

Notes from 5-day site visit to Myanmar to learn more about PSI/Myanmar's Artemisinin Monotherapy Replacement (AMTR) project

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Site visit participants

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- Dr. Hnin Su Su Khin, Deputy Director, Malaria, PSI/Myanmar
- Ko Pyae Son Aung, Regional Manager, PSI/Myanmar
- Iain Jones, Economic Advisor, United Kingdom Department for International Development (DFID)

- Louise Mellor, Health Advisor, DFID Burma
- Nan Hom Nwet, National Project Manager, DFID Burma
- Tom Kanyok, Senior Program Officer, Bill and Melinda Gates Foundation
- Cari Tuna, President, Good Ventures
- Natalie Crispin, Research Analyst, GiveWell

In addition, we were joined by Billy Stewart, Team Leader Basic Services/Senior Health Advisor, DFID Burma for the discussion of the project on the first day, Barry Whittle, Country Director, PSI/Myanmar, for an overview of PSI/Myanmar on the first day and for one day of the site visit, and a Liaison Officer from the Ministry of Health for two of the days of the site visit.

In Yangon

PSI/Myanmar overview

PSI originally funded its work in Myanmar with unrestricted funds because it believed there was a significant need and restricted funding was not available.

PSI works through four channels in Myanmar:

1. Sun Quality Health: a franchised network of privately owned clinics in urban and peri-urban areas that provide a wide range of services, including family planning and treatment for malaria, TB, STIs, pneumonia and diarrhea. The Gates Foundation provided the initial funding to support these providers. Other funders have provided funding for specific interventions delivered through the clinics (e.g. Global Fund, President's Malaria Initiative and the 3MDG Fund).
2. Sun Primary Health: a network of community health workers in rural areas that treat uncomplicated cases (referring complicated cases to Sun Quality Health general practitioners).
3. TOP program: health and community-building centers for groups living with and at-risk for HIV/AIDS and STIs.
4. Subsidized commercial sales and distribution: medications and fast-moving goods for malaria, HIV/AIDS, and diarrhea and family planning supplies through private commercial distribution channels.

Artemisinin Monotherapy Replacement (AMTR) project

Chris White, project director, presented an overview of PSI's work on malaria and on the AMTR project specifically.

Mr. White noted that he has worked in many war and disaster zones, but that Myanmar is the most complex operational environment he has ever worked in.

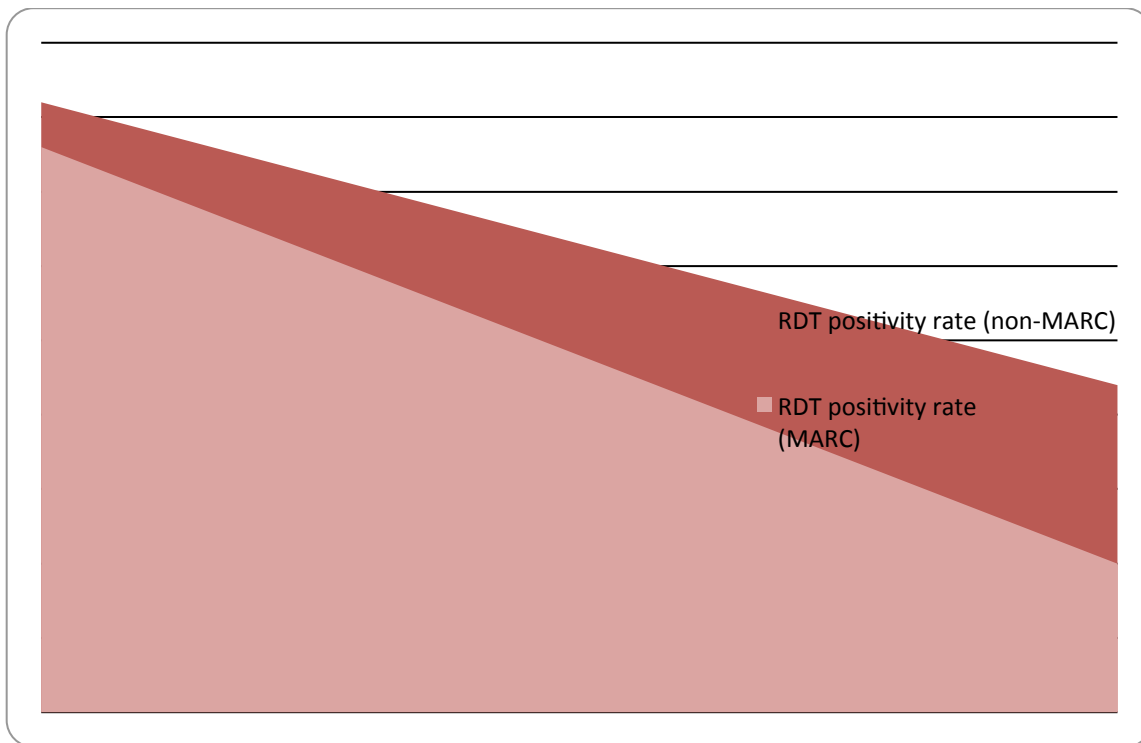
PSI sells subsidized artemisinin-combination therapies (ACTs) to AA Medical Products. AA then supplies the ACTs, branded as "Supa Arte," to the majority of the country. In areas in the eastern part of the country (prioritized for drug resistance containment), PSI also sends product promoters to drug outlets and informal providers to encourage them to use Supa Arte instead of artemisinin monotherapies. Per PSI's agreement with the government, product promoters are not allowed to provide training on diagnosis, treatment, etc. There are areas that are targeted by PSI but not directly supplied by AA (i.e. outlets in areas below the wholesale and large retailer level).

