Reviews/Analyses

Pricing, distribution, and use of antimalarial drugs

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Prices of new antimalarial drugs are targeted at the "travellers' market" in developed countries, which makes them unaffordable in malaria-endemic countries where the per capita annual drug expenditures are US$ 5 or less. Antimalarials are distributed through a variety of channels in both public and private sectors, the official malaria control programmes accounting for 25–30% of chloroquine distribution. The unofficial drug sellers in markets, streets, and village shops account for as much as half of antimalarials distributed in many developing countries. Use of antimalarials through the health services is often poor; drug shortages are common and overprescription and overuse of injections are significant problems. Anxiety over drug costs may prevent patients from getting the necessary treatment for malaria, especially because of the seasonal appearance of this disease when people's cash reserves are very low. The high costs may lead them to unofficial sources, which will sell a single tablet instead of a complete course of treatment, and subsequently to increased, often irrational demand for more drugs and more injections. Increasingly people are resorting to self-medication for malaria, which may cause delays in seeking proper treatment in cases of failure, especially in areas where chloroquine resistance has increased rapidly. Self-medication is now widespread, and measures to restrict the illicit sale of drugs have been unsuccessful. The "unofficial" channels thus represent an unacknowledged extension of the health services in many countries; suggestions are advanced to encourage better self-medication by increasing the knowledge base among the population at large (mothers, schoolchildren, market sellers, and shopkeepers), with an emphasis on correct dosing and on the importance of seeking further treatment without delay, if necessary.

Introduction

While much attention has been paid to the development of new antimalarial drugs, the development of the ability to deliver them to people at risk has lagged behind—in large part because of economic considerations. In a typical drug supply system, decisions as to where, when, and what quantity of a drug are used are often influenced by price and affordability considerations more generally; this is true at household level as well as at national level.

The first part of this paper describes prices of antimalarial drugs and pricing policies for drugs for tropical diseases, including antimalarials. The second describes the various drug distribution systems found in developing countries with reference to the impact of price, and the third reviews the decisions made regarding the selection, distribution, and use of antimalarial drugs, in both public and private sectors, with reference to price and its influence on decisions about the use of antimalarials at household level. While malaria continues to be a major health problem in many parts of the world, in sub-Saharan Africa the situation is especially severe, with an estimated 90 million clinical cases occurring annually—nearly 18 times more cases than in the rest of the world combined (*1*). As a result, many of the examples presented are from Africa.

Countries where malaria is endemic present a wide variety of economic situations, ranging from Malawi and Bangladesh with incomes of US$ 170 per capita to Thailand with US$ 1000 per capita, and to Malaysia and Brazil with around US$ 2000. Approximately 3000 million persons (over half the world's population) have annual per capita incomes of US$ 500 or less. Per capita income levels, however, can be a misleading guide to actual cash available to any given individual since income is unequally distributed. As an example, the poorest 20% in Brazil have only 2.4% of the national

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income, but the top 10% have nearly 50% (*2*). On average, the richest 20% of the population has 12 times the income of the poorest 20%.

National expenditures on health and on pharmaceuticals are usually correlated with income as well; per capita drug consumption in developed countries averaged US$ 62 in 1985, but in developing countries the average expenditure was only US$ 5.40 (*3*). Many sub-Saharan African countries are spending much less than US$ 5 annually per person on drugs. The economic situation influences malaria control, and in particular the use of antimalarial drugs at both national and individual level. What is affordable and feasible in one country may be completely beyond the means of another.

Prices and pricing policies

Antimalarial drugs can be classified into two categories as far as price is concerned. The first group is what might be termed "commodity generic" antimalarials, drugs that are traded in large quantities on the international market and whose patents have expired, e.g., chloroquine. The second is the group of relatively new antimalarials which are available from only one or a few sources; these are still under patent and therefore usually available only under brand names. Current (May 1990) unit prices for some common antimalarial drugs are presented in Table 1.

Prices of a single treatment (for an adult weighing approximately 65 kg) using various antimalarial drugs vary significantly (by a factor of nearly 66), from US$ 0.08 for chloroquine to US$ 5.31 for halofantrine, and nearly US$ 2.00 for mefloquine (Table 2). These prices effectively exclude the use of the newer drugs for all but a very few patients.

The breakdown of prices for bulk generic drugs is of interest. Raw materials account for about 70% of the price of a tablet of internationally traded bulk generic chloroquine. Bulk chloroquine phosphate has recently been trading on the international market for about US$ 30 per kg. Assuming 10% waste during formulation, a kg of chloroquine would yield about 6000 tablets of 150 mg base (or 9000 of 100 mg base); the active ingredient therefore costs about US$ 0.005 per tablet of 150 mg base. This works out to about US$ 5 per 1000 tablets of 150 mg base (or US$ 3.33 for 100 mg base), whereas the wholesale price of the generic form is about US$ 7–8 per 1000 tablets of 150 mg base. The additional 30% covers the costs of production (electricity, water, labour, machinery, etc.), packaging and labelling, transport to the warehouse of the procurement service, a small profit for the (generic) manufacturer, and a small operating margin for the procurement service.

Retail prices of brand name equivalents are significantly higher at country level. Surprisingly,

Table 1: **Current international prices (US$) of various antimalarial drugs**

			Price (US$)[a]			
Drug	Dosage form (unit)	Units/pack	WHO[b]	UNICEF[c]	IDA[d]	Lowest unit price
Amodiaquine[e]	200 mg tab.	1000	17.74		17.37	0.018
Chloroquine phosphate	100 mg base tab.	1000	6.05	5.94	6.43	0.006
Chloroquine phosphate	150 mg base tab.	1000	7.50	8.06	8.75	0.008
Chloroquine phosphate	40 mg base/ml, 5 ml amp.	100	5.40		5.83	0.054
Chloroquine phosphate	50 mg/5 ml syrup, 1l bottle	1	1.85	1.65		1.65
Doxycycline	100 mg tab.	1000	28.65	42.47	27.86	0.028
Halofantrine[f]	250 mg tab.	6	5.31			0.885
Mefloquine[f]	250 mg tab.	1000	481.00			0.481
Primaquine phosphate	15 mg tab.	1000	4.80	3.54	9.06	0.004
Proguanil	100 mg tab.	1000	20.16			0.020
Quinine dihydrochloride	300 mg/ml in 2 ml amp.	100	13.25		14.69	0.133
Quinine sulfate	200 mg tab.	1000	26.20		23.65	0.024
Quinine sulfate	300 mg tab.	100		3.49		0.035
Sulfadoxine/pyrimethamine	500 mg/25 mg tab.	1000	46.76	43.79	51.04	0.044
Tetracycline	250 mg tab.	1000	9.00	9.33	10.68	0.009

[a] All prices are FOB Europe. To these prices about 25% should be added for shipping, handling, and insurance.
[b] WHO Supply Services, Geneva (prices at May 1990).
[c] UNICEF Supply Division, Copenhagen (price list January 1990).
[d] International Dispensary Association, Amsterdam, Netherlands. Prices originally quoted in Dutch guilders; conversion made at May 1990 exchange rates. Price Indicator May 1990.
[e] No longer recommended by WHO.
[f] Price to WHO in January 1990.

