

# Containment

The Quarterly Newsletter of the Containment of Artemisinin-Tolerant Malaria Parasites in South-East Asia Project



## Community Malaria Workers Use SMS to Report in Real-Time

**Moeun Chhean Nariddh** reports on a mobile phone-based frontline reporting system for detected malaria cases, implemented in Kampot province.

From her house in Snay Anchit Village, about five kilometers from the health center in Kampot province's Chum Kiri district, 20-year-old village malaria worker Kong Lida can clearly hear the noise of a generator roaring in the distance. This generator is an important source of power where Lida and other villagers have their car batteries charged everyday so that their houses can be lit up at night from electric lamps and at the same time charge up their mobile phones.

But soon Lida and other village malaria workers in her village and other communes will not need to pay the generator owner to have their car batteries charged anymore. Now, all these VMWs will get their power from a ubiquitous source of energy – namely solar power.

As part of the country's malaria elimination strategy, the National Center for Parasitology, Entomology and Malaria Control or CNM, with technical support from Malaria Consortium (MC) and WHO, has launched a pilot program to train VMWs in Kampot, Siem Reap and Kampong Cham provinces on how to send simple mobile phone text messages (SMS) to report in real



Photo: WHO / Moeun Chhean Nariddh  
Malaria Consortium's Ngor Pengby demonstrating how to charge a mobile phone using a solar panel. This project is in collaboration with Mobitel.

time on detected malaria cases. These SMS messages also support the paper reporting that feeds into the health information system from the health centers.

CNM and MC also provide each of the VMWs with a solar panel

and a lamp together with a mobile phone and a charger since there is no electricity in their villages.

Cambodia is currently seeing a revolution in communications with the roll-out of affordable wireless

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# Dr. Char Meng Chuor: 'We Need Community Support to Eliminate Malaria'

CONTAINMENT recently spoke to **Dr. Char Meng Chuor** the new Director of the National Center for Parasitology, Entomology and Malaria Control (CNM).

**One big concern is malaria on the move. How important is the role of village malaria workers or VMWs in the early diagnosis and treatment of mobile migrant workers?**

Yes, indeed, malaria on the move among mobile migrant workers is worrying. But first let me clarify one thing on terminology. I like to refer to the village malaria workers as community health workers because they can also work on other diseases at the community-level. At present in each health center there are only seven to eight full-time health staff as first-line health workers. And as you know most of the villages are far from the health centers. So we need these community health workers to support the work of the health centers.

When Khmer people fall sick, they tend to seek treatment from the nearest source available to them. And most often, these community health workers are nearest to them. For that reason they are so important in the fight to contain multi-drug resistant malaria. These community health workers not only carry out early diagnosis and treatment, but they also provide vital information to the mobile migrant workers on how they can protect themselves against malaria.

**Counterfeit and substandard anti-malarials are one of the causes for the emergence of MDR-falciparum malaria. What are the efforts to eliminate these counterfeit and substandard drugs sold by the private sector and also enforce the ban on oral artemisinin monotherapy?**

First of all, we have to ensure that communities must have access to genuine medicines. This



Photo: WHO / Sonny Krishnan

Dr. Char Meng Chuor.

Dr. Char Meng Chuor was appointed Director of the National Centre for Parasitology, Entomology and Malaria Control (CNM), with the retirement of H.E. Dr. Doung Socheat, on 6 May 2011.

Prior to this appointment, Dr. Char Meng Chuor had served as Deputy Director General, Directorate General of Health, in the Ministry of Health where he was in charge of planning, implementing and managing projects financed by multi-donors and partners including the Health Sector Support Project.

Dr. Char Meng Chuor holds a Masters in Public Health from Boston University.

is essential. We can ban oral monotherapies, but if sick people do not know where to get effective anti-malarials, we will go back to square one. Secondly I need to emphasize the importance of law enforcement.

The elimination of malaria by 2025 is a government priority and so it's important that legislation is in place for the law enforcers to start the crackdown of counterfeit malaria medicines.

But let us not forget that we have to also work with the private sector through partnerships. We are now drafting the strategy for the public-private mix, in terms of malaria. We're still in the learning process, when it comes to dealing with the private sector. But there's a lot of donor goodwill to provide technical assistance. The chink in the armour is the private sector because most Khmers when they fall sick go to the pharmacies or drug stores

first. We have to convince the private sector on why they need to be good and responsible providers to prevent a public health emergency that could cross borders.