Two species of malaria predominate in Myanmar: *Plasmodium falciparum* (P.f.) and *Plasmodium vivax* (P.v.). The recommended treatment for P.f. is ACT (and single dose Primaquine). The recommended treatment for P.v. is chloroquine and primaquine, though in the private market it may be treated with chloroquine only. There is a concern that chloroquine may be overprescribed because it makes patients feel better in the short-term, even though it may not cure them. Rapid Diagnostic Tests (RDTs) distinguish between P.f. and P.v. malaria.

There is a long-standing culture of untreated, locally manufactured, bednet use in Myanmar and throughout SE Asia. In the past PSI distributed ITNs and LLINs in Myanmar but funding for this has since ended (BMGF, GFATM, and PMI) and PSI does not consider it a top priority because they may not be an effective use of limited funds. This is because (a) mosquitos have different biting and resting behaviors in the region than in sub-Saharan Africa and (b) the groups most at risk for malaria tend to be migrants workers who often work during the biting hours and sleep in non-traditional locations. LLINs should still be deployed where possible to assist with transmission reduction, but preferably as part of a suite of appropriate interventions. New tools for this epidemiological setting are currently being evaluated, such as spatial repellents (including coils) and treated clothing.

Malaria cases in the country seem to be falling quickly. RDT positivity rates at PSI's Sun Quality Health clinics for both P.f. and P.v. have declined rapidly since early 2013. Declines in transmission are particularly pronounced in the MARC priority containment area (see fig. below).

Malaria Incidence Decline in Myanmar (2011-2013)¹



PSI's household surveys for the project have been impacted by this rapid decline in transmission (and associated fever incidence). While certain questions can be asked of any household in a malarious area, others need to be addressed to households that have experienced a fever within the past two weeks (due to memory recall limitations around fever-related questions). As malaria has declined it has become increasingly difficult to find a sufficient number of households that have had fever in the past two weeks. Furthermore, only a fraction of fevers are due to malaria. As a result, data related to those deemed to have had a malaria-specific fever is derived from very small sample sizes and should be interpreted with caution. PSI is now considering a number of additional methods to complement the HH surveys, such as exit interviews.

PSI's subsidy of ACT is about 85% of the cost.

The AMTR project has been given a "no-cost extension" by the Gates Foundation, DFID and Good Ventures. This means that it will continue for an additional 18 months (to early 2016, instead of ending in September 2014) with the funding it previously received for the project. It has spent less than expected to date, partly because of a delay to the start of the project, but primarily due to faster than anticipated declines in transmission and a subsequent drop in supplier and consumer demand for ACT (which is the projects main cost driver).

¹ Source: PSI SUN Franchise

PSI supplied ACTs to one company initially – Supa Arte to AA. But, it is now also supplying a second company, Polygold, to distribute a second brand of ACTs, Artel+. PSI has been working to promote a national, MOH-owned, "quality seal," for quality-assured ACTs in the market. It has recently shifted its promotional campaigns from promoting the Supa Arte brand specifically to promoting the nationally endorsed quality seal. PSI notes that the quality seal will likely be faked before long, so it is seen as a time-limited intervention, for accelerating displacement of oAMT from the market.

Some members of the government have expressed concern that PSI's work may legitimize informal (and supposedly unqualified and unskilled) providers. PSI notes that some of these providers used to be government or NGO employees (and in some cases split time between public and private practice). In addition, other members of the MOH are supportive of the intervention and fully endorse PSI's strategic role as articulated in the MARC Strategic Planning documents.

The DFID competition assessment team concluded that there is no current risk of monopoly power in the market because PSI is open to working with other companies and because PSI determines the price structure (including initial selling price to the distributors). PSI is now working with a second distributor to extend its coverage of the national market and help change the perception that the quality seal is specific to PSI and Supa Arte.

The benefits of RDT use:

1. Reduce drug wastage (but may not reduce overall costs due to costs of the tests and required supervision and demand creation communications).
2. Better patient outcomes by allowing providers to more accurately diagnose so they do not treat non-malaria cases with malaria drugs.
3. Reduce development of resistance to drug that is used in combination with artemisinin.

