies on subsidies for ACTs and information provided by respondents interviewed for the purpose of this rapid analysis, nine scenarios have been identified for estimating the uptake of co-paid ACTs by the private commercial sector in Benin. Figure 4 summarizes the assumptions made in the nine scenarios.

The nine scenarios use three different assumptions on the rate of substitution towards the subsidized product.

First, scenarios A1, B1, and C1 assume that 30% of all treatment types will be substituted towards the subsidized product. These are the most conservative scenarios, and are based on the preliminary results of Uganda's ACT Leaf subsidy scheme.

[43] From discussions with staff from Medicines for Malaria Ventures in April 2009

[44] Sabot OJ, Mwita A, Cohen JM, Ipuge Y, Gordon M, et al. (2009). Piloting the Global Subsidy: The Impact of Subsidized Artemisinin-Based Combination Therapies Distributed through Private Drug Shops in Rural Tanzania. *PLoS ONE* 4(9): e6857

[45] Laxminarayan R, Over M, and Smith, D (2006). Will a global subsidy of new antimalarials delay the emergence of resistance and save lives? *Health Affairs.* 25(2): 325-336.

Second, scenarios A2, B2, and C2 assume that 50% of ACTs and AMTs and 30% of nAMTs will be substituted towards the subsidized product. These scenarios are based on the authors' assumption that nAMTs will have a lower cross-price elasticity of demand then ACTs and AMTs.

Third, scenarios A3, B3, and C3 assume that 70% of ACTs, 60% of AMTs and 40% of nAMTs will be substituted towards the subsidized product. As above, these scenarios are based on the authors' assumption that nAMTs will have a lower cross-price elasticity of demand then ACTs and AMTs.

The nine scenarios also use the following three assumptions about the subsidy's impact on the overall quantity of antimalarial treatments consumed:

First, scenarios A1, A2 and A3 assume that there is no change in the aggregate demand for antimalarials.

Second, scenarios B1, B2 and B3 assume that there is 19% increase in the total volume of antimalarials sold. This is based on the projection that the subsidy will decrease the end-user price of the subsidized product by approximately 95%,[46] and the assumption that a 10% decrease in the price of ACTs will result in a 2% increase in total antimalarial use.

Third, scenarios C1, C2 and C3 assume that there is 47.5% increase in the total volume of antimalarials sold. This is based on the projection that the subsidy will approximately decrease the end-user price of the subsidized product by 95%, and the assumption that a 10% decrease in the price of ACTs will result in a 5% increase in total antimalarial use.

[46] It is anticipated that the retail price of the subsidized product will be reduced from $7-8 to $0.30-0.40. Laxminarayan R, and Gelband H. (2009), A Global Subsidy: Key to Affordable Drugs for Malaria. *Health Affairs.* 28(4): 949-961.

Figure 6: Matrix of possible scenarios for the uptake of co-paid ACTs by the private commercial sector in Benin

Scenario A1 • 30% substitution of all therapies towards the subsidized product • No change in aggregate demand for antimalarials	**Scenario A2** • 50% substitution of ACTs & AMTs, and 30% substitution of nAMTs towards the subsidized product • No change in aggregate demand for antimalarials = 0	**Scenario A3** • 70% substitution of ACTs, 60% substitution of AMTs, and 40% substitution of nAMTs towards the subsidized product • No change in aggregate demand for antimalarials = 0
Scenario B1 • 30% substitution of all therapies towards the subsidized product • Aggregate demand for antimalarials increases by 19%	**Scenario B2** • 50% substitution of ACTs & AMTs, and 30% substitution of nAMTs towards the subsidized product • Aggregate demand for antimalarials increases by 19%	**Scenario B3** • 70% substitution of ACTs, 60% substitution of AMTs, and 40% substitution of nAMTs towards the subsidized product • Aggregate demand for antimalarials increases by 19%
Scenario C1 • 30% substitution of all therapies towards the subsidized product • Aggregate demand for antimalarials increases by 47.5%	**Scenario C2** • 50% substitution of ACTs & AMTs, and 30% substitution of nAMTs towards the subsidized product • Aggregate demand for antimalarials increases by 47.5%	**Scenario C3** • 70% substitution of ACTs, 60% substitution of AMTs, and 40% substitution of nAMTs towards the subsidized product • Aggregate demand for antimalarials increases by 47.5%

5.1 Estimating the uptake of the subsidy

The 9 scenarios were applied to the baseline estimates of total sales volumes of antimalarials presented in Table 5.[47] Although these estimates do not include antimalarials imported in the informal sector (which likely account for a significant proportion of antimalarials consumed in the country – refer to Section 3.2.2), they provide a good basis for calculating the uptake of an ACT subsidy in Benin as the registered wholesalers would likely be eligible first-line buyers under AMFm.

[47] The baseline estimates are produced from the wholesaler's records of the total volume of each antimalarial product sold over a one year period. Due to differences in the wholesalers' record management systems, it was not possible to get data for an identical timeframe from all three wholesalers (one wholesaler provided sales figures for 2008, while the others provided figures for the past 12 months). These sales figures were used to approximate the total volume of adult equivalent treatment doses for each antimalarial sold in tablet form. Refer to Annex 4 for the assumptions used to calculated adult equivalent treatment doses.

Table 5: Estimated wholesaler sales volumes, mean mark-up & net revenue, by treatment type in adult equivalent treatment doses

	Volume[46]	Mean Wholesale Mark-up (CFA)	Mean Wholesale mark-up less CIF (CFA)	Net revenue (CFA)	Net revenue (US$)
AL	190,428	601	417.25	79,456,083	177,357.33
Artemisinine Nap	8,160	534	370.5	3,023,280	6,748.39
AS – AQ	26,240	953	662	17,370,880	38,774.29
AS – Mef	26,988	819	569	15,356,172	34,277.17
AS SP	125,855	754	523.75	65,916,556	147,135.17
DHA Pip	46,127	855	594.25	27,410,970	61,185.20
DHA SP	4,810	288	200	962,000	2,147.32
Artemether	739	1111	778	574,942	1,283.35
AS	9,010	527	366.25	3,299,913	7,365.88
AQ	16,915	117	81.5	1,378,573	3,077.17
CQ	1,505	148	102.5	154,263	344.34
Halofantrine	13,630	781	542	7,387,460	16,489.87
Mefloquine	58	3926	2726.25	158,123	352.95
Proguanil	1,994	1350	937.5	1,869,375	4,172.71
Quinine	27,629	1350	937.25	25,895,280	57,801.96
SP	496,834	108	75	37,262,550	83,175.33
CQ Proagnil	2,684	1404	975	2,616,900	5,841.29
Total ACT	428,608			209,495,941	467,624.87
Total AMT	9749			3874854.5	8,649.23
Total nAMT	558,565			74,105,623	165,414.34
Total nACT	2,684			2,616,900	5,841.29
Total	999,606			290,093,318	647,529.73

In the nine scenarios, the market share of the subsidized product ranges from 30% in Scenarios A1, B1, and C1, 39% in Scenarios A2, B2, and C2, to 53.06% in Scenarios A3, B3, and C3 (refer to Table 6). The market share for all ACTs (subsidized plus non-subsidized ACTs) reaches approximately 60% in all scenarios, other than scenarios A3, B3, and C3 where the market share of all ACTs reaches 66%.