**What are the lessons learnt from the Containment Project, and how can these lessons be used as we move from malaria control to elimination?**

CNM has been implementing the containment project since January 2009, and we have many lessons to share. The first and most important lesson is that it is possible to reduce malaria incidence in the target zones through good management and implementation of proven strategies in malaria control, such as high-level coverage of long-lasting insecticide treated bed nets, provision of free diagnosis and treatment at the community level, and engagement of the community through malaria education and awareness programs. CNM, through the support of the Bill & Melinda Gates Foundation and the assistance of technical partners such as WHO, Institute Pasteur and Malaria Consortium, and others, has helped us achieve this.

We have also found that, when malaria cases begin to decrease, the role of systematic gathering of health information, including malaria surveillance and response becomes very important. As malaria cases decrease in Cambodia and we are on our path towards elimination, we need to strengthen surveillance systems to capture information on cases up to the village level.

Another lesson learned is the need to engage and work closely with the private sector in order to be informed of those malaria cases treated by the private sector, in pharmacies and private clinics, and to provide incentives to the private sector to help in the fight against the sale and manufacture of artemisinin monotherapies, as well as fake and substandard drugs.

# Customs Department Backs Malaria Elimination Plan with Zero Tolerance for Counterfeits

**Em Khin Vorac**, Deputy Director General, Department of Customs and Excise of the Government of Cambodia, speaks to CONTAINMENT's **Moeun Chhean Nariddh** in Phnom Penh.

## How is the Department of Customs and Excise involved in the fight against counterfeit products and medicines?

With support from the Mekong Priority Solidarity Fund Project, coordinated by the French Embassy, we are active partners with other project members including the Ministry of Interior. We have had a number of meetings and workshops on the joint crackdown on counterfeit products and medicines. Our Customs officers are now positioned at different checkpoints along the land borders with Thailand, Vietnam and Laos. Most of the counterfeits, originating from neighbouring countries, seem to be getting through these checkpoints and for this reason we have increased the number of Customs personnel at these border crossings.

Our Customs officers remain vigilant. Some of these counterfeit medicines are smuggled through in small quantities in people's handbags. Sometimes, they conceal them with lawful goods. For example, they might conceal about ten small cartons (of counterfeit medicines) with sacks of cement, piles of iron, boxes of cakes and sweets and other items where Customs duties have been paid. Under such circumstances it can get difficult to check all items coming into the country through these land borders.

Certainly more cooperation and sharing of information are needed



Photo: WHO / Sonny Krishnan

Em Khin Vorac, Deputy Director General, Department of Customs and Excise.

from our neighbouring countries to curb smuggling of counterfeit medicines through these land border crossings.

## What new efforts have been made by the Customs and Excise Department in the Mekong Priority Solidarity Fund Project?

Our monitoring, investigation, inspection and reporting activities have increased after our officers attended workshops in the project. In Pailin and Battambang, for instance, at a project workshop with Customs officers from 10 border checkpoints along the border with Thailand we made it known to them of the existence of the five so-called 'ghost companies' with fictitious addresses. These 'ghost companies' are responsible for the smuggling of fake medicines into the country.

I have informed His Excellency Pen Siman, (Director-General of the Department of Customs and Excise) of the five ghost companies and he has issued a letter to all cus-

toms checkpoints in the country with an attached report, urging our offices to be extra vigilant in looking out for fake products, especially medicines, from these fictitious manufacturers. They are basically criminal rings with no respect for human lives.

## What percentage of medicines produced by these ghost companies are anti-malarials?

Not much actually. But there are oral artemisinin monotherapies manufactured by these 'ghost companies' that are banned in the country. These monotherapies are one of the main reasons why there is malaria resistance in the country.

## The Cambodian government has a national strategic plan to eliminate malaria from the country by 2025. How important is your work to combat counterfeit medicines in the context of Cambodia's National Elimination Strategy for Malaria?

Clearly fake and substandard anti-malarials cause selection pressure and this makes problems related to resistance worse. His Excellency Prime Minister Hun Sen made the declaration at the National Health Congress to eliminate malaria by 2025, and we will abide by that order. We will confiscate all counterfeit and substandard malarial medicines and prosecute those who illegally bring them into the country. We cannot risk the lives of the Cambodian people.

Cambodians in remote areas do not take any notice on whether the drugs are fake or not. All they are bothered about is the price. If you give them counterfeits, they will take these medicines without any questions asked. And they will be putting their health at serious risk.

# From Music to Malaria Education

**Moeun Chhean Nariddh** profiles a popular interactive radio program on malaria education broadcast from Battambang.

As the sun sets in a late afternoon in Cambodia's Battambang province, many housewives, shopkeepers, farmers and others stay glued to their radio sets to listen to music and songs played from FM radio stations along both sides of the Steung Sangke – a legendary river that was romanticized in many fond Khmer love songs and romantic music from the 1960s and 1970s.

