



a decade in communicable disease control and child health

Cambodia Malaria Surveillance System

Pengby Ngor

March 25, 2014



PREVENTION



DIAGNOSIS



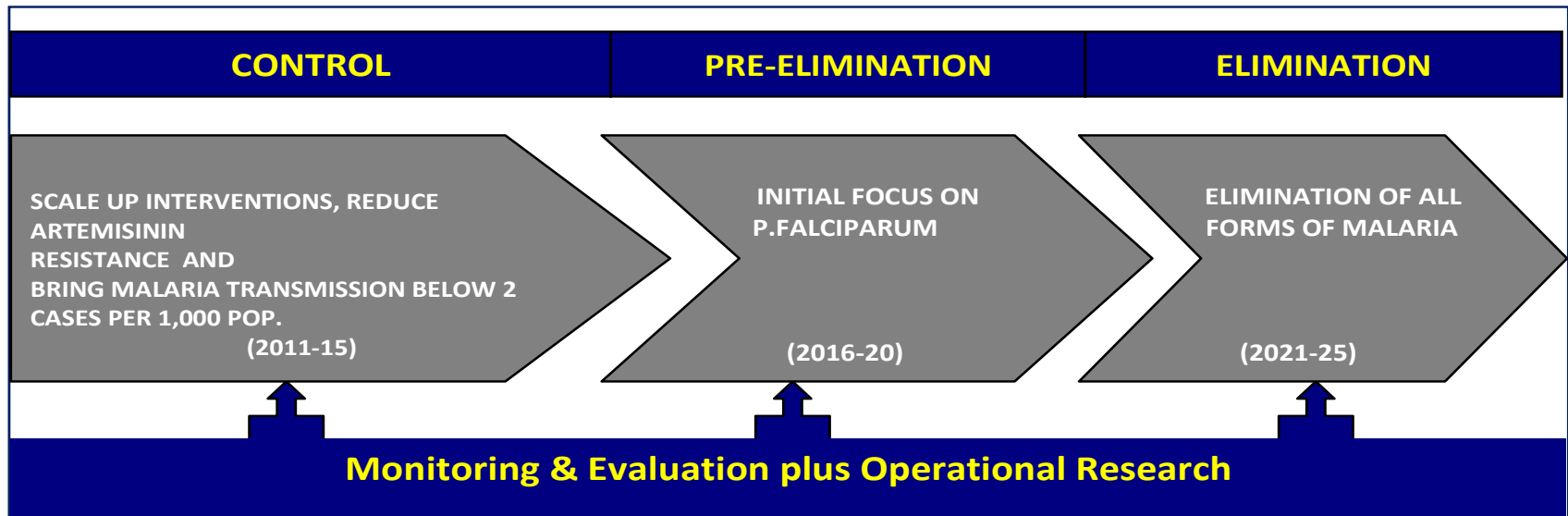
TREATMENT



RESEARCH

Background

Cambodia has set a goal of eliminating malaria by 2025. Malaria Consortium has played an important role in supporting the surveillance system to National Malaria Centre of Cambodia since 2009



Cambodia malaria surveillance system

- ▶ **Malaria Information System (MIS)**

- ▶ Day 3 positive alert system

- ▶ **Malaria Alert System (Day 0)**

- ▶ Referral System

- ▶ Stock Out Alert System

Malaria Information System(MIS)

- ▶ Designed in Microsoft Access, it is a desktop application
- ▶ There are four main datasets in MIS: Village Malaria Workers (VMWs), health facilities, mosquito net distribution data and private provider reports
- ▶ 45 Operational District (OD) staff are responsible for entering and sending the data to the National Malaria Control Programme (CNM) and Provincial Health Department (PHD) staff on a monthly basis
- ▶ The data are used for creating malaria bulletin every quarter

Malaria Information System(MIS)



Pailin

REPORTS

GRAPHS

SYSTEM MENU

EXIT

Data Entry

- ▶ VMW Reports (new format)
- ▶ Health Centre Reports
- ▶ Bed Net Reports
- ▶ Populations
- ▶ Mapping
- ▶ Malaria Mapping
- ▶ VMW Management
- ▶ Private Sector Data
- ▶ Day 3 Positives
- ▶ Stratification

