

Phaseout of Antimalarial Monotherapies in Support of ACT Policy Implementation in Ghana: Assessment of the Quantities of Monotherapies on the Market, September 2005

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Strategic Objective 5

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ACRONYMS AND ABBREVIATIONS

ACT	artemisinin-based combination therapy
API	active pharmaceutical ingredient
CMS	Central Medical Store(s)
FDB	Food and Drugs Board
GIHOC	Ghana Industrial Holding Corporation
IPTp	intermittent preventive treatment in pregnancy
MSH	Management Sciences for Health
NMCP	National Malaria Control Programme
RMS	Regional Medical Store(s)
RPM Plus	Rational Pharmaceutical Management Plus Program
SP	sulfadoxine-pyrimethamine
USAID	U.S. Agency for International Development

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EXECUTIVE SUMMARY

The National Malaria Control Programme of Ghana adopted artesunate + amodiaquine, an artemisinin-based combination therapy (ACT) as the first-line treatment of choice for uncomplicated malaria in 2004.¹ Previously, chloroquine was the first-line therapy nationally recommended for the treatment of uncomplicated malaria whereas sulfadoxine-pyrimethamine (SP) was reserved for use as second-line therapy. The emergence and spread of *Plasmodium falciparum* resistance to chloroquine in the country and the rapid spread of resistance to chloroquine's replacement, SP, led to a strong consensus among relevant stakeholders for making available and affordable a combination therapy for use in the first-line treatment of malaria.

An ACT is a combination of two or more antimalarial medicines, one of which is an artemisinin derivative, with independent modes of action and different biochemical targets in the parasite. The component medicines may be synergistic or additive/complementary in their effect. ACTs have been identified as a strategic and viable option in improving therapeutic efficacy and delaying development of parasite resistance. The partner medicines that comprise Ghana's choice of ACT are individual components (artesunate and amodiaquine) formulated into co-packaged dosage forms for simultaneous administration (co-administered therapy). Because artesunate and amodiaquine each have been previously used as monotherapies, they are still available on the Ghana market. Their continued use as monotherapies can potentially compromise the value of the artesunate/amodiaquine combination by selecting for drug resistance. As such, the withdrawal from the market of artemisinins (artesunate and its derivatives) and other antimalarial monotherapies (such as chloroquine, amodiaquine, SP, and their derivatives) is recommended.

In order (1) to maintain the efficacy of the individual components of the selected ACT as well (2) to avoid wastage of medicines put on the market under the previous malaria treatment policy, the National Malaria Control Programme, in conjunction with the Food and Drugs Board, Central Medical Stores, and Ministry of Health Procurement Unit, developed a plan for the removal of artesunate and amodiaquine monotherapies as well as the phaseout of chloroquine and limitation of SP for use only in intermittent preventive therapy in pregnancy. In phasing out any group of medicines from a supply chain, the existing pipelines of the medicines must be determined and future procurements of current medicines adjusted to avoid accumulation of large pipelines of "old" medicines.

In November 2005, the Food and Drugs Board, with technical support from the Rational Pharmaceutical Management (RPM) Plus Program, funded through the U.S. Agency for International Development (USAID), undertook an assessment of the existing pipeline of antimalarials within the outgoing malaria treatment policy, with the aim of—

¹Ghana Health Service. 2004. *Antimalaria Drug Policy, October 2004*. Government of Ghana: Accra.

1. Determining approximate quantities of antimalarial monotherapies on the market
2. Determining the quantities of raw materials in the warehouses of the local pharmaceutical manufacturers capable of being used for the production of monotherapies
3. Determining stocks of finished products of antimalarial monotherapies in the warehouses of importers of such products
4. Determining stocks of monotherapy antimalarials in the Central and Regional Medical Stores

The assessment was designed to cover the following products—

1. All the different dosage forms of chloroquine and their raw materials
2. All the different dosage forms of amodiaquine and their raw materials
3. All the different dosage forms of artesunate and other artemisinin derivatives and their raw materials

Interpretation of assessment findings indicates that, within the six months following the assessment, all stocks in the public sector will be exhausted if no new supplies are received during the period.

The same cannot be assumed of the private sector, where companies assessed have already made huge investments in raw and packaging materials as well as finished products.

The recommendation of the Food and Drugs Board, therefore, is that a period of six months to one year should be allowed for phasing out the existing antimalarial monotherapies. The immediate discontinuation of chloroquine is recommended, whereas the monotherapies of artesunate and amodiaquine and their derivative products may be prescribed and used during the transition period.

As a follow-up to this assessment of antimalarial monotherapies, the Food and Drugs Board has implemented the phaseout plan by—

1. Immediate discontinuation of the registration of new antimalarial monotherapies
2. Immediate discontinuation of the renewal of antimalarial monotherapies whose market authorization has expired
3. Immediate discontinuation of the issuance of new permits for importation of chloroquine powder

INTRODUCTION

The National Malaria Control Programme (NMCP) of Ghana adopted artesunate + amodiaquine, an artemisinin-based combination therapy (ACT) as first-line treatment of choice for uncomplicated malaria in 2004.¹ An ACT is a combination of two or more antimalarial medicines, one of which is an artemisinin derivative, with independent modes of action and different biochemical targets in the parasite. The component medicines may be synergistic or additive/complementary in their effect. ACTs have been identified as a strategic and viable option in improving therapeutic efficacy and delaying development of parasite resistance.

Until the time of ACT adoption, chloroquine was the first-line therapy nationally recommended for the treatment of uncomplicated malaria, and sulfadoxine-pyrimethamine (SP) was reserved for use as second-line therapy. The emergence and spread of *Plasmodium falciparum* resistance to chloroquine in the country and the rapid spread of resistance to chloroquine's replacement, SP, led to a strong consensus among relevant stakeholders for making available and affordable a combination therapy for use in the first-line treatment of malaria.

The partner medicines that comprise Ghana's choice of ACT are individual components (artesunate and amodiaquine) formulated into co-packaged dosage forms for simultaneous administration (co-administered therapy). Because artesunate and amodiaquine each have been previously used as monotherapies, they are still available on the Ghana market. Their continued use as monotherapies can potentially compromise the value of the artesunate/amodiaquine combination by selecting for drug resistance. As such, the withdrawal from the market of artemisinins (artesunate and its derivatives) and other antimalarial monotherapies (such as chloroquine, amodiaquine, SP, and their derivatives) is recommended.