The Gates Foundation is focusing its investments on malaria elimination and 'accelerating to zero' the number of cases currently reported (whilst developing innovative tools for eventual eradication). Achieving regional and sub-national Pf elimination in the Greater Mekong (one of the Gates Foundation's three priority geographic areas) will require finding, testing, treating and tracking both symptomatic and asymptomatic cases (including deploying single dose primaquine to reduce Pf transmission). WHO has also recently started talking about treating asymptomatic cases (in recognition of their probable role as infection reservoirs). Mr. Kanyok notes that the only way to eliminate P.f. drug resistance is to eliminate P.f. entirely within the Greater Mekong. Mr. Kanyok asked PSI about collecting blood samples along with RDTs as part of the project to assess the prevalence of asymptomatic malaria. PSI said that once it scaled up the RDT project, it did not expect to be able to collect used tests from the entire operational area (but some sampling may be possible). PSI is also in talks with the University of Maryland

about a possible collaboration to collect large volume blood samples as part of the effort to better map and respond to Pf drug resistance.

PSI has submitted a proposal to the Global Fund (NFM) to continue the AMTR project for an additional six months in 2016 (with a specific focus on improving case management and RDT use among private providers). The exact nature of the proposed support would be ascertained in 2015 as more trend data emerges (e.g. fourth round of Outlet Survey, SUN Franchise caseload data etc).

Globally PSI is the largest distributor of LLINs. It distributed about 50% of all LLINs delivered in sub-Saharan Africa in 2011.

About malaria control in Myanmar

Bednet coverage in the region is high due to a culture of net use, but most nets are untreated. Some people have complained that LLINs do not come in the softness, shape, size, or color that they like. Retreatment kits for existing nets used to be available in the country, but manufacturers have reduced production because of the scale up of LLINs and reduced demand for retreatment kits. There is little indoor residual spraying (IRS) used in the country because of local mosquito resting behavior.

It's not entirely clear why drug resistance has repeatedly arisen in the Mekong region. There is more genetic diversity among Pf malaria parasites in a small region of Cambodia than in the rest of the world combined, and there is likely a link between this diversity and resistance. That diversity may have arisen from early, intensive treatment of malaria, but that link is speculation.

PSI warehouse

PSI receives and stores a variety of health products for repackaging/rebranding at its central warehouse in Yangon before being distributed around the country. The warehouse supplies the Sun Network, and, for ACT, drug outlets throughout the country through AA Medical and PolyGold. Products we saw included condoms, oral rehydration salts (ORS) packets, tuberculosis (TB) medications, water purifiers, and ACT.

On the top floor of the warehouse, 88 packers repackage ACT blisters into Supa Arte packaging. The tertiary packaging is designed to make blister cutting (and thus sale of partial doses) more difficult by gluing the blister into a cardboard package. They work 8 hours a day, 5 days a week. When we visited they were packaging ORS — combining it with zinc tablets and instructions that included pictures.

Condoms are sold for a subsidized price to the general public or given for free to sex workers. No products are sold to government clinics.

Field visit

The area we visited is both directly supplied by AA (at wholesale and large retail level) and targeted by PSI for visits by product promoters (at lower levels of the supply chain). It was in Mon State, a few hours drive southeast of Yangon. We spent three days there. The area was very poor by developed world standards and somewhat above average for Myanmar. Homes had access to electricity and we saw many roads being paved. The poorest areas in Myanmar tend to be the mountainous regions. Our visit was during the dry season when malaria rates are low.

We were taken around by a PSI product promoter and his supervisor. They went ahead of us on motorcycle. The product promoter said his main job is to encourage use of combination therapy over monotherapy and to teach people how to use the drugs. He is responsible for visiting 100-120 outlets and visits 5-6 per day and about 80 per month. He visits the closer ones more frequently than others. This is his first job after graduating. He plans to open a general store in the future.

Throughout our trip, we saw a large number of Supa Arte posters and other promotional materials. The outlets we visited often devoted a large portion of their advertising space to the posters and there were additional posters on trees on the side of the road.

Unless otherwise stated, statements below are based on what interviewees told us. So, for example, "Supa Arte was the only antimalarial in stock" is based on a drug provider's answer to our questions rather than a search of the shop. We did look for visible evidence that other drugs were in stock, but did not look for drugs kept out of sight.

Drug outlet 1

This outlet was on a dirt road just a few hundred yards off the main paved road. Supa Arte was available and an adult course cost 400 kyat (the cost previously of a partial course of oAMT). The shop owner buys it at a drug store in the closest town for 350 kyat. She said she knew when the drugs would expire and would throw them away after that. She sells a maximum of 10 Supa Arte packs in a month in the rainy season. She sold two that morning to people who had recently returned from working in the forest. She did not have other antimalarials on display and said she carried only Supa Arte. Customers have not asked to buy partial courses of ACT because of the low price of a full course. She believes her customers finish the full course.

Other services she provides include blood sugar testing, checking temperature, and checking blood pressure. She stocked antibiotics, deworming drugs (albendazole for 100 kyat), and many other medicines. She doesn't provide injections. She would be interested in doing RDTs if provided training. When someone has a fever, she

prescribes antibiotics. She only gives an antimalarial if the customer asks for it. If a customer had a negative RDT, she would refer but not provide antimalarials.