VIEW DATA

 Browse  EXCEL  Export to text

 Import HIS data 

All Villages ☐ National Data

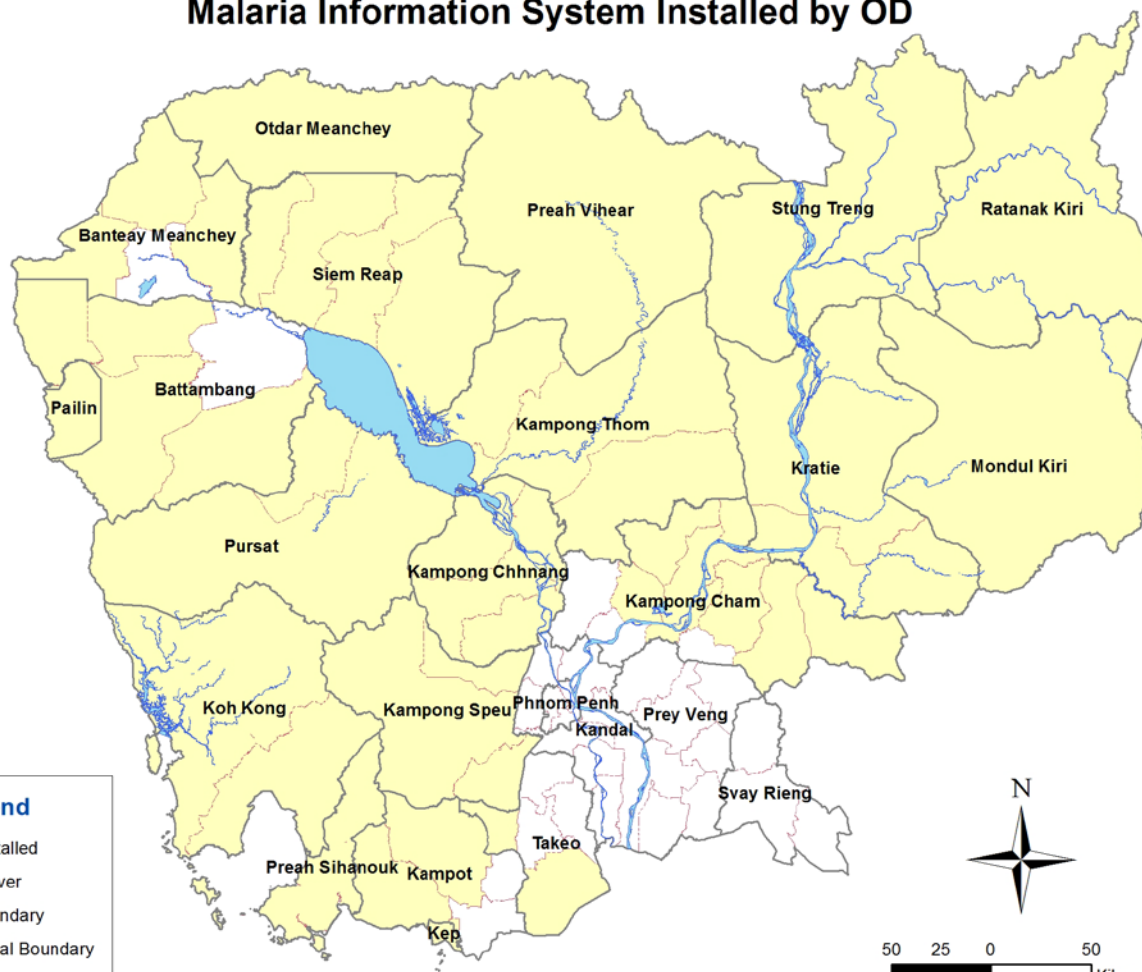
Choose dataset to view

F3 

About this system ...

Malaria information system installed by OD

Malaria Information System Installed by OD



45
Operational
Districts

20 Provincial
Health
Departments

Refresher training activities on using MIS



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Data entry form and report in MIS