In order (1) to maintain the efficacy of the individual components of the selected ACT, as well (2) to avoid wastage of medicines put on the market under the previous malaria treatment policy, the NMCP, in conjunction with the Food and Drugs Board (FDB), Central Medical Stores, and Procurement Unit, developed a plan for the removal of artesunate and amodiaquine monotherapies as well as the phaseout of chloroquine and limitation of SP for use only in intermittent preventive therapy in pregnancy.

METHODOLOGY

In phasing out any group of medicines from a supply chain, the existing pipelines of the medicines must be determined and future procurements of current medicines adjusted to avoid accumulation of large pipelines of “old” medicines.

As a first step in the phaseout plan leading up to the full implementation of Ghana’s new malaria treatment policy, in November 2005, the FDB, with technical support from the Rational Pharmaceutical Management (RPM) Plus Program, funded through the U.S. Agency for International Development (USAID), undertook an assessment of the existing pipeline of antimalarials within the outgoing malaria treatment policy, with the aim of—

1. Determining approximate quantities of antimalarial monotherapies on the market
2. Determining the quantities of raw materials in the warehouses of the local pharmaceutical manufacturers capable of being used for the production of monotherapies
3. Determining stocks of finished products of antimalarial monotherapies in the warehouses of importers of such products
4. Determining stocks of monotherapy antimalarials in the Central and Regional Medical Stores

The assessment was designed to cover the following products—

1. All the different dosage forms of chloroquine and their raw materials
2. All the different dosage forms of amodiaquine and their raw materials
3. All the different dosage forms of artesunate and other artemisinin derivatives and their raw materials

Sampling

The assessment was implemented nationwide and covered all 10 regions of Ghana. In order to ensure that both the public and private sectors were included in the assessment, the following sampling processes were undertaken by the FDB.

Selection of Local Companies Importing and Manufacturing Antimalarial Products

A list of companies holding market authorization for the products under assessment was compiled by the FDB. The selected companies were categorized as shown in Table 1.

Table 1. Local Manufacturers and Importers Studied

Manufacturer/Exporters	Local Agent/Importers
Ciron Drugs & Pharmaceuticals Pvt. Ltd.	Bedita Pharmacy
Dafra Pharma N.V.	Daamass Co. Ltd.
DanAdams Pharmaceuticals Group Co. Ltd.	Dandong Pharmaceutical Factory
Dannex Ltd.	Dannex Ltd.
Elys Chemical Industries Ltd.	Ebenezer Pharmacy Ltd.
Ernest Chemists Ltd.	Ernest Chemists Ltd.
Glow Export Trading Pvt. Ltd.	Far East Mercantile Ltd.
Intravenous Infusions	Geo Pharmacy
Jaya Impex	Hem Pharmacy
Jinling Import & Export Co. Ltd.	Intravenous Infusions
Kama Health Industries Ltd.	K. Somuah & Sons Pharmacy
Kinapharma Ltd.	Kama Health Industries Ltd.
Kojach Pharma Ltd.	Kinapharma Ltd.
LETAP Pharmaceuticals Ltd.	Kojach Pharma Ltd.
London United Exports Ltd.	LETAP Pharmaceuticals Ltd.
Medicore Laboratories Pvt. Ltd.	Medistar Ghana Ltd.
Medistar Ghana Ltd.	Pharma Info Consult
Mepha Ltd.	Phyto-Riker (GIHOC) Pharmaceuticals Ltd.
M/S GVS Labs	PZ Ghana Ltd.
NIC Pharma	Rock Chemists
Phyto-Riker (GIHOC) Pharmaceuticals Ltd.	Salom Pharmacy
Shalina Laboratories Pvt. Ltd.	Socomex Pharmacy Ltd.
Tonghe Pharmaceutical Co. Ltd.	Tobinco Pharmacy
	Unichem Ghana Ltd.
	Vicdoris Pharmacy

Selection of Medical Stores

The Central Medical Stores and 10 Regional Medical Stores (RMS), one in each region of Ghana, were sampled, as shown in Table 2.

Table 2. Public Sector Medical Stores Studied

Medical Stores Assessed	Number
CMS	1
RMS, Ashanti	1
RMS, Brong Ahafo	1
RMS, Central	1
RMS, Eastern	1
RMS, Greater Accra	1
RMS, Northern	1
RMS, Upper East	1
RMS, Upper West	1
RMS, Volta	1
RMS, Western	1

Establishment of the Research Team

Fourteen FDB field officers were involved in the assessment and were constituted into three teams to cover the southern, middle, and northern sectors of the country. The field officers were qualified pharmacists; however, they received a brief training from the deputy head of the FDB for medicines, which provided them with a background on the malaria situation in Ghana and the purpose of the assessment.

A list of the facilities to be sampled and their locations was shared with the research team. Each team was headed by an experienced FDB field officer during fieldwork. The list of teams, schedule of work, and sequence of fieldwork were discussed and finalized. The training session provided an excellent opportunity to build the teams on the basis of qualification and aptitude of the data collectors.

Data Collection

Data was collected by the research team through visitation and inspection of the premises of the listed importers and manufacturers, as well as from the Central and Regional Medical Stores. This enabled the team to obtain firsthand information on the quantities imported or manufactured and the approximate consumption rate of the various products within the public and private sectors.

FINDINGS

Tables 3–8 show the stock of antimalarial monotherapies found in the Regional Medical Stores visited nationwide.

Table 3. Antimalarial Monotherapy Stocks Found in Regional Medical Stores

Regional Medical Store	Generic Name of Product	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Balance	Quantity Sold/Issued per Month
Eastern	Dihydroartemisinin	NA	2,000	2,000	2,000	NA	1,000
Eastern	Artesunate	NA	2,000	2,000	1,060	940	354
Ashanti	Artesunate	2,750	7,000	9,750	5,430	4,320	639
Brong Ahafo	Dihydroartemisinin	NA	4,500	4,500	4,500	NA	70
Upper West	Dihydroartemisinin	NA	200	200	50	150	25
Western	Dihydroartemisinin	NA	4,800	4,800	3,530	1,270	1,200
Eastern	Chloroquine injection	9,630	29,000	38,630	38,630	NA	5,578
Upper East	Chloroquine injection	27,712	50,000	77,712	66,662	11,050	8,300
Northern	Chloroquine injection	23,100	11,000	90,000	86,200	26,900	8,700
Ashanti	Chloroquine injection 5 ml	1,745	100,000	105,845	25,245	76,600	2,970
Ashanti	Chloroquine injection 30 ml	25,817	100	25,917	18,534	7,383	2,180
Brong Ahafo	Chloroquine injection	9,308	11,600	20,908	20,908	NA	4,182
Western	Chloroquine injection	11,700	82,000	93,000	93,000	NA	11,800
Upper West	Chloroquine injection	18,000	12,000	30,000	22,978	7,022	3,750

NA = Data not available.