In terms of the volumes of antimalarials purchased, in the scenarios where the subsidy increases the total antimalarial use, the volumes of artemisinin monotherapies and non-artemisinin monotherapies generally decrease. The exception occurs when the rate of substitution towards the subsidized product is smaller than the rate at which the total use of antimalarials increases. For example, in Scenario C1, 30% of all treatment types are substituted towards the subsidized product, but there is a 47.5% increase in total antimalarial use. Although the market share for non-artemisinin monotherapies decreases from 56% to 39% of all adult equivalent doses sold, the total volume of non-artemisinin monotherapies increases by 3% relative to the baseline scenario. The market share for artemisinin monotherapies decreases from 1% to 0.7% of all adult equivalent doses sold, but the total volume of artemisinin monotherapies increases by 3%.

We have shown that the potential uptake of the subsidy is substantial. In all scenarios, there is a considerable reduction in the market share of ineffective antimalarial treatments, even in the cases where the overall volume of these treatments has increased.

Table 6: Scenarios for estimating uptake of subsidized ACT & impact on market share of other product types

	Baseline	Scenario A1		Scenario A2		Scenario A3		Scenario B1		Scenario B2		Scenario B3	
	Total Vol. (AETD)	Total Vol. (AETD)	Market Share	Total Vol. (AETD)	Market Share	Total Vol. (AETD)	Market Share	Total Vol. (AETD)	Market Share	Total Vol. (AETD)	Market Share	Total Vol. (AETD)	Market Share
Co-Paid ACT	0	299,882	30.00%	387,553	38.77%	530,375	53.06%	356,859	30.00%	461,188	38.77%	631,146	53.06%
Other ACT	428,608	300,026	30.01%	214,304	21.44%	128,582	12.86%	357,030	30.01%	255,022	21.44%	153,013	12.86%
AMT	9,749	6,824	0.68%	4,875	0.49%	3,900	0.39%	8,121	0.68%	5,801	0.49%	4,641	0.39%
nAMT	558,565	390,996	39.11%	390,996	39.11%	335,139	33.53%	465,285	39.11%	465,285	39.11%	398,815	33.53%
nACT	2,684	1,879	0.19%	1,879	0.19%	1,610	0.16%	2,236	0.19%	2,236	0.19%	1,916	0.16%
Total	999,606	999,606	100.00%	999,606	100.00%	999,606	100.00%	1,189,531	100.00%	1,189,531	100.00%	1,189,531	100.00%

	Scenario C1		Scenario C2		Scenario C3	
	Total Vol. (AETD)	Market Share	Total Vol. (AETD)	Market Share	Total Vol. (AETD)	Market Share
Co-Paid ACT	442,326	30.00%	571,641	38.77%	451,166	53.06%
Other ACT	442,538	30.01%	316,098	21.44%	189,659	12.86%
AMT	10,066	0.68%	7,190	0.49%	5,752	0.39%
nAMT	576,718	39.11%	576,718	39.11%	823,883	33.53%
nACT	2,771	0.19%	2,771	0.19%	3,959	0.16%
Total	1,474,419	100.00%	1,474,419	100.00%	1,474,419	100.00%

5.2 Estimating the potential financial impact of the ACT subsidy on registered wholesalers

As explained in Section 4.1, the respondents interviewed for the purpose of this rapid analysis were concerned that under Benin's pharmaceutical pricing scheme, the absolute mark-ups of the subsidized product would be insufficient to cover the costs related to wholesale and retail distribution of the product.

The potential financial impact of the ACT subsidy on Benin's registered wholesalers is estimated under two potential conditions:

(1) Benin's current pricing structure is applied to the first line buyer's purchase price of 25 CFA ($0.06) per adult equivalent dose. Registered wholesalers would sell the subsidized ACT for 34 CFA (0.08 US$) per adult equivalent dose.

(2) The absolute mark-up of Chloroquine under Benin's fixed pricing scheme is applied to the first line buyer's purchase price of 25 CFA. Registered wholesalers would sell the subsidized product for 173 CFA (0.39 US$).[48]

In both cases, we assume that the registered wholesalers will pay a clearance tax of 2.5%, but will not have to pay for freight and insurance for subsidized ACTs. For non-subsidized products, the wholesaler will pay the 2.5% clearance tax plus freight and insurance (CIF), which we assume equals 8.5%.[49]

Using the 9 uptake scenarios described in Section 5, the two potential pricing scenarios were applied to the baseline estimates of the wholesalers' sales volumes presented in Table 7.

Table 7 illustrates the potential financial impact of the ACT subsidy on the registered wholesalers' net revenue assuming that Benin's fixed price structure is applied to the first line buyer's price of 25 CFA (0.06 US$). The registered wholesalers would be able to sell each adult equivalent dose for 34 CFA (0.08 US$). After clearance taxes are paid, the registered wholesalers would receive a mark-up of 8 CFA (0.02 US$) for each full adult treatment course sold.

[48] Based on sales volume data from Benin's three registered wholesalers, the mark-ups on a full adult dose of Chloroquine from the PGHT to the retail price ranged from 44–333 CFA (US$ 0.10–0.74), and the weighted mean mark-up equaled 320 CFA (US$ 0.71) (refer to Table 3). Assuming that a full-course of adult treatment is available to first line buyers at a price of 25 CFA, if the weighted mean absolute mark-up of Chloroquine is added to co-paid ACTs, the retail price would be 345 CFA (US$ 0.77). The wholesaler selling price would be 173 CFA (US$ 0.39). Registered wholesalers and pharmacies would respectively earn mark-ups of 148 CFA (US$ 0.33) and 172 CFA (US$ 0.38) for each adult dose sold.

[49] This assumption is based on research by Dalberg Global Development Advisors in Burkina Faso, Cameroon, Kenya and Uganda, which found that the average cost of clearance charges, insurance and freight equals 11%.

AMFm Task Force. (2007). *Technical Design for the Affordable Medicines Facility – Malaria.* http://www.rollbackmalaria.org/partnership/tf/globalsubsidy/AMFmTechProposal.pdf

In all but one scenario, the wholesalers' total net revenue, that is total revenue minus the purchase price, and costs related to clearance, insurance and freight,[50] decreases relative to the baseline scenario. The decrease in total net revenue ranges from 16% in Scenario B1 to 60% in Scenario A3. These declines in total net revenue are observed because of the substantial differences in the absolute margins of unsubsidized ACTs relative to the subsidized product (refer to Table 7 for a comparison of the weighted mean wholesale mark-up by antimalarial type).