HealthCentre: Krachab **MONTHLY REPORT: 2013 / 12** No Cases ☐ Fever Cases   

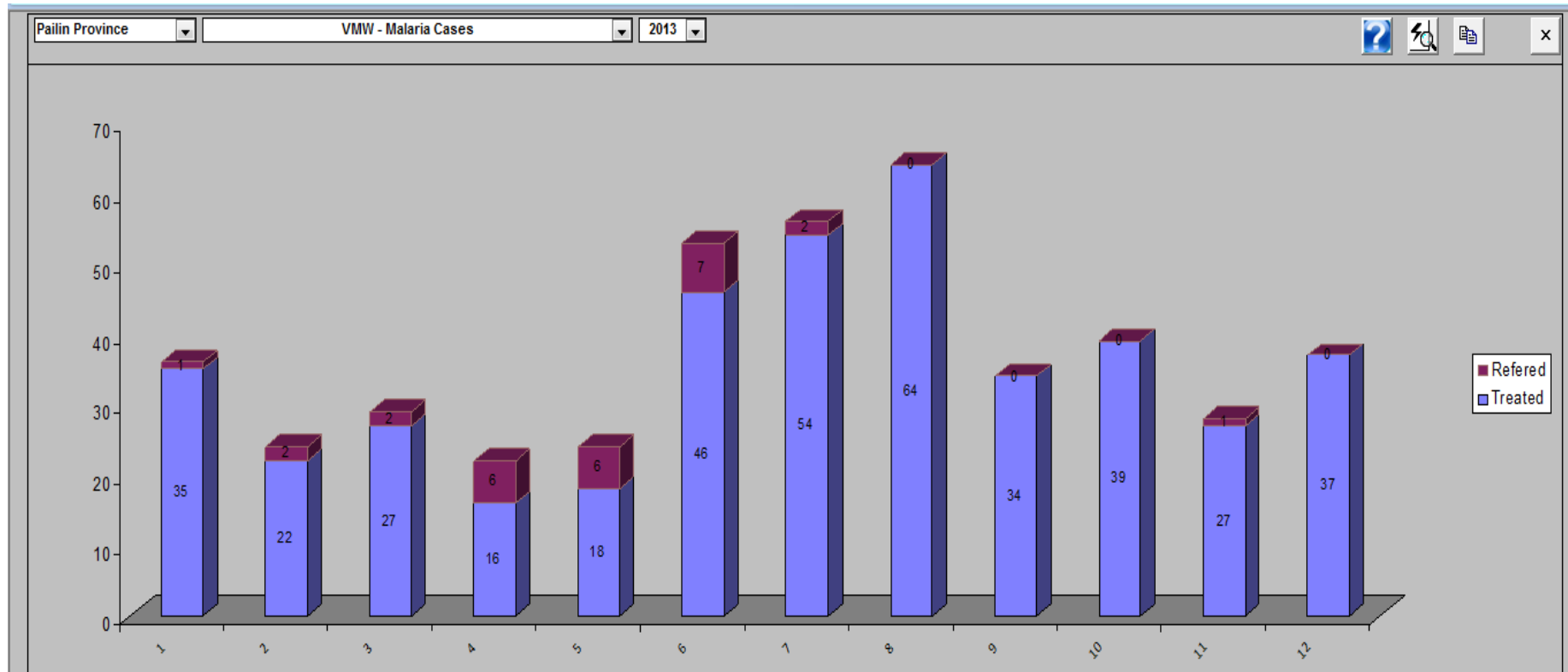
Cannot edit in this screen as it was entered in the district Total Cases Pf Pv Mix UC

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	Village	Sex	Age	M/Y	Pregnant MTHS	Severe	Result	Treatment	Referred	Dead	
	Ta Kream	M	32	Y		☐	V	Duocot	☐	☐	Battambang / Banan / Ta Kream / Ta Kream
	Krachab Leu	F	16	Y		☐	V	Duocot	☐	☐	Pailin / Pailin / Ou Ta Vau / Krachab Leu
	Phnom Reang	M	18	Y		☐	V	Duocot	☐	☐	Pailin / Pailin / Ou Ta Vau / Phnom Reang
	Krachab Leu	M	44	Y		☐	V	Duocot	☐	☐	Pailin / Pailin / Ou Ta Vau / Krachab Leu
* 						☒			☒	☒	#Error

HF Case Data - 2013

Province	Villages	Reports	Pop	Positive	Pf	Mix	Pv	Unconfirm	Referred	Deaths	Severe	Fevers
Pailin	86	72	91099	171	10	15	146	0	18	0	0	13173
OD - Pailin	86	72	91099	171	10	15	146	0	18	0	0	13173
HF - Krachab	14	12	16581	43	0	3	40	0	1	0	0	466
HF - Ou chra	29	12	28323	54	4	5	45	0	3	0	0	6235
HF - Phnom Preal	10	12	7487	17	1	1	15	0	0	0	0	959
HF - Phnom Spong	13	12	8499	14	2	1	11	0	0	0	0	3821
HF - Phsar Prom	5	12	9987	17	2	1	14	0	0	0	0	1331
HF - Suon Koma	15	12	20222	26	1	4	21	0	14	0	0	361