Common illnesses in the area include diarrhea, malaria, and flu.

She is visited by the PSI product promoter 1-2 times per month.

She did a four week pharmacy training course in Yangon with a private company in 2004. Her shop is associated with a Muslim charity. It had a sign with a phone number to call for free referral service to the hospital.

Drug outlet 2

She had Supa Arte available and said it was the only antimalarial she sold. We did not see any other antimalarials. She pays 300 kyat for an adult course of Supa Arte and sells it for 400. She gets the drugs from a wholesaler. She has been selling it for over a year. Some fever patients ask for Supa Arte by name, others ask for an AMT brand and others ask her to diagnose them. She prefers Supa Arte to the AMTs because it is effective and affordable. Customers can only afford two tablets of AMT and she knows they should be taking a full course. She tells customers to finish the full course of Supa Arte and believes they do finish it. She diagnoses malaria by fever headache and whether the person has recently returned from working in the forest.

She doesn't use RDTs but would be interested in using them because it would make customers trust her more. She isn't sure if customers would pay for tests, but they might pay if it were less than 200 kyat. If a customer had a fever and a negative malaria test, she would prescribe antibiotics.

She does receive visits from the product promoter. He gave her promotional materials.

Common illnesses in the area include muscle aches and flu. People in the area can get health services or drugs from three drug shops, a midwife, a public clinic that is open two hours in the afternoon, and a general practitioner.

She had deworming medications in stock.

Like the previous pharmacist, she took a four week private pharmacy course in Yangon. It cost 60,000 kyat (about \$60).

Informal provider 1

We met with him in his home in a village. He seemed relatively well off for the area - he had a TV and laptop. This provider serves patients in three villages, totaling about 1000 households. He has been working as a health provider for ten years. He

got into this work because his relatives were sick and he wanted to help them, so he took a four-week training course in Yangon.

He believes malaria is declining in the area. Five years ago he would see 20-50 cases per rainy season and now he sees 3-4. The remaining cases are generally among people coming back from working in the forest, mostly adults. He has been using Supa Arte for eight months and has used it seven or eight times. He hasn't used an AMT since he started using Supa Arte. He likes it because it is effective and cheaper than monotherapies. He has always given the full course of both AMT and Supa Arte. When asked what the full course involves, he answered with the correct number of pills. He had one of each dose size in stock. He doesn't keep more stock because he can quickly restock from a nearby pharmacy. He pays 350 for the adult course and sells it for 500. When asked why patients don't go directly to the drug shop, he replied that it was because they didn't know they had malaria.

He does not use RDTs because he doesn't have training on how to use them. He once bought one to try it. He would be willing to buy RDTs for 300 kyat and would charge patients 500 kyat.

The PSI product promoter visits him about once per month and provided him with Supa Arte promotional materials.

Other medicines he had included vitamins, digestive aids, and treatment for hypertension. He provides injections. He has about 5 patients per day and is available at all times of day. He does follow up visits to patients. Common illnesses among his patients include common cold, cough, general weakness, and hypertension. On average he charges 1000 kyat for a consultation plus the cost of drugs.

Drug outlet 3

We made an unscheduled visit to a pharmacy down the road from the informal provider.

Supa Arte was the only anti malarial in stock. The prices for the four dose sizes, from smallest to largest were 300, 300, 400, and 450 (adult course). The pharmacist had bought them each for 50 kyat less than he was selling them for. He started selling them two months ago. He sells about 10 adult courses per month.

Discussion of expiration dates

DFID noted that all package of Supa Arte that we had seen so far were expiring in April 2014, just two months after our visit. PSI is aware of this issue and is currently deciding when to replace expiring stocks at AA's central warehouse and with drug

sellers. AA will do some of the work of replacing drugs at the outlet level, while PSI product promoters may do some replacing in areas the AA does not supply directly.

The drugs expiring in April were part of the initial order PSI placed at the beginning of the project in 2011, before it was able to more accurately predict demand. In addition, malaria rates have declined rapidly since the start of the project.

PSI had previously mentioned this issue to DFID Burma in a monthly check in meeting. Other visitors on the trip had not been aware of it.

Drug outlet 4

This was an unscheduled stop.

The shop owner told us that fever is the most common illness and that she usually prescribes paracetamol for this. She might consider giving a customer an antimalarial instead if they had recently visited the mountains. The only anti malarial she stocks is Supa Arte. She was out of stock of Supa Arte at the time of our visit. She ran out the day before and planned to restock that day. She doesn't stock other antimalarials because there is no demand for them. Her supplier no longer carries AMTs.

She sold about ten Supa Arte packs in the past two months. She started selling it about a year ago. Customers say they like it. She pays 300 kyat for an adult dose and sells it for 400.

She is visited by the product promoter about once every two months.

She did a four week training course in Yangon and then worked in a private hospital for a year. She does not use RDTs but said she would be interested if she received training.