Before too long, this entertainment comes to an abrupt end on the Chamkar Chek National Radio as the clock strikes 5pm.

Unlike the DJs at other private stations who continue playing music or singing karaoke songs along with their listeners, Soeum Chamnan at Chamkar Chek Radio is now engaged in a more serious radio show. She changes from entertaining her audience to helping save lives of people who are at risk of getting malaria.

For an hour from 5pm to 6pm, every Friday, Chamnan's task is to coordinate a radio talk show, jointly produced by the USAID-funded Malaria Control in Cambodia, Equal Access and the National Malaria Control Center, during which listeners pose questions to experts about how to protect themselves and get treatment for the mosquito-borne disease. The radio program is also fully funded by USAID.

This afternoon, she has a special guest speaker: Dr. Ouk Vichea, Director of the Battambang Malaria Program.

After an opening remark to introduce the talk show, Chamnan switches on the microphone for her guest speaker to begin the dialogue with the first caller.



Photo: WHO / Sonny Krishnan

Soeum Chamnan, the radio presenter in Battambang.

"I have a few questions, but I am so new and afraid to ask," 28-year-old Kosal, from Rokha Kiri district, tells Dr. Vichea.

"No problem!" he responds, "Please, go ahead."

"Some people in my village who have malaria don't have money or the means to get treatment. How can they do it?" asks Kosal, who used to have malaria himself a few years ago.

"Does your village have a health center?" Chamnan interrupts.

"Yes, it does. It's about 20-30 kilometers away," Kosal continues.

"I know the health center is far away, but you can ask the village chief about the village malaria workers." Dr. Vichea advises. "They have the means to do blood test for malaria, and if they find out that you have malaria, they will provide treatment free of charge."

Like all other callers, the malaria expert poses a question to Kosal to test his knowledge about how malaria is transmitted.

"Malaria is transmitted by the female Anopheles mosquito. We, Khmers, call it the nail mosquito." Kosal answers confidently.

"You are correct," Dr. Vichea responds.

The phone in the studio rings again. It's a call from Meta, a 22-year-old student from Battambang town, who also had malaria when she was 13. As a university student, her queries appear more knowledgeable.

"Why are pregnant women and children under five more at risk of getting malaria?" she throws in her question.

"Thank you for your question," the malaria expert replies.

"As you know, pregnant women need nutrients to feed herself and her baby," he explains. "So her immunity becomes weak; second, children's immunity from the mothers goes down after six months old."

He adds: "So, when they have malaria, they face a serious danger. Therefore, they must consult the doctor immediately when they suspect that they have malaria."

After a few dialogues with the listeners who have called in, Chamnan calls for a break and announces another quiz for the audience to send text messages to the program.

"The question is: if you don't have malaria, what benefits do you have?" she plays the clip with her recorded voice. "If your answer is correct, you will get a prize!"

It's now 6pm and the talk show ends. Chamnan counts seven callers on her show today and she announces the end of the program.

"Thank you, Doctor, and the listeners," she concludes.

# Radio Program in Containment Zone in Thailand Offers Life-Saving Advice

The 'Love Your Health' radio program hosted by the head of the Malaria Clinic in Khaeng Harn Maew District, Chanthaburi is a community favourite. CONTAINMENT's **Nat Sumon** tells why.

If you live in Khaeng Harn Maew district, Chanthaburi, where there is only one strong radio frequency, your favorite entertainment channel would definitely be the local radio network FM95.75.

Among the variety of programs carried by FM95.75, the most popular slot seems to be a one-hour health program every Wednesday called "Rak Sukaphab" or "Love Your Health". Undoubtedly the listening audience, attracted by the easy-listening music, tune in faithfully every Wednesday to the health program that has helpful tips on how to lead a healthy life-style.

"Love Your Health" also has a call-in facility that allows listeners to interact with the presenter Anukoon Charunthup, who is also head of the Malaria Clinic in Khaeng Harn Maew District, Chanthaburi. The program allows listeners to phone in to ask any health-related questions they might have. And as an indication of the radio program's popularity, the station's phone is always ringing off the hook.

Anukoon tells CONTAINMENT that he began hosting the "Love Your Health" radio program about five years ago when the local radio network was just launched.

"Chanthaburi is no stranger to vector-borne diseases," he says. "The health topics that I cover in my radio program range from malaria, dengue and other mosquito-borne diseases."



Photo: WHO / Nat Sumon

Anukoon Charunthup, the presenter of "Rak Sukaphab" or "Love Your Health".

