

Cassava Mosaic Virus Disease and Cassava Witches' Broom Disease Surveillance

Project: Establishing sustainable solutions to cassava diseases in mainland
Southeast Asia

15th December 2020
Phnom Penh, Cambodia

Dr. Ny Vuthy

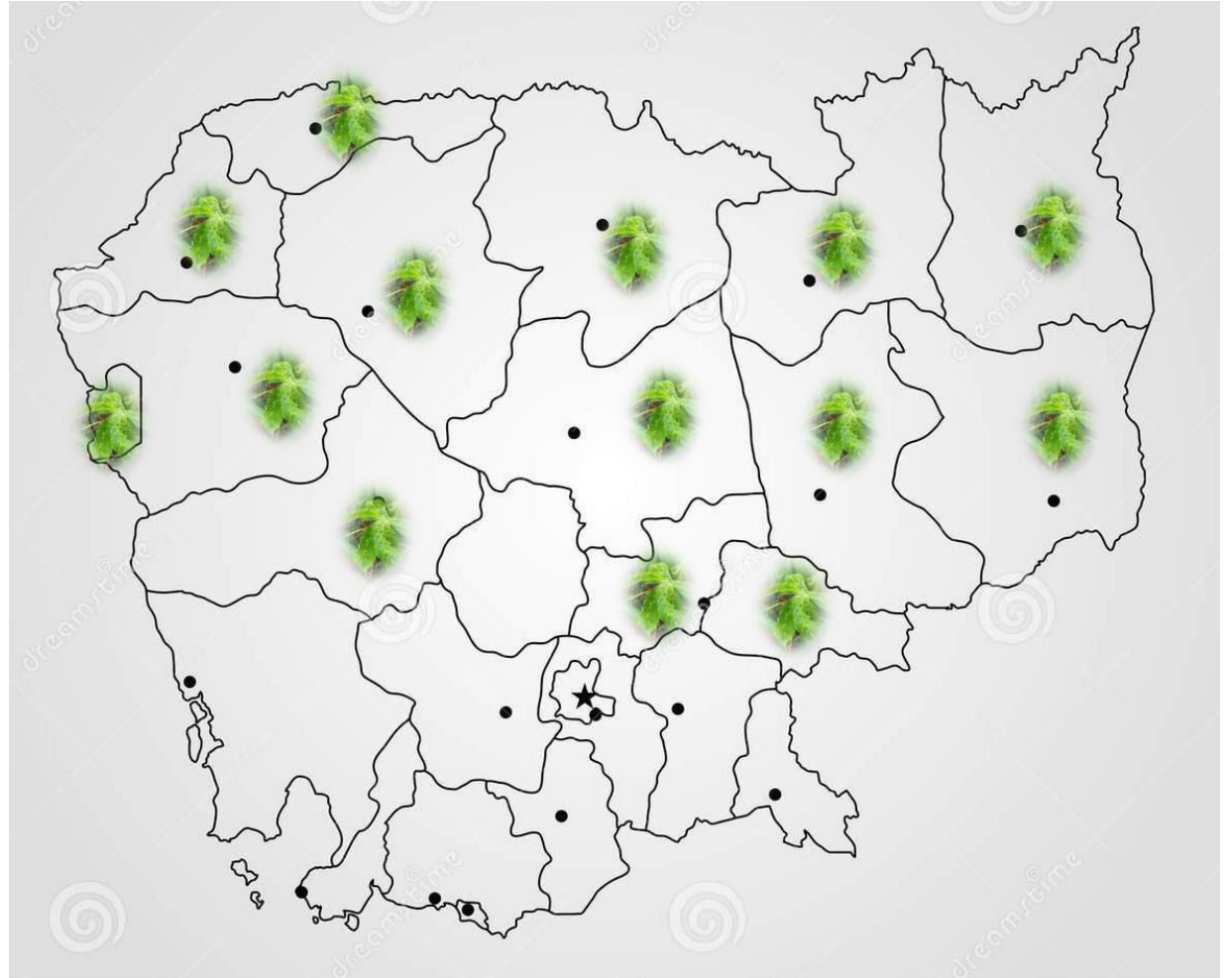
Deputy-Director

Plant Protection Sanitary and Phytosanitary Department