Malaria treated and referred cases detected by VMW



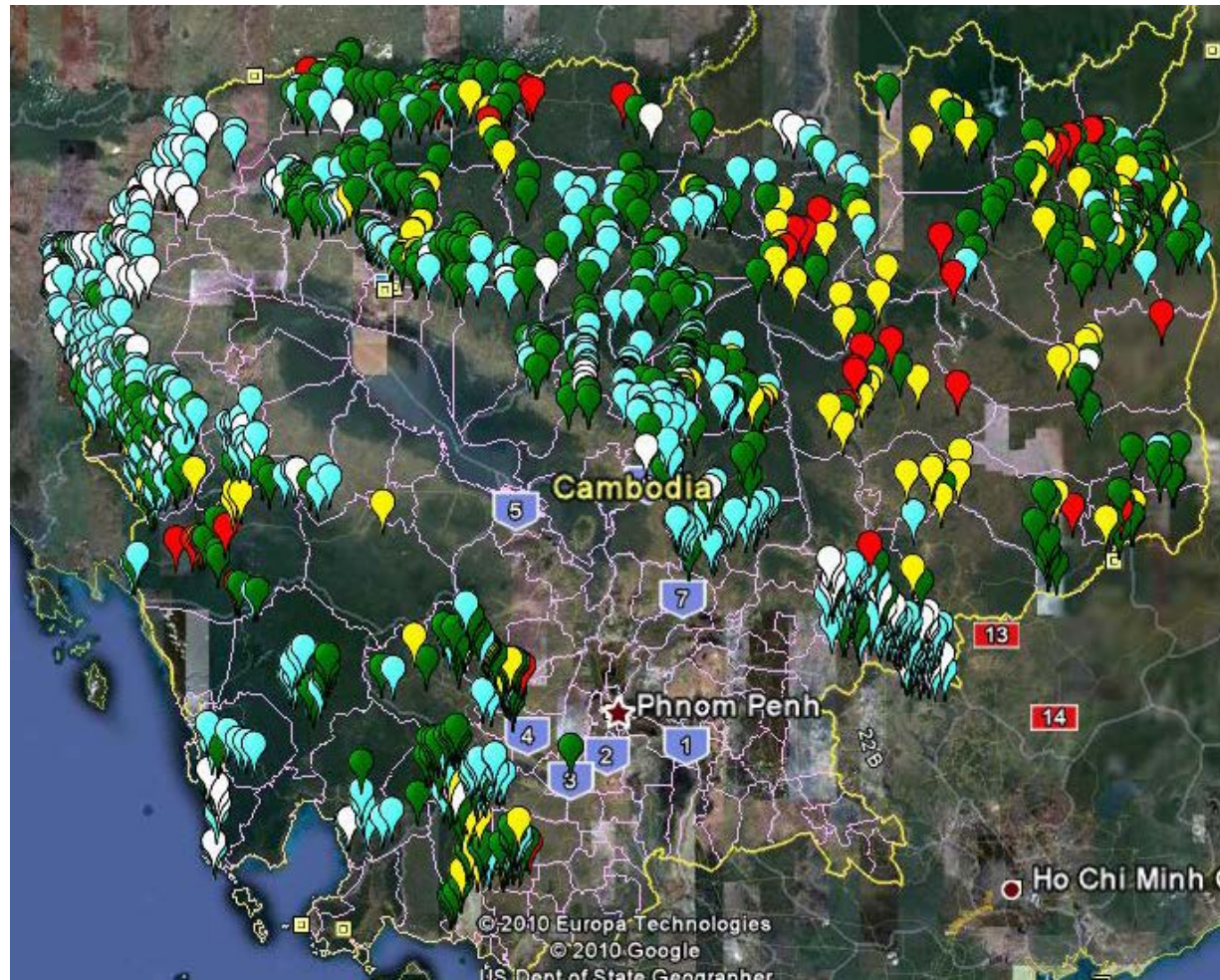
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Malaria cases plotted on Google Earth



Malaria Bulletin in Cambodia

CAMBODIA MALARIA BULLETIN

DECEMBER 2013 BULLETIN, DATA TO 4TH QUARTER, CNM, CAMBODIA

Estimated coverage with LLIN or retreated mosquito net	Target ¹	Mobile ²
No. of persons at risk of malaria	3,342,007	448,593
No. of LLIN distributed YTD	2,244	4,568
No. of LLIN distributed YTD	1,607	467
No. of conventional nets distributed and retreated YTD	35,137	300
No. of long lasting nets distributed in last 3 years	2,954,224	5,035
Estimated coverage with LLIN / treated net (1 net / 1 pers)	89%	1%

¹ Pop of target villages

² Mobile pop (est from census)

Indicators	HIS			VMW			Total		
	2012	2013	Change	2012	2013	Change	2012	2013	Change
Malaria cases	45,553	24,135	-47%	28,613	20,068	-29%	74,166	44,203	-40%
Malaria incidence ³	3.10	1.60	-48%	24.31	14.40	-41%	5.04	2.94	-42%
Malaria deaths	46	12	-74%	0	0	0%	46	12	-74%
Mortality rate ⁴	0.31	0.08	-75%	0.00	0.00	0%	0.31	0.08	-75%