Anukoon's radio program is important for Khaeng Harn Maew residents especially during the rainy season. "It's the rainy season when diseases like malaria and dengue are rife and I use the radio program to disseminate preventive messages and tips on how listeners will be able to protect themselves from falling sick," he adds.

But there is a humorous side to Anukoon, too. He tells CONTAINMENT that malaria is also known as "*khai-mae-yai-bua*" in Thai, which means "fever that pisses your mother-in-law off!"

Anukoon explains. "When you have malaria, you can't work to feed your family, and that's when the mother-in-law becomes cross because her daughter and grandchildren would have to go hungry."

The Malaria Clinic head in Khaeng Harn Maew District made it clear that the most vulnerable group to malaria are male wage earners.

"Because of this, my program gives advice on where these workers would be able to get mosquito repellents and insecticide-treated bed nets to prevent themselves from getting malaria," adds Anukoon. The "Love Your Health" radio call-in program also tells these workers where the locations of the malaria clinics are and assures them that diagnosis and treatment is free of charge.

Though Anukoon believes that local people are well acquainted with malaria, its symptoms, and vector control and prevention measures, he, however, tells CONTAINMENT that they need to be reminded of the dangers of the disease during the rainy season.

Anukoon has been presenting "Love Your Health" for about five years and is now building up the capacity of his staff to co-host the show to add diversity to the radio program and also fill in as main presenters when he has to travel outside the district for meetings and workshops.

"My hope is that by building up the capacity of my staff as presenters, they would in turn be able to start their own malaria radio shows if they are promoted and transferred out of the district," he explains.

But wearing two hats at one time can be tiring for Anukoon. "I frequently get calls from listeners asking me where I was in the previous week, for instance, because they didn't hear my voice on radio," he explains.

But the rewards are always gratifying. "Every week I get e-mails and calls from listeners telling me how much they enjoyed my show and how useful the health messages were to them," says Anukoon. "That's enough to keep me going."

# AFRIMS Mobile Units Help Detect Malaria

CONTAINMENT's **Nat Sumon** accompanied an Armed Forces Research Institute of Medical Sciences (AFRIMS) mobile unit to a remote location on the Thailand side of the border to screen soldiers for malaria.

Over the course of history, more soldiers have died from malaria than in direct combat.

Over 40,000 cases of malaria were reported in U.S. Army troops stationed in Indochina between 1965 and 1970 with 78 deaths. The U.S. Army established a malaria drug research program when U.S. troops first encountered drug resistant malaria during the Vietnam War. In 1967, Chinese scientists set up Project 523 - a secret military project - to help the Vietnamese military defeat malaria by developing artemisinin based anti malarial formulations.

For the Thai army, malaria still remains a threat despite the drastic fall in cases of falciparum malaria – the most fatal form of the mosquito-borne disease. According to 2010 Royal Thai Army statistics, 572 soldiers contracted malaria on the Thailand side of the Thai-Cambodian border and constituted one-fourth of overall malaria patients seeking treatment in the area.

Many Thai soldiers used to harsh tropical jungle conditions are well aware of protective measures. If they fall sick, they are instructed to go either to local malaria clinics or local hospitals to have their blood tested on a weekly basis.

But due to the remoteness of certain areas of the Thai-Cambodian border, mobile malaria clinics and malaria post workers have no access to high-security areas. And soldiers sick with malaria are often unable to leave their posts to seek treatment in the neighboring health facilities in a timely manner as well.



Photo: WHO / Nat Sumon

Thai soldiers line up for blood samples to be taken from them by the AFRIMS mobile unit.

Indeed there is a gap between the early diagnosis and treatment of soldiers posted on the Thailand side of the Thai-Cambodian border. Fortunately, the Armed Forces Research Institute of Medical Sciences (AFRIMS) addresses this serious problem by sending out mobile units to carry out

active malaria case detections among army and border police personnel stationed in areas where civilian public health workers have no access.

AFRIMS was set up as collaboration between the Thai and U.S. governments to combat a wide-



Photo: WHO / Nat Sumon

Microscopists in the AFRIMS mobile unit analyzing blood slides to detect positive malaria cases.



Photo: WHO / Nat Sumon

More blood taken from a soldier after testing positive for malaria to monitor drug resistance parasite strains.

spread cholera outbreak in Bangkok during the late 1950s. Recognizing the importance of this cooperative effort, the two governments agreed to continue joint medical research efforts, which led to the establishment of the SEATO Cholera Research Laboratory. After a series of transformations, the research institute was renamed AFRIMS in 1977. Over the last 50 years AFRIMS has been a benchmark of success in tropical infectious disease research.