Table 4. Antimalarial Monotherapy Stocks Found in Regional Medical Stores

Region	Generic Name of Product	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Balance	Quantity Sold/Issued per Month
Volta	Amodiaquine tablets 200 mg	NA	280,000	280,000	275,000	5,000	30,556
Greater Accra	Amodiaquine tablets 200 mg	10,000	200,000	300,000	300,000	NA	4,000
Central	Amodiaquine tablets 200 mg	50,000	120,000	170,000	62,000	108,000	3,500
Eastern	Amodiaquine tablets 200 mg	NA	300,000	300,000	273,500	26,,500	30500
Northern	Amodiaquine tablets 200 mg	99,000	NA	99,000	96,000	3,000	8,000
Kumasi	Amodiaquine tablets 200 mg	147,000	500,000	647,000	600,000	47,000	7,100
Kintampo	Amodiaquine tablets 200 mg	20,300	300,000	503,000	453,000	50,000	50,333
Western	Amodiaquine tablets 200 mg	56,200	300,000	356,200	257,900	98,300	32,000
Upper West	Amodiaquine tablets 200 mg	88,500	46,000	134,500	134,500	NA	16,813
Volta	Chloroquine tablets 250 mg	312,000	1,000,000	1,312,000	880,000	432,000	97,778
Greater Accra	Chloroquine tablets 250 mg	NA	400,000	400,000	296,000	104,000	33,000

NA = Data not available.

Table 5. Antimalarial Monotherapy Stocks Found in Regional Medical Stores

Region	Generic Name of Product	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Balance	Quantity Sold/Issued per Month
Central	Chloroquine tablets 250 mg	144,000	400,000	544,000	447,000	97,000	37,000
Eastern	Chloroquine tablets 250 mg	80,000	600,000	680,000	645,000	35,000	80,800
Upper West	Chloroquine tablets 250 mg	243,000	340,000	583,000	511,500	71,500	72,875
Upper East	Chloroquine tablets 250 mg	123,500	700,000	823,500	563,000	260,000	70,437
Northern	Chloroquine tablets 250 mg	NA	750,000	750,000	750,000	NA	91,700
Kumasi	Chloroquine tablets 250 mg	1,477,000	15,000	1,492,000	1,212,000	280,000	143,000
Kintampo	Chloroquine tablets 250 mg	395,000	800,000	1,195,000	807,000	388,000	89,667
Western	Chloroquine tablets 250 mg	377,000	100,000	477,000	477,000	NA	60,000

NA = Data not available.

Table 6. Antimalarial Monotherapy Stocks Found in Regional Medical Stores

Region	Generic Name of Product	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Balance	Quantity Sold/Issued per Month
Volta	Amodiaquine syrup	NA	313.2 L	313.2 L	205.2 L	108 L	22.8 L
Eastern	Amodiaquine syrup	2,000	15,500	17,500	7,818	9,682	869
Kumasi	Amodiaquine suspension	4,089	65,120	69,209	67,951	1,258	7,994
Kintampo	Amodiaquine suspension	NA	19,000	19,000	15,000	4,000	1,667
Western	Amodiaquine suspension	NA	18,000	18,000	14,410	3,590	1,800
Upper West	Amodiaquine suspension	4,000	4,000	8,000	7,346	654	1,000
Kumasi	Chloroquine syrup 12.5 ml	18,785	15,240	34,025	31,376	2,649	3,691
Volta	Chloroquine syrup	113 L	700 L	813 L	680.25 L	132.75 L	75.58 L
Upper East	Chloroquine syrup 125 ml	2,359	2,000	4,359	4,174	588	521
Northern	Chloroquine syrup 125 ml	NA	3,000	3,000	3,000	NA	1,300
Western	Chloroquine syrup 125 ml	NA	600	600	600	NA	360
Upper West	Chloroquine syrup 125 ml	1,495	1,600	3,095	3,095	NA	381

NA = Data not available.

Table 7. Antimalarial Monotherapy Stocks Found in Regional Medical Stores

Region	Generic or Brand Name of Product	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity So Far Distributed in 2005	Current Balance	Quantity Sold/Issued per Month
Kumasi	Artemether	2,489	25,000	27,489	14,396	13,093	1,693
Northern	Artemether	1,884	NA	1,884	1,028	856	129
Western	Artemether	NA	2,000	2,000	NA	2,000	NA
Volta	Dihydroartemisinin	160	1,470	1,630	1,630	NA	203.75
Central	Artemax tablets (dihydroartemisinin)	NA	24,000	24,000	13,200	10,800	4,400
Central	Alaxin tablets (dihydroartemisinin)	1,340	30,000	31,340	7,340	24,000	6,000
Eastern	Dihydroartemisinin	NA	20,000	20,000	14,740	5,260	2,457
Western	Dihydroartemisinin	NA	9,000	9,000	4,100	4,900	1,400
Kintampo	Dihydroartemisinin	4,010	26,000	30,010	26,010	4,000	2,890
Greater Accra	Artesunate 50 mg	NA	69,920	69,920	60,320	9,600	8,000
Central	Artesunate 50 mg	1,200	NA	1,200	300	900	125
Central	Artesunate 200 mg	1,300	NA	1,300	930	370	330
Kumasi	Artesunate 50 mg	13,003	35,080	48,083	47,917	166	5,637
Western	Artesunate 50 mg	14	29,000	29,014	9,984	19,030	1,250
Western	Artesunate 200 mg	NA	5,000	5,000	1,600	3,400	500
Upper West	Artesunate 200 mg	12,000	12,000	24,000	24,000	NA	3,000
Upper West	Artesunate 50 mg	9,008	8,280	17,288	17,288	NA	2,161
Kintampo	Artesunate 200 mg	NA	12,000	12,000	6,220	5,780	1,555
Kumasi	Artesunate 200 mg	1,478	19,500	20,978	20,978	NA	2,468

NA = Data not available.