Table 2: **Costs of one treatment episode for a 60-kg adult with some antimalarial drugs, calculated from Table 1**

Drug	Dosage form (unit)	Lowest unit price (US$)	No. units per treatment episode	Cost per treatment episode (US$)
Halofantrine	250 mg tab.	0.885	6	5.31
Mefloquine	250 mg tab.	0.481	4	1.92
Quinine sulfate	200 mg tab.	0.024	63	1.51
Quinine sulfate	300 mg tab.	0.035	42	1.47
Quinine dihydrochloride	300 mg/ml in 2 ml amp.	0.133	7.5	0.99
Amodiaquine[a]	200 mg tab.	0.018	8	0.14
Sulfadoxine/pyrimethamine	500 mg/25 mg tab.	0.044	3	0.13
Chloroquine phosphate	100 mg base tab.	0.006	15	0.09
Chloroquine phosphate	150 mg base tab.	0.008	10	0.08

[a] No longer recommended by WHO.

they vary significantly even for a single product from the same manufacturer. Table 3 shows the retail prices of chloroquine and amodiaquine from the same manufacturer in a number of French-speaking African countries.

It can be seen from Tables 1 and 3 that raw materials account only for about 10% of the retail price of a brand-name antimalarial. Furthermore, a tablet of brand-name chloroquine is about 6 times more expensive than the internationally traded generic equivalent. Some of this cost is accounted for by differences in packing; the generic drug is packed in tins of 1000 tablets, while the brand-name equivalent is packed in blister packs or foil strips. Included in the cost of brand-name drugs are the costs of distribution, promotion and advertising, research and development, etc.

The differences in *retail* prices observed in Table 3 are in large part explained not by the manufacturer's ex-factory price, nor transportation which accounts for 16% of less, nor taxes, but by substantial wholesale and retail margins permitted by national authorities. For example, in Côte d'Ivoire, Algeria, and Zaire the wholesaler's margin is 21%, 20%, and 27% respectively, while the retailer's margin is 81%, 53%, and 54% respectively. This is in large measure due to the social standing of pharmacists (both wholesale and retail) in the countries concerned, who are in a position to demand their "fair" remuneration. They may also be the result of different prices quoted by the same manufacturer, taking account of the market conditions, the terms of payment, etc.[a]

Drug import policies vary considerably from one country to another, according to the degree to which the government intervenes to hold drug prices down; in sub-Saharan Africa for the most part the governments do not intervene, whereas in Algeria and Tunisia, for example, the governments purchase drugs using generic names through international competitive bidding or by negotiations with companies. As a result, drugs in these two countries are only half as expensive as in France, whereas in sub-Saharan French-speaking Africa, prices are on average from 12–28% higher than in France.[a]

[a] **Dumoulin, J. & Kaddar, M.** *Le prix des médicaments dans certains pays d'Afrique: comparaison avec les prix français.* Paris, Frères des hommes, unpublished document, 1989.

Table 3: **Retail prices of antimalarial drugs in several French-speaking African countries and France**[a]

Country	Nivaquine 100 tablets (chloroquine 100 mg)[b]		Flavoquine 12 tablets (amodiaquine 200 mg)[c]	
	CFAF	US$	CFAF	US$
Senegal	710	2.63	478	1.77
Côte d'Ivoire	1491	5.52	570	2.11
Congo	985	3.65	530	1.96
France[d]	1200	4.44	1195	4.42

[a] Source: **Dumoulin, J. & Kaddar, M.** *Le prix des médicaments dans certains pays d'Afrique: comparaison avec les prix français.* Paris, Frères des Hommes, unpublished document, 1989.
[b] French francs (FF) converted to CFA francs at fixed exchange rate of CFAF 50 = 1 FF.
[c] Specia (package of 100 tablets).
[d] Roussel (package of 12 tablets; no longer recommended by WHO).

Pricing strategies for antimalarials and other drugs for tropical diseases

An understanding of pricing strategies requires some familiarity with the criteria upon which a pharmaceutical company decides whether or not to pursue development of a drug. Criteria related to the potential market are especially important in a company's decision to proceed with research into a drug. For a positive decision to be reached, three criteria must be met:

— the disease must be significant in terms of worldwide health needs;
— there must be marketing possibilities in areas where the company operates;
— the potential users of the drugs must be willing and able to pay (in the case of tropical diseases, this means the governments) (*4*).

The problem is that research involved in bringing a drug to market is expensive, although typically research and development do not exceed 5% of a company's overall expenditures. Pressures to enhance profitability and offer a good return on investments mean that many companies attempt to recover their investment within three or four years. Industry sources estimate the cost of bringing a drug successfully to market at $100 million (an average cost of the research and development of *both* successful and unsuccessful drugs, and therefore an overestimate of the cost of bringing a specific successful drug to market, especially if some of the research and development were done outside the company by third parties). A drug would then have to bring in an average of over US$ 30 million annually over the first three years to be considered by the company. For many drugs this is no problem; for example, Seldane (terfenadine), a new antihistamine, and Zantac (ranitidine) earned US$ 180 million and US$ 655 million, respectively, in the USA alone in 1988. But given the income levels in developing countries, especially of those with many tropical diseases, sales of US$ 30 million might be difficult to achieve, regardless of disease prevalence. The exceptions perhaps are schistosomiasis (in view of the very large numbers of persons affected) and malaria (because of the number of persons affected and also an affluent traveller's market of some 20 million).

It is interesting to review the pricing strategies for tropical disease drugs in light of the above. Multidrug therapy (MDT) for multibacillary leprosy, for example, is quite expensive, and probably would be unaffordable for many countries where leprosy is widespread. Yet the disfigurement and disability caused by leprosy, the relatively limited number of leprosy patients (about 10–12 million, compared with over 100 million each for malaria and schistosomiasis), and the fact that there are few relapses after a successful cure have made it possible for private organizations to raise over US$ 70 million annually for leprosy work including anti-leprosy treatment. Many developing country governments are thus relieved of the need to pay for MDT. The manufacturers of one of the most expensive components, clofazimine, have therefore not been obliged to lower prices, despite consumer pressure on them to do so. The fact remains, however, that many leprosy sufferers are not currently under treatment of any kind.

The situation is quite different with schistosomiasis, a disease suffered by about 200 million people; donor support for the purchase of praziquantel is not a viable long-term prospect, except in the context of development schemes, especially since reinfection is likely. The fact that there are acceptable alternatives to praziquantel has forced the company to continue to seek the price level at which it will be taken up as a first-line treatment, and as a result the price of praziquantel has declined continuously—although not to the point where it has completely displaced the less effective but less expensive alternatives.