The only scenario where the introduction of the ACT subsidy results in an increase of total net revenue is Scenario C1, where total net revenue is projected to increase by 5%. Under this scenario, we model a moderate level of substitution towards the subsidized product (30% of all therapies), and an increase in the total volume of antimalarials sold equal to 47.5%. This scenario is undesirable from a public health perspective. Although the market share of ACTs relative to other therapies increases in this scenario, the total volume of ineffective antimalarial treatments increases.

The analysis presented thus far substantiates the concerns raised by respondents that increases in sales volumes may be insufficient to offset losses of revenue resulting from substitution. Table 8 illustrates the potential financial impact of the ACT subsidy using an alternative pricing structure. In these scenarios, the absolute mark-up of Chloroquine under Benin's fixed pricing scheme is applied to the first line buyer's purchase price of 25 CFA. Registered wholesalers would sell the subsidized product for 173 CFA (0.39 US$) per adult equivalent dose.[51] After clearance taxes are paid, the registered wholesalers would receive a mark-up of 147 CFA (0.33 US$) for each full adult treatment course sold.

Even with a higher mark-up, the registered wholesalers' total net revenue is projected to decrease relative to the baseline case in most scenarios. The declines in total net revenue are nevertheless significantly smaller, and range from -5.33% in Scenario C3 to -34.99% in Scenario A3. Increases in total net revenue are observed in 3 scenarios: B1, C1 and C2.

[50] This modeling exercise assumes that under AMFm, registered wholesalers will be reimbursed for freight and insurance charges associated with the international distribution of co-paid ACTs.
[51] Refer to footnote 47 on page 21 for a detailed description on how this price was derived.

Table 7: Scenarios for estimating the potential financial impact of the ACT subsidy under Benin's fixed price structure

Treatment Type	Baseline		Scenario A1		Scenario A2		Scenario A3		Scenario B1		Scenario B2	
	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue
Co-Paid ACT	0	0	299,882	2,511,510	387,553	3,245,758	530,375	4,441,887	356,859	2,988,697	461,188	3,862,452
Other ACT	428,608	209,495,941	300,026	146,647,159	214,304	104,747,971	128,582	62,848,782	357,030	174,510,119	255,022	124,650,085
AMT	9,749	3,874,855	6,824	2,712,398	4,875	1,937,427	3,900	1,549,942	8,121	3,227,754	5,801	2,305,538
nAMT	558,565	74,105,623	390,996	51,873,936	390,996	51,873,936	335,139	44,463,374	465,285	61,729,984	465,285	61,729,984
nACT	2,684	2,616,900	1,879	1,831,830	1,879	1,831,830	1,610	1,570,140	2,236	2,179,878	2,236	2,179,878
Total	999,606	290,093,318	999,606	205,576,833	999,606	163,636,922	999,606	114,874,125	1,189,531	244,636,431	1,189,531	194,727,937
% change in total net revenue	-	-	-	-29.13%	-	-43.59%	-	-60.47%	-	-15.67%	-	-32.87%

Treatment Type	Scenario B3		Scenario C1		Scenario C2		Scenario C3	
	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue
Co-Paid ACT	631,146	5,285,846	442,326	3,704,477	571,641	4,787,493	451,166	3,778,512
Other ACT	153,013	74,790,051	442,538	216,304,559	316,098	154,503,256	189,659	92,701,954
AMT	4,641	1,844,431	10,066	4,000,787	7,190	2,857,705	5,752	2,286,164
nAMT	398,815	52,911,415	576,718	76,514,055	576,718	76,514,055	823,883	109,305,794
nACT	1,916	1,868,467	2,771	2,701,949	2,771	2,701,949	3,959	3,859,928
Total	1,189,531	136,700,209	1,474,419	303,225,828	1,474,419	241,364,460	1,474,419	211,932,351
	-	-52.88%	-	4.53%	-	-16.8%	-	-26.94%

Table 8: Scenarios for estimating the potential financial impact of the ACT subsidy using the absolute mark-up of Chloroquine

Treatment Type	Baseline		Scenario A1		Scenario A2		Scenario A3		Scenario B1		Scenario B2	
	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue
Co-Paid ACT	0	0	299,882	44,195,080	387,553	57,115,653	530,375	78,163,957	356,859	52,592,146	461,188	67,967,627
Other ACT	428,608	209,495,941	300,026	146,647,159	214,304	104,747,971	128,582	62,848,782	357,030	174,510,119	255,022	124,650,085
AMT	9,749	3,874,855	6,824	2,712,398	4,875	1,937,427	3,900	1,549,942	8,121	3,227,754	5,801	2,305,538
nAMT	558,565	74,105,623	390,996	51,873,936	390,996	51,873,936	335,139	44,463,374	465,285	61,729,984	465,285	61,729,984
nACT	2,684	2,616,900	1,879	1,831,830	1,879	1,831,830	1,610	1,570,140	2,236	2,179,878	2,236	2,179,878
Total	999,606	290,093,318	999,606	247,260,403	999,606	217,506,817	999,606	188,596,194	1,189,531	294,239,880	1,189,531	258,833,112
% change in total net revenue	-	-	-	-14.77%	-	-25.02%	-	-34.99%	-	1.43%	-	-10.78%

Treatment Type	Scenario B3		Scenario C1		Scenario C2		Scenario C3	
	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue	Total Vol. (AETD)	Net Revenue
Co-Paid ACT	631,146	93,015,108	442,326	65,187,743	571,641	84,245,588	451,166	66,490,534
Other ACT	153,013	74,790,051	442,538	216,304,559	316,098	154,503,256	189,659	92,701,954
AMT	4,641	1,844,431	10,066	4,000,787	7,190	2,857,705	5,752	2,286,164
nAMT	398,815	52,911,415	576,718	76,514,055	576,718	76,514,055	823,883	109,305,794
nACT	1,916	1,868,467	2,771	2,701,949	2,771	2,701,949	3,959	3,859,928
Total	1,189,531	224,429,471	1,474,419	364,709,094	1,474,419	320,822,554	1,474,419	274,644,373
% change in total net revenue	-	-22.64%	-	25.72%	-	10.59%	-	-5.33%

6 Recommendations

Any supporting interventions related to AMFm should ensure that the current distribution system in the formal private sector is not disrupted. In particular, initiatives seeking to repackage subsidized ACTs should intervene at the level of the manufacturer to avoid creating lengthy lead times. Possible strategies for addressing the barriers identified above that would not disrupt existing distribution channels, include:

- **Amend the pharmaceutical pricing structure for co-paid ACTs**
  Respondents interviewed for the rapid analysis suggested the following three approaches for pricing ACTs subsidized by the AMFm:

  1. The absolute margin of Chloroquine under Benin's fixed price scheme could be applied to subsidized ACTs. Until recently, high volumes of Chloroquine were sold by the private sector wholesalers and pharmacies. This implies that at adequately high volumes the absolute margin of Chloroquine is sufficient to induce registered wholesalers, pharmacies, and pharmaceutical depots to sell an antimalarial product.

