Large-Scale Malaria Treatment in the Private Sector:
A Case Study of the Cambodian Experience

UCSF GLOBAL HEALTH SCIENCES
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From evidence to action

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EXECUTIVE SUMMARY

Population Services International/Cambodia (PSI/Cambodia) was established in 1993 to address child survival (safe water and diarrhea treatment), HIV/AIDS, malaria, and reproductive health needs among women of child-bearing age, caretakers of children under five, and high-risk groups including commercial sex workers and men who have sex with men. Following a successful pilot in 2002, in 2003 PSI/Cambodia established an initiative to provide branded malaria treatment through private clinics, pharmacies, and shops across most of rural Cambodia. By 2009 this program provided half of all malaria treatment in the country and 75% of all artesunate and mefloquine (AS/MQ) distributed.[1] Cambodia was the first country to pilot and then scale-up the provision of subsidized ACTs in the private sector.

The PSI/Cambodia malaria program sells a branded version of the same ACT supported by Cambodia's National Malaria Control Program, known as "CNM." PSI/Cambodia imports the ACTs directly into its Phnom Penh warehouse before distributing them to three regional PSI depots. PSI-employed sales representatives make monthly sales calls to 1,737 private outlets. 500 of these are clinician- or pharmacy-operated facilities that are also visited once per month by PSI-employed medical detailers who provide training, counseling, and support on the appropriate use of ACTs, malaria test kits, and other medicines.

Stock outs have been a major problem for the program since inception. The primary causes of stock outs have been changes in the approval status of manufacturers, and long procurement timelines often associated with donor delays which have hindered the arrival of ACTs into Cambodia. Because of PSI/Cambodia's in-house management of the in-country supply chain, no stock outs have been reported resulting from breakdowns of the supply chain within Cambodia; breaks have all been the result of delays in the procurement of Malarine into Cambodia and affect both the public and private sector's ability to deliver.

ACTs sold through the PSI/Cambodia program are highly subsidized, and are sold to private outlets at an average price of $0.29,[2] with a recommended average price-to-patients of $0.45.[3] In practice, the price of Malarine to patients has been documented to vary considerably, ranging between $0.82 and $1.18.[4] This price volatility and overcharging appears to be due primarily to fluctuations in the supply of ACTs.

[1] "Malaria Situation and Drug Resistant Management in Cambodia and Containment Response along Thai-Cambodia Border and Beyond" ACTMalaria EB and Partner Meeting in Lao PDR, March 17–18, 2009. Presentation by Dr. Chea Nguon, Vice Director, National Center for Parasitology, Entomology & Malaria Control Cambodia

[2] ACTs are sold in three age doses to providers: Adult $0.42/blister; Adolescent $0.27/blister and Child $0.18/blister. The average price is $0.29/blister.

[3] The recommended retail price (RRP) to consumers is: Adult $0.63; Adolescent $0.43 and Child $0.30/blister. The average price is $0.45/blister.

[4] ACTwatch Outlet Survey 2009

The PSI/Cambodia experience shows that large-scale provision of ACTs is possible through private sector channels. Ongoing supply management, greatly dependent on donor flexibility and responsiveness, and regular, focused interactions with retailers are important factors in assuring both price and quality service at the outlet level.

1. CONTEXT

National population and health system

Cambodia has over 13.4 million people.[5] 40% of the population lives below the international poverty line of $1.25 per day and is primarily rural (WHO 2008).

The national health system provides care in a system of referral hospitals, clinics, and centers and user fees are charged across all commodities and services offered. However, limited coverage, stock outs of medicines, and widespread informal and semi-formal payments mean that an estimated 80% of all health treatment happens in the private for-profit sector.[6] Approximately 70% of fevers are treated in the private sector, and 85% of deliveries happen in the private sector, mostly at home.[7] For the poorest quintile, approximately 96% of births and 77% of fever treatments occur outside of the government healthcare system.[8]

Per capita total health expenditure was 5.9% of GDP in 2006. Of this, government expenditures represented 26%, mostly from external support, and private expenditure 74%. Health insurance is of limited importance in the Cambodian context, and most of private expenditure comes from out-of-pocket payments.[9] However, health equity funds that compensate public providers and hospitals for income forgone from fee waivers mandated for indigent patients are playing an increasingly important role in Cambodia.

Although the CNM has reported an overall drop in the number of malaria cases treated in public health facilities over the past 10 years, malaria continues to be a leading cause of death, accounting for 10% or more of hospital mortalities. Also, in Cambodia resistance to artemisinin has developed, though ACTs are still effective in the country. Especially vulnerable to malaria are Cambodia's poor, including those living in or near the forests that cover 62% of the country, including plantation workers, miners, migrant laborers, internally displaced persons, and ethnic minorities. There were an estimated 83,777 cases of malaria reported via public sector health facilities in 2009 according to the CNM.[10] In 2009, approximately 70,000 people were treated by government facilities, and a further 35,400 were treated by government-supported "village malaria workers"—rural volunteers trained and supplied by the national malaria program. Based on estimates from multiple datasets, it seems between 250,000 and 600,000 cases of malaria are treated in the private sector in Cambodia each year.[11]

[5] General Population Census of Cambodia—2008
[6] DHS 2005
[7] Ibid.
[8] Ibid.
[9] WHO, 2006 National Health Accounts Data: http://www.who.int/nha/country/en/index.html
[10] Annual Program Report of the National Centre for Parasitology, Entomology and Malaria Control, 2009
[11] This range was arrived at using CNM statistics and the following three data sources: 1) the Cambodia Malaria Survey in 2007 (66% of people seek treatment in the private sector), 2) the ACTwatch Household Survey 2009 (75% people seek treatment in the private sector), and 3) Dr. Chea Nguon's 2009 presentation cited above (86% of people seek treatment in the private sector).