Informal provider 2

He was returning from a visit to a patient and showed us what he carries in his medicine bag. There were many injectable medicines and he said this was because patients often are not happy until they receive an injection. He reported using a different needle for each injection. He had a record book of all of his consultations. He follows up with patients every day of their drug course and makes sure they finish the course. He generally charges about 2,000 kyat for a consultation, including drugs.

The most common illnesses he sees are common cold and general weakness. He sees less and less malaria. He uses Supa Arte now for malaria. He used to use two brands of AMT and quinine and stopped using them about 1.5-2 years ago, when he started

using Supa Arte, which he found to be more effective. He is very happy with Supa Arte. He started using it before the first visit from the product promoter because he was encouraged to try it by his drug supplier. He wasn't sure whether the supplier still carried other antimalarials because he only asks for Supa Arte.

Informal provider 3

This was a general retail store that sold a wide variety of items and had a one-room clinic in the back. The family that owns the shop appeared relatively prosperous. They gave us gifts of straw hats and purses at the end of our visit.

The clinic has been open for four years and serves seven villages. The young man who ran the clinic received a degree in zoology and then did a four-week pharmacy course in Yangon. He returned to his hometown to be with his family. He chose not to work for the public sector because he did not want to be sent to another part of the country.

The drugs he most commonly prescribes are for flu, malaria, stomach ache, pain, hepatitis, and skin problems. In the dry season, he sees about 4-5 cases of malaria per month and about 50 per month in the wet season.

He has used Supa Arte for about 1.5 years. He buys it for 270 kyat and sells it for 500. Previously he felt he needed to give malaria patients both tablets and an injection of antimalarial drugs. With Supa Arte he is able to treat patients much more cheaply. He had seen an ad about the quality seal and his drug supplier had told him about the benefits of ACTs, including that they are more effective because they are a combination of two drugs, are cheaper than AMTs, and do not cause resistance. He did not believe that AMTs were available anywhere anymore and he had heard a rumor while visiting the wholesale drug market in Yangon that if someone stocked them they could get in trouble with the police. His patients are happy with Supa Arte. They ask for it because they have seen ads for it. He does not follow up with patients because he does not believe it is necessary to do so.

We quizzed him on the purpose of an anti-seizure medication and he answered correctly.

Drug outlet 5

This was a supply point for many local vendors in a busy town. It does not serve patients directly so it is not visited by PSI's product promoters. It is supplied directly from AA. There were no Supa Arte promotional materials on display.

The shop owner said that many customers ask for Supa Arte. She buys an adult course for 220 (a bulk discount) and sells it for 250 kyat. She does not stock other antimalarials. She told us that chloroquine and primaquine are very difficult to find

in the private market and demand for them is very low. The doctor who works in the clinic attached to the drug shop has these drugs and receives them from the Myanmar Medical Association. He has ACTs but they are not branded as Supa Arte. He uses RDTs.

She last saw AMT tablets 1.5-2 years ago.

She did a similar four-week private training program as many of the drug sellers we had previously spoken to. She isn't interested in using RDTs because she is busy and if the test was negative, customers would just go buy antimalarials at a different outlet.

Drug outlet 6

This outlet is directly supplied by AA and is not visited by a PSI product promoter.

He had multiple boxes of Supa Arte. He did not have other antimalarials. His shop has only been open for about a year and he has never stocked other antimalarials. There is no demand for chloroquine. He sells Supa Arte for 100, 150, 250, and 300 kyat respectively for the four dose sizes. He bought them for 70, 144, 197, and 249 respectively from AA. He showed us his invoice from AA. In the rainy season he sells 100-200 malaria treatments per month to about 15 health providers.

He had boxes of RDTs which he sells to health providers. He does not perform them himself but would be interested in doing so if he received training. He bought them in a township that is part of PSI's RDT pilot project. Last month he sold about 100 RDTs. He started selling them in May because his customers were asking for them.

His wife has received pharmacy training.

Drug outlet 7

This outlet mostly sold drugs but also sold some other general items. It was in the same town as the previous outlet. The town serves about 150 villages. This outlet is a supply point for village outlets and providers.

The shop owner's most popular items are multivitamins. For antimalarials, he sells Supa Arte and chloroquine. A year ago, most customers asked for an AMT brand. Now most ask for ACT. He believes Supa Arte is more effective and a second generation drug, but he has heard people worry that it's less effective because it's much cheaper. He sells an adult course of Supa Arte for 250 kyat.

He didn't know what the Pandomar quality seal meant.

Seven or eight years ago malaria was probably ten times as common as it is now.

Drug outlet 8

This outlet was two shops down from the previous one we visited.

Supa Arte was the only antimalarial in stock. He sells the adult course for 250 kyat and received much of his stock for free as a promotion when he bought amoxicillin. We saw about 100 adult courses and 30 courses of each of the other three doses. They expire in April and he plans to throw them away after that.

He hasn't stocked chloroquine or primaquine for five years. He used to stock AMT brands, but hasn't stocked the Polygold brand in five months or the AA brand in about a year. There is low and declining demand for antimalarials.

He is not interested in doing RDTs because he is too busy.