     Based on sales volume data from Benin's three registered wholesalers, the mark-ups on a full adult dose of Chloroquine from the PGHT to the retail price ranged from 44–333 CFA (US$ 0.10–0.74), and the weighted mean mark-up equaled 320 CFA (US$ 0.71) (refer to Table 3). Assuming that a full-course of adult treatment is available to first line buyers at a price of 25 CFA, if the weighted mean absolute mark-up of Chloroquine is added to co-paid ACTs, the retail price would be 345 CFA (US$ 0.77). The wholesaler selling price would be 173 CFA (US$ 0.39). Registered wholesalers and pharmacies would respectively earn mark-ups of 148 CFA (US$ 0.33) and 172 CFA (US$ 0.38) for each adult dose sold.

  2. The absolute margin of the least expensive brand of Artmether-Lumefantrine under Benin's fixed price scheme could be applied to subsidized ACTs.

     The mark-up from the PGHT to the retail price of the least expensive full adult dose of Artemether + Lumefantine is 1014 CFA (US$ 2.26). If this absolute margin is applied to target price of 25 CFA, the wholesaler's selling price would be 493 CFA (US$ 1.10) and the retail price would be 1039 CFA (US$ 2.32). Registered wholesalers and pharmacies would respectively earn mark-ups of 468 CFA (US$ 1.04) and 546 CFA (US$ 1.29) for each adult dose sold. This mark-up would be sufficient to cover the costs of registered wholesalers, pharmacies, and pharmaceutical depots, and would induce formal outlets to encourage substitution from monotherapies to ACTs. However, the retail price prevailing under this scheme would likely be prohibitively expensive for a large proportion of the population.

3. Several key informants reasoned that the private sector has a responsibility to promote public health. Since pharmaceutical outlets are not obliged to sell subsidized ACTs and will be free to sell other non-subsidized antimalarial products, these key informants argued that subsidized ACTs should be priced at the lowest-possible price that covers the direct and indirect financial costs incurred by selling antimalarials.

A detailed costing exercise of registered wholesalers, pharmacies, and pharmaceutical depots would be necessary to determine the appropriate pricing structure. This exercise would need to examine a wide range of enterprises, as the business practices, product mix, and consequently costing structure differed substantially among the respondents visited for the rapid analysis.

It should be noted that the private sector respondents consulted for the rapid analysis expressed considerable interest in revising the overall pricing structure of Benin's pharmaceutical products. Efforts to determine the appropriate price of ACTs co-paid under the AMFm could provide the opportunity to address deficiencies identified in the broader pricing policy of pharmaceutical products in Benin. First, transportation and other costs have purportedly increased since the coefficients were set in 2003. Second, the current pricing scheme does not explicitly describe how generic medicines purchased from CAME by private sector buyers should be priced, nor does it incentivize registered wholesalers or pharmacies into supplying generic pharmaceutical products.

- **Harmonize the price of co-paid ACTs in the public and private sectors**

  Patients can purchase a full adult dose of Coartem for 4085 CFA (US$ 9.12) in registered pharmacies and pharmaceutical depots, but must only pay 600 CFA (US$ 1.34) in public health facilities. The significant difference between these prices promotes the proliferation of Coartem in the informal sector.

  Preliminary evidence from in-depth interviews conducted as part of the ACTwatch Supply Chain Survey suggests that Coartem originally designated for the public sector (not necessarily from Benin) is increasingly available in the informal sector. A full adult dose can often be found for a price of 1200 CFA (US$ 2.68). Patients that are unaware of the price in public health facilities often believe that they are saving money by purchasing treatment from informal drug sellers.

  The price difference also encourages leakage into the informal sector. One pharmaceutical retail-wholesaler operating in a market in Porto Novo reported that they visit many public health facilities to purchase small quantities of Coartem. Stocks are then resold for approximately double the purchase price. Harmonizing the price between the public and private sectors is consequently a potential strategy to reduce demand for treatment in the informal sector and decrease the leakage of co-paid ACTs into the informal sector.

- **Implement a major information and communications campaign**

  Preliminary evidence from the ACTwatch Supply Chain Survey suggests that the current communications activities of the Ministry of Health and other partners are already increasing demand for ACTs. In-depth interviews with several wholesalers operating in informal markets have indicated that clients are increasingly specifically asking for ACTs. Some of these wholesalers have indicated that Coartem has now replaced Chloroquine as their top-selling antimalarial product.

  On-going communication activities can be enhanced to sensitize the population to the availability of low-cost effective antimalarial treatment in both the public and private sector. The communication activities should specify the exact price of co-paid ACTs to ensure that the fixed prices are observed in all public and private outlets. A widespread communications campaign is an integral mechanism to reduce domestic demand for antimalarials purchased in the informal sector, and attract patients to formal structures to purchase subsidized ACTs