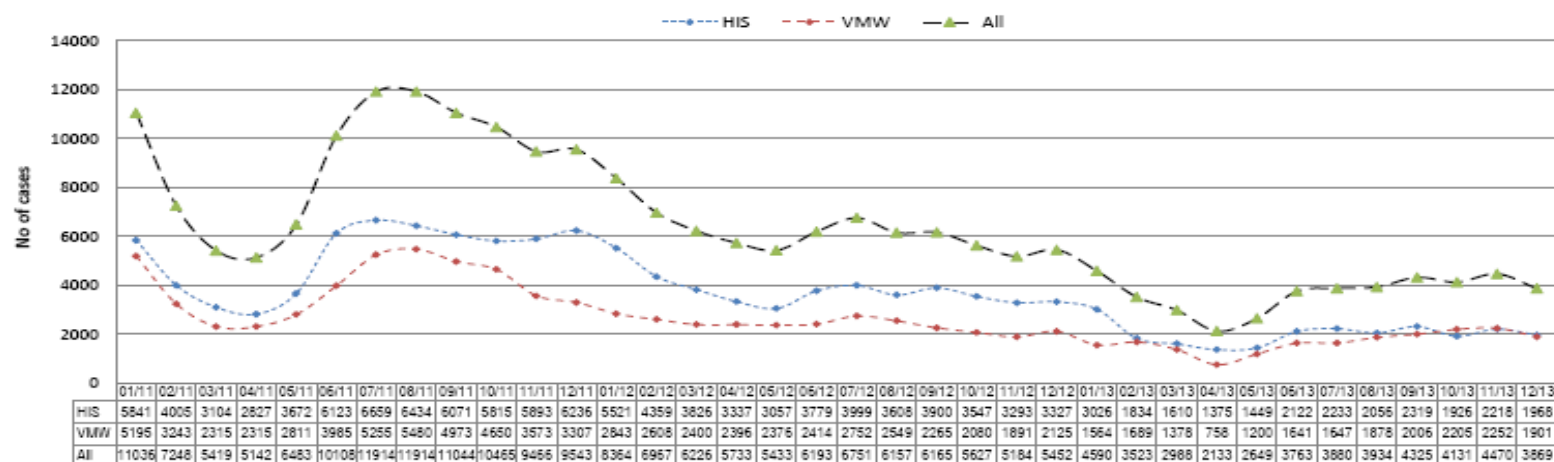
³ Cases per 1000 pop

⁴ Deaths per 100,000 pop

^{4b} VMW rates uses VMW village populations

TRENDS IN SURVEILLANCE

Treated malaria cases from HIS and VMW by month



Severe malaria cases and deaths from HIS by month

Severe Deaths

Data flow of MIS



Sender

Operational
District



Receiver

Provincial Health
Department



Receiver

National Malaria
Control



Sender

Operational
District

Day 0 Malaria Alert System

- ▶ Uses the model piloted by the Day 3 positive system
- ▶ Web based system – more robust than FrontlineSMS
- ▶ Malaria cases reported using very simple code
- ▶ Simple SMS (5 digit) are sent by VMWs and HC staff