The recent introduction of ivermectin for onchocerciasis demonstrates yet another pricing strategy, that of giving the drug away free to approved onchocerciasis control programmes. The company assessed the market which includes some 17.5 million already infected and some 85 million at risk of infection; for the most part, this group is extremely poor and living in remote areas outside the cash economy, often with little access to health services and no possibility of buying the drug at a reasonable price. As a result the company decided to provide the drug free; distribution costs will be borne by the control programmes. Advertising and publicity is being provided virtually free by the international press; and if significant operational constraints can be overcome, there is a possibility that eventually onchocerciasis can be eradicated, which would bring invaluable recognition to the company.

The pricing strategy for the new antimalarials, in particular halofantrine and mefloquine, appears to take account of several factors. First of all, malaria does not cause dramatic disfigurement or disability, as do leprosy and onchocerciasis, and the numbers of people exposed to malaria are extremely high, in the hundreds of millions. The ability to raise significant donor funds is therefore limited. Furthermore, cure of one episode in no way precludes the

need for treatment of a second or third episode, even within a given year. As a result, the likelihood of donors taking on a major share of the antimalarials consumed is small, since donor commitment would have to be significant and over a long term.

But perhaps most important, and the factor which distinguishes malaria from most other tropical diseases, is that the market is clearly segmented into an affluent group of travellers and the local elites on the one hand, and the low-income majority of the population on the other. (Antimalarial drugs share this characteristic with drugs for AIDS and HIV disease, whose market is segmented into affluent Europeans, North Americans and local elites, whose drug costs are covered by either public or private insurance, and the low-income developing country AIDS patients who have to pay all drug costs out of their own pockets.) Even if they take precautions, travellers to malarious areas are susceptible to malaria. One company estimates that some 20 million travellers are exposed to malaria each year; this includes tourists and business travellers, as well as official staff (diplomats, aid workers, etc.) and military personnel. In fact much of the development of antimalarials has been financed and carried out by military authorities. The travellers' market and the local elites can afford to pay a high price for protection from and cure of malaria, and this segment of the market is large enough to justify the development and marketing of newer, expensive antimalarials. There is also an affluent urban elite in most countries which has the purchasing power to pay for expensive drugs. Unfortunately, within an endemic country, it is often the economic status of the population which is a major determining factor in the kinds of antimalarial drugs used—and unfortunately also the dosage (the poor may be able to afford only one or two tablets of chloroquine instead of a complete course). The ethics of conducting clinical trials of drugs using subjects from the poorer segment of a segmented market needs to be examined; is it ethical to test a drug on a low-income population, and then set a price for that drug which is unaffordable for that population?

A number of factors may affect the trends of antimalarial drug prices in the near future. Although no price was available for artemisinin (presumably it is widely traded in China), Chinese domestic drug prices are on average as low as 10% of international prices; if it becomes widely used outside of China, artemisinin may be significantly less expensive than the other new antimalarials. Another development which might lower treatment costs would be the discovery of a low-cost adjuvant drug, available in generic form, which could reverse chloroquine resistance. On the other hand, prices of quinine and quinidine might rise by as much as 50% in the next few years owing to a fungal disease which has led to a shortage of good quality cinchona bark.

A concern of the pharmaceutical industry is that many countries have not purchased new drugs for tropical diseases in the expected quantities; therefore the industry does not have an incentive to invest in tropical disease research (*4*). To remedy this, one author proposes that "Third World governments . . . make clearer their willingness to purchase at a national level new therapies relevant to even the poorest sections of their people" (*5*). The question needs to be asked, however, whether it is a lack of willingness or a real *inability* to pay for new drugs which is at the heart of the problem. A quick review of the economic fortunes of the developing countries over the past decade and the resulting trends in availability of pharmaceuticals should indicate that the obvious problem is one of ability to pay, rather than willingness to pay. Especially for diseases as widespread as malaria or schistosomiasis, the cost of the newest therapies, if made available to all sufferers of those two diseases alone, would easily exceed the total drugs budget. For example, Malawi reported 3.4 million cases of malaria in 1985, of which 1.9 million cases were in persons over 5 years of age. Chloroquine (both tablets and injection) accounted for 8.2% of the public sector drugs budget. If all malaria cases in persons over 5 had been treated with halofantrine at US$ 6.64 (US$ 5.31 + 25% shipping and insurance) per treatment, the total cost would have been US$ 12.6 miillion, or 274% of the drugs budget for that year (equivalent to US$ 4.6 million). Treating even 10% of adult cases with halofantrine would have cost nearly US$ 1.3 million, or over a quarter of the government drugs budget. To imply that these governments lack the willingness to pay for expensive drugs, therefore, is to ignore the fact that they simply lack the resources.

Drug distribution systems

The question then arises, if high-cost drugs are to be used at all, what are the criteria to be used in making *rational* decisions? And rationality aside, how are decisions actually made about the selection, procurement, and use of drugs in both public and private sectors? In most countries there are typically four main distribution and supply networks through which antimalarial drugs might be distributed, as follows:

- *The public sector*: including the Ministry of Health facilities, the national teaching hospital, the military and police, etc. The national malaria control programme would normally fall under this

category. In countries where social security payments provide health care with government support, it could be said to form part of the public sector despite the fact that it only serves its members. Typically these are funded out of government revenues; in addition, the population is often asked to pay a "user fee" at the time of consultation.

- *The private non-profit sector*: usually made up primarily of mission hospitals and other nongovernmental services. This sector often receives some financial support from the government, as well as from user charges and external support from nongovernmental organizations and churches.

- *The private commercial sector*: this is composed of private physicians, hospitals and clinics, private drug importers and pharmacies, and other outlets such as general stores and drug depots which are licensed to sell a limited range of drugs. Local manufacturers and subsidiaries of multinational companies could also be said to form part of this sector. It is usually self-financing although there may be significant subsidies from the government, in the form of direct payments, tax concessions, preferential access to undervalued foreign exchange, or tariff protection from imports.

- *The private "unofficial" or "informal" sector*: composed of unofficial sales points such as market and street sellers, distributors of pilfered drugs, occasionally distributors of counterfeit or adulterated drugs, etc. Despite the illegality of such practices in most countries, these activities are usually tolerated and those who carry them out may be well integrated into the local community. Such distribution in many countries accounts for a significant portion of the antimalarial drugs consumed. This sector is financed by charges to users, and indirectly by public revenues where pilferage from government facilities is widespread.

The relative importance of each of the above varies by country but globally it is possible to get a rough estimate of the relative importance of malaria control programmes as distribution mechanisms for chloroquine. The United Nations Industrial Development Organization (UNIDO) estimated in 1985 that approximately 1300 metric tonnes of chloroquine are produced annually.[b] WHO estimates on the basis of data from surveys submitted by governments that approximately 300–400 tonnes are distributed annually through malaria control programmes.[c] Therefore, approximately 25–30% of annual chloroquine production is estimated to be distributed through malaria control programmes.