P. falciparum malaria is endemic in Cambodia and a leading cause of morbidity. Cambodia's recommended first-line treatment for uncomplicated *P. falciparum* malaria is AS/MQ for all age groups (except in Zone 1 where the first-line drug is dihydroartemisinin-piperaquine, or DHA-pip). In the public sector it is referred to as "A+M" and in the private sector, supplied by PSI, this formulary is sold under the brand name Malarine. In both the public and private sectors AS/MQ is provided as blister-packed tablets of both medicines. Fixed-dose combination (FDC) tablets are not available.

Regulatory framework for private providers

The regulatory statutes for private providers of malaria treatment recognize three levels of practitioners in addition to doctor-run clinics:

- Pharmacies—operated by a registered pharmacist (393)
- Depot A—operated by an assistant pharmacist (175)
- Depot B—operated by a retired midwife or nurse (446)[12]

In addition, it is estimated that there are 2,461 illegal drug retail outlets in Cambodia.

The Cambodian government has recently announced that it will increase efforts to ensure providers are registered and will step up enforcement on non-registered providers selling medicines—including antimalarials. In addition, the government has announced that it will soon enact and begin to enforce a ban forbidding the sale of artemisinin monotherapies. The nature and speed of implementation of both of these new enforcement initiatives is uncertain, but a new bureau has been created specifically for policing private drug sellers and the government appears committed to active work in this area.

A number of regulatory areas remain unclear however, with contradictory legislation presenting a challenge to both government and the private sector. For example, the government policy has been to actively promote the use of rapid diagnostic tests (RDTs) prior to treatment for malaria. However, in a meeting in early 2009 it was pointed out by a representative of the Pharmacy Association of Cambodia that it is illegal for doctors, nurses, or pharmacists to provide blood tests, and that there are examples of pharmacists having been harassed or prosecuted for conducting RDTs. The legislative process to resolve this and other contradictions between areas of government remains cumbersome.

[12] Numbers of each facility type from *Department of Drug and Food, 2002*, presentation by Dr. Socheat Duong

Program relationship with government

PSI has operated in Cambodia since 1993 under agreements with the Government and the Ministry of Health (MoH). Following decentralization of many areas of government, in 2009 PSI signed letters of support with the 24 provinces covering all aspects of PSI's work (malaria, child survival, etc.) and signed an MoU with the central MoH.

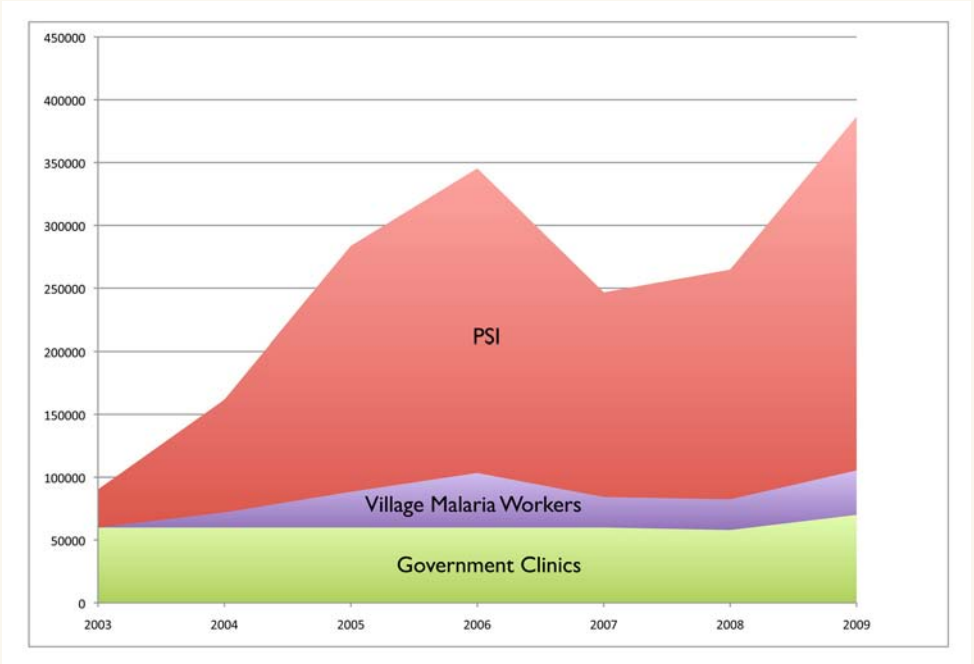
In provinces and districts where PSI operates, relations with local health officials are nearly always positive and collaborative. Recruitment of most new retailers is done in conjunction with local health officials. Most significantly, when new clinical products are introduced, PSI medical staff and provincial health officials jointly provide the training for private practitioners.

Malaria market participants

At the time of publication, 156 companies were registered to import pharmaceuticals, however, only eight were registered specifically to import antimalarials, and only four for-profit companies actively supply antimalarials to the private market. Imports include ACTs, chloroquine, and artemisinin monotherapies.[13] In addition to the four for-profit companies noted above, the CNM and PSI also directly import AS/MQ.