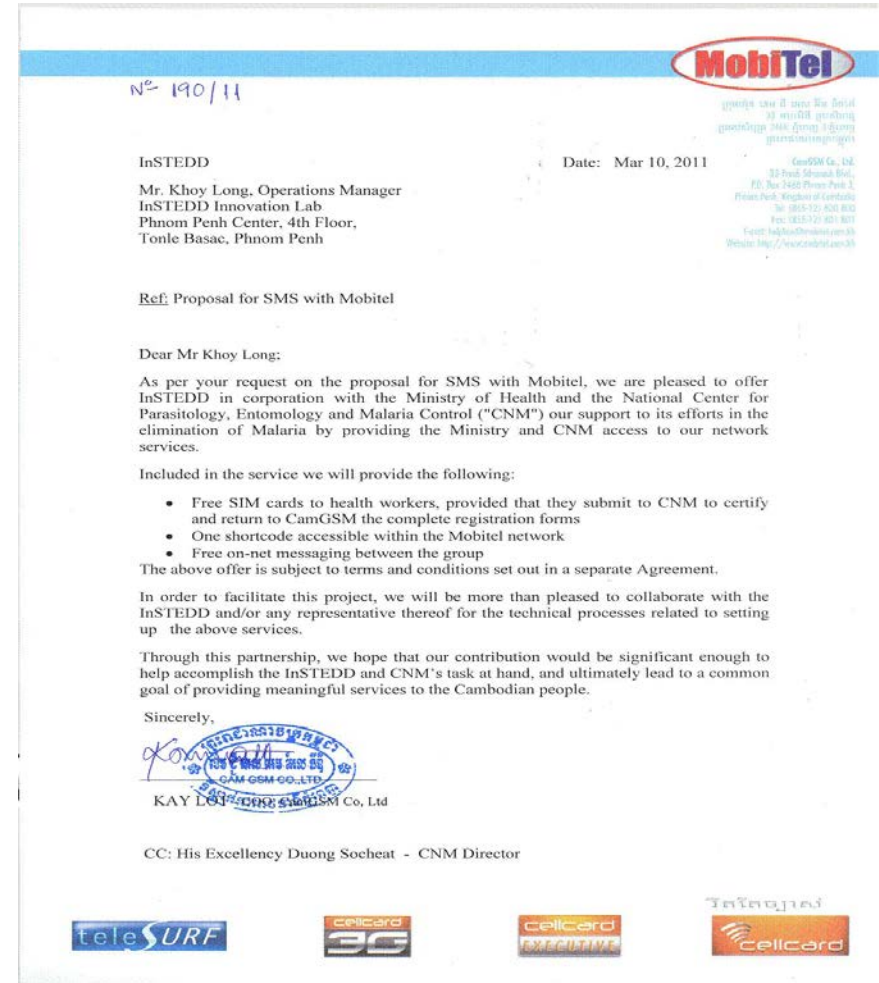
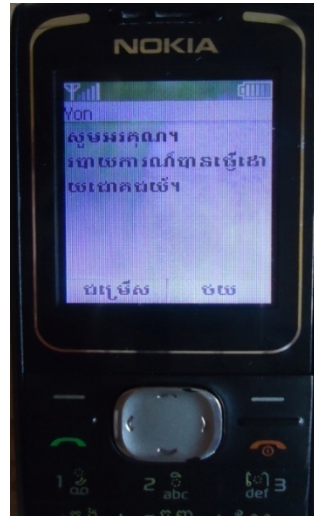
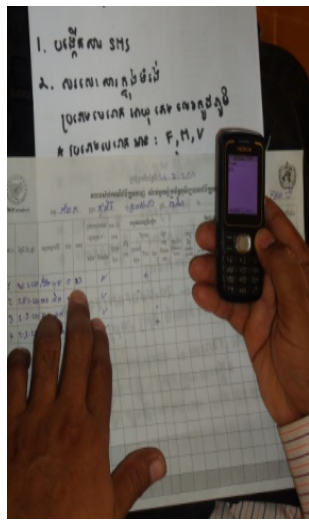
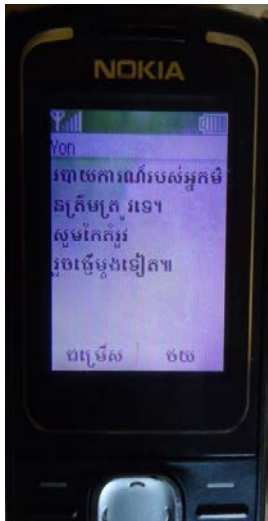
VMW

HC

Species (F,M,V,N)	Age	Sex (F,M)	Day (RDT Test)	Mobile	Village code for current address
_ _	_ _	_ _	_ _	.	_ _ _ _ _ _ _

- 
- ▶ Ex: F23M0
 - ▶ Implemented in 5 ODs with 298 VMWs and HC staff provided with basic phones

A unique public / private partnership between CNM, InSTEDD and Mobitel



Activities of training VMW in Koh Sla Health Centre, Kampot



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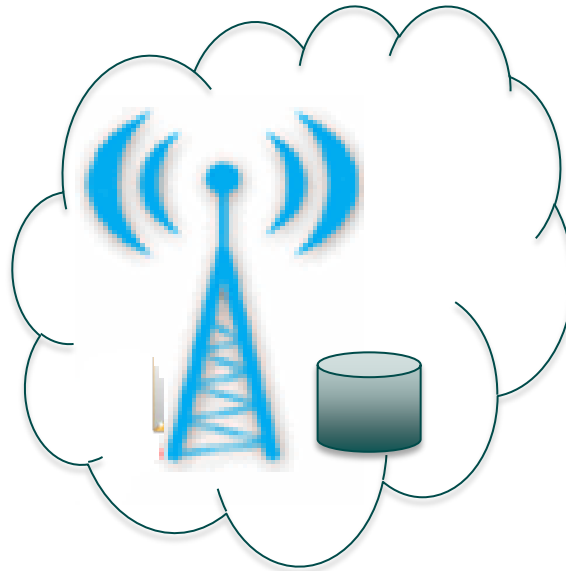
Data Flow of Day 0 Malaria Alert System



Sender
Health Centre



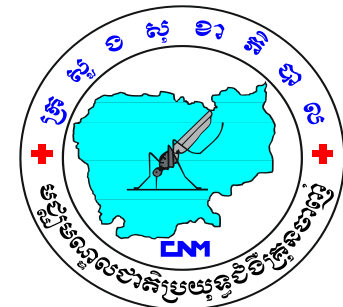
Sender
Village Malaria
Worker



**Day 0 Malaria
Alert System**



Receiver
Provincial Health Department
Operational District



Receiver
National Malaria Control

Day 0 Malaria Alert System



malaria consortium
disease control. better health.