Use of amodiaquine and sulfadoxine–pyrimethamine in malaria control programmes has been increasing recently, with an 8-fold increase in the use of sulfadoxine–pyrimethamine between 1978 and 1984. Much of this increase was in Africa, even where drug resistance problems were only emerging. Use of parenterally administered quinine is widespread in French-speaking Africa (especially Mali, Côte d'Ivoire, Senegal, and Burkina Faso) and in Laos and Vietnam (which together accounted for 90% of the use of this drug in the Western Pacific region).[c]

While the use of antimalarials within the context of malaria control programmes is well documented, especially in Asia,[d,e] little is known about the very significant part of antimalarials distributed through unofficial channels and the private sector. Within the private sector, it is difficult to know what percentage is sold through "official" pharmacies and what percentage is sold by rural stores and street sellers, since many of these purchase their drugs at official pharmacies. At lower levels of the "unofficial" distribution system, a reduced range of antimalarials is available, usually chloroquine, and occasionally amodiaquine and sulfadoxine–pyrimethamine, It appears therefore that, on average, about half of the antimalarial drugs are distributed through the public sector, including through national malaria control programmes which account for 25–30% of the total. It can then be inferred that about half is distributed through the private sector.

The private sector involves not only official "ethical pharmacies" staffed by qualified pharmacists, but also other "unofficial" outlets such as drugstores, general stores, market sellers, and street peddlers. Dispensing physicians and clinics are also common in some countries. The number of "official ethical pharmacies" is of course limited by the number of pharmacists available, and in many countries there are simply not enough of them to staff more than a handful of pharmacies. These are usually in urban areas, especially in the capital city.

[b] **UNIDO (United Nations Industrial Development Organization)**. *Technical and economic analysis of the manufacture of chloroquine phosphate.* Sectoral Studies Branch, Division for Industrial Studies, doc. no. UNIDO/IS.581, 1985.

[c] **Kouznetsov, R.** *Antimalarial drug requirements for national malaria control programmes in developing countries, 1983–1989.* Unpublished document, WHO/MAP 87.1, 1987.

[d] **Somkid Kaewsonthi**. *Cost and performance appraisal of malaria surveillance and monitoring measures: final report.* WHO/TDR/SER/PRS/5, 1983.

[e] **Mills, A. J.** *Economic study of malaria in Nepal: the cost-effectiveness of malaria control strategies.* London, Evaluation and Planning Centre, London School of Hygiene and Tropical Medicine, unpublished report, 1987.

As a result, "unofficial" outlets of various types typically account for as much as 25% of the total of drugs distributed; in some countries the percentage may be significantly higher and in rural areas they may account for most of the drugs distributed. The nongovernmental organizations and mission facilities also account for a considerable portion in many countries; for example, in Kenya they account for about 35% of drugs distributed. Therefore, the approximate breakdown for distribution to the consumer of antimalarials may be as follows:

	% of total
Public sector	40–60
National malaria control programmes	20–30
Primary health care and hospital use	20–30
Private sector[f]	40–60
"Official" ethical pharmacies	20–30
"Unofficial" outlets and sellers	20–50
Nongovernmental organizations and clinics	25–40

Decisions about antimalarial drug use

Regulation

A first decision is whether or not a given drug should be made available through either public or private sectors (or both) in the country concerned. Most countries now have some provision for the regulation of the import, distribution, and use of pharmaceuticals. Many of the countries (especially in Africa), which gained independence in the 1960s, had legislation dating back to the 1930s or even earlier and which was at least loosely based on the legislative framework of the former colonial power; most of these have now revised their legislation to reflect current needs.

In some cases, the legislation was actually used more to ration the outflow of scarce foreign exchange than to regulate the inflow of drugs, but this too is changing with the growing awareness of the need to prevent harmful products (or counterfeit drugs in some cases) from circulating on the market, and to ensure that products are actually what they purport to be. The main tool for accomplishing this is through registration of products authorized for use in the country; "medical need" is a criterion for registration in a few countries. But registration (as well as other legislative provision) must be accompanied by the ability to evaluate applications, carry out quality control tests, and so on. In practice, many countries lack the resources for carrying out extensive tests and they therefore refer to registration decisions made in the country where the drug is manufactured or used (*6*). They may also depend on close relations with a laboratory or regulatory authority in the former colonial country; as an example, the decision by the French authorities to register halofantrine was followed closely by approval in Côte d'Ivoire, Togo, and Congo.

Selection

The fact that a drug is registered does not automatically mean it will be used in the country. In fact, many countries have as many as 25 000 drugs registered, but less than 1000 are actually used in the public sector, with a larger number (5–10 000) available through the private sector. Ministries of Health must decide which antimalarial drugs are appropriate, and when and how they are to be used. In practice this decision is often made in two steps: first, the selection of which drugs to use; and secondly, the circumstances under which they will be used, which is largely determined by how much can be made available, given a fixed budget. In the public sector, the first decision, whether to include a drug on the national essential drugs list or national formulary, and thereby select a drug for use in health facilities, is often made by a drugs committee or formulary committee, usually made up of top clinicians and pharmacists, including the chief pharmacist. Such committees often refer to the criteria set out in the first model list of essential drugs in 1977, namely, safety, efficacy, quality, stability, ease of storage, cost, and availability. The second part of the decision, how much to make available for use at which levels, is at least in part a procurement decision, which will be described below.

The decision as to the level of use (LOU) of a specific drug is not a trivial one. In practice it determines how far up the referral system a patient would have to go to receive a specific treatment, thereby, indirectly determining the cost to the patient and whether he will receive the needed treatment in time. The LOU designation will also influence the overall quantity of the drug needed because of the pyramidal structure of most health systems, with a majority of consultations taking place at lower levels; only 10–15% of patients see a physician in many developing countries. This will therefore influence the cost; but in practice, as described below, the cost often determines the

[f] Private sector totals add to more than 100% since "unofficial" outlets are supplied through "official" pharmacies.

LOU, with more expensive drugs reserved for the referral hospital level despite their usefulness at lower levels. The implicit use of cost for rationing and determining the level of use deserves scrutiny; other more sensitive measures, based on therapeutic considerations, could perhaps be used with better results.

The designation of LOU is dependent not only on the need for a drug at a given level, but also on the staff's (both medical and nursing) skills at a given level, the availability and cost of laboratory and diagnostic services needed to use a drug, the availability and cost of special equipment or supplies needed to administer a drug, etc. The designation of LOU will take into account not only the cost of the drug but the availability and costs of these other factors as well. With the antimalarials, an additional consideration has to be the degree of chloroquine resistance present, and a decision will have to balance the risk of misusing a valuable new drug with the benefit of having the drug close at hand when needed in life-threatening situations. Frequently, however, the data on which such decisions would be made are of low quality or not available; and when the drug is an expensive one, the decision may be made by default on the basis of cost alone.