Today, AFRIMS has programs in enteric diseases, malaria vaccine and drug research and viral diseases including dengue fever, hepatitis and HIV.

“AFRIMS was set up as collaboration between the Thai and U.S. governments.”



Photo: WHO / Nat Sumon

Blood slides to detect malaria infection by WHO standard microscopic method.

Recently, CONTAINMENT accompanied an AFRIMS’ malaria mobile unit to the Thai-Cambodian border to test and treat Thai soldiers stationed there. The mobile unit collects blood samples, from the soldiers, for blood slides and also records the history of movements of the individual soldier, like which border checkpoints he had been stationed in previous months. If any soldier’s temperature is more than 37.5°C, the mobile unit would carry out a rapid diagnostic test and collect blood samples from the patient. If the RDT is positive for any plasmodium species, malaria

treatment commences immediately.

After having collected blood samples from the soldiers, for the day, the AFRIMS mobile team makes their way back to their hotel rooms and to start working on Giemsa-staining the blood slides for viewing under their microscopes. Later that night, they discover a positive case of falciparum malaria and immediately the next morning make their way back to the platoon to seek the patient and start his malaria treatment.

While the AFRIMS mobile epidemiology unit analyzes the blood slides using microscopy, Colonel Dr. Jariyanart Gaywee, the head of AFRIMS epidemiology division, ensures that army units in remote locations are equipped with anti-malarials and RDTs.

Because of limited manpower and resources, the AFRIMS malaria mobile units cannot be in the field along the Thai – Cambodian border as often as they wish in order to help their fellow soldiers. But Col. Dr. Gaywee has found a way forward.

“AFRIMS is piloting a project with the help of the local commanders to train soldiers to carry out early diagnosis and treatment using RDTs for units stationed in extremely remote areas along the Thai-Cambodian border,” she told CONTAINMENT.

AFRIMS is also in charge of educating newly recruited soldiers on the importance of vector control and protecting themselves from malaria. The officer in charge of this task is Lieutenant Colonel Pradith Kaewsatien.

“Malaria education should be made compulsory. And while the subject may not be exciting to the new recruits, they will come to realize the importance of being armed with malaria knowledge once they start their field trainings. Malaria prevention knowledge is essential for jungle survival training for a soldier,” he added.

# Respondent-Driven Sampling on the Thailand-Cambodia Border: Can Malaria Cases be Contained in Mobile Migrant Workers?

Respondent driven sampling methodology, for hidden populations, is an effective strategy to study the migrant populations from Myanmar and Cambodia on the Thailand-Cambodia border, write **Amnat Khamsiriwatchara, Piyaporn Wangroongsarb, Julie Thwing, James Eliades, Wichai Satimai, Charles Delacollette** and **Jaranit Kaewkungwal** in the *Malaria Journal*.

There is substantial population movement across the Thai-Cambodian border that is largely driven by economics. Migrants from both Cambodia and Myanmar settle for varying periods of time in Thailand, often in search of work. The International Organization of Migration reported that Thailand has attracted increasing numbers of migrant workers, mostly from neighbouring countries with over one million registered migrant workers entering the country since 2004.

Channels for migration, in particular labour migration, are defined by the policy of the destination country, usually in response to the demand of domestic labour markets for foreign workers. When the supply through established channels does not match the demand, irregular migration dynamics develop, and migrants enter illegally and undocumented.

While various government ministries attempt to collect data on migrant workers, they usually have information on the number of registered migrants and those applying for work permits, but little information on the unregistered migrants. The true size of the migrant worker



Photo: WHO / Nat Sumon

Migrant workers in Chantaburi on the Thailand side of the Thai - Cambodian border.

population in Thailand, in particular of irregular migrants, is notoriously difficult to quantify.

Rather than classifying migrant workers as documented or undocumented, the Thailand Ministry of Public Health defines migrants who have been in Thailand for more than six months as M1, and migrants who have been in Thailand for less than six months as M2.

Both M1 and M2 migrants are eligible to receive diagnosis and treatment for malaria free of charge at malaria clinics in border zones. Patients who cross the border for a day to seek treatment at the border clinics are counted among the M2. Migrants in Thailand account for a higher proportion of cases than Thai citizens, especially among the M2 migrants.

Malaria surveillance in undocumented migrants is challenging,

and ensuring treatment compliance and parasite clearance in an environment in which increased parasite clearance times need to be closely monitored is quite difficult in this population. While undocumented and highly mobile workers may receive diagnosis and treatment at malaria clinics along the border areas free of charge, they are often not followed up for compliance and parasite clearance, as is the norm in the provinces targeted by the containment project.