admin@md0.com | [Home](#) | [Users](#) | [Thre](#)



You are here: **National**

Provinces

01 Banteay Meanchey
02 Battambang
03 Kampong Cham
04 Kampong Chhnang
05 Kampong Speu
06 Kampong Thom
07 Kampot
23 Kep
09 Koh Kong
10 Kratie
11 Mondul Kiri
22 Oddar Meanchey
24 Pailin
13 Preah Vihear
15 Pursat
16 Ratanak Kiri
17 Siem Reap
18 Sihanoukville
19 Stung Treng
21 Takeo

Users

Province users (0) ☐
OD users (5) ☐
HealthCenter users (8) ☐
Village users (191) ☐

Send SMS

Displaying messages 1 - 20 of 1477 in total

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1

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Next →

Date	Sender	Sender number	Text	Type	Age	Sex	Mobile?	Reported at	Health Center	Village
3 minutes ago	Damrei Phong	85595705662	m23	invalid sex edit			No		070414 Steung Keo	07071509 Damrei Phong
3 minutes ago	Anlong Makprang	85595705661	M300m	M	300	Male	No	village	070414 Steung Keo	07071505 Anlong Makprang
5 minutes ago	Damrei Phong	85595705662	M36f	M	36	Female	No	village	070414 Steung Keo	07071509 Damrei Phong
8 minutes ago	Anlong Makprang	85595705661	M30m.	M	30	Male	Yes	village	070414 Steung Keo	07071505 Anlong Makprang
13 minutes ago	Damrei Phong	85595705662	M25f	M	25	Female	No	village	070414 Steung Keo	07071509 Damrei Phong
16 minutes ago	Damrei Phong	85595705662	M35f.	M	35	Female	Yes	village	070414 Steung Keo	07071509 Damrei Phong
20 minutes ago	Damrei Phong	85595705662	M32f.	M	32	Female	Yes	village	070414 Steung Keo	07071509 Damrei Phong
25 minutes ago	Damrei Phong	85595705662	F65m.	F	65	Male	Yes	village	070414 Steung Keo	07071509 Damrei Phong
27 minutes ago	Damrei Phong	85595705662	M32f	M	32	Female	No	village	070414 Steung Keo	07071509 Damrei Phong
30 minutes ago	Damrei Phong	85595705662	F44f	F	44	Female	No	village	070414 Steung Keo	07071509 Damrei Phong
36 minutes ago	Damrei Phong	85595705662	M36m	M	36	Male	No	village	070414 Steung Keo	07071509 Damrei Phong
39 minutes ago	Damrei Phong	85595705662	F23f	F	23	Female	No	village	070414 Steung Keo	07071509 Damrei Phong
39 minutes ago	Anlong Makprang	85595705661	M360f	M	360	Female	No	village	070414 Steung Keo	07071505 Anlong Makprang
39 minutes ago	Damrei Phong	85595705662	F23f	F	23	Female	No	village	070414 Steung Keo	07071509 Damrei Phong
39 minutes ago	Anlong Makprang	85595705661	M30m	M	30	Male	No	village	070414 Steung Keo	07071505 Anlong Makprang
39 minutes ago	Anlong Makprang	85595705661	M30m	M	30	Male	No	village	070414 Steung Keo	07071505 Anlong Makprang
42 minutes ago	Anlong Makprang	85595705661	M30m	M	30	Male	No	village	070414 Steung Keo	07071505 Anlong Makprang
about 1 hour ago	Anlong Makprang	85595705661	F25m.	F	25	Male	Yes	village	070414 Steung Keo	07071505 Anlong Makprang
about 1 hour ago	Damrei Phong	85595705662	F45m	F	45	Male	No	village	070414 Steung Keo	07071509 Damrei Phong
about 1 hour ago	Anlong Makprang	85595705661	F25f.	F	25	Female	Yes	village	070414 Steung Keo	07071505 Anlong Makprang