In the private sector, the selection criteria are likely to be quite different. "Medical need" is not a major criterion, whereas "patient demand" is. The private importer is likely to be more concerned with the relevance of the product as perceived by his clients and the resulting "demand", its price level as compared with alternatives, and as compared to the income level of his clients, and the degree to which the company has provided publicity and advertising for the product. The price of the product will not concern him as long as it is affordable for his clients; in fact, the more expensive the better, since most importers (and their clients, the retail pharmacies) are remunerated on the basis of a margin applied to the base price of the product. Level of use is applied in theory, with prescription-only drugs reserved for pharmacies with fully-qualified staff; but in practice the designation "prescription only" merely increases the client demand and makes it more difficult to restrict its use, especially in countries which lack the resources to actually inspect pharmacies and drug sellers. In Brazil, the designation "for sale on doctor's prescription" became more of a quality certificate than a restrictive measure (*7*). In Sierra Leone the additional difficulty of obtaining a prescription-only medicine enhanced its value (*8*). The public's awareness of the possibility of chloroquine resistance, which may be enhanced by private sector advertising and contact with pharmacy employees, may act in favour of the sale of newer antimalarials.

Procurement

The official responsible for deciding on and placing orders for specific quantities of individual drugs is probably the chief pharmacist or someone on his staff. He has the unenviable task of balancing the available budget with the competing demands for drugs and consumables from all parts of the public health system. Considerations uppermost in his mind are probably the price of an individual drug, the level of use designation, and the amount required; he may also have to contend with political pressure to procure certain drugs for the referral level serving the urban population, or with pressure from specialist doctors or from company representatives, or with dissatisfaction expressed by the rural population through their parlimentary representatives. Other considerations are the lead times for delivery of a drug, seasonal demand, stability of the drug and storage requirements, and local availability of the drug. Recently many procurement officials are having to contend with drug requests to treat a new complex of diseases caused by HIV. Some authors have argued that the cost-effectiveness of some drugs for tropical diseases is high, despite the high prices of some of the drugs. But for the harried procurement official such considerations are too abstract. His problem is to make the limited budget satisfy as many people as possible. And despite the fact that his is a key position with responsibility for expenditure of millions of dollars, he is usually a poorly paid civil servant, which makes him vulnerable to bribery.

A change in recommended treatment may have significant implications for the budget and for the drug supply system more generally. The change in recommended chloroquine treatment for malaria from 10 mg/kg to 25 mg/kg effectively meant that unless sufficient advance planning had been done, supplies would be sufficient to treat only 40% of the patients who could be treated previously with the same amount of chloroquine. The fact that procurement lead times are often a year or more meant that adjustment could take some time. But the impact on the budget would be most important, since the chloroquine budget would have to be increased by 250%; if 10% of the overall drugs budget previously went for chloroquine, then this would have to be increased by 15% *in real terms* to provide enough drugs, given the same number of cases. Clearly this would not be possible in many countries. Faced with insufficient supplies, the health workers would have three options: provide complete treatments (25 mg/kg) for about 40% of the patients; provide complete treatment for some patients and send others to buy their chloroquine on the private

market; or continue to provide 10 mg/kg to most of the patients despite the new dosage regimen.

Once the drugs are in the country, it is often the chief pharmacist who allocates them to the health facilities that request them. His concerns are again to satisfy the competing demands which make fair distribution very difficult; and typically the specialists at the referral hospital are closest geographically to him as well as politically powerful, so hospitals usually take priority over rural health centres and dispensaries. Transportation is almost always a major problem, making it difficult to ensure timely deliveries to as many as a thousand health facilities, especially to those in remote areas. Other concerns are to prevent pilferage and ensure that most of the drugs reach their destination; and to prevent deterioration due to poor transport and storage conditions. Most recently, a concern is to prevent penetration of counterfeit drugs into the supply chain.

On the private market, procurement is usually done on the basis of a different set of considerations. The importer will have a good idea of the previous year's sales of a specific product, and he will adjust this by taking into account any price rises (including those caused by devaluation of his local currency and general inflation), the economic health of his clients (for example, the drop in oil prices hit several developing countries especially hard, with significant drops in pharmaceutical sales), and any special demand-creating activities of the company (advertising to the public, visits to prescribers, conferences, etc.) or new information about chloroquine resistance. Most likely his delivery lead time is much shorter than that of the public sector, so he can afford to order smaller quantities more often.

The private sector wholesaler's distribution system is usually simpler since the number of outlets is limited and concentrated in urban areas; and the availability of transport is not usually a problem. The more remote and poorer urban areas are reached by the "informal" sector which for the purposes of the "official" private sector acts like other retail clients, provides its own transportation, and runs its own affairs.

Prescription and use of antimalarials

Prescription of antimalarials is affected by three main factors: the prescriber's skill level and experience; the availability of different antimalarial drugs; and the patient's own demands and expectations. In developing countries, only about 10–15% of outpatients are seen by a medically qualified person, and the level of education of lower-level health staff may be very inadequate. Furthermore, at lower-level health facilities there may be no capacity to perform even the most simple laboratory tests. Self-medication (where no qualified prescriber is consulted) may account for as much as half of the use of antimalarials, and the percentage may be growing. The rapidly changing picture as regards chloroquine resistance makes up-to-date prescribing information for prescribers, drug dispensers, and the public even more necessary.

A major problem is overprescription. Prescribers frequently do not know the prices of drugs; many prescribe a large number of drugs in the expectation that the patients will think they are "good doctors." Patients, on the other hand, may expect a long prescription to validate their "sick role"; if they are unable to decide which of the numerous medications is the one really needed, they may ask the person behind the counter at the pharmacy, who becomes in fact the one who "prescribes", usually on the basis of what the patient says he can afford. In Nigeria, when the cost of a prescription was between 1 and 9 naira (US$ 1 = 1 naira) all items were purchased in 83% of cases, compared with only 21% when the cost exceeded 20 naira (*9*). Overprescription also encourages self-medication. In Pikine, a suburb of Dakar, Senegal, the average prescription from a dispensary cost 5200 CFAF or nearly US$ 20 (and from a private doctor, as much as 14 000 CFAF), but most households received less than 30 000 CFAF per month. As a result, most households chose to self-medicate with drugs bought from market sellers (*10*).

In many countries there is overlap of the roles of patient and client. The prescriber–patient relationship often resembles more a business relationship between a seller and a client. This is particularly true of the private sector pharmacies where the person behind the counter has no training; he may advise his client that in view of chloroquine resistance, he should purchase one of the newer drugs. Doctors who have a financial interest in a specific pharmacy to which they direct their patients, or dispensing physicians who sell medication directly to their patients, also risk falling into the salesman–client type of relationship. The problem is not limited to the private sector, however; underpaid public sector physicians often "refer" patients to their own after-hours practices where medicines (often pilfered from the government facilities) are available for a fee. In all of these cases, the prescriber has an interest in prescribing the maximum amount of drugs which the patient/client can afford. This clearly does not encourage rational prescribing.