- **Monitor the volumes of subsidized ACTs purchased by first line buyers**

- **Increase the number of pharmaceutical depots in rural areas**

Annex 1: Volumes and prices of antimalarials sold by private wholesalers

Table 1.1: Volume and prices of ACTs sold by registered private wholesalers

Brand	Active Ingredients	Strength	Manufacturer	Dosage Form	Package Size	PGHT[1]	WS sell price[1]	Retail price[1]	Vol.[2]
Alaxin	Dihydroartemisinine	160 mg	Bliss GVS	Tablet	3	800	1088	1424	1405
	Sulfadoxine	500 mg							
	Pyrimethamine	25 mg							
Alaxin	Dihydroartemisinine	160 mg	Bliss GVS	Tablet	2	800	1088	1424	3405
	Sulfadoxine	500 mg							
	Pyrimethamine	25 mg							
Arco	Artemisinine	125 mg	Kunming Pharma Corp	Tablet	8	1482	2016	2639	8160
	Napthoquine	50 mg							
Artediam	Artesunate	20 mg	Odypharm	Tablet	12	1902	2587	3386	1678
	Amodiaquine	120 mg							
Artefan	Artemether	20 mg	Ajanta Pharma	Tablet	16	1640	2230	2919	658
	Lumefantrine	120 mg							
Artefan	Artemether	20 mg	Ajanta Pharma	Tablet	24	2427	3301	4320	639
	Lumefantrine	120 mg							
Artefan	Artemether	40 mg	Ajanta Pharma	Tablet	12	2427	3301	4320	713
	Lumefantrine	240 mg							
Artefan	Artemether	40 mg	Ajanta Pharma	Tablet	16	3247	4416	5780	1008
	Lumefantrine	240 mg							
Artefan	Artemether	80 mg	Ajanta Pharma	Tablet	6	2229	3032	3968	4960
	Lumefantrine	480 mg							
Artefan	Artemether	180 mg/60 ml	Ajanta Pharma	Suspension	60ml	1837	2498	3269	4800
	Lumefantrine	1080 m/60mlg							
No brand/ unknown	Artemether	20 mg	Unknown	Tablet	24	1300	1768	2314	132
	Lumefantrine	120 mg							
Artequin	Artesunate	300 mg	Mepha	Tablet	6	1640	2230	2919	5394
	Mefloquine	375 mg							
Artequin	Artesunate	600 mg	Mepha	Tablet	6	2165	2944	3853	24291
	Mefloquine	750 mg							
Artequin pédiatrique	Artesunate	50 mg	Mepha	Granules	3	1968	2676	3502	9840
	Mefloquine	125 mg							
No brand/ unknown	Artesunate	50 mg	Unknown	Tablet	24	1600	2176	2848	60
	Amodiaquine	153.1 mg							
Asunatedenk 100 plus	Artesunate	100 mg	Denk pharma	Tablet	6	1312	1784	2335	1404
	Sulfamethoxypyrazine	250 mg							
	Pyrimethamine	12.5 mg							
Asunatedenk 200 plus	Artesunate	200 mg	Denk pharma	Tablet	6	1968	2676	3502	11747
	Sulfamethoxypyrazine	500 mg							
	Pyrimethamine	25 mg							
Co-Arinate Adulte	Artesunate	200 mg	Dafra pharma	Tablet	6	2001	2721	3561	80376
	Sulfamethoxypyrazine	500 mg							
	Pyrimethamine	25 mg							
Co-Arinate Enfant	Artesunate	100 mg	Dafra pharma	Tablet	6	1351	1837	2404	17504
	Sulfamethoxypyrazine	250 mg							
	Pyrimethamine	12.5 mg							
Co-Arinate FDC Adulte	Artesunate	200 mg	Dafra pharma	Tablet	3	2152	2927	3831	21248
	Sulfamethoxypyrazine	500 mg							
	Pyrimethamine	25 mg							
Co-Arinate FDC Enfant	Artesunate	100 mg	Dafra pharma	Tablet	3	1397	1900	2487	6060
	Sulfamethoxypyrazine	250 mg							
	Pyrimethamine	12.5 mg							
Coarsucam	Artesunate	25 mg	Sanofi Aventis	Tablet	3	1246	1695	2218	4037
	Amodiaquine	67.5 m							
Coarsucam	Artesunate	50 mg	Sanofi Aventis	Tablet	3	1371	1865	2441	8194
	Amodiaquine	135 mg							
Coarsucam	Artesunate	100 mg	Sanofi Aventis	Tablet	6	2184	2970	3887	15085
	Amodiaquine	270 mg							
Coarsucam enfant	Artesunate	100 mg	Sanofi Aventis	Tablet	3	1561	2123	2779	6098
	Amodiaquine	270 mg							
Coartem	Artemether	20 mg	Novartis	Tablet	24	2296	3122	4086	23903
	Lumefantrine	120 mg							

Table 1.2: Volume and prices of ACTs sold by registered private wholesalers

Brand	Active Ingredients	Strength	Manufacturer	Dosage Form	Package Size	PGHT[1]	WS sell price[1]	Retail price[1]	Vol.[2]
Co-Artesiane	Artemether	180 mg/60 ml	Dafra Pharma	Suspension	60 ml	2250	3060	4005	21411
	Lumefantrine	1080 mg/60 m							
Co-Artesiane	Artemether	360 mg/120 ml	Dafra Pharma	Suspension	120 ml	3798	5165	6760	3072
	Lumefantrine	2160 mg/120 ml							
Cofantrine	Artemether	20 mg	EGR Pharma	Tablet	24	1968	2676	3502	8048
	Lumefantrine	120 mg							
Cofantrine	Artemether	80 mg	EGR Pharma	Tablet	6	2034	2766	3620	1860
	Lumefantrine	480 mg							
Cofantrine	Artemether	180 mg/60 ml	EGR Pharma	Suspension	60 ml	2034	2766	3620	10958
	Lumefantrine	1080 mg/60 m							
Duo-Cotexin	Dihydroartemisinine	40 mg	Holleypharm	Tablet	8	2617	3559	4658	29361
	Piperaquine	320 mg							
Larimal FD Adulte	Artesunate	50 mg	IPCA	Tablet	6	1935	2632	3445	60
	Amodiaquine	153.1 mg							
Larimal FD Junior	Artesunate	50 mg	IPCA	Tablet	3	1410	1918	2510	24
	Amodiaquine	153.1 mg							
Lonart	Artemether	20 mg/ 60 ml	Bliss GVS	Suspension	60 ml	1804	2453	3211	384
	Lumefantrine	120 mg/ 60 ml							
Lonart Forte	Artemether	40 mg	Bliss GVS	Tablet	12	1705	2319	3035	1200
	Lumefantrine	240 mg							
Lufanter	Artemether	20 mg	IMEX Health	Supository	6	1935	2632	3445	2658
	Lumefantrine	120 mg							
Lufanter	Artemether	40 mg	IMEX Health	Tablet	12	2263	3078	4029	13756
	Lumefantrine	240 mg							
Lufanter	Artemether	180 mg/60 ml	IMEX Health	Suspension	60 ml	2230	3033	3970	8729
	Lumefantrine	1080 mg/60 m							
Lufanter	Artemether	Unknown	IMEX Health	Tablet	8	1377	1873	2451	200
	Lumefantrine	Unkown							
Lumartem	Artemether	20 mg	Cipla	Tablet	24	1410	1918	2510	90356
	Lumefantrine	120 mg							
Lumartem	Artemether	20 mg	Cipla	Tablet	8	499	679	889	21884
	Lumefantrine	120 mg							
Lumet Forte	Artemether	40 mg	Cipla	Tablet	12	1443	1963	2569	22809
	Lumefantrine	240 mg							
Lumet Forte	Artemether	40 mg	Cipla	Tablet	6	721	981	1284	6211
	Lumefantrine	240 mg							
Lumiter	Artemether	20 mg	Macleod's	Tablet	24	1640	2230	2919	11596
	Lumefantrine	120 mg							
Macsunate Plus	Artesunate	50 mg	Macleod's	Tablet	24	1148	1561	2043	798
	Amodiaquine	153.1 mg							
Macsunate Plus	Artesunate	50 mg	Macleod's	Tablet	12	853	1160	1518	292
	Amodiaquine	153.1 mg							
Macsunate Plus	Artesunate	50 mg	Macleod's	Tablet	6	656	892	1167	350
	Amodiaquine	153.1 mg							
Malacur	Dihydroartemisinine	40 mg	Elder	Tablet	8	1968	2676	3502	15608
	Piperaquine	320 mg							
Malacur	Dihydroartemisinine	90 mg/60 ml	Elder	Suspension	60 ml	1968	2676	3502	6744
	Piperaquine	720 mg/60 ml							
Malmed	Artesunate	25 mg	Medinomics	Tablet	6	532	723	946	480
	Amodiaquine	75 mg							
Malmed	Artesunate	50 mg	Medinomics	Tablet	6	695	945	1237	696
	Amodiaquine	100 mg							
Malmed	Artesunate	100 mg	Medinomics	Tablet	6	1351	1838	2406	132
	Amodiaquine	300 mg							
Macsunate FDC	Artesunate	50 mg	Macleod's	Tablet	12	1214	1651	2161	1976
	Amodiaquine	200 mg							
Macsunate FDC	Artesunate	50 mg	Macleod's	Tablet	3	722	982	1285	612
	Amodiaquine	200 mg							
Macsunate FDC	Artesunate	50 mg	Macleod's	Tablet	6	820	1115	1459	516
	Amodiaquine	200 mg							