Sales data indicate that PSI is the largest importer and distributor of AS/MQ in the country (see Figure 1), and quite likely one of the largest pharmaceutical distributors in the country.

Figure 1: Cumulative AS/MQ distribution 2003–2009



[13] ACTwatch, November 2009

Recent data

According to a summer 2009 baseline outlet survey report[14] conducted by ACTwatch, 73.3% of public health facilities stocked antimalarials, while 55.9% of pharmacies/clinics and 53% of drug stores did so. Public health facilities had the highest availability of first-line treatments, though fewer than 65% of public facilities stocked ASMQ at the time of the survey. Roughly 30% of pharmacies/clinics and 25% of drug stores stocked first-line treatment. Oral artemisinin monotherapies were available at 15.2% of drug stores and roughly 10% of pharmacies/clinics. The same ACTwatch survey also concluded that the private sector dominates the antimalarial market in Cambodia where 83.5% of drugs were sold/distributed through private outlets, and of that percentage, pharmacies/ clinics account for almost 50% of the antimalarial market.

[14] ACTwatch Outlet Survey Report (Baseline), Cambodia 2009

2. BUSINESS MODEL

PSI is a Washington, DC-based nonprofit organization operating in over 60 countries around the world. The work of PSI primarily focuses on social marketing for behavior change and as a platform for distributing subsidized commodities.

PSI/Cambodia was established in 1993 and has since had a permanent office and staff in Phnom Penh. Currently, PSI/Cambodia employs 74 staff in its Phnom Penh office including four expatriates and 116 fixed term field staff and 127 casual staff. PSI/Cambodia has large programs in family planning and reproductive health, HIV/AIDS, and child survival including safe water and diarrhea treatment, in addition to its malaria prevention and treatment work. Malaria prevention activities focus on the bundling of insecticide treatment kits (called Super Malatabs) with commercially sold nets. These products are part of PSI/Cambodia's branded portfolio of malaria products, together with Malarine drugs and Malacheck RDTs.

The malaria program is supported in Phnom Penh by two management staff plus two additional dedicated support staff. In addition, the program benefits from significant support from the other technical areas within the PSI program. For example, PSI/Cambodia has a large and important program of medical detailers and marketing and outreach programs, as well as in-house research, graphic design, stock management, and logistics teams. All of these are relevant to the functioning of the malaria program, and the program supports a varying number of full-time employees (FTEs) within each technical area. In practice, these FTEs do not represent specific individuals, but rather part of the effort undertaken by all members of each team. In most cases work is shared, making this "incremental support" more cost-effective than a standalone program would be.

Service delivery outlets

PSI directly supplies a range of health commodities (for example, condoms, birth spacing methods, etc.) to over 9,000 outlets, the bulk of these are shops, bars, hotels, and other facilities. Malarine and RDTs are supplied only to a subset of these outlets comprising 1,737 so-called 'traditional outlets' encompassing:

- clinics and hospital
- pharmacies
- clinic-based pharmacies
- para-medical provider-run consultation rooms; mobile providers
- drug stores

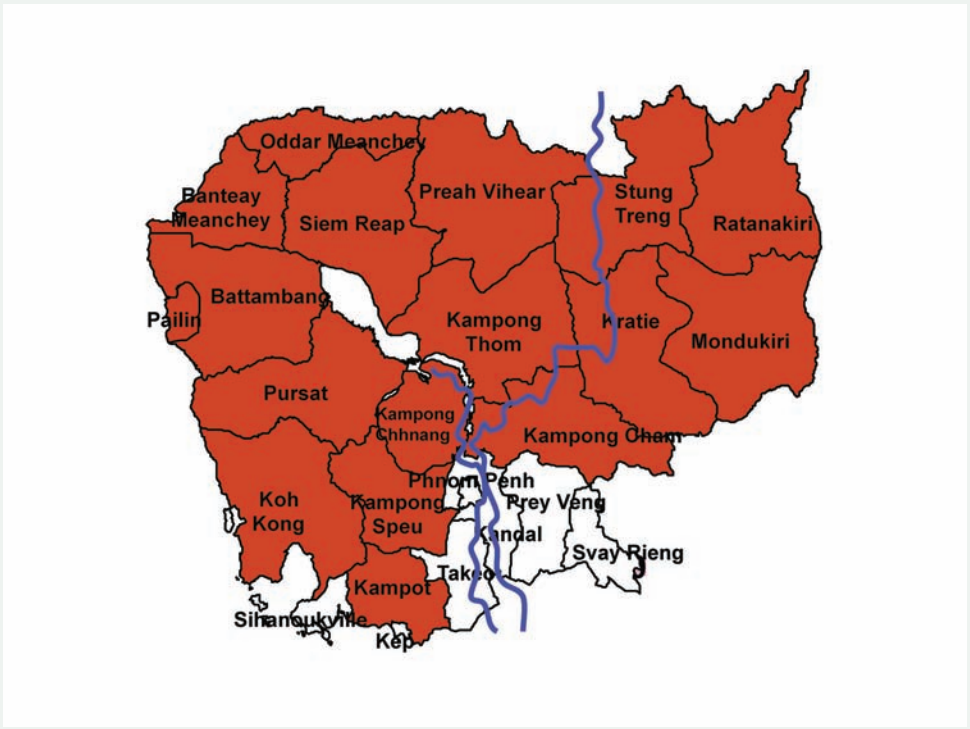
These outlets progress naturally from larger, more urban settings to rural towns. The first four outlet types, staffed by doctors, nurses, physician assistants, pharma-

cists, or pharmacist assistants, are visited monthly by a PSI medical detailer (see operations section below).