Table 8. Antimalarial Monotherapy Stocks Found in Regional Medical Stores

Region	Generic Name of Product	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Balance	Quantity Sold/Issued per Month
Kumasi	Artesunate 50 mg	1,650	2,500	4,150	4,150	NA	488
Central	Dihydroartemisinin 80 mg	240	8,000	8,240	360	7,880	120
Central	Dihydroartemisinin 40 mg	800	8,000	8,800	320	7,480	120
Western	Dihydroartemisinin 40 mg	NA	1,000	1,000	100	900	100
Western	Dihydroartemisinin 80 mg	NA	1,000	1,000	100	900	100
Kintampo	Artemether injection	NA	500	500	500	NA	250
Western	Artemether injection 80 mg/5 ml ampoule	NA	7,000	7,000	4,210	2,790	1,400
Western	Artemether injection 40 mg	NA	5,000	5,000	3,610	1,390	1,200

NA = Data not available.

Table 9 shows the stock of raw materials for antimalarial monotherapies in warehouses of local manufacturers visited nationwide.

Table 9. Stocks of Raw Materials for Antimalarial Monotherapy Found in Local Manufacturers' Warehouses

Raw Material	Manufacturer	Quantity as of Dec. 31, 2004 (kg)	Total Quantity Imported/Produced in 2005	Total Available for Year 2005	Quantity Used to Date in 2005	Current Stock Balance
Chloroquine	Phyto-Riker (GIHOC) Pharmaceuticals Ltd.	11,700.00	0	11700.00	11,602.50	97.50
	Ernest Chemists Ltd.	575.00	0	575.00	300.00	275.00
	Intravenous Infusions	500.00	0	500.00	0	500.00
	LETAP Pharmaceuticals Ltd.	NA	NA	NA	NA	3,820
	Dannex Ltd.	381.14	1,125.00	1,506.14	1303.87	202.27
Total		13,156.14	1,125	14,281.14	13,206.37	4,894.77
Amodiaquine	Phyto-Riker (GIHOC) Pharmaceuticals Ltd.	2,550	0	2,550	600	1,950
	Ernest Chemists Ltd.	200	1,500	1,700	1,067	633
	Ernest Chemists Ltd.	45	300	345	100	245
	Dannex Ltd.	5	500	505	9	496
Total		2,800	2,300	5,100	1,776	3,324
Artesunate	Ernest Chemists Ltd.	10	150	160	160	0
Total		10	150	160	160	0

NA = Data not available.

Table 10 shows the stock of finished antimalarial products of major importers and manufacturers. The breakdown is shown in Tables 11-A–11-U.

Table 10. Stocks of Finished Antimalarial Products Found in Warehouses of Major Importers and Manufacturers

Antimalarial	Total Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Total Quantity Distributed to Date in 2005	Total Current Stock Balance	Quantity Sold/Issued per Month
Amodiaquine	NA	NA	NA	NA	NA	NA
Tablet 200 mg	NA	425,075	401,975	27,059	398,016	3,118
Suspension 50 mg/5 ml	NA	418,200	418,200	284,156	134,044	23,628
Chloroquine	NA	NA	NA	NA	NA	NA
Tablet 150 mg	16,908,810	52,201,500	69,109,810	58,767,000	38,342,810	1,060,500
Tablet 250 mg	8,070,000	25,148,217	33,218,217	6,851,217	26,637,000	NA
Syrup 80 mg/5 ml–125 ml bottle	44,140	62,306	306,446	245,222	128,996	2,617
Syrup 80 mg/5 ml–1,000 ml bottle	NA	NA	5,000	4,387	613	NA
Injection 40 mg/ml–5 ml	17,090	1,422,000	1,439,090	869,090	570,000	108,780
Raw materials/APIs						
Chloroquine	13,156.14	NA	14,281.14	13,206.37	4,894.77	NA
Amodiaquine	2,800	2,300	5,100	1,776	3,324	NA
Artesunate	10	150	160	160	0	NA

NA = data not available.

Table 11-A. Artesunate 50 mg, 12 Tablets per Pack

Local Agent/Importer	Manufacturer/Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Quantity Imported/Produced in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Dandong Pharmaceutical Factory	DanAdams Pharmaceuticals Group Co. Ltd.	Adamsunate	NA	NA	NA	NA	NA	NA
Ebenezer Pharmacy Ltd.	Dafra Pharma N.V.	Ariante	NA	NA	NA	NA	NA	NA
Ernest Chemists Ltd.	Ernest Chemists Ltd.	Malasate	11	67,922	67,933	64,933	3,000	5,411
Geo Pharmacy	Glow Export Trading Pvt. Ltd.	Artesunate	NA	0	0	0	0	0
Kama Health Industries Ltd.	Kama Health Industries Ltd.	Artesunate XL	NA	17,970	17,970	10,763	7,207	1,196
Kojach Pharma Ltd.	Kojach Pharma Ltd.	Acumal	NA	NA	NA	NA	0	NA
LETAP Pharmaceuticals Ltd.	LETAP Pharmaceuticals Ltd.	Letasunate	NA	NA	NA	NA	1,500	NA
Pharma Info Consult	Mepha Ltd.	Plasmotrim	NA	NA	NA	NA	NA	NA
Phyto-Riker (GIHOC) Pharmaceuticals Ltd.	Phyto-Riker (GIHOC) Pharmaceuticals Ltd.	Risunex	NA	NA	NA	NA	NA	NA
Rock Chemists	Jinling Import & Export Co. Ltd.	Artesunate	NA	NA	NA	NA	NA	NA
Salom Pharmacy	NIC Pharma	Arsun	NA	NA	NA	NA	NA	NA
Tobinco Pharmacy	M/S GVS Labs	Gsunate Forte	NA	NA	NA	NA	NA	NA
Kinapharma Ltd.	Kinapharma Ltd.	Artenex	NA	NA	NA	NA	NA	NA
Total			11	85,892	85,903	75,696	11,707	6,607

NA = data not available.