Table 1.3: Volume and prices of ACTs sold by registered private wholesalers

Brand	Active Ingredients	Strength	Manufacturer	Dosage Form	Package Size	PGHT[1]	WS sell price[1]	Retail price[1]	Vol.[2]
P-Alaxin	Dihydroartemisinine	40 mg	GVS Labs	Tablet	8	1804	2453	3211	1158
	Piperaquine	320 mg							
P-Alaxin	Dihydroartemisinine	80 mg/80 ml	GVS Labs	Suspension	80 ml	2099	2855	3737	289
	Piperaquine	640 m g/80 ml							

Table 2: Volume and prices of artemisinin monotherapies sold by private wholesaler

Brand	Active Ingredients	Strength	Manufacturer	Dosage Form	Package Size	PGHT[1]	WS sell price[1]	Retail price[1]	Vol.[2]
Ametherdenk 40	Artemether	40 mg	Denk pharma	Tablet	6	1378	1874	2453	1047
Arinate pédiatrique	Artesunate	50 mg	Dafra Pharma	Tablet	6	-	-	-	295
Artemal S	Artesunate	50 mg	Plethico	Tablet	12	1299	1767	2313	1032
No brand/ unknown	Artemether	20 mg/1 ml	Cipla	Liquid Inject.	10 amp.	2960	4025	5268	116
No brand/ unknown	Artemether	80 mg/1 ml	Codip	Liquid Inject.	5 amp.	2283	3105	4064	1428
No brand/ unknown	Artemether	80 mg/1 ml	Tongmei	Liquid Inject.	6 amp.	2401	3265	4273	119
Artenam	Artemether	50 mg	Arenco	Tablet	14	2256	3068	4015	380
Artenam Injections	Artemether	100 mg	Ebewe	Liquid Inject.	7 amp.	4231	5754	7531	63
Artésiane	Beta-Artemether	20 mg	Dafra Pharma	Liquid Inject.	3 amp.	1482	2015	2637	488
Artésiane	Beta-Artemether	20 mg	Dafra Pharma	Liquid Inject.	10 amp.	3103	4220	5523	1125
Artésiane	Beta-Artemether	40 mg	Dafra Pharma	Suppository	6	1646	2239	2930	1279
Artésiane	Beta-Artemether	80 mg	Dafra Pharma	Liquid Inject.	5 amp.	3000	4080	5340	4927
Artésiane	Beta-Artemether	160 mg	Dafra Pharma	Suppository	6	3496	4755	6223	121
Artésiane	Beta-Artemether	180 mg/60 ml	Dafra Pharma	Suspension	60 ml	1397	1900	2487	3900
Artésiane	Beta-Artemether	300mg/100ml	Dafra Pharma	Suspension	100 ml	1800	2448	3204	8677
Arthesis	Artesunate	50 mg	Cipla	Tablet	12	1312	1784	2335	3304
Gsunate	Artesunate	50 mg	Bliss GVS	Suppository	6	1391	1892	2476	28
Gsunate	Artesunate	100 mg	Bliss GVS	Tablet	6	1699	2311	3025	12
Gsunate	Artesunate	200 mg	Bliss GVS	Suppository	6	2453	3336	4366	5
Gvither	Artemether	80 mg/1 ml	Bliss GVS	Liquid Inject.	6 amp.	5097	6932	9073	27
Gvither	Artemether	80 mg/1 ml	Bliss GVS	Liquid Inject.	10 amp.	3582	4872	6377	180
Gvither	Artemether	300 mg	Bliss GVS	Suspension	100 ml	1797	2444	3199	36
Malather	Artemether	80 mg/1 ml	IMEX Health	Liquid Inject.	5 amp.	2624	3569	4671	274
Malather	Artemether	300mg/100ml	IMEX Health	Syrup	100 ml	1745	2373	3106	170
Plasmotrim	Artesunate	50 mg	Mepha	Suppository	6	1214	1651	2161	10704
Plasmotrim	Artesunate	50 mg	Mepha	Suppository	30	4985	6780	8874	184
Plasmotrim	Artesunate	50 mg	Mepha	Suppository	150	19941	27120	35495	39
Plasmotrim	Artesunate	200 mg	Mepha	Suppository	6	1968	2676	3502	5078
Plasmotrim	Artesunate	200 mg	Mepha	Tablet	6	2435	3312	4335	3003
Plasmotrim	Artesunate	200 mg	Mepha	Tablet	30	6297	8564	11209	1

Table 3: Volume and prices of non-artemisinin combination therapies sold by private wholesalers

Brand	Active Ingredients	Strength	Manufacturer	Dosage Form	Package Size	PGHT	WS sell price[1]	Retail price[1]	Vol.[2]
Malarone	Atovaquone	250 mg	GlaxoSmithKline	Tablet	12	21324	29000	37956	84
	Proguanil	100 mg							
Savarine	Chloroquine	200 mg	GlaxoSmithKline	Tablet	28	3900	5304	6942	2684
	Proguanil	100 mg							

Table 4.1: Volume and prices of Non-artemisinin monotherapies sold by private wholesalers