Target population

PSI's malaria program is active in all 17 provinces with endemic malaria (red areas in Figure 2 below). Malarine is sold in all regions of the country, but the target population remains those most at risk for malaria—rural and agricultural populations, usually poor. Particular emphasis is given to people living and working in and around forests and migrant workers. While provincial sales representatives are used to deliver Malarine, outlets which are directly supplied by PSI only reach to the district towns. To assure supply in villages, PSI conducts demand creation outreach activities including radio ads and Mobile Video Units (MVUs), and then relies on village drug sellers to procure Malarine as needed from their district pharmacies.

Figure 2: Map of endemic areas



PSI's malaria program is active in all 17 provinces with endemic malaria (red areas).

Commodities offered under program

Malarine is sold in three pre-packaged formulas—adult, child, and, as of 2009, adolescent. These are all sold together with Malacheck—a brand of socially-marketed RDT kits. Sales data suggest that both are used. A wide range of other products are also imported and distributed by PSI, sold by PSI sales representatives, and promoted and supported by PSI detailers and PSI marketing campaigns.

Scalability

In 2009 PSI sold 281,000 Malarine treatment kits, representing 75% of all AS/MQ distributed in Cambodia

PSI sold 30,000 Malarine treatment doses in 2003. In 2009 PSI sold 281,000 Malarine treatment kits, representing 75% of all AS/MQ distributed in Cambodia (see Figure 1 on page 11). Malarine now represents nearly 50% of the overall markets for antimalarials, and is available in all districts (though not all treatment-selling outlets) throughout the country. This model has proven to be highly scalable.

Finances

Prices for commodities and services

Prices to consumers remain a challenge for PSI/Cambodia management. While PSI's RRP for Malarine averages $0.45, survey data show that the average market price is $1.00 (see page 16 and 23 for more pricing information).

Subsidies

Malaria treatment in the PSI/Cambodia program is highly subsidized. The FOB price of blister-packaged Malarine is $3.40 per treatment. Malarine is sold in 12-pack dispensers to retailers at an average cost of $0.29 per treatment, resulting in a ***direct commodity subsidy of $3 per treatment***. Indirect subsidy, in the form of shipping and handling within Cambodia, management, branding, advertising, marketing, promotion, and quality controls, undoubtedly dwarf this direct subsidy; breakdown on these costs were unavailable at the time of writing.

In the long term, economies of scale are expected to be achieved due to shared utilization of PSI infrastructure (including stockage, sales, medical detailers, MVUs, etc.) however, this has yet to be verified.

Donors

The PSI/Cambodia malaria program was initially supported by USAID, and is currently fully supported by the Global Fund for AIDS, Tuberculosis, and Malaria (GFATM).

PSI CAMBODIA

CURRENT PRICE STRUCTURE

(Effective date: ..... 2009)

PRODUCT	UNIT	Price	Consumer	Discount Term
Number One®	Dispenser (100 condoms)	$3.80		≥ 50 dis.→8% ≥ 200 dis.→10%
	Pack (4 condoms)		1,000 Riels	
OK® Condom	Dispenser (90 condoms)	$2.50		
	Pack (3 condoms)		500 Riels	
OK® Condom	Jar (144 condoms)	$3.80		
	Foil (1 condom)		200 Riels	
OK Plus®	Dispenser (60 condoms +60 Lubes)	$2.50		
	Pack (2 condoms + 2 Lubes)		500 Riels	
OK® Pill	Dispenser (12 Cycles)	$2.00		≥ 24 dis.→8% ≥ 100 dis.→10%
	Pack (1 Cycle)		700 Riels	
OK® Injection	Dispenser (5 boxes)	$1.00		
	Pack (1 box)		1,000 Riels	
Implanon				
	Pack (1 Unit)	$28.00	120,000 Riels	
Jadell				
	Pack (1 Unit)			
IUD Copper T				
	Unit	$0.40	2,000 Riels	
Malarine® for Children	Dispenser (12 Packs)	$2.20		
	Pack		1,200 Riels	
Malarine® for Adolescent	Dispenser (12 Packs)	$3.20		
	Pack		1,700 Riels	
Malarine® for Adults	Dispenser (12 Packs)	$5.00		
	Pack		2,500 Riels	
Malacheck®	Dispenser (10 tests)	$0.50		
	Pack (1 test)		1,000 Riels	
Orasel KIT®	Dispenser (10 Kits)	$2.80		
	Pack (1 kit)		1,500 Riels	
Other				