Table 11-B. Artesunate 100 mg, 6 Tablets per Pack

Local Agent/Importer	Manufacturer/Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Dandong Pharmaceutical Factory	DanAdams Pharmaceuticals Group Co. Ltd.	Adamsunate	NA	NA	NA	NA	NA	NA
Ebenezer Pharmacy Ltd.	Dafra Pharma N.V.	Arinate	NA	NA	NA	NA	NA	NA
Phyto-Riker (GIHOC) Pharmaceuticals Ltd.	Phyto-Riker (GIHOC) Pharmaceuticals Ltd.	Risunex	NA	NA	NA	NA	NA	NA
Tobinco Pharmacy	M/S GVS Labs	Gsunate	3,520	8,198	11,718	9,120	2,598	1,140
Total			3,520	8,198	11,718	9,120	2,598	1,140

NA = Data not available.

Table 11-C. Artesunate 200 mg, 6 Tablets per Pack

Local Agent/Importer	Manufacturer/Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Ebenezer Pharmacy Ltd.	Dafra Pharma N.V.	Arinate	NA	NA	NA	NA	NA	NA
Ernest Chemists Ltd.	Ernest Chemists Ltd.	Malasate	0	55,570	55,570	54,818	752	4,568
Pharma Info Consult	Mepha Ltd.	Plasmotrim	NA	NA	NA	NA	NA	NA
Unichem Ghana Ltd.	London United Exports Ltd.	Armax	NA	NA	NA	NA	NA	NA
Total			0	55,570	55,570	54,818	752	4,568

NA = data not available.

Table 11-D. Artesunate Suppositories 50 mg

Local Agent/Importer	Manufacturer/Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Pharma Info Consult	Mepha Ltd.	Plasmotrim Rectocap, 50–66 suppositories/pack	0	0	0	0	0	0
Total			0	0	0	0	0	0

Table 11-E. Artesunate Suppositories 200 mg

Local Agent/Importer	Manufacturer/Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Pharma Info Consult	Mepha Ltd.	Plasmotrim Rectocap	0	0	0	0	0	0
Total			0	0	0	0	0	0

Table 11-F. Dihydroartemisinin Tablets 60 mg

Local Agent/Importer	Manufacturer/Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Dandong Pharmaceutical Factory	DanAdams Pharmaceuticals Group Co. Ltd.	Codidsin	NA	NA	NA	NA	NA	NA
K. Somuah & Sons Pharmacy	Tonghe Pharmaceutical Co. Ltd.	Atrecom, 8 tablets/pack	NA	NA	NA	NA	NA	NA
Medistar Ghana Ltd.	Medistar Ghana Ltd.	Cotecxin, 8 tablets/pack	NA	NA	NA	NA	NA	NA
Socomex Pharmacy Ltd.	Shalina Laboratories Pvt. Ltd.	Paludose, 8 tablets/pack	NA	NA	NA	NA	NA	NA
Tobinco Pharmacy	M/S GVS Labs	Alaxin	3,500	74,602	78,102	68,786	9,316	8,598
Total			3,500	74,602	78,102	68,786	9,316	8,598

NA = data not available.

Table 11-G. Dihydroartemisinin Powder for Suspension 160 mg/80 ml

Local Agent/Importer	Manufacturer/Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Medistar Ghana Ltd.	Medistar Ghana Ltd.	Cotecxin, 80 ml bottle	NA	NA	NA	NA	NA	NA
Tobinco Pharmacy	None at present	Alaxin	8 bottles	275,352	275,360	215,588	59,772	26,948
Total			8	275,352	275,360	215,588	59,772	26,948

NA = data not available.

Table 11-H. Dihydroartemisinin Suppositories 20 mg

Local Agent/Importer	Manufacturer/Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Tobinco Pharmacy	M/S GVS Labs	Alaxin	4,500	39,500	44,000	28,500	15,500	3,562
Total			4,500	39,500	44,000	28,500	15,500	3,562

Table 11-I. Dihydroartemisinin Suppositories 40 mg

Local Agent/Importer	Manufacturer/Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Tobinco Pharmacy	M/S GVS Labs	Alaxin	3,600	48,999	52,599	28,099	24,500	3,152
Total			3,600	48,999	52,599	28,099	24,500	3,152

Table 11-J. Dihydroartemisinin Suppositories 80 mg

Local Agent/Importer	Manufacturer/Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Tobinco Pharmacy	M/S GVS Labs	Alaxin	3199	17,599	20,798	12,100	8,698	1,513
Total			3,199	17,599	20,798	12,100	8,698	1,513

Table 11-K. Beta-Artemether Capsules 40 mg

Local Agent/Importer	Manufacturer/Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Vicdorix Pharmacy	None at present	Artemos	NA	NA	NA	NA	NA	NA
Far East Mercantile Ltd.	None at present	Larither	20	2,844	2,684	2,836	69	NA
Hem Pharmacy	None at present	Artem	NA	NA	NA	NA	NA	NA
Hem Pharmacy	None at present	Artenam	NA	NA	NA	NA	NA	NA
Total			20	2,844	2,684	2,836	69	NA

NA = data not available.

Table 11-L. Beta-Artemether Suspension 300 mg/100 ml

Local Agent/Importer	Manufacturer/Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Tobinco Pharmacy	None at present	Gvither	6,740 bottles	126,521	133,261	110,027	23,234	13,753
Ebenezer Pharmacy Ltd.	None at present	Artesiane	NA	NA	NA	NA	NA	NA
Total			6,740	126,521	133,261	110,027	23,234	13,753

NA = data not available.

Table 11-M. Beta-Artemether Injection 40 mg

Local Agent/Importer	Manufacturer/ Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Ebenezer Pharmacy Ltd.	None at present	Artesan	NA	NA	NA	NA	NA	NA
Hem Pharmacy	None at present	Artem	NA	NA	NA	NA	NA	NA
Far East Mercantile Ltd.	None at present	Larither	NA	3,295	3,295	2,525	770	NA
Total			NA	3,295	3,295	2,525	770	NA

NA = data not available.

Table 11-N. Beta-Artemether Injection 80 mg/5 ml

Local Agent/Importer	Manufacturer/ Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Ebenezer Pharmacy Ltd.	None at present	Artesan	NA	NA	NA	NA	NA	NA
Hem Pharmacy	None at present	Artem	NA	NA	NA	NA	NA	NA
Tobinco Pharmacy	None at present	Gvither	NA	18,418	18,418	4,000	14,418	500
Far East Mercantile Ltd.	None at present	Larither	5	3,295	3,300	3,293	7	NA
Total			5	21,713	21,718	7,293	14,425	500

NA = data not available.