Brand	Active Ingredients	Strength	Manufacturer	Dosage Form	Package Size	PGHT[1]	WS sell price[1]	Retail price[1]	Vol.*
No brand/ unknown	Amodiaquine	200 mg	Unknown	Tablet	100	2296	3123	4087	10
No brand/ unknown	Amodiaquine	200 mg	Unknown	Tablet	150	2528	3438	4500	96
Amodiaquine QT	Amodiaquine	200 mg	Unknown	Tablet	12	216	294	385	8478
Amodiaquine QT	Amodiaquine	50 mg/5ml	Unknown	Suspension	60 ml	407	553	724	3416
A-Quin	Amodiaquine	50 mg/5ml	Plethico	Suspension	60 ml	649	883	1156	171
A-Quin	Amodiaquine	50 mg/5ml	Plethico	Suspension	60 ml	650	884	1157	361
Arsiquinoforme	Quinine	250 mg	Cipharma	Tablet	15	2599	3535	4627	507
Camoquin	Amodiaquine	200 mg	Pfizer	Tablet	75	7294	9920	12984	468
Camoquin sirop	Amodiaquine	50 mg/5 ml	Pfizer	Syrup	60 ml	1004	1365	1787	29428
Chloroquine	Chloroquine	100 mg	Tongmei	Tablet	1000	3801	5170	6767	1
Clip	Chloroquine	25 mg/5ml	Opalia	Syrup	150 ml	800	1088	1424	3360
Combimal	Sulfadoxine	500mg/2.5ml	Ajanta Pharma	Liquid Inject.	3 amp.	807	1098	1437	499
	Pyrimethamine	25 mg/2.5ml							
Combimal (Deconditioned)	Sulfadoxine	500 mg	Ajanta Pharma	Tablet	3	271	368	482	157052
	Pyrimethamine	25 mg							
Combimal	Sulfadoxine	500 mg	Ajanta Pharma	Tablet	150	13500	18360	24030	2211
	Pyrimethamine	25 mg							
Duliquine	Chloroquine	50 mg/5 ml	Medicale Pharma	Suspension	60 ml	525	714	935	1133
Duliquine	Chloroquine	300 mg	Medicale Pharma	Tablet	6	512	696	911	1199
Fansidar	Sulfadoxine	500 mg	Roche	Liquid Inject.	2 amp.	1344	1828	2393	10744
	Pyrimethamine	25 mg							
Fansidar	Sulfadoxine	500 mg	Roche	Tablet	3	577	785	1027	23628
	Pyrimethamine	25 mg							
Fansidar	Sulfadoxine	500 mg	Roche	Liquid Inject	30 amp	19152	26047	34091	128
	Pyrimethamine	25 mg							
Fansidar	Sulfadoxine	500 mg	Roche	Tablet	150	14400	19584	25632	239
	Pyrimethamine	25 mg							
Fansidar	Sulfadoxine	500 mg	Roche	Tablet	3	288	392	513	1997
	Pyrimethamine	25 mg							
Flavoquine	Amodiaquine	Unknown	Sanofi Aventis	Suspension	90 ml	1117	1519	1988	3132
Halfan	Halofantrine	100 mg/45 ml	Glaxo	Suspension	45 ml	2200	2992	3916	9405
Halfan	Halofantrine	233 mg	Glaxo	Tablet	120	36000	48960	64080	313
Halfan	Halofantrine	233 mg	Glaxo	Tablet	6	3100	4216	5518	3859
Halfan (deconditioned)	Halofantrine	233 mg	Glaxo	Tablet	6	1800	2448	3204	204

Table 4.2: Volume and prices of Non-artemisinin monotherapies sold by private wholesalers

Brand	Active Ingredients	Strength	Manufacturer	Dosage Form	Package Size	PGHT[1]	WS sell price[1]	Retail price[1]	Vol.[2]
Halfan HOP	Halofantrine	Unknown	Glaxo	Tablet	Unknown	1800	2448	3204	3307
Lariam	Mefloquine	250 mg	Roche	Tablet	8	17448	23729	31057	36
Madar	Sulfadoxine	500 mg	Caplin	Tablet	3	215	292	382	6420
	Pyrimethamine	25 mg							
Malaquin	Amodiaquine	500 mg/5 ml	unknown	Suspension	60 ml	407	553	724	3416
Malareich	Sulfadoxine	500 mg	Medreich Sterilab Limited	Tablet	3	230	313	410	1750
	Pyrimethamine	25 mg							
Malareich	Sulfadoxine	500 mg/5 ml	Medreich Sterilab Limited	Suspension	10 ml	197	268	351	454
	Pyrimethamine	25 mg/5 ml							
Malarix	Quinine	250 mg	Gracure	Tablet	12	1315	1788	2340	1122
Malarix	Quinine	400 mg/4 ml	Gracure	Liquid Inject.	10 amp	1279	1740	2277	167
Malarix	Quinine	400 mg /4 ml	Gracure	Liquid Inject.	100 amp	12790	17395	22767	204
Malastop	Sulfadoxine	500 mg	Sterop Laboratories	Tablet	3	354	481	630	1141
	Pyrimethamine	25 mg							
Malastop	Sulfadoxine	500 mg	Sterop Laboratories	Tablet	24	1968	2676	3502	553
	Pyrimethamine	25 mg							
Maloxine	Sulfadoxine	500 mg/2.5 ml	Exphar	Liquid Inject.	2 amp	750	1020	1335	6614
	Pyrimethamine	25 mg/2.5 ml							
Maloxine	Sulfadoxine	500 mg	Exphar	Tablet	3	282	356	466	128983
	Pyrimethamine	25 mg							
Maloxine	Sulfadoxine	500 mg	Exphar	Tablet	150	13118	17841	23351	736
	Pyrimethamine	25 mg							
Metakelfin	Sulfametopyrazine	500 mg	Pfizer	Tablet	3	544	740	969	240
	Pyrimethamine	25 mg							
Palidar	Sulfadoxine	500 mg	Phyto-Riker	Tablet	150	8724	11865	15529	5
	Pyrimethamine	25 mg							
Paludoxin	Sulfadoxine	500 mg	Unknown	Tablet	150	11807	16058	21017	22
	Pyrimethamine	25 mg							
Paludoxin	Sulfadoxine	500 mg	Unknown	Tablet	3	236	321	420	940
	Pyrimethamine	25 mg							
Paludoxin	Sulfadoxine	500 mg/? ml	Unknown	Suspension	10 ml	408	555	726	395
	Pyrimethamine	25 mg/? ml							
Paludrine	Proguanil	100 mg	Astra Zenca	Tablet	56	3750	5100	6675	1994
Paluject	Quinine	400 mg/? ml	Sanofi Aventis	Liquid Inject.	72 amp	7779	10580	13847	545
Paluject	Quinine	400 mg/? Ml	Sanofi Aventis	Liquid Inject.	6 amp	1082	1472	1927	49
Plecidar	Sulfadoxine	250 mg/5 ml	Plethico	Suspension	10 ml	426	580	789	432
	Pyrimethamine	12.5 mg/5 ml							
Quinimax	Quinine	125 mg	Sanofi Aventis	Tablet	18	1843	2507	3281	13070
Quinimax	Quinine	250 mg/2 ml	Sanofi Aventis	Liquid Inject.	25 amp	6553	8912	11664	578
Quinimax	Quinine	250 mg/2 ml	Sanofi Aventis	Liquid Inject.	3 amp	983	1137	1750	543
Quinimax	Quinine	500 mg	Sanofi Aventis	Tablet	9	2893	3934	5149	4731
Quinimax	Quinine	500 mg/4 ml	Sanofi Aventis	Liquid Inject.	25 amp.	11487	15622	20446	1028
Quinimax	Quinine	500 mg/4 ml	Sanofi Aventis	Liquid Inject.	3 amp.	1725	2346	3071	1634
Unbranded/ unknown	Quinine	100 mg	CP Pharma	Tablet	150	1559	2120	2775	175
Unbranded/ unknown	Quinine	100 mg	Pharmaquick	Tablet	30	372	506	662	23248
Unbranded/ unknown	Quinine	300 mg	Pharmaquick	Tablet	1000	26180	35605	46601	136
Unbranded/ unknown	Quinine	300 mg	Pharmaquick	Tablet	20	714	971	1271	19096
Unbranded/ unknown	Quinine	600 mg/2 ml	Philco Pharma	Liquid Inject.	10 amp.	1653	2248	2942	682
Unbranded/ unknown	Quinine	400 mg/? ml	Sedapharm	Liquid Inject.	72 amp.	5760	7834	10253	10720