PSI CAMBODIA

DISTRIBUTION CHANNELS

PRODUCT	Traditional Outlet					HIGH RISK OUTLET (Non-Traditional Outlet)							Non-Traditional Outlet						
	Clinic/ Hospital	Pharmacy	Clinical Pharmacy	CCR HCR MP***	Drug Store	Brothel	Beer Garden	BBQ / Soup	Club/ Restaurant	Massag/ Karaoke	Guest House	Hotel	Market Stall	Grocery	Convenience	Village Shop	Street Vendor	SQHN	UHN
Number One® Condom	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
OK® Condom	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y
OK Plus®	Y*	Y*	Y*	Y*	Y*	Y	Y	Y	Y	Y	Y*	Y*	Y*	Y*	Y*	Y*	Y*	Y*	Y*
OK® Pill	Y	Y	Y	Y	Y								Y	Y		Y		Y	Y
OK® Injection	Y		Y	Y														Y	Y
Implanon																		Y	
Jadelle																		Y	
IUD Copper T																		Y	
Malarine® for Children	Y	Y	Y	Y	Y													Y	Y
Malarine® for Adolescent	Y	Y	Y	Y	Y													Y	Y
Malarine® for Adults	Y	Y	Y	Y	Y													Y	Y
Malacheck®	Y	Y	Y	Y	Y													Y	Y
Orasel KIT® **	Y	Y	Y	Y	Y								Y	Y		Y		Y	Y

* Malatab® : Priority outlets are net outlets, covenience outlets where mosquito coils and sprays are sold, village shops and UHN.

** Orasel KIT® social marketing project in Pursat, Siem Reap, Kg Cham, Kg Thom and Prey Veng only.

*** CCR=Cabinet Consultation Room, HCR=Health Care Room, MP=Mobile Provider

Y* Non priority outlets for Sales Reps, but sales can be made to these outlets at outlet request.

3. PROGRAM OPERATIONS

Systems

Outlet selection

Outlets are selected based on location, and/or whether they are known to the provincial and district medical authorities. At the launch of a new product, expansion into a new district and during the regular provincial level training sessions, PSI medical staff meet with the provincial health officers and jointly plan and invite eligible providers to the training session on the products supplied by PSI/Cambodia. In this way the credibility of PSI/Cambodia's products and system are clear, relations with local government are positive and transparent, and PSI/Cambodia is able to assure, insofar as possible, that it is working with appropriate providers.

Cost/benefit to outlet

Outlets profit from the sale of Malarine, and from the sale of a host of other associated products supplied and promoted by PSI/Cambodia. Some outlets also stock and sell other malaria treatments beyond the purview of PSI/Cambodia, e.g., chloroquine (which is the recommended treatment for *P. vivax*) and artemisinin monotherapy.

The medical detailing programs and ongoing training and support for outlets are designed to build competence and increase quality. It is not known to what extent these are valued by providers, but studies of other social marketing programs of correct diagnosis and treatment suggest that perceived benefit is likely.

Communication, promotion, and marketing

PSI/Cambodia's malaria program uses a mixture of communication channels to encourage the appropriate use of products and create demand by both consumers and providers:

- Mass Media: TV, radio and billboard advertising coordinated with product launches (e.g., with the 2010 launch of the insecticide net retreatment kit—Super Malatab).
- Point-of-Sale Materials: Ongoing distribution of point-of-sale materials including stickers, posters, pamphlets, t-shirts, and leaflets.
- MVUs: Community education and marketing through MVUs. MVU teams travel constantly, providing "edutainment" including screenings of short films about malaria (and other PSI/Cambodia-covered topics) in rural areas.
- Medical Detailing: One-on-one education, motivation, and support to clinicians and retailers through the PSI medical detailing program.

Critical to the successful launch of new products has been the large-scale mobilization of all four channels. This has been evident most recently in the launch of Super Malatab for which significant broadcasting and other traditional media campaigns were developed, complemented by a doubling of the normal MVU teams.

Training and education

PSI employs 10 full-time medical detailers; of these, two FTEs are paid by the malaria program. These are medical doctors who do not sell products, but provide targeted training, education, and support for both PSI products and treatment areas. For example, medical detailers might provide updated training or support on the use of RDTs during a visit, but they might also focus on issues of counseling that are not product-related.

According to PSI/Cambodia managers, the medical detailers' credibility is enhanced by their advice being divorced from product sales.

A typical visit (see photo) lasts 20 to 30 minutes and focuses on one product or service that is either of interest or concern to the retailer, or is a current priority focus for PSI/Cambodia. Neither sales reps nor medical detailers are given bonuses for sales of malaria treatment products. This is part of a larger effort by PSI/Cambodia to ensure that detailers are not incentivized to promote a product regardless of appropriate use.