Table 11-O. Amodiaquine Suspension 50 mg/5 ml

Local Agent/Importer	Manufacturer/ Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Ernest Chemists Ltd.	None at present	Enoquine	NA	NA	145,111	144,062	1,049	12,005
Bedita Pharmacy	Elys Chemical Industries Ltd.	Enoquine	NA	NA	NA	NA	NA	NA
Daamass Co. Ltd.	None at present	Amodiaquine, 50 mg/5–60 ml bottle	NA	NA	NA	NA	NA	NA
Geo Pharmacy	Medicore Laboratories Pvt. Ltd.	Amodiaquine, 50 mg/5–100 ml bottle	NA	75,000	75,000	54,000	21,000	NA
K. Somuah & Sons Pharmacy	Jaya Impex	Amodiaquine, 60 ml bottle	NA	0	0	0	0	NA
Osons Chemist Ltd.	Ciron Drugs & Pharmaceuticals Pvt. Ltd.	Amodiaquine, 60 ml bottle	NA	0	0	0	0	NA
Unichem Ghana Ltd.	London United Exports Ltd.	Lexaquin	NA	30,000	30,000	30,000	0	3,000
Unichem Ghana Ltd.	None at present	Camoquine, 60 ml bottle	NA	180,000	180,000	145,000	35,000	14,500
Kama Health Industries Ltd.	None at present	Kamoc	NA	133,200	133,200	55,156	78,044	6,128
Total			NA	418,200	418,200	284,156	134,044	23,628

NA = data not available.

Table 11-P. Amodiaquine Tablets 200 mg

Local Agent/Importer	Manufacturer/ Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Phyto-Riker (GIHOC) Pharmaceuticals Ltd.	Phyto-Riker (GIHOC) Pharmaceuticals Ltd.	Camorex J/250 & P/150	NA	NA	NA	NA	NA	NA
Phyto-Riker (GIHOC) Pharmaceuticals Ltd.	Phyto-Riker (GIHOC) Pharmaceuticals Ltd.	P/150, 250, 400 & 500	NA	NA	NA	NA	NA	NA
Unichem Ghana Ltd.	London United Exports Ltd.	Lexaquin 3'S	NA	NA	NA	NA	NA	NA
Unichem Ghana Ltd.	None at present	Camoquine 3'S x 25	NA	4,800	4,800	3,496	1,304	350
Kama Health Industries Ltd.	None at present	Kamoc	NA	2,000	2,000	463	1,537	51
Salom Pharmacy	None at present	Malatab	NA	418,275	395,175	23,100	395,175	2,717
Total			NA	425,075	401,975	27,059	398,016	3,118

NA = data not available.

Table 11-Q. Chloroquine Injection

Local Agent/Importer	Manufacturer/ Exporter	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Unichem Ghana Ltd.	None at present	NA	1,350,000	1,350,000	780,000	570,000	780
Geo Pharmacy	None at present	NA	72,000	72,000	72,000	0	8,000
Intravenous Infusions	Intravenous Infusions	17,090	0	17,090	17,090	0	100,000
Ernest Chemists Ltd.	None at present	NA	0	NA	NA	NA	NA
Total		17,090	1,422,000	1,439,090	869,090	570,000	108,780

NA = data not available.

Table 11-R. Chloroquine Tablets 150 mg Base

Local Agent/Importer	Manufacturer/Exporter	Quantity as of Dec. 31, 2004	Total Quantity Imported/Produced in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Dannex Ltd. (Malarex blister pack)	None at present	288,000	NA	NA	NA	384,000	NA
Dannex Ltd. (Malarex bulk tablets)	None at present	768,000	NA	NA	NA	0	NA
PZ Ghana Ltd.	None at present	0	0	0	00	0	0
Ernest Chemists Ltd. (Plasmoquine tablets)	None at present	0	0	0	0	0	0
Kinapharma Ltd.	None at present	0	0	0	0	0	0
Ernest Chemists Ltd. (Mastaquine bulk tablets)	Ernest Chemists Ltd.	NA	2,168,000	2,168,000	1,405,000	763,000	117,000
Ernest Chemists Ltd. (Mastaquine blister pack)	Ernest Chemists Ltd.	NA	4,748,500	4,748,000	4,748,000	0	395,500
Eskay Therapeutics	Eskay Therapeutics	2,342,000	10,000,000	12,342,000	4,384,000	7,958,000	548,000
Phyto-Riker (GIHOC) Pharmaceuticals	Phyto-Riker (GIHOC) Pharmaceuticals	14,566,810	35,285,000	49,851,810	48,230,000	1,621,810	NA
LETAP Pharmaceuticals Ltd.	LETAP Pharmaceuticals Ltd.	NA	NA	NA	NA	28,000,000	NA
Total		16,908,810	52,201,500	69,109,810	58,767,000	38,342,810	1,060,500

NA = data not available.

Table 11-S. Chloroquine Tablets 250 mg Base

Local Agent/Importer	Manufacturer/Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Phyto-Riker GIHOC Pharmaceuticals	None at present	Chloroquine	8,070,000	25,148,217	33,218,217	6,851,217	26,637,000	NA
Total			8,070,000	25,148,217	33,218,217	6,851,217	26,637,000	NA

NA = data not available.

Table 11-T. Chloroquine Syrup 125 ml Bottle

Local Agent/Importer	Manufacturer/Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/ Issued per Month
Dannex Ltd.	Dannex Ltd.	Malarex	NA	NA	200,000	192,036	7,964	NA
PZ Ghana Ltd.	PZ Ghana Ltd.	Maladrin	0	0	0	0	0	0
Phyto-Riker (GIHOC) Pharmaceuticals Ltd.	Phyto-Riker (GIHOC) Pharmaceuticals Ltd.	Rikaquin-1	19,985	9,956	29,941	400	29,541	NA
Phyto-Riker (GIHOC) Pharmaceuticals Ltd.	Phyto-Riker (GIHOC) Pharmaceuticals Ltd.	Rikaquin-2	24,069	19,778	43,847	21,380	22,239	NA
Ernest Chemists Ltd.	Ernest Chemists Ltd.	Mastaquine	86	32,572	32,658	31,406	1,252	2,617
LETAP Pharmaceuticals Ltd.	LETAP Pharmaceuticals Ltd.	Letaquine	NA	NA	NA	NA	68,000	NA
Total			44,140	62306	306,446	245,222	128,996	2,617

NA = data not available.