Site Suviellance

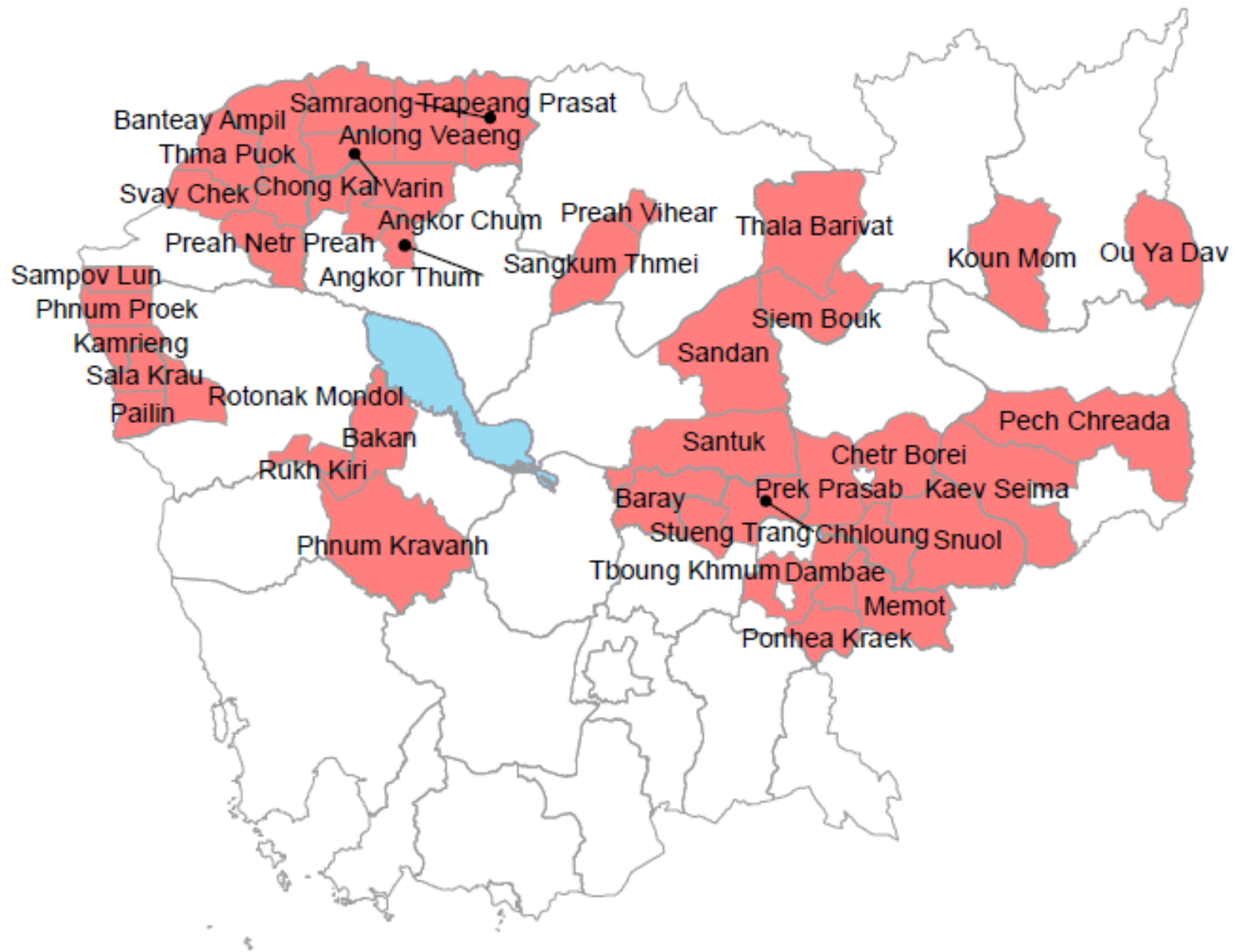
- There are 14 provinces that selected to conduct CMD and CWBD.
 1. Banteay Meanchey
 2. Battambang
 3. Odor Meanchey
 4. Pailin
 5. Preah Vihear
 6. Pursat
 7. Siem Reap
 8. Kampong Cham
 9. Kampong Thom
 10. Kratie
 11. Mondulkiri
 12. Ratanakiri
 13. Steung Treng
 14. Tboung Khmum