## **Innovative strategy with respondent driven sampling**

Developing innovative strategies for follow-up is critical to the containment effort.

Little is known about migratory patterns along the Thailand-Cambodia border. However, given the hidden and mobile nature of these populations and the difficulty in

generating a sampling frame, traditional sampling techniques such as cross sectional community-based surveys or time-location sampling are unable to produce an adequate and statistically valid sample. Respondent driven sampling (RDS) is a modified form of chain-referral or snowball sampling that has been used to sample hidden populations, and seeks to overcome the biases in traditional snowball sampling.

It uses a structured system of incentives to encourage recruitment by peers while limiting the number of individuals each participant can recruit, records the size of each participant's network to weight the sample, and enables calculation of sampling error, thus allowing for inferences about the characteristics of the population from which the sample is drawn.

Pre-survey focus group discussions were held with migrants from Cambodia and Myanmar to assess the feasibility of using RDS. Discussions focused on migrants' links to and relative size of social networks, willingness to participate, and potential barriers to participation such as limitation of local travel due to lack of transportation or poor roads, a burdensome work schedule, or fear of authority figures.

RDS starts with purposeful selection of a few members of the target population, or "seeds", who are selected based on: (1) diversity of demographic and geographic factors; (2) diversity on key outcome variables; and (3) commitment to the goals of the study. Each participant receives an incentive for participating, and a preset number of coupons with which to recruit peers. The recruiter then receives a secondary incentive for each recruited peer who participates. The method continues as seeds recruit first-wave respondents, first wave respondents recruit second-wave respondents, and continues until the desired sample size is reached. Participants are encouraged to recruit randomly from their personal social networks. Data are collected on the size of the social

networks, and the analysis is weighted based on the size of the social networks.

RDS has typically been used to study urban populations, among highly networked communities, such as injecting drug users or commercial sex workers. While the migrant population faces similar issues of stigma, and those who are undocumented wish to remain undetected by authorities, questions were raised as to whether the networks in this population would be sufficient to support this methodology.

This analysis focuses on the understanding of mobility dynamics of different types of migrant workers in the border area as well as the application of RDS methodology to the migrant population; demographics, malaria prevention and treatment-seeking behaviour of this population.

**Study area and population**

Five study sites within three of seven provinces along the Thailand-Cambodia border were selected in areas where there were known to be many migrant workers and close by areas where *P. falciparum*

resistance to artemisinins has been documented; three sites recruited for Cambodian migrants (one each in Chantaburi, Trat, and Sa Kaeo provinces) and another two sites for Myanmar migrants (both in Trat). The survey was conducted from June to September 2009.

**Results – migration patterns**

Migrants from Myanmar had a longer duration of residence in Thailand than migrants from

Cambodia, with a median duration of residence of 87 months in M1 migrants from Myanmar compared to 62 months in M1 migrants from Cambodia. Among M2 migrants, those from Myanmar had been in Thailand 4.5 months, compared to 2.6 months for those from Cambodia.

Long-term migrants were more likely to have crossed the border by themselves (among Cambodians, 49% of M1 vs. 35% of M2, and among those from Myanmar 45% of M1 vs. 34% of M2). Long-term Cambodian migrants had been helped by relatives (19%), friends (16%), and employers (27%), while 57% of short-term Cambodian migrants were helped by employers.



Photo: WHO / Nat Sumon

Bi-lingual posters in Thai and Khmer on malaria prevention in Chantaburi. It is important to reach out to migrant workers from both countries.

Among migrants from Myanmar, 32% of M1 and 41% of M2 had used the services of a broker, compared to 1% of Cambodians. Migrants from Myanmar were also helped by relatives (19% of M1 and 26% of M2). Cambodian M1 migrants were least likely to have paid money upfront to come to Thailand (36%), compared to 53% of Cambodian M2, 58% of Myanmar M1, and 76% of Myanmar M2.

Among Cambodian migrants, 5% of M1 and 6% of M2 returned to Cambodia more frequently than once monthly. Among M2, 36% had not returned since their arrival, 32% returned every 2-3 months, and 26% returned every 6 months. Among M1, 21% returned every 2-3 months, 16% returned every six months, 23% returned once annually, and 29% had not returned since their arrival.

This pattern was very different for migrants from Myanmar; 85% of M1 and 100% of M2 had never returned to Myanmar. Only 2% reported returning as often as once per year. Of those who returned, the primary reason among long-term migrants from both Cambodia and Myanmar was to visit friends and family. Cambodian M2 migrants were more likely to return for traditional or national holidays.