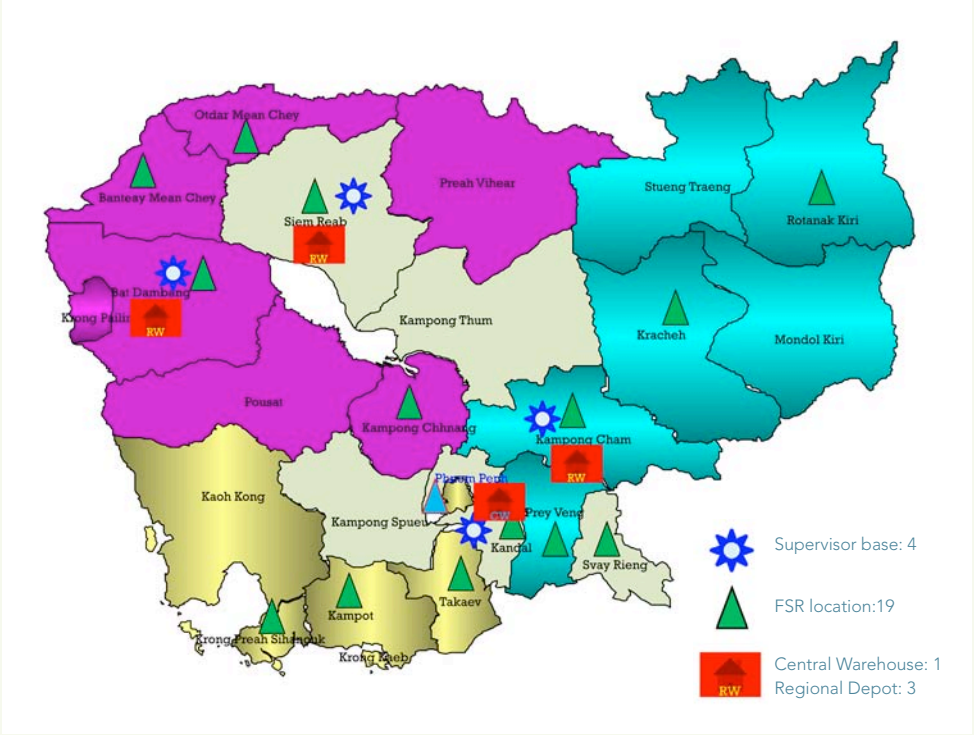
One of the 1,737 pharmacies participating in PSI/Camobodia's malaria program

Logistics

Procurement and delivery processes

Procurement is managed centrally by the PSI/Cambodia office, with regular support from PSI's global procurement division to contact manufacturers, solicit bids when appropriate, negotiate prices, and arrange shipping and handling.

Figure 3: Map with sales and distribution structure



Once inside Cambodia, Malarine tablets are stored initially in PSI/Cambodia's warehouse in Phnom Penh and then distributed to three regional depots distributed across the country (see Figure 3). PSI/Cambodia-owned trucks transport the products to each depot. PSI/Cambodia's 17 provincial sales representatives (sales reps) collect the products from the depots once a month, storing products at their homes throughout the month. Four of the sales reps use PSI trucks and the rest travel primarily on motorcycle, occasionally using PSI/Cambodia trucks to reach more difficult or more remote areas. Each sales rep visits all service delivery points in his or her province each month, representing approximately 100 sites per sales rep per month.[15]

[15] Note: the sales reps visit many more sites each month than this, however, only the more formal sites are supported for Malarine sales.

It is known and encouraged that larger pharmacies in most districts act as de-facto wholesalers, selling ACTs on to mobile drug sellers and drug stores operating in smaller towns and villages. There is no active distribution to these "third tier" retailers, however, they operate independently, buying from the pharmacies on changing schedules.

The manufacturers supplying the AS/MQ have changed a number of times since the program began.[16] Initially, artesunate and mefloquine were purchased separately from independent foreign manufacturers, brought to Cambodia, and combined/packaged in blister packs in country. The WHO-GMP approved company for the blister packaging then lost its GMP status and PSI had to negotiate shipment from manufacturers to a third-country packager prior to shipping the final product to PSI/Cambodia's warehouse in Phnom Penh.

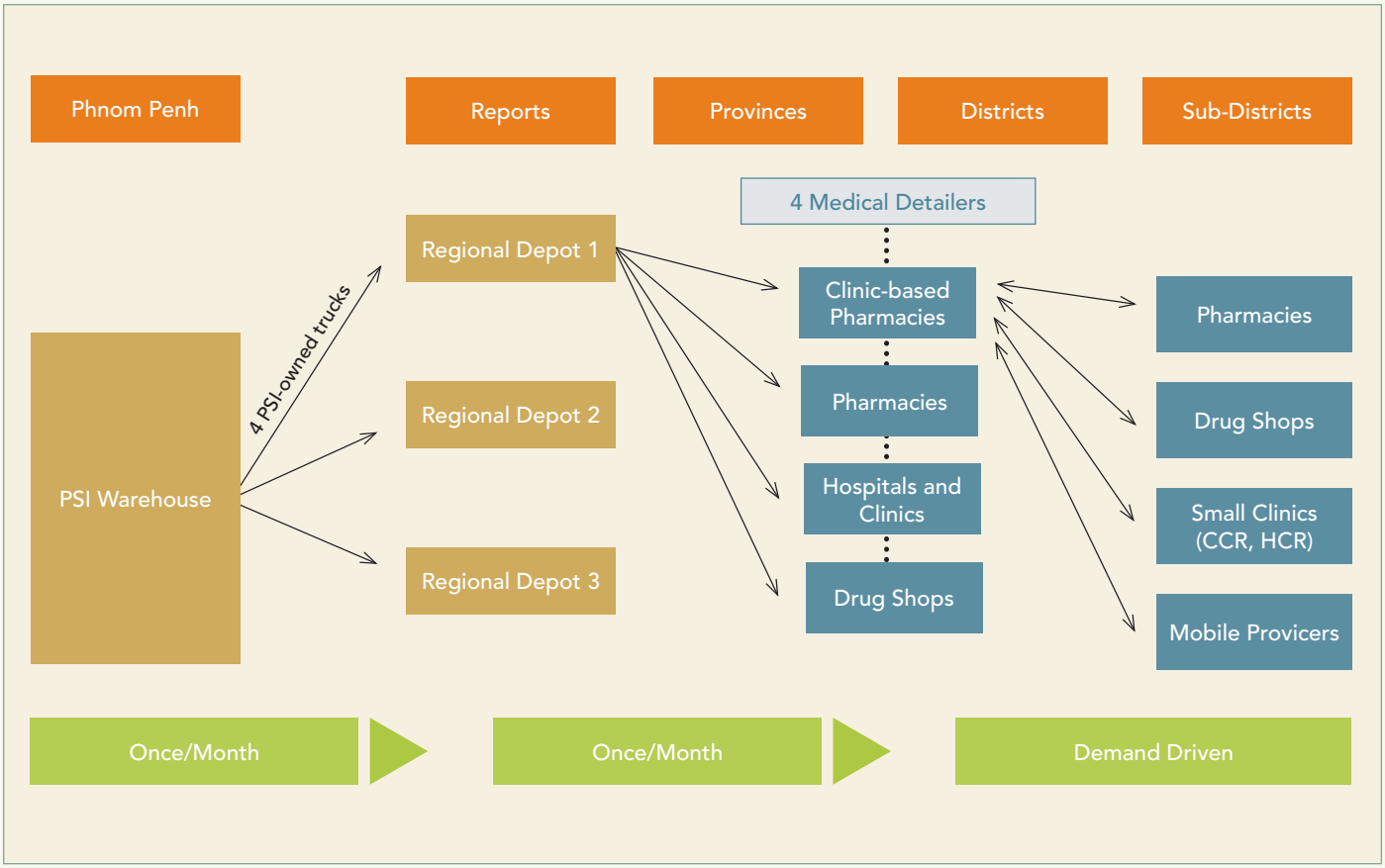
More recently, GFATM has stipulated that it will not support the purchase of ACTs other than FDCs. As no FDCs exist for AS/MQ, a special exemption was required to continue with the current system for one more year. The most recent purchase of AS/MQ was from Cipla, which also supplied the packaging, however, Cipla is not yet WHO-GMP certified for AS/MQ FDC.