Province	District	Area of cassava (ha)	Villages	No. field
Banteay Meanchey	Thmor Pouk	37694	4	8
Banteay Meanchey	Svay Chek	27100	3	6
Banteay Meanchey	Phnom Srok	18600	2	4
Banteay Meanchey	Malai	10680	2	4
Banteay Meanchey	Preah Netpreah	7364	1	2
Battambang	Sam Lout	23665	3	6
Battambang	Ratanak Mundul	21294	2	4
Battambang	Kamrieng	16518	2	4
Battambang	Phnom Preuk	13700	2	4
Battambang	Sampeuv Lun	13050	2	4
Battambang	Roukhakiri	13049	2	4
Oddar Meanchey	Trapaing Prasat	19705	2	4
Oddar Meanchey	Banteay Ampil	12834	2	4
Oddar Meanchey	Anlong Veng	11750	2	4
Oddar Meanchey	Chong Kal	9474	1	2
Oddar Meanchey	Samrong	7263	1	2
Pailin	Salakrav	21945	3	6
Pailin	Pailin Municipality	20165	2	4
Preah Vihear	Preah Vihear	4500	1	2
Preah Vihear	Sangkom Thmey	4121	1	2
Pursat	Phnom Kravanh	8767	1	2
Pursat	Bakan	5262	1	2
Siem Reap	Srey Snorm	7900	1	2
Siem Reap	Angkor Chum	7310	1	2
Siem Reap	Angkor Thom	5775	1	2
Siem Reap	Varin	4400	1	2

Province	District	Area of cassava (ha)	Villages	No. field
Kampong Cham	Chamkar Leu	10173	1	2
Kampong Cham	Steung Trang	9670	1	2
Kampong Thom	Santouk	15893	2	4
Kampong Thom	Sandan	14485	2	4
Kampong Thom	Baray	13382	2	4
Kratie	Snuol	39035	5	10
Kratie	Prek Prasob	13005	2	4
Kratie	Chhloung	9090	1	2
Kratie	Cheut Borey	8521	1	2
Mondulkiri	Keo Seyma	6874	1	2
Mondulkiri	Pech Chreada	5709	1	2
Ratanakiri	Kun Mum	3690	1	2
Ratanakiri	Ou Yadav	3285	1	2
Steung Treng	Thalaborivat	5010	1	2
Steung Treng	Siembouk	3286	1	2
Tboung Khmum	Memot	21800	2	4
Tboung Khmum	Dambae	17130	2	4
Tboung Khmum	Punnheakrek	7200	1	2
Tboung Khmum	Tbong Khmum	5130	1	2

2 fields per village is selected for surveillance;
totally **there are 150 fields** will conduct surveillance in country.



Map: Jonathan Newby

Field sampling: Whiteflies, Cassava Mosaic Disease (CMD) and Cassava Witches' Broom Disease (CWBD)

Wilmer J. Cuellar; Maria I. Gomez, Virology Laboratory, Crops for Nutrition and Health, International Center for Tropical Agriculture (CIAT), The Americas Hub, Colombia.

Before you go to the field

1 -Prepare the following materials

- [Ziploc bags](#) of 10 x 10 cm (see figure below). Each bag should have written the Date, Field and Location identifiers e.g. 01/06/20; F1; Tay Ninh.
- Prepare each Ziploc bag with 20 g of silica gel.
- You should collect 60 leaf samples per field (see below) and each bag can contain 4 samples. So that per each field you will have a total of 15 Ziplock bags.
- A GPS tracker or a mobile phone that can store the GPS location of photographs (be sure you have your phone with 100% battery or acquire an external charger).
- Tissue paper. 1.5 mL eppendorf tubers (for collecting whiteflies), ethanol 80%, water-proof

Surveillance Protocols

- The field sampling protocol is follows by CIAT-Virology-Crop Protection Protocol v2.0 (*Wilmer J. Cuellar and Maria I. Gomez*)

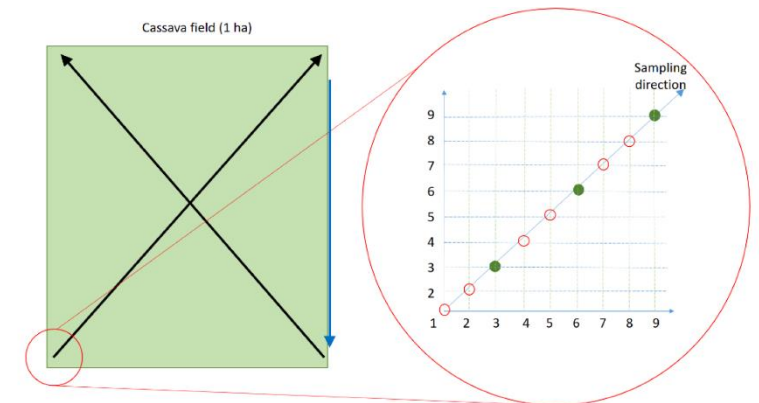


Figure 3. Sampling for CMD (photographs and top leaves) will follow the X pattern indicated by the black arrows (left panel). Sampling for whiteflies (photographs and whitefly collection) should follow only one diagonal (one black arrow). The blue arrow indicates the direction to follow (aprox 100 plants) before starting sampling in the second diagonal. For fields smaller than 1 ha, one should adjust the sampling (every second plant or every plant in the diagonal, but not the final number of samples collected).