Governments are increasingly asking their populations to pay for services or for drugs, or both.

If such user charges are well designed and *affordable*, they can have a positive impact on the rational use of drugs. However, there is a growing body of evidence to show that often user charges have three types of negative impact which are relevant to malaria control:

— utilization of health facilities declines, with the cash-poor segments of the population, especially women and children, accounting for proportionally more of the decline;
— self-medication from "unofficial" sources increases, since these sources are willing to sell single tablets of drugs at a lower overall cost (although unit costs are higher); and
— those patients who continue to frequent the health services demand a better service; but where there is a flat fee-for-service unrelated to the consumption of drugs, the patients' demand for "better service" often expresses itself in terms of "more drugs". This may lead to pressure on the prescriber for inappropriate quantities or forms (i.e., injections) of drugs. These drugs may then be hoarded for future use or may be sold to others for self-medication.

These problems, and their importance for the malaria control effort, are illustrated by a recent experience in Ashanti-Akim district in Ghana, where a large proportion of outpatient consultations are for malaria (44% at one health centre). A steep fee increase went into effect in June 1985 and the impact was felt immediately. Attendance at health stations dropped to a quarter of 1984 levels, and while the large urban-based stations had recovered two and a half years later, small rural-based stations are still well below half their previous levels of utilization.[9] But while patient demand had dropped, the quantities of drugs supplied remained the same, resulting in a high wastage of antimalarial drugs. On average, each patient attending the clinic, regardless of age or diagnosis, received up to 8 tablets of chloroquine, 29 ml of chloroquine syrup, and 0.5 ml of chloroquine injection. But only about a third of patients were diagnosed as having malaria. If this factor is included in the estimates of consumption, then each patient reporting with malaria receives up to 24 tablets of chloroquine, 57 ml of chloroquine syrup, and 1.5 ml of injection. If further adjustments are made for age structure, the wastage is even more dramatic. It appears that wastage of chloroquine is in the order of 100–200%, and the same applies to other drugs whose usage has been monitored (*11*).

Further research on drug use and on the reasons for the decline in attendance at rural health facilities in Ashanti-Akim was undertaken. Many people found the fees too high and instead turned to self-medication at local shops and market sellers, since they could obtain small amounts of drugs there which were cheaper than the charges in the health services. If self-medication failed, patients would go for treatment on about the fourth or fifth day of their illness. Cost considerations caused them to delay their use of government facilities until they were sure their illness was not self-limiting, or curable with simple drugs. Ironically, despite the greater incidence of disease, especially malaria, fee collection was at its lowest during the rainy season, because farmers were most likely to be short of cash just before the harvest; and the government fiscal year and budget processes meant that the health facilities would be most likely to be out of stock of freqently used drugs during the first two quarters of the year (*11*).

Self-medication and the "unofficial" market

In many countries where malaria is a major cause of morbidity and mortality, chloroquine or other antimalarial drugs are widely available on the open market. In fact a very considerable portion of antimalarial drugs are taken through self-medication, without a proper diagnosis or treatment having been made. Delay in seeking treatment, and the resulting mortality from malaria, may in many cases be traced to inappropriate self-medication.

Why do people self-medicate? When a person in a family has a fever, especially a child, a decision has to be made quickly. The mother knows only that the child has fever and that malaria is common; she has to decide, on the basis of inadequate information, common sense, and the local beliefs about health and disease, which of four possible situations is the correct one:

— the fever is caused by malaria, and will resolve itself with home treatment with chloroquine;
— the fever is malaria but, owing to chloroquine resistance or other complication, the situation will not be resolved by home treatment;
— the fever is not malaria, but it is not serious, and it will resolve itself; or
— the fever is not malaria but it *is* serious and will not resolve itself without medical care.

She has to take account of the options open to her such as distance to travel, cash required, etc. Not surprisingly, in many areas where malaria is endemic the mother takes the risk that the situation will resolve itself and treats the child herself, or with local resources. This will probably mean self-medication with drugs already in the home or with drugs

[9] *Financing essential drugs: report of a WHO Workshop.* Unpublished WHO document DAP/88.10, 1988.

purchased locally on the market. Only when she sees that home treatment is not working will she consider taking the child for professional care. At this point she has to organize care for the other children, obtain the cash needed, etc.; it may take a day or more to organize the trip to the health facility. Given the time already spent waiting to see the effect of the self-medication, a two-day delay in seeking care would not be unusual. In Thailand, people came to the malaria clinics after an average of 7.8 days from the onset of symptoms, and most of them had tried self-medication prior to seeking care at the clinics.[h] In Togo, only 17% of children with malaria seen in health facilities were seen on the first day of fever (*12*).

Unfortunately, with malaria a delay of a few days can prove fatal; in Gambia, the mean duration of symptoms in children who died of malaria was only 2.8 days, but half of the children had been ill for 2 days or less (*13*). In a sample of 1323 paediatric deaths from malaria in Kinshasa, Zaire, 62% occured in the emergency ward prior to admission to hospital (*14*). Similarly, in Malawi, 28% of a group of 96 children with cerebral malaria had been ill less than 24 hours before presenting to the hospital; and 58% had had antimalarials prior to arrival in the hospital (*15*).

Another problem is that parents, and lower-level health staff, may not realize the extent of chloroquine resistance, and that the dose which cured malaria a few years ago is no longer completely reliable. In Kinshasa, Zaire, there was a striking increase in malaria morbidity and mortality between 1982 and 1986, which may be related to the rapid spread of chloroquine resistance over that period; whereas in 1982 no cases of resistance had been detected, by 1986 some 82% of *P. falciparum* parasites isolated from children at Mama Yemo hospital were resistant *in vitro* to chloroquine. Blood samples were collected from 140 malaria patients presenting to the emergency ward, and 92% had evidence of a recent intake of chloroquine and/or quinine (*14*). Parents and lower-level health workers may have delayed treatment or referral in the expectation that chloroquine would cure the malaria.

The availability of different brands of chloroquine on the market may be another source of confusion in self-medication and delay in seeking treatment. People might start self-medication with one brand, and when the condition did not improve, they might switch to another marketed by a different company. In the meantime the illness may have progressed almost to the point of no return. The fact that the tablets are of different sizes (100 mg and 150 mg base) and in different packaging might also suggest to the layman that they are different drugs.