Table 11-U. Chloroquine Syrup 1,000 ml Bottle

Local Agent/Importer	Manufacturer/Exporter	Brand Name of Finished Product or API	Quantity as of Dec. 31, 2004	Total Quantity Imported in 2005	Total Available for Year 2005	Quantity Distributed to Date in 2005	Current Stock Balance	Quantity Sold/Issued per Month
Dannex Ltd.	None at present	Malarex	NA	NA	5,000	4,387	613	NA
Total			NA	NA	5,000	4,387	613	NA

Notes to Tables 11-A–11-U:

No data was obtained from Central Medical Stores because there was no stock of the monotherapies during the study period.

DanAdams Pharmaceuticals had no stock of chloroquine but indicated that stocks of amodiaquine and artesunate powder will be used in the production of the ACT products.

Phyto-Riker (GIHOC) Pharmaceuticals Ltd. was expecting 5,400 kg of chloroquine powder for production of various dosage forms, primarily for export.

INTERPRETATION AND DISCUSSION

The analysis of data gathered from the assessment was used to estimate the average monthly consumption of antimalarial monotherapies nationwide and to determine how much time would be needed to phase out chloroquine and eliminate monotherapies of artesunate and amodiaquine from the public and private sector pharmaceutical supply chains.

Data from the Regional Medical Stores

Chloroquine

Chloroquine Injections

Table 12 shows data compiled from the summary within the Findings section of this report and shows the stock-out period for chloroquine injection in the Regional Medical Stores in the country by region.

Table 12. Stock-Out Periods for Chloroquine Injection at Regional Medical Stores

Region	Current Stock Balance	Quantity Issued per	
		Month	Stock-Out Period
Brong Ahafo	0	4182	Stock exhausted
Ashanti	76,600	2,970	2 years+2 months
Northern	26,900	8,700	3 month
Upper East	11,050	8,300	>1 month
Eastern	0	0	Stock exhausted
Greater Accra	0	0	Stock exhausted
Volta	0	0	Stock exhausted
Central	0	0	Stock exhausted

The results in Table 12 demonstrate that, in general, a period of three months could exhaust all stocks nationwide. Depletion of the high stocks of antimalarial monotherapies seen in the Ashanti region will require more than two years; these stocks could be sold to the other regions so that the stock-out period within the recipient regions can be improved.

Chloroquine Syrup

Table 13 shows that Regional Medical Stores in the Greater Accra, Brong Ahafo, Northern, and Central regions were out of stock for chloroquine syrup at the time of the assessment. However, the general time period for all the regions to exhaust current stocks could be two months, if no further supplies are provided to the medical stores.

Table 13. Stock-Out Periods for Chloroquine Syrup at Regional Medical Stores*

Region	Current Stock Balance	Quantity Issued per Month	Stock-Out Period
Brong Ahafo	0	0	Stock exhausted
Ashanti	2,649 (125 ml)	3,691 (125 ml)	>1 month
Northern	0	0	Stock exhausted
Upper East	585 L	521 L	>1 month
Eastern	0	0	Stock exhausted
Greater Accra	0	0	Stock exhausted
Volta	133 L	76 L	2 months
Central	0	2100* 60 ml	Stock exhausted

*Data not available for the Western and Upper West regions.

Chloroquine Tablets

Table 14 indicates that chloroquine tablets will be exhausted in all the stores within five months from the time of the assessment.

Table 14. Stock-Out Periods for Chloroquine Tablets at Regional Medical Stores

Region	Current Stock Balance	Quantity Issued per Month	Stock-Out Period
Brong Ahafo	388,000 tablets	89,667 tablets	4.5 months
Ashanti	280,000 tablets	143,000 tablets	2 months
Northern	0	91,700 tablets	Stock exhausted
Upper East	260,000 tablets	70,437 tablets	4 months
Eastern	35,000 tablets	80,500 tablets	>1 month
Greater Accra	104,000 tablets	33,000 tablets	3.5 months
Volta	432,000 tablets	97,778 tablets	4.5 months
Central	97,000 tablets	37,000 tablets	3 months
Western	0	60,000 tablets	Stock exhausted
Upper West	71,500 tablets	72,875 tablets	>1 month

Amodiaquine Hydrochloride

Amodiaquine Tablets

Analysis of the findings shows that most of the regions have less than a month to exhaust their stocks of amodiaquine (Table 15). However, the stock at the Regional Medical Stores in the Central region can be exhausted in about four months.

Table 15. Stock-Out Periods for Amodiaquine Tablets at Regional Medical Stores

Region	Current Stock Balance	Quantity Issued per Month	Stock-Out Period
Brong Ahafo	50,000 tablets	50,333 tablets	1 month
Ashanti	47,000 tablets	71,000 tablets	>1 month
Northern	3,000 tablets	8,000 tablets	>1 month
Upper East	0	0	Stock exhausted
Eastern	26,500 tablets	30,000 tablets	>1 month
Greater Accra	0	40,000 tablets	Stock exhausted
Volta	5,000 tablets	30,000 tablets	>1 month
Central	108,000 tablets	35,000 tablets	3.5 months
Western	98,300 tablets	32,000 tablets	3.5 months
Upper West	0	16,813 tablets	Stock exhausted

Amodiaquine Suspension

As indicated in Table 16, the Eastern Regional Medical Stores have stocks that will take about a year to deplete. All the other regional stores can exhaust their stocks within five months.

Table 16. Stock-Out Periods for Amodiaquine Suspension at Regional Medical Stores

Region	Current Stock Balance	Quantity Issued per Month	Stock-Out Period
Brong Ahafo	4,000 (60 ml)	1,667 (60 ml)	2.5 months
Ashanti	1,258 (60 ml)	7,994 (60 ml)	>1 month
Northern	0	0	Stock exhausted
Upper East	0	0	Stock exhausted
Eastern	9,682 (60 ml)	869 (60 ml)	11.5 months
Greater Accra	0	0	Stock exhausted
Volta	108 L	23 L	5 months
Central	0	0	Stock exhausted
Western	3,590	1,800	2 months
Upper West	654	1,000	>1 month

Artesunate and Its Derivatives

The assessment found that there are varied brands of artesunate and its derivatives in use in all the regional hospitals; consequently, this is the slowest-moving product in terms of quantity.