Table 4.3: Volume and prices of Non-artemisinin monotherapies sold by private wholesalers

Brand	Active Ingredients	Strength	Manufacturer	Dosage Form	Package Size	PGHT[1]	WS sell price[1]	Retail price[1]	Vol.[2]
Unbranded/ unknown	Quinine	100 mg	Unknown	Tablet	1000	9075	12342	16154	138
Unbranded/ unknown	Quinine	300 mg	Unknown	Tablet	100	2750	3740	4895	1298
Unbranded/ unknown	Quinine	400 mg/? ml	Unknown	Liquid inject.	100 amp.	7115	9676	12664	522
Unbranded/ unknown	Quinine	500 mg/4 ml	Sedapharm	Liquid inject.	100 amp.	9426	12819	16778	3
Unbranded/ unknown	Quinine	600 mg/? ml	Unknown	Liquid inject.	100 amp.	10055	13675	17898	24
Unbranded/ unknown	Quinine	600 mg/2 ml	Unknown	Liquid inject.	10 amp.	913	1242	1626	932
Quininject	Quinine	300 mg/2 ml	Medreich	Liquid inject.	10 amp.	2493	3390	4437	174
Quininject	Quinine	600 ml/2 ml	Medreich	Liquid inject.	10 amp.	2493	3390	4437	12
Unbranded/ unknown	Sulphadoxine	500 mg	Pharmaquick	Tablet	3	255	347	454	4485
	Pyrimethamine	25 mg							
Unbranded/ unknown	Sulphadoxine	500 mg	Unknown	Tablet	75	5641	7672	10041	136
	Pyrimethamine	25 mg							
Unbranded/ unknown	Sulphadoxine	500 mg	Unknown	Tablet	3	2100	2856	3738	57
	Pyrimethamine	25 mg							
Unbranded/ unknown	Sulphadoxine	500 mg	Unkown	Tablet	100	18150	24684	32307	5
	Pyrimethamine	25 mg							
Surquina	Quinine	250 mg	Innotech	Tablet	600	27229	37031	48467	4
Surquina	Quinine	250 mg	Innotech	Tablet	18	1325	1802	2359	2327
Surquina	Quinine	250 mg	Innotech	Tablet	6	273	371	486	399
Surquina	Quinine	490 mg	Innotech	Liquid inject	3	1325	1802	2359	4

[1]The PGHT and retail prices were calculated from the wholesaler selling prices provided by the private sector wholesalers. As a result of rounding and minor discrepancies (ranging from 1-5 CFA) among the prices provided by the wholesalers, there may be small deviations in the prices reported here and the true values of the PGHT and the retail prices.

[2]The volumes presented in these tables estimate the total number of full packages sold by Benin's three private wholesalers over the course of one year. The figures presented are an approximation only; it was not possible to get data for an identical timeframe from all three wholesalers (one wholesaler provided sales figures for 2008, while the others provided figures for the past 12 months).

Annex 2: List of antimalarials available for purchase by private sector buyers at CAME in 2008[52]

Brand Name	Generic Name	Strength	Form	Manufacturer
Unbranded	Artemether	40 mg	Tablet	Cipla
	Lumefantrine	240 mg		
Unbranded	Artemether	20 mg	Tablet	Cipla
	Lumefantrine	120 mg		
Artésiane	Artemether	20 mg	Amp. inject.	Rotex Medica
Artésiane	Artemether	80mg	Amp. inject.	Rotex Medica
Unbranded	Artesunate	25 mg	Tablet	Sanofi Aventis
	Amodiaquine	67.5 mg		
Unbranded	Quinine	100 mg/ 1ml	Amp. inject.	ZR Pharmaceutical
Unbranded	Quinine	300 mg	Tablet	Pharmaquick
Unbranded	Quinine	100 mg	Tablet	Pharmaquick
Unbranded	Quinine	100 mg	Tablet	Pharmaquick
Unbranded	Quinine	300 mg	Tablet	Pharmaquick
Unbranded	Quinine	300 mg/ 1ml	Amp. inject.	Wuhan Grand Pharma
Unbranded	Quinine	600 mg/2 ml	Amp. inject.	Wuhan Grand Pharma
Unbranded	Sulfadoxine	500 mg	Tablet	Ajanta
	Pyrimethamine	25 mg		
Unbranded	Sulfadoxine	500 mg	Tablet	Pharmaquick
	Pyrimethamine	25 mg		
Unbranded	Sulfadoxine	500 mg	Amp	IPCA
	Pyrimethamine	25 mg		
Co-Artesiane suspension	Artemether	180 ml	Susp.	MPF BV Netherlands
	Lumefantrine	1080 ml		
Co-Arinate FDC Adulte	Artesunate	200 mg	Tablet	Pharma Italia
	Sulfadoxine	500 mg		
	Pyrimethamine	25 mg		
Co-Arinate FDC Junior	Artesunate	100 mg	Tablet	Pharma Italia
	Sulfadoxine	250 mg		
	Pyrimethamine	12.5 mg		

[52] These products can also be purchased by public sector buyers. This list does not include supplies of Coartem managed by CAME on behalf of the PNLP that can only be distributed in the public sector.

Annex 3: Population data used to scale-up ACTwatch Outlet Survey Data to generate national estimates of retail provider numbers

Total population from Benin 2002 census	**6,762,989**
Population of 19 arrondissements visited for the ACTwatch Outlet Survey	**427,073**
Adjustment factor to scale up Outlet Survey data	**15.83**

Annex 4: Antimalarial doses used to calculate adult equivalent treatment doses

Drug	Treatment regimen
Amodiaquine	9 X 200 mg 11 X 153.1 mg
Artemether	14 X 50 mg 7 X 100 mg
Artemether – Lumefantrine	24 X 20 mg / 120 mg 12 X 40 mg / 480 mg
Artemisinine –Napthoquine	8 X 125 mg / 50 mg
Artesunate	14 X 50 mg 7 X 100 mg
Artesunate - Amodiaquine	12 X 50 mg + 12 X 153.1 mg 6 X 100 mg + 12 X 270 mg
Artesunate – Mefloquine	12 X 50 mg + 6 X 250 mg 6 X 100 mg + 6 X 250 mg
Artesunate – SP	3 X 200 mg + 3 X 500 mg/25 mg 6 X 100 mg + 6 X 500 mg/25 mg 3 X 200 mg/500 mg/25 mg 6 X 200 mg/500 mg/25 mg
Chloroquine	15 X 100 mg 10 X 150 mg
DHA – Piperaquine	8 X 40 mg/320 mg 12 X 30 mg/225mg
DHA – SP	3 X
Halofantrine	6 X 233 mg
Quinine	18 X 100 mg 6 X 300 mg
SP	3 X 500 mg/25 mg

Figure 1: The private for-profit sector supply chain for antimalarials