Another factor which can cause delay in seeking treatment is the seasonality of malaria. Seeking care requires cash. Malaria occurs during the rainy season when cash income from the previous harvest is exhausted. Cham et al. found in Gambia that the rainy season was the time of maximum hunger, work, and poverty; cash availability after seven years of drought was so low that many villagers did not have enough cash to purchase chloroquine from the village health workers. If cash was required for health care, the less privileged would either be excluded or would have to beg for cash from their patron or a former master (*16*). Lack of cash was also a problem in rural Malawi, where a drug sales scheme was providing chloroquine at a very low price; but even though there was a malaria epidemic, people could not find the cash to purchase the chloroquine and the drugs eventually had to be given away free or they would have passed the expiry date.[i]

Seeking health care also requires time, which is at a premium during the rainy season. The workload of the villagers, including village health workers (both men and women) during the rainy season is at its peak; they are often in their fields and therefore not available when the villagers seek them out (*16*). Seasonal changes hit the poorer groups harder than the rich; in Kenya, for the poorest 20% of the population, an hour during the rainy season was nearly 8 times more valuable than an hour during the dry season, but only 2.2 times more valuable for the rich (*17*). As a result, for a poor person the cost of seeking care is much higher during the rainy season in terms of both the loss of time, which would otherwise be devoted to productive work, and in the low availability of cash needed to pay for transportation, drugs, medical fees, etc.

How widespread is self-medication against malaria? Evidence from several countries indicates that it may account for as much as half of all consumption, especially in rural areas. Reports from a variety of countries show that general stores or market sellers may sell as much or possibly more chloroquine than is distributed through the health services. In the Pikine suburb of Dakar, for example, one author reports that private street sellers sell drugs valued at 32 million CFAF (US$ 125 000) while the

[h] See footnote *d* on page 354.

[i] **Richardson, S.** *Charging for malaria treatment in rural Malawi: recovering costs or restricting a control strategy?* Unpublished M.Sc. dissertation, London School of Hygiene and Tropical Medicine, London, 1990.

government provides only 3 million CFAF worth; local self-financing schemes provide a further 40 million CFAF. Such "illicit" sellers therefore account for some 43% by value of drugs sold. In Pikine, street sellers have differentiated the antimalarial drugs market into "prophylaxis" and "cure", which is up to ten times more expensive. They typically provide chloroquine at 5 CFAF per tablet (100 mg base) for weekly *prevention*, in a dose of 2 tablets once a week. For *treatment*, however, they propose amodiaquine (200 mg) at 25 CFAF per tablet, 2–4 tablets to be taken at once (*18*). These sellers, mostly recent immigrants to Dakar from rural areas, are highly organized and belong to a Moslem sect which supplies their drugs and protects them, and intervenes in cases of difficulties with the law (*10*). In other areas people may be less well-informed about how to self-medicate, however; in Gambia, prior to an information campaign, only 2.3% of mothers would have given chloroquine if they thought their child had malaria, but 79% would have given aspirin or paracetamol (*19*).

Similarly, in 1983 in rural Zimabawe (prior to the introduction of the essential drugs programme), rural shopkeepers accounted for 43% of the consumption of chloroquine in the local area, while rural health facilities gave away free about 56%. Reasons people gave for patronizing the stores included the lack of queues, the convenient late opening hours of the stores, a suspicion against "free" things (including drugs), their dislike of being asked questions or being physically examined, and the generally more friendly and helpful attitude of the shopkeepers (*20*). In Saradidi, Kenya, prior to the initiation of a control programme, 53% of people in the area bought antimalarials from shops; the reasons given were that other sources were too far, the shops were open in emergencies, the hospital or dispensary had no drugs, they had good past experience with the shops, and the shopkeeper gave advice, especially on dosage. But following the establishment of a community-based programme using village health volunteers to distribute chloroquine, the use of shops declined significantly (*21*). And in Mara, Tanzania, 72% of people obtained chloroquine from sources other than the official chemoprophylaxis programme; these included official sources such as the MCH clinic (55%), dispensary (98%), and hospital (18%), and unofficial outlets including shops (41%) and the market (10%) (*22*).

In Togo, 83% of children with fever had been treated at home with chloroquine. Two-thirds of the mothers had obtained the drug from private sellers, who would sell chloroquine (100 mg base) at 10 CFAF per tablet (about US$ 0.04). For 2–6 tablets they would give a discount, bringing the price to just over 8 CFAF per tablet. There was at least one full-time vendor of chloroquine in 11 of the 13 sites studied. The policy of the national drug supply company was to sell a minimum of 20 tablets, at approximately 6 CFAF each; this was unaffordable for a large number of potential clients who preferred to pay a higher price per tablet for the possibility of buying only a few (*12*).

One researcher who studied drug use in detail concluded that the legal regulation that pharmacists should sell drugs only in standardized packs, as in Togo, actually worked to their advantage. Drugs were sold at retail price to street vendors who broke the packs down and sold smaller quantities to the poorer segments of the population; the vendors thus undertook the unprofitable part of the retail trade for them while extending their market (*23*). Ironically, the closer one gets to the poorest income groups, the higher the unit price of antimalarial drugs. The presence of a thriving "unofficial" drugs market and extensive self-medication may also be an indication that the public health services are either inaccessible (geographically or financially), or of such low quality that they are not patronized.

People often have stocks of drugs in their homes; Haak found in Brazil that many homes had various drugs, some of which had been prescribed by the physician; many had expired dates and had deteriorated (*7*). In the United Republic of Tanzania, people liked to keep a reserve of antimalarials; one of the reasons given for the failure of a malaria prophylaxis programme was that the chloroquine intended for prophylaxis of the children was viewed by adults as "a resource to be shared by all with fever, not necessarily the sole prerogative of well young children" (*22*). Drug trials involving use of placebos must take account of the fact that people tend to save drugs for future illnesses; in particular, the introduction of placebo antimalarials into the pool of drugs which may be used for self-medication poses risks which should be taken into account in design of the trials.

Another example will demonstrate the need to look into people's beliefs about antimalarial drugs and the disease itself. In Malawi a programme of chloroquine prophylaxis for pregnant women failed. Sociological investigation revealed that the bitter taste of chloroquine was associated with traditional herbs which cause abortion, and pregnant women were advised to avoid all bitter medicine during pregnancy. Provision of coated tablets significantly increased compliance (*24*).

The disadvantages of self-medication with antimalarials are numerous, the most obvious being the development of resistance and the risks of incorrect

dosing. Prior self-medication increases the risk of an overdose, particularly of chloroquine. In Zimbabwe, the doses people reported for malaria prophylaxis varied from 300 mg base every two months to 300 mg base daily, with only 16% of urban and 31% of rural people consuming the proper dose (*25*). Some authors feel that this is justification for prohibiting the sale of drugs over the counter (*25*), whereas others consider that the benefits may outweigh the risks (*18–20*).

Drugs used for self-medication constitute an important part of the health resources available at local level. It is clear that self-medication is not likely to disappear in the foreseeable future and there are reasons to believe that it is on the increase. As noted above, attempts to restrict drugs to prescription-only have rarely succeeded in developing countries. Nor are "official" health workers always good prescribers of antimalarials, as the example from Ghana shows. Unfortunately, the fact that the activities of "unofficial" drug sellers are illegal makes it difficult to work with them to improve their knowledge of correct usage and dosage (*12, 18*). There have been examples, however, of training programmes for unofficial retailers to improve their overall knowledge level and dispensing skills (in Nepal) and in training them to prescribe and dispense oral contraceptives (Ghana). Such initiatives could be applied more widely and targetted specifically at improving the use of antimalarials. Another possibility might be to inform and train schoolchildren about the correct use of antimalarials.