Informal provider 4

This provider was not home. He had been in Yangon for a week. His family told us that he had previously worked for the government as a community health worker and now was a private provider.

Informal provider 5

This provider appeared relatively wealthy. He lived in a concrete house with multiple rooms and owned a TV and a motorbike. He was an army medic for 15 years and has been an informal provider for 30 years. He serves four or five villages. He sees three or four patients per day on average, primarily with flu, common cold, cough, and in the rainy season, malaria. He sees about 16 cases of malaria during the four to five month rainy season. Most of these patients are people who live in villages near the forest. Many of his patients are too poor to pay him, so he provides services for free and his wife supports the family.

He uses Supa Arte because it is effective and cheap. He learned about the benefits of ACTs from the product promoter. He has seen that patients that use it are cured. He follows up with his patients. He doesn't use any other antimalarials. He used to use AMT tablets. He buys Supa Arte in the nearest town for 250 kyat and sells it for 500 kyat.

When he was in the army he used to provide soldiers with prophylaxis each week (chloroquine and another drug). His current patients don't ask for preventative treatment because they know that they can get curative treatment after getting sick. He doesn't believe that patients see malaria as a serious illness because they have been living with it for many years. He would be interested in treating patients preventatively if such treatment was available.

He believes that malaria has declined by about 50% in the last few years. He attributes the decline to more effective treatment. He doesn't believe that LLINs have caused the decline because many people don't like sleeping under them.

He would be interested in using RDTs.

RDT supply point in Belin

This was a general retail shop. It was one of the supply points responsible for collecting used RDTs for PSI's RDT pilot project. He didn't remember what percentage of RDTs sold are returned.

Shops and providers that purchase RDTs are generally those located in villages, in the mountains, or near a gold mine. Prior to the pilot project, he had heard of RDTs but didn't stock them because demand was low. During the pilot project they were cheap and customers were asking about them because they heard about them from PSI. In the private market RDTs cost 1,500 kyat but he was able to buy them from the PSI product promoter for 100 and sold them for 150.

He had Supa Arte and chloroquine in stock. He hasn't been able to buy AMTs in over a year. He has heard they were banned. Army medics like to buy chloroquine and they use it to prevent malaria. In the low transmission season, he sells about 30 antimalarials per month. In the high season, he sells 30 every two to three days. He thought that sales of antimalarials had gone up since the start of the RDT pilot but believes that this was probably unrelated to the project. He buys an adult course of Supa Arte for about 350 from an AA salesman who visits two times per month and sells it for 500. He wasn't able to show us the AA invoice.

Drug outlet 9

Customers of this outlet are largely informal providers. It does not sell to individual patients.

This outlet had Supa Arte, injectable AMT (which is recommended for severe malaria), and chloroquine. Supa Arte is the most popular. They buy it for 240 for an adult course and sell it for 300.

RDTs were also on sale. They get them from PSI for 100 kyat and sell them for 200 kyat. Before PSI supplied them, they used to buy them for 1250 kyat and sell them for 1400. They sell about 300 per month and the quantity varies with the number of migrant workers. Sales of Supa Arte have gone down by about 30% since the RDT project started.

Drug outlet 10

This was an unscheduled stop. The shop was located a few minutes drive outside of a town. It was a general retailer that opened three years ago.

We saw Supa Arte and RDTs. She started selling Supa Arte about a year ago when a product promoter came and asked her if she was interested. Before Supa Arte, she did not stock antimalarials. It is largely workers from rubber plantations that have malaria. Before using RDTs, she sold five or six packs of Supa Arte. Since then, she has not sold any.

She had done three RDTs so far. All were negative and she gave the customers paracetamol. She buys RDTs for 200 kyat and sells them for 300. Before using RDTs she had never worked with blood before.

We asked her to perform an RDT on a member of our group. She did this well, without instructions. She put on gloves, drew blood, collected a few drops and put them in the test, applied buffer solution, set a timer for 20 minutes, put the waste in an (overflowing) biological waste bin, recorded the "patient's" details on the back of the test and in a record book, and placed it in a bag with the other completed tests, which she can exchange for new tests once she has done five. She may have been confused about the amount of time she was supposed to wait before reading the test. She seemed to say that she needed to wait 20 minutes. The English instructions in the package said 'wait no longer than 20 minutes.'

Patients were happy to pay for the test and accepted the diagnosis.

Informal provider 6

This provider was located in a village and lived on a dirt road. Local industries are farming and rubber plantations. He was a military medic for 30 years and retired in 2011.

The most common health conditions he sees are common cold, digestion problems, diarrhea, flu and accidents, which are increasingly common and which he refers to the hospital. He sees 4-6 patients per day.

Malaria has declined by about 30%, due to LLINs. It is more common in the rainy season than in the dry season. He administers RDTs to suspected malaria cases. He learned how to use them in the army and then started using them privately when the PSI project started. He doesn't have records of past RDTs, but he believes he's done about 200 tests, of which 8 were positive, 4 with P.f. (treated with Supa Arte) and 4 with P.v. (treated with chloroquine, did not use primaquine). For the cases that were negative, he treated with paracetamol. No patients disputed his diagnosis. He had 6 used RDTs at the time of our visit. Four had notes on them. He had returned previous tests.