The effects of high annual variation in ACT supplies can be seen in the monthly sales figures, corroborated by the stories of often frustrated program managers, sales managers, and marketing managers. Supplies are dictated by donor funding, scheduling, packaging, and approval processes, and a host of other factors. As a result, stocks of ACTs are very often at their highest at times when the need for them is low. In 2004, the program had no ACTs until August. In 2005 and 2007, the highest volumes came in the December-to-January period when malaria infections are at their lowest. RDTs stocked out for eight months in 2008. Managers all agreed: stock timing drives sales volume rather than demand.

A schematic representation of PSI's supply chain is shown in Figure 4 on facing page.

[16] Manufacturers in China, Switzerland, and India have all been used.

Figure 4: A schematic representation of PSI's supply chain



Sales and inventory management

Inventory systems exist through to PSI sales reps. However, though sales reps collect stock information from service delivery points monthly using a standardized form, this data is not verified, and is used primarily by the sales reps themselves to forecast next month demand.

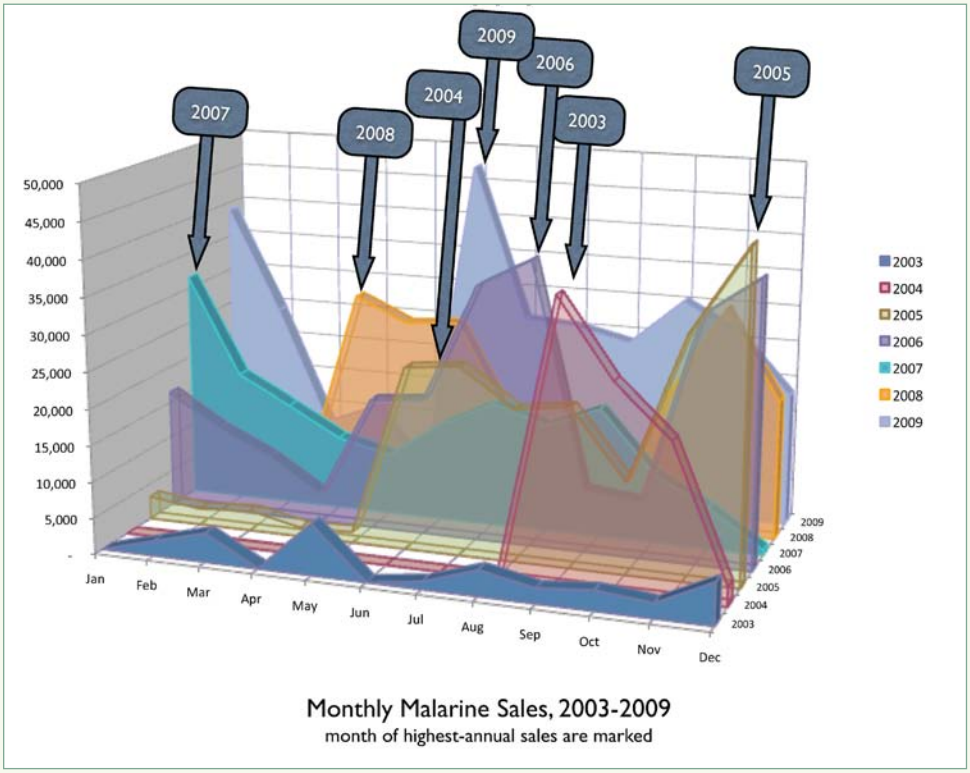
Stock outs and supply chain breaks

Stock outs of Malarine have occurred nearly every year since 2003 and remain a significant cause of concern, undermining the program's ability to assure treatment to those in need. Stock outs are also widely agreed to be responsible for the price variations noted above.