Public transportation was not a popular option for Cambodians returning home; most travelled by personal or hired vehicle. While only 22% of M1 return at least every 2-3 months, 72% of M2 have been to Cambodia in the last three months.

In terms of future plans, of Cambodians, 32% of M1 and 68% of M2 planned to return to Cambodia. Only 4% of migrants from Myanmar planned to return. Among M1 migrants, 36% of Cambodians and 82% of those from Myanmar had no plans to move, and an additional 32% of Cambodians and 14% from Myanmar did not know. By comparison, among Cambodian M2, 22% had no plans to move and 9% did not know. The primary reason



Photo: WHO / Nat Sumon

A migrant worker in Chantaburi has his blood tested at a mobile malaria clinic.

for an upcoming move was 'work finished' or 'to live with family members.'

### Discussion and conclusion

The migration patterns demonstrated here have implications for containment of artemisinin resistance. There was a concern that migrants from Myanmar may carry the resistant parasite back to their country of origin, which is highly endemic, has not achieved the levels of malaria control that other Southeast Asian countries have, and has limited access by international agencies due to the political situation. However, those residing along the Thai-Cambodia border, primarily in Trat, have in fact largely settled in Thailand, and do not return often, if at all.

The Cambodian population in the three border provinces of Trat, Chantaburi, and Sa Kaeo differ in three important ways. First, there is considerably more frequent cross-border mobility, with even long-term migrants returning on a regular basis. Second, while migrants come primarily from western and central Cambodia, there has been migration from and back to almost all provinces in Cambodia, some with very low transmission levels and largely non-immune populations. Interestingly, no migrants claimed an origin in Pailin Province, which has typically been thought to be an epicenter of development of anti-malarial resistance.

Frequent population movements, both across the Thailand-Cambodia border and from the border area across Cambodia, indicate the need for heightened surveillance for artemisinin tolerance outside what has been designated as the containment zone, as well as close cooperation amongst Thai and Cambodian authorities.

*An RDS has been completed in Cambodia with results to be published soon.*

*The full article can be downloaded from <http://www.malariajournal.com/content/10/1/120>*

Migration patterns by province of Cambodia and Myanmar				
Province	Cambodian migrants (%)		Myanmar migrants (%)	
	Province of Birth	Province considered home	Province of birth	Province considered home
Battambang	27.5	30.0		
Kampot	12.5	7.8		
Siem Reap	9.4	10.0		
Koh Kong	7.3	1.4		
Takeo	7.3	6.2		
Kampong cham	6.7	4.2		
Kampong Speu	5.3	4.7		
Other				
Mon			<b>85.9</b>	<b>64.1</b>
Bago			1.4	1.1
Tanintharyi			3.7	2.8
Rangoon			2.9	2.6
Other			6.2	9.4
Trat			0	<b>24.1</b>



Photo: WHO / Nat Sumon

n=1719; Cambodia=828; Myanmar=891

Source: BVBD Thailand

# Mobilizing Communities Through Positive Deviance

Members of the Buddhist clergy certainly have an important role to play in positive behaviour change when it comes to malaria prevention, writes **CONTAINMENT'S Moeun Chhean Nariddh**.

In a spacious, yet unfinished dining hall at Serey Mongkul Pagoda near the Cambodian-Thai border in Battambang Province, young and old villagers sing songs and play games with health workers and malaria experts at a handover ceremony, to locals, of a positive behaviour change communication project to fight malaria.

Men, women, boys and girls brave their usual shyness and stand up to answer quizzes and questions posted by communication and public health experts from Cambodia's National Centre for Parasitology, Entomology and Malaria Control (CNM) and the international NGO Malaria Consortium to test their knowledge and understanding about malaria.

In contrast with the mostly blue-collared polo T-shirts worn by staff from CNM, Malaria Consortium and community leaders, about half a dozen monks in saffron robes watch and listen with great attention to how the villagers answer the questions and quizzes.

In fact, these monks are here with a reason. In the campaign to fight malaria, Buddhist monks have been involved to help educate villagers about malaria and how to protect themselves from the mosquito-borne disease.

It is here that Malaria Consortium and CNM, with the support of the World Health Organization's Containment Project, pioneered an innovative behaviour change communication strategy called 'Positive Deviance' or PD. Three



Photo: WHO / Sonny Krishnan

Malaria campaigners are increasingly using monks to help disseminate preventive messages.

villages, Kampong Chamlang Leu, Ploav Praim Muy and Samsep, selected for the study were from Sampov Loun, a district of Battambang province.

The PD approach initiates community dialogue, respects local wisdom and provides social proof by identifying positive practices from within the community which ensure acceptance and expedite the process of behavior change. It allows community members to be active beneficiaries, engaged as full partners to play a role in their own health and protection from malaria.