Tablet Artesunate and Its Derivatives

Generally, the data in Table 17 indicate that 18 months is a good forecasting period for exhausting all stocks of artemisinin derivatives in Regional Medical Stores nationwide.

Table 17. Stock-Out Periods for Artesunate and Its Derivatives at Regional Medical Stores

Region	Current Stock Balance	Quantity Issued per Month	Stock-Out Period
Brong Ahafo (Alaxin)	26,010 packets	4,000 packets	6.5 months
Ashanti (Artemos)	13,093 packets	1,693 packets	8 months
Northern	856 packets	129 packets	7 months
Upper East	0	0	Stock exhausted
Eastern (Alaxin)	5,260 packets	2,457 packets	2.5 months
Greater Accra (Artemos)	9,600 packets	8,000 packets	1.5 months
Volta	0	0	Stock exhausted
Central (Malarate)	900 packets	125 packets	7.5 months
Western	19,030 packets	1,250 packets	16 months
Upper West	0	2,161 packets	Stock exhausted

Suppository Artesunate and Its Derivatives

As Table 18 indicates, the Regional Medical Store in the Central region has high stocks of suppository artesunate and its derivatives. It is anticipated that if the Central region medical store is able to trade off some stocks of artesunate suppositories with other regional stores, the remaining stocks of the product could be exhausted within six months.

Table 18. Stock-Out Periods for Suppository Artesunate and Its Derivates at Regional Medical Stores

Region	Current Stock Balance	Quantity Issued per Month	Stock-Out Period
Brong Ahafo	0	0	NA
Ashanti (Plasmotrim)	0	488 packets	Stock exhausted
Northern	0	0	Stock exhausted
Upper East	0	0	Stock exhausted
Eastern	0	0	Stock exhausted
Greater Accra	0	0	Stock exhausted
Volta	0	0	Stock exhausted
Central (Alaxin 40 mg)	7,880 packets	520 packets	15 months
Western	900 packets	100 packets	9 months

Suspension Artesunate and Its Derivatives

Stocks of artemisinin derivative suspensions found at the Brong Ahafo Regional Medical Stores could generally be exhausted in about eight months from the time of assessment, as is evident from Table 19.

Table 19. Stock-Out Periods for Artesunate Suspension and Its Derivatives at Regional Medical Stores

Region	Current Stock Balance	Quantity Issued per Month	Stock-Out Period
Brong Ahafo	0	70	Stock exhausted
Ashanti	4,320 bottles	639 bottles	7 months
Northern	0	0	Stock exhausted
Upper East	0	0	Stock exhausted
Eastern (Gsunate)	940 bottles	354 bottles	3 months
Greater Accra	0	0	Stock exhausted
Volta	0	0	Stock exhausted
Central	0	0	Stock exhausted
Western	1,270 bottles	1,200 bottles	1.5 months
Upper West	150 bottles	25 bottles	6 months

Data from Local Manufacturers

Analysis of the assessment data shows that there is a total of 4,895 kg chloroquine powder in the pharmaceutical supply system. In addition, a large quantity of chloroquine powder was expected at the time of the assessment by two local manufacturers.

Assuming two-thirds of the stock is to be used for tablets and one-third for syrups, this is equivalent to 3,263 kg and 1,632 kg, respectively, for tablet and syrup production.

In the manufacture of chloroquine tablets, 250 mg chloroquine powder yields 13,052,000 tablets. Assuming a monthly issue rate of 1,060,500 tablets, as per data generated, a stock-out period of almost one year would be expected.

In the manufacture of chloroquine syrup (80 ml/5 ml in 125 ml bottles), the 1,632 kg chloroquine powder determined will yield 816,000 bottles of the syrups. Assuming the monthly issuing rate is 50,000 bottles nationwide, a stock-out period of 17 months is expected.

Private Sector Recommendations to the Government Regarding the Phaseout of Antimalarial Monotherapies

Some recommendations proposed by a number of associates in the importing and local manufacturing industry were documented and are as follows—

- A longer phaseout period is needed to enable the private sector to recoup its investment both in human resources and large financial commitments used to develop existing brands.
- The private sector should be allowed to continue to register monotherapies for an allotted time period so as to have some time to recoup the large investment already committed to the development of amodiaquine products and machinery. This time will allow companies to revamp their manufacturing facilities to accommodate development of the new medicines.
- Because chloroquine resistance is the basis for the malaria treatment policy change, the NMCP data on chloroquine resistance should be revalidated using larger sample sizes.
- The government should remind itself that the artesunate + amodiaquine combination is more than 20 times the cost of chloroquine for a course of treatment.
- Compliance and adherence by patients to the high dosage of amodiaquine will be a challenge to implementation.
- Monotherapies of injectable forms of artemisinin derivative should be excluded from the phaseout program.
- Monotherapies of artemisinin derivatives and amodiaquine should be allowed alongside implementation of the new treatment policy, because much effort and investment has gone into promoting the efficacy of the monotherapies.
- Manufacturers who export monotherapy products should be allowed to continue to serve the export market.
- There should be a caveat in the policy statement such that, in situations where raw materials for ACTs have a short supply chain, there should be a provision for fallback treatment with monotherapies.

CONCLUSIONS AND RECOMMENDATIONS

Interpretation of the assessment findings indicates that within the six months subsequent to the assessment, all stocks in the public sector will be exhausted if no new supplies are received within the period.

The same cannot be assumed of the private sector, where companies assessed have already made huge investments in raw and packaging materials as well as finished products.

The recommendation by the FDB, therefore, is that a period of six months to one year should be allowed for phasing out the existing antimalarial monotherapies. The immediate discontinuation of chloroquine is recommended, whereas amodiaquine and artesunate and their derivative products may be prescribed and used simultaneously within the transition period.

As a follow-up to this assessment of antimalarial monotherapies on the market, the FDB has implemented the phaseout plan by—

1. Immediate discontinuation of the registration of new antimalarial monotherapies
2. Immediate discontinuation of the renewal of antimalarial monotherapies whose market authorization has expired
3. Immediate discontinuation of the issuance of new permits for importation of chloroquine powder

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