Field Data Collection to Report



GeoJot+

Form: 'Sample - Demo'

N 12.20426°
E 105.32123°
126 m

Direction
203° SW

GPS Accuracy
+/- 8 m

Cancel Enter Values Save

Form: 'CMD and CWBD E Suveillance 2020'

Survey ID
Cassava CMD and CWBD e-suveillan... >

Sample Lab Code
1 >

Image
<None> >

Cultiva Name
<None> >

Collection Date (YYYYMM...
<None> >

Country (ISO3)
KHM >

Location Level2
<None> >

Location Level3
<None> >

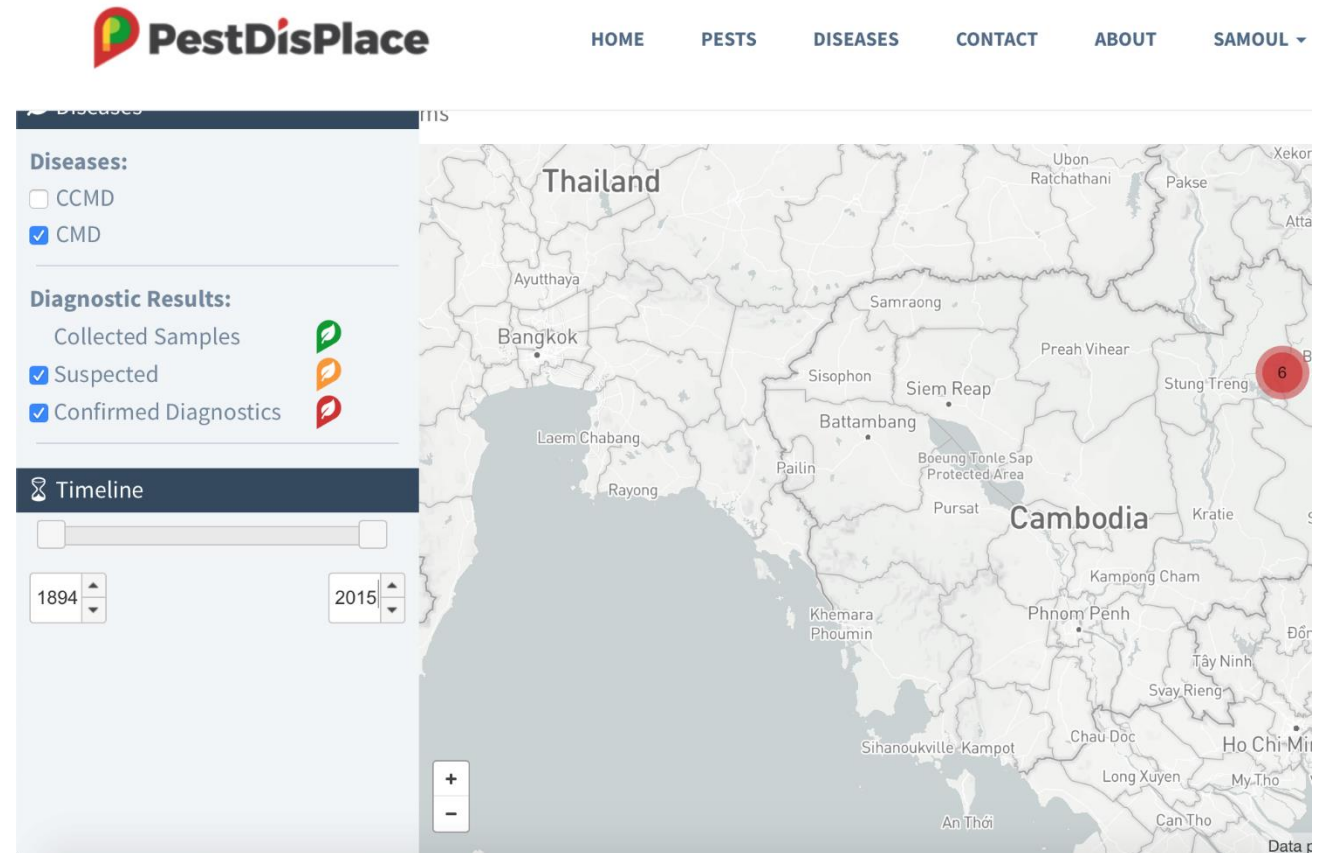
Location Level4
<None> >

Latitude (decimal)
<None> >

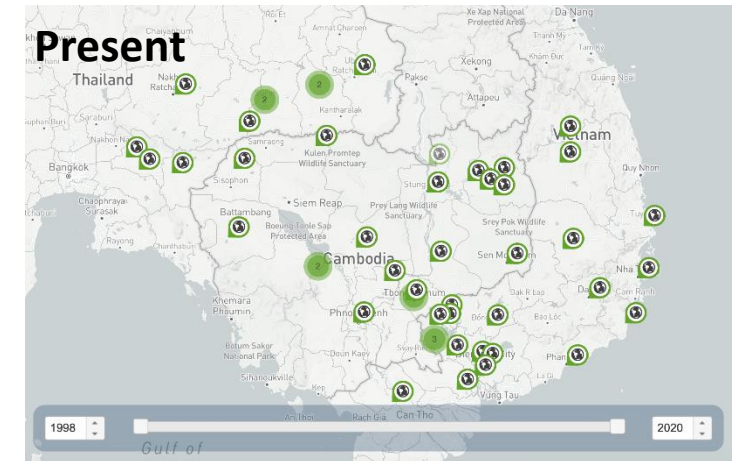
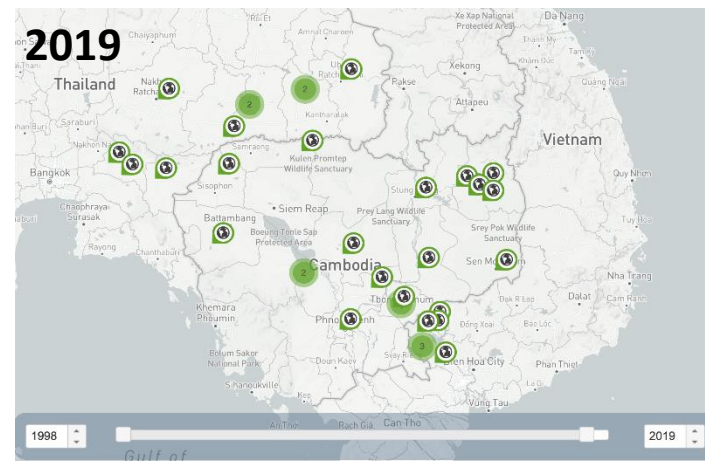
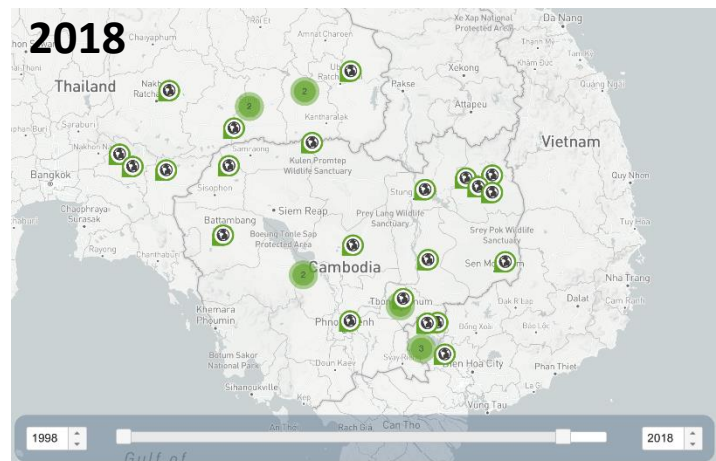
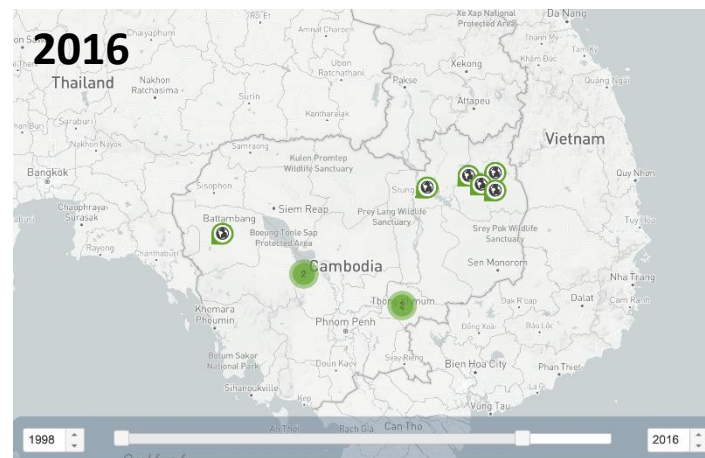