"I preach Buddhism and teach people about malaria and dengue fever," explains Venerable Pich Bunthoeun, the 45-year-old abbot of Serey Mongkul Pagoda. He adds: "The monks have a very important role to educate people about malaria."

Venerable Bunthoeun says people give more respect to the monks and will follow their advice when they tell them to do good things.

"When the monks say anything, people listen to them more than ordinary persons," he says.

The abbot says he and other monks attended a three-day training seminar in Battambang province in April 2009 and learned various knowledge and skills on how people can prevent and get treatment for malaria.

The Venerable says he got enough knowledge to teach people and that people have also known a lot about the disease partly thanks to the teaching by the monks.

"I am happy that people and children have good health," Venerable Bunthoeun says with a smile, adding that he hopes that he will continue the work to fight malaria.

Loch Yoeum, 60, says she has lived for 13 years in Komrieng District's Takrey Commune, where Serey Mongkul Pagoda is located.

She says there used to be a lot of forests around these areas and that people were falling sick from malaria, including herself.

Yoeum says the monks have told people to clean the environment, sleep in mosquito nets and to wear long-sleeved shirts to avoid malaria.

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services to much of the rural population. The potential of approaches based on mobile phones and web-based technology to address the gaps in field data collection for malaria is now widely recognized.

"I think using a mobile phone is good, because I can report immediately when I come across a malaria case," said village malaria worker Lida. Previously, the VMWs would record the data in a logbook which they would then report to the health centers at the end of every month before it was sent to the operational district hospitals and finally to CNM.

InSTEDD, an innovative humanitarian technology NGO, designed the system, utilizing SMS messages in Khmer script that interact with mapping software to generate maps on the World Wide Web for the locations of malaria cases reported by the VMWs. These malaria cases are also known as Day Zero cases, to indicate the locations of the patients before they are given appropriate and effective treatment.

"The web-based system uses simple SMS, which is four to five digit codes in the case of VMWs," Malaria Consortium's Information Systems Manager Steve Mellor told CONTAINMENT. "In addition to the targeted alerts all cases are displayed on-line which allows registered users to view cases," added Mellor.

The SMS from the village malaria worker only includes a code for the type of malaria, the patient's sex, age and the village name to indicate the sick person's location.

The InSTEDD-designed system, Mellor pointed out, has a unique threshold feature which allows it to be used in low transmission settings to promptly identify the last few remaining cases and can also be used in high transmission set-



Photo: Malaria Consortium / Steve Mellor

The SMS from a village malaria worker in Khmer script.

tings to identify possible malaria outbreaks as they occur.

"The system allows for VMWs and health centre staff to alert the relevant (based on location) district, provincial and national staff to malaria cases as they are diagnosed facilitating a prompt response," he emphasized.

This project also highlights the effective cooperation with the private sector for a public good with low start-up costs that is estimated at US\$100 for each VMW which includes a mobile phone, SIM card, solar charger and training.

"Due to the collaboration between CNM and Mobitel all SMS messaging is free which essentially results in zero maintenance cost," noted Ngor Pengby, Malaria Consortium's Data Manager. "Mobitel have pledged SIMs and free SMS for all VMWs and health facilities in Cambodia should CNM decide to scale up the system in the future," he added.

One of the consequences associated with the delays in paper-based

reports is frequent stock-outs of essential anti-malarial drugs in the health facilities that can deprive target populations like mobile migrant workers of access to effective treatment.

Deputy Director of CNM, Dr. Chea Nguon, said the SMS reporting would also help identify mobile migrant workers so that the district or provincial hospitals could request more anti-malarials when they detect an increase in migrant workers in certain locations.

"If we request the same amount of medicines, we might have a stock-out if there is an increase in the number of malaria cases among the mobile migrant population," he added.

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"People are poor, so it will be more difficult if they get sick," she explains.

The findings in Malaria Consortium's report titled: "The 'Positive Deviance' approach to improve malaria outcomes among mobile and migrant workers in Cambodia" indicate that most of the community members and migrant workers believed that men especially mobile and migrant workers, 'kamakor and kachport', (corn collectors) are the high-risk group for malaria. The female mobile workers also noted that men are most vulnerable to get malaria as they work at night in the farm or forest.

The Malaria Consortium report, however, has several positive stories one of which is on a migrant worker's wife.

"A migrant worker's wife always pack a hammock net in her husband's luggage, whenever he goes to the farm and reminds him, '*Eing eing mon chol dek kom plech chang mong*' (Darling! Do not forget to use the bed-net before you sleep to avoid malaria)."