Because of PSI/Cambodia's in-house management of the in-country supply chain, there have been no reported breakdowns of supply between Phnom Penh and outlets. Breaks have all been the result of delays in the procurement of Malarine into Cambodia and affect both the public and private sector's ability to deliver.

Long procurement lead times and funding constraints have resulted in highly varied order schedules, volume, and bidding processes. Delayed or insufficient stock arrivals in country have followed. A visual demonstration of this is shown in Figure 5, below, which shows monthly sales for Malarine reported by PSI/Cambodia since 2003. Each year, the highest volume of sales varies significantly, often falling well outside of the May-to-November malaria season.

Figure 5: Evidence of Supply Variations



Monthly Malaria Sales, 2003–09 The months of highest-annual sales are marked

Quality assurance

Product quality

Quality control is managed at the point of reception of supplies in Phnom Penh, but no subsequent quality control is undertaken through the delivery chain.

Consultation/prescription quality

There are two ongoing quality concerns related to Malarine: first that the two co-packaged medicines, artesunate and mefloquine, are cut apart and sold separately, and second that Malarine is provided to patients who do not have malaria.

The first problem is believed to be significant, although the actual numbers of Malarine blisters that are divided are uncertain. The solution to this quality issue is co-formulated ACTs, expected to be introduced to Cambodia in 2011.

Through the medical detailers, higher level delivery points (clinics, doctors, pharmacies, and drug stores) are given regular training and support on prescription quality, and particularly on the need to use test kits to verify malaria prior to sale of Malarine for treatment. Ongoing mass media campaigns reinforce this message with clients, underscoring the need to test positive for malaria prior to taking medicine for it. Finally, the pricing of RDTs to retailers is very low (approximately $0.10/test). The recommended sale price is set at $0.25/test (although real prices average $0.37), which is means a provider can make a 400% profit, even if the test result is negative. This type of price structure is deliberately put in place to encourage providers to test every febrile patient that arrives at their outlet.

In 2009, the ratio of test kits sold to treatments sold was 1.4:1. However, prior to stock outs of test kits between October and December, the ratio had been close to 2:1. This is equivalent to the 2:1 ratio of tests to treatment in the government's Village Malaria Worker Project, suggesting that if the burden of malaria in the two populations is similar, testing within the PSI/Cambodia-supported private sector was probably close to current appropriate levels.[17] This cannot be said with full certainty, however, as the low price of test kits may have led to over-purchasing by retailers. If so, this would not be captured by PSI/Cambodia sales data.

Network linkages

Referring advanced or urgent malaria cases from retailers to appropriate clinical care facilities is included in the PSI/Cambodia-supported training sessions, and is encouraged in face-to-face sessions by medical detailers. This is further supported by having trainings given in conjunction with provincial medical officers, and often made easier for clinical retailers because many of them are government employees, working in private practice in the evenings and on weekends. Referrals are not tracked, however, and there is a sense that such referrals are probably rare.

[17] Note that this is a conservative comparison as VMWs work specifically in high-risk areas, while private outlets are all over the country.

4. LESSONS LEARNED

Large-scale provision and use of ACTs within the private sector is possible, and both quality of pre-testing and counseling appears achievable. However, there are some critical components which cannot be overlooked:

Supply chain management

For PSI/Cambodia, donor-related delays were the cause of all stock outs, and the effects were apparent both in the uptake of medicines, and in pricing and provider confidence. Assuring smooth supply chain functioning from manufacturer-to-port was a critical issue.

Provider training and support

Routine, concentrated, and personal interactions between detailers and retailers were critical to assuring providers promoted Malarine over other alternative medicines. The most important determinant of which medicines a patient chooses is what his/her provider recommends. Relationships with providers require ongoing one-on-one exchanges and must be sustained to assure provider confidence.

Collaboration with local government

Credibility, transparency, and support are critical to changing retailer behavior. PSI/Cambodia's collaborations with local government officers to provide trainings and engagement in broader programmatic decision-making processes were central to successful scale up of the program.

Demand creation

Especially at product launch, building awareness and demand was critical for extending the availability of Malarine beyond district towns. Previously, village-level retailers were not reached directly by PSI/Cambodia (or other intermediary) distributors; their stocking of Malarine was dependent upon both their and their clientele's awareness and demand for the medicine.

Incentivizing diagnostics

With proper one-on-one support and careful alignment of finance incentives vis à vis treatment, large-scale RDT provision in private pharmacies and drug stores is feasible.

GLOSSARY

ACT	Artemisinin combination therapy
AIDS	Acquired immunodeficiency syndrome
ASMQ	Cambodia's recommended first-line treatment for uncompromised *P. falciparum*
CNM	National Malaria Control Program, Cambodia
DALY	Disability adjusted life year
FDC	Fixed-dose combination
FOB	Free-on-board pricing that includes all costs up to the point of transport
GHG	Global Health Group
GMP	Good manufacturing practice
GDP	Gross domestic product
HIV	Human immunodeficiency virus
LLIN	Long lasting insecticide-treated mosquito net
MVU	Mobile Video Unit used for "edutainment"
PSI	Population Services International
RDT	Rapid diagnostic test
TB	Tuberculosis
USAID	United States Agency for International Development
USD	United States dollar

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