To date, research in human behaviour, in particular the use of antimalarials and other drugs, has rarely formed part of a malaria control programme, so the results of such studies have not had a great inpact.[j] Measures to inform and educate the general public, based on an understanding of human behaviour as it relates to malaria and using up-to-date and culturally acceptable means of communication, are essential if the use of antimalarials is to be improved.

Conclusion

Recent trends in the pricing of antimalarials indicate that despite the development of several promising new drugs, their prices for the most part put them beyond the reach of many people in endemic countries, particularly in Africa where the per capita drug budgets rarely exceed US$ 5. Worldwide, about one-third of antimalarials are provided through official malaria control programmes, but as much as half are actually distributed through unofficial channles for self-medication without professional advice, let alone any laboratory tests. A number of trends seem to indicate that self-medication may be on the rise; and as the costs of seeking professional care continue to rise, people may increasingly delay seeking care until they are sure that the condition is not self-limiting. Without measures to improve the quality of both professional health care and of self-medication, and with increasing chloroquine resistance, it seems that these trends could lead to increasing mortality even if very effective drugs are, in theory, available.

Several possible measures might improve the situation with regard to use of antimalarial drugs.

(1) The price of new antimalarials should be kept as low as possible and, in any case, below US$ 1 per treatment episode, if they are to be available where needed. The implicit use of price as a rationing measure and for determination of level of use should be examined. Research into ways of preserving chloroquine as a first-line drug including reversal of chloroquine resistance using low-cost adjuvant drugs, could prove very useful.

(2) Treatment of malaria has a strong "public good" aspect, and free treatment could be justified on the same economic grounds as provision of immunizations or maternal and child care. However, the economic situation of many endemic countries makes it unlikely that malaria treatment can be provided free, especially given the costs of drugs and the large numbers of cases to be treated. If therefore there is to be a charge for antimalarial treatment, the price should be nominal. In particular, any cost recovery scheme should *encourage* rational use of antimalarials as well as of other drugs; flat prescription fees should be avoided.

(3) Prescribers and the public at large need to be kept up to date on treatment of malaria, and particularly the local situation with regard to chloroquine resistance. At present, much of their information comes from representatives of pharmaceutical companies who may tend to exaggerate the need for new antimalarials. The essential drugs programmes operating in many countries could be used to distribute not only drugs but information as well, with malaria guidelines being included in prescribers' manuals, and drug ration kits, and in discussions at prescriber training seminars. Less conventional methods could be used to reach the public, including radio, television, print media, literacy classes, advertising, etc.

[j] **Litsios, S.** *Public information and education in malaria control: need for research and development.* Paper presented at the 22nd meeting of the Steering Committee of the Scientific Working Group on Applied Field Research in Malaria, WHO/TDR, April 1989 (unpublished).

(4) More rational patterns of self-medication could be encouraged. In particular, families could be encouraged to keep a small stock of chloroquine for full radical treatment (*19*); although it is unrealistic to expect this to be reserved for use in children. This would need to be accompanied by instructions on dosage, as well as clear, unambiguous guidance on when to seek further treatment, bearing in mind that the referral facility may be a day or more away. Schoolchildren (often more literate than their parents) could be used to disseminate information about antimalarials and their use. The possibility of making a second-line treatment available locally, i.e., within an hours' walk, might be considered.

(5) Rural storekeepers, market sellers, and other "unofficial" drug distributors could be provided with simple information on use of antimalarials, if legal barriers can be overcome. For example, following training in dosage and when to refer, they could constitute a distribution network for certain antimalarials. In the past they have proven receptive to such information and recognition. If their activities in distribution of antimalarials could be improved, the network for distribution would be extended to a much lower level than is possible working through official control programmes or government health facilities. Delays in seeking further treatment, in particular, might be reduced.

Résumé

Politique des prix, distribution et usage des antipaludéens

Cet article commence par une revue de la politique des prix appliquée aux antipaludéens. Dans de nombreux pays d'endémie, le montant annuel consacré à l'achat de médicaments est inférieur à US$ 5 par habitant, alors que le prix des nouveaux antipaludéens est aligné sur le pouvoir d'achat des voyageurs des pays développés, ce qui les rend inaccessibles à la population de la plupart des pays en développement. Les prix indicatifs des médicaments ainsi que le coût du traitement d'une crise de paludisme sont présentés, ainsi qu'une comparaison des prix pratiqués dans plusieurs pays. Les quatre principaux canaux de distribution sont examinés: le secteur public, le secteur privé non lucratif, le secteur privé commercial, et le secteur privé "officieux" ou "parallèle" qui, dans de nombreux pays, représente pratiquement la moitié des antipaludéens consommés. Quelque 25 à 30% de la chloroquine, antipaludéen le plus couramment utilisé, sont distribués par le biais des programmes de lutte antipaludique. L'article décrit également les processus d'homologation, de sélection et d'approvisionnement en antipaludéens.

L'automédication est fréquente, et semble en augmentation; ce phénomène est dû en partie aux insuffisances de la prescription et de l'emploi des antipaludéens par les services de santé officiels, avec notamment les pénuries de médicaments, la surprescription et le suremploi de médicaments injectables. Aussi bien la sous-prescription que la surprescription poussent les malades à l'automédication; ne pouvant payer la totalité du traitement prescrit, ils achètent quelques comprimés à la boutique locale. Le prix trop élevé des médicaments peut empêcher les malades de recevoir le traitement nécessaire, d'autant plus que la maladie est saisonnière et frappe au moment où les réserves financières de la population sont au plus bas. Les malades se tournent alors vers les distributeurs parallèles, qui leur vendront des comprimés à la pièce plutôt qu'un traitement complet. Au contraire, des prix bas peuvent conduire à une augmentation, souvent irrationnelle, de la demande de médicaments et d'injections. L'automédication a entre autres comme conséquences négatives de différer le recours à un service de santé en cas d'échec du traitement. Or un retard de quelques jours, voire de quelques heures, peut entraîner la mort, en particulier chez les jeunes enfants. Un tel retard peut contribuer à la mortalité palustre, surtout dans les régions où la résistance à la chloroquine est en augmentation rapide; la plupart des malades qui se présentent à l'hôpital ont déjà pris de la chloroquine. L'automédication est maintenant très répandue et les mesures tendant à limiter la vente illicite de médicaments ont échoué. Les canaux de distribution parallèles représentent donc un prolongement occulte des services de santé dans bien des pays. L'article présente des suggestions pour améliorer l'automédication en élevant le niveau des connaissances de base de la population (mères, écoliers, marchands et vendeurs), en insistant sur l'observation de la posologie correcte et en soulignant l'importance de consulter sans retard si nécessaire.

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