Testing has not decreased demand for his services but it has decreased the number of ACTs he has prescribed. He prefers ACTs to AMTs because two drugs lead to lower relapse rates. He believes the price of Supa Arte could increase without a reduction in demand because once patients use it once they will realize that it is a good drug.

People cut AMT blisters because it wasn't clear what the prescription should be. It is clear for Supa Arte so blister cutting is unlikely.

He charges about 1,500 per consultation, including drugs, or up to 2,000 if the drug is more expensive. He does not charge extra for testing. If the cost of tests increased, he would probably reduce his consultation fee to allow patients to afford it.

He is planning a trip to an area he suspects has not been reached with LLINs to test people for malaria and give treatment to positive cases. He expects to find a 50% positivity rate.

Rubber plantation

We met with the management of a rubber plantation.

The plantation employs 100 supervisors and 500 laborers. About a third are from local communities, while the remainder are migrants from other areas who return to their homes for a few months each year. The tapping season is from September to July so these migrants are returning during the period of peak malaria transmission.

The plantation employs a health provider to serve its staff. The most common conditions he treats are flu, common cold, and injuries. Malaria has declined in recent years. Someone came to test the workers for malaria recently and found a 4% positivity rate. It used to be 10%. About 10% of newly arriving workers have malaria.

Tapping is done between one and five AM. Workers are given mosquito repellent, but management doesn't know if they use it. They are also given mosquito nets, and they may use these while resting in the evening. The plantation is supplied with these materials by the International Organization for Migration (IOM), and management told us they would be willing to purchase them if IOM stopped providing them. Workers don't use mosquito coils.

Management would be interested in giving workers preventative treatment, but would want to have a dedicated provider for it, because the medic wouldn't have enough time.

Sun Quality Health clinic

This clinic was located in Myanmar's third largest city. It consisted of a small room with shelves of drugs, a desk, and one examination table. The provider was an existing general practitioner who received additional training from PSI. A PSI representative visits her each month to check quality, deliver supplies and/or provide informal education. She receives supplies from PSI and reports to PSI on the services she provides each month. She let us look at her record book. She doesn't find the reporting burdensome, but noted that some SUN providers find reporting on TB and STIs burdensome. Reporting for malaria includes the number of RDTs given, the number with positive tests, what treatment was given, and whether treatment was given within 24 hours of symptom onset.

She is involved in three PSI programs: malaria, family planning and pneumonia. She does not provide TB or STI services because there is low demand for these services. Her supplies included ORS, contraceptives, including emergency contraceptives, RDTs, and treatment for both P.f. and P.v. malaria (the P.y. malaria treatment pack has both chloroquine and primaquine with instructions).

She tests all cases of fever for malaria among patients who have recently spent time in the forest.

She has been a member of the Sun network for 10 years. The main benefit of membership is more effective and cheaper drugs, which has led to more clients. Her main complaint is that she sometimes runs out of stock before she receives more from PSI.

There were no patients waiting at the time of our visit. She told us that because she is open all day, she is often not busy.

AA field office

This office was one level down the supply chain from AA's central warehouse in Yangon. It covers 10 townships and mainly serves urban areas directly. It has a sales team that visits each township twice per month to take orders from a total of 350 outlets and a promotion team that visits providers directly but doesn't sell products. The office employs 17 people and has one sales van and several motorbikes.

The office orders drugs from the central warehouse once a month by a contracted delivery service. The field office delivers orders to outlets within a few hours for local outlets and the next day for further outlets by public transit.

In the rainy season, this office sells 15,000-20,000 packs of Supa Arte per month, and about 5,000 per month in the dry season. The manager showed us the price sheet. The wholesale prices (more than 20 in an order) were 70, 134, 197, and 249 kyat for the four dose sizes. The retail prices were 100, 150, 250, and 300.

AA believes that outlets will sell their stock of Supa Arte that expire in April in time because they have been keeping stocks low due to the expiration date issue. AA has been encouraging outlets to keep their stocks low. Urban outlets rarely have stockouts because they are able to access new stocks very quickly (within a few hours). AA may be able to move some stocks around to areas with higher sales volumes to minimize the number of expired drugs.

They have not seen AMT tablets on the market in the past 8 or 9 months. They thought that the price of an adult course of Supa Arte could be increased to 500 without a significant reduction in demand because the competing drugs are 1,500-2,000. Customers were confused by the very low price when they started selling Supa Arte.

Urban retail shop

This shop is directly supplied by AA. In addition to drug and traditional remedies, it sold clothing and shoes.

They started selling Supa Arte two weeks ago, and were paid 20,000 kyat to display Supa Arte promotional materials. They haven't yet paid for their supplies of Supa Arte, but will pay soon. They have sold three adult courses so far, directly to patients. They weren't aware that adult courses sell more quickly than other doses when they bought the drugs so they may have over stocked for the other doses. They weren't aware that the drugs are expiring in March.