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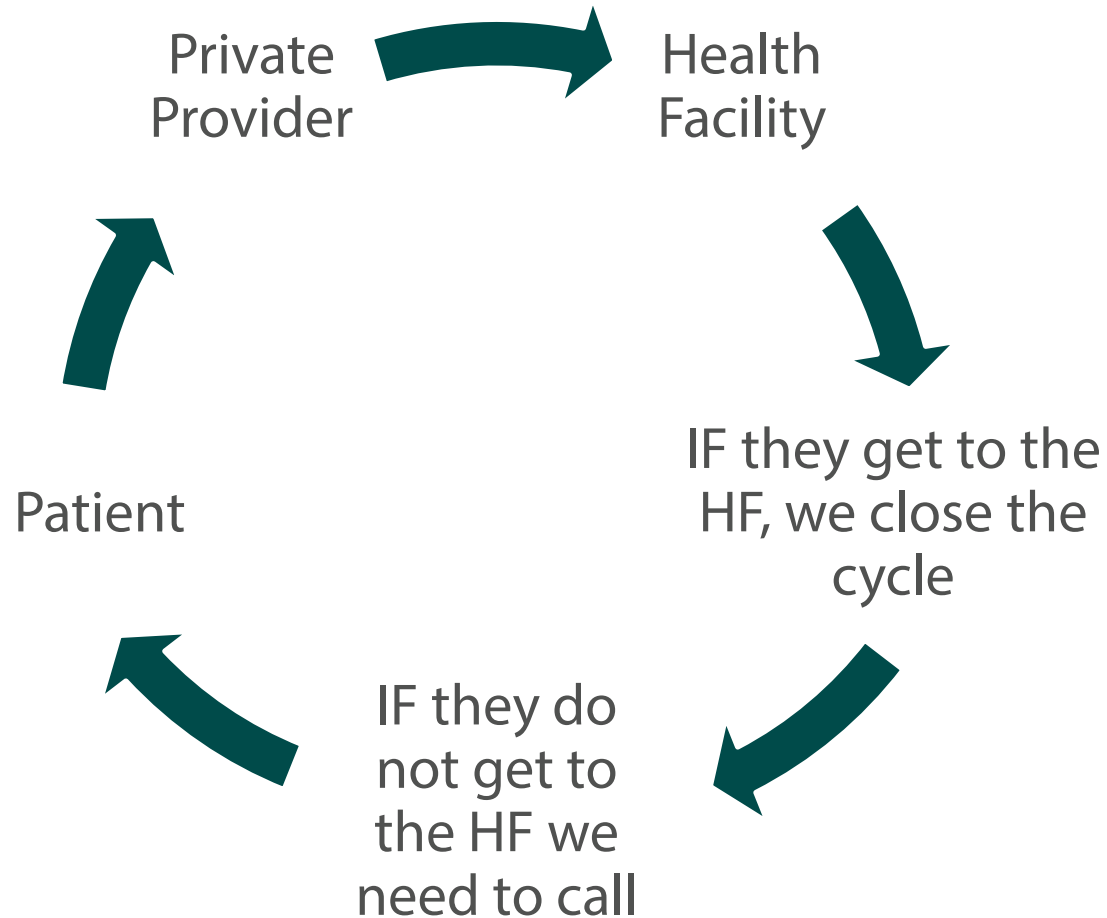
Next →

Use this to send a free SMS message to VMWs in Khmer

Malaria Cases Plotted on Google Map



Referral System



Challenges

Malaria Information System

- ▶ Incentive for staff who are responsible for Malaria Information System at operational district level
- ▶ Data management and information technology knowledge of operational district staff are still limited
- ▶ There are a lot of changes of health and administrative structure (village, health centre, operational district were changed or created)
- ▶ Lack of staff to monitor or check the data quality control

Day 0 Malaria Alert System

- ▶ Difficult for training them on how to use the phone
- ▶ Some phones are broken or lost
- ▶ The coverage area network of mobile company that we are collaborating is limited

Next Steps

Malaria Information System

- ▶ Upgrade MIS to web-base system
- ▶ Strengthen the data quality control
- ▶ Refresher training every year
- ▶ Update Malaria Information System following National Malaria Control and Operational District staff requirement

Day 0 Malaria Alter System

- ▶ Deals with other mobile operators
- ▶ National Malaria Control Program will implement this system in other Operational Districts in next year.
- ▶ Day zero software would require some minor modification
- ▶ Replace basic phone with smart phone?

Next Steps

Why smart phone?

Pro	Con
Friendly user interface	More expensive than feature phone
Can collect more information	High cost of maintenance
Reduce invalid data that send from user	
The price is decreasing everyday	

Lessons Learned

Malaria Information System

- ▶ Easy to manage, maintain and extract the data
- ▶ Improving Malaria Information System in Cambodia
- ▶ Build the capacity of National Malaria Control and operational district staff in terms of Data Management
- ▶ Get feed back from OD staff to update bulletin in Khmer

Day 0 Malaria Alert System

- ▶ Introduce the new technology to community level
- ▶ Get information from remote area in real time with low cost
- ▶ Effective low cost communication system linking all VMWs and health centres with national and district staff
- ▶ Cost effective (\$100 per user setup costs) uses simple phones with minimal ongoing costs
- ▶ Phones use Khmer script and software can send SMS to all, or defined groups of users (such as health information messages to all VMWs in a province) for free

Acknowledgements





a decade in communicable disease control and child health

www.malariaconsortium.org

Thank you



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RESEARCH