They don't perform RDTs but would be interested in doing so.

Wholesale drug market

We visited two wholesale drug outlets in this market. The first was scheduled and the second we stopped at on our way out.

At first they told us that it had been 8-9 months since they had AMT tablets. They don't have them because they are hard to find, more expensive, banned, and customers are fine with Supa Arte. They sell 200-300 courses of Supa Arte per month in the dry season and 2-3 times that in the rainy season. They sell the adult course for 300 kyat.

However, DFID noticed that they did in fact have a non-injectable AMT on their shelves. It was the type sold by Polygold. They told us they sell it for 2,000 kyat per course. They asked if they were going to be in trouble for having this.

At the second wholesaler, we asked about antimalarials and they showed us Supa Arte. We asked if they had any others and they said no. We were unable to find

others on their shelves, but they had hundreds of medicines, so we may have missed them.

Conversation with Regional Malaria Officer

PSI told us that this government official has been very supportive of the AMT replacement program. He told us that he thinks it is a good program, but that junior malariologists that work under him are concerned about the project because they believe that supplying antimalarials through the private sector could lead to overuse and more drug resistance. He advised PSI to scale up RDT use quickly in order to allay their fears.

He started a monthly meeting to coordinate NGO malaria activities in the region. It is a model that other regions are now interested in. IOM has been running a community health worker program with 3MDG funding, which is ending soon. He has been working to coordinate who will take over this work.

He has seen a large decline in malaria cases in recent years. Some areas are now being targeted for elimination. A team recently visited an area where they found zero cases of malaria through RDT and microscopy testing. He believes elimination is possible in the country by 2025-2030.

He has been seeing less AMT in the market, but believes it still exists. Use of AMT may differ by ethnic group and region. Artemether, an AMT, is produced in China and has Mandarin instructions so may still be favored by Mandarin-speaking groups. PSI has done more intensive work in Mon state than in some other regions.

Site visit review with PSI and DFID

DFID provided the following feedback to PSI:

- Overall, DFID's review was positive
- The RDT pilot seems to have gone well
- The logistics of the trip were very well organized
- It was useful to have multiple partners on the trip
- DFID doesn't see barriers to approving the 18 month no-cost extension but will need official approval to do so
- It would be good to have more communication among donor partners and with PSI
- It is unlikely that it will be possible to raise the price of ACT during the course of the project, including the no-cost extension (PSI agrees), but DFID would like to see PSI do feasibility studies of reducing the subsidy over the longer term
- DFID would like to track a few value-for-money indicators, in addition to the log frame indicators (a set of metrics DFID is tracking throughout the

- project), to use to demonstrate the value of the project to the British government and public
- DFID would like more information on how PSI will procure drugs for the period of the no-cost extension. PSI's procurement contract runs out at the end of 2014
 - In the future, it would be good to make sure all partners are aware of issues like the drug expiration issue and give them information on the severity of the issue and how PSI is managing it
 - On the expiration issue, DFID would like PSI to prepare a note on the costs and benefits of replacing the drugs soon and to update that note over the next few months. Any information on how and when replaced drugs will filter down to the end of the supply chain would be appreciated. PSI noted that its product promoters will be able to switch out drugs at the end of the supply chain relatively quickly.
 - DFID suggested that perhaps the expiration date should be printed on the packaging in Myanmar as well as English
 - All partners should make sure to show appreciation to AA. The donors will send a letter of appreciation.
 - DFID will work to improve communications with the FDA and to engage the global community on the issue of why AMT is still being produced in Vietnam and elsewhere
 - DFID asked about the timeline for replacing the household survey with exit interviews and follow-ups. PSI said this would be possible for this year's survey in August-September.
 - The impact weighting in the log frame should be edited to emphasize results of the Outlet Survey rather than Household Survey (i.e. availability, price and relative market share of ACT relative to oral artemisinin monotherapies).
 - DFID suggested that PSI might explore using local languages for Supa Arte packages that are used by ethnic minorities
 - It is difficult to know whether conflict areas are being served by the program. PSI intends the surveys to be nationally representative, but it isn't always able to survey certain areas.
 - It would have been interesting to have an opportunity to talk to patients

We asked PSI how the level of donor monitoring for this project compares to a typical project. Chris White said this project has received more donor monitoring than any other he has worked on. DFID noted that the annual review process is typical for a project of its size, but that the project has also been involved in unrelated evaluation processes such as an overall evaluation of DFID's work. In addition, PSI has monthly meetings with DFID (which PSI believes could be reduced to once every two months), had a competition assessment completed by DFID, and there is an ongoing independent evaluation of the project. DFID sees the project as particularly important and high risk. Myanmar is a priority country for DFID.

Data from the next outlet survey will be available by November and presented at the ASTMH conference in the USA

We asked DFID what they see as the value of site visits. They noted that the observations are anecdotal, but that they provide a reality check on your assumptions, raise potential problems, and allow for relationship building and evaluation of project management. DFID feels it is important to combine site visits with desk reviews for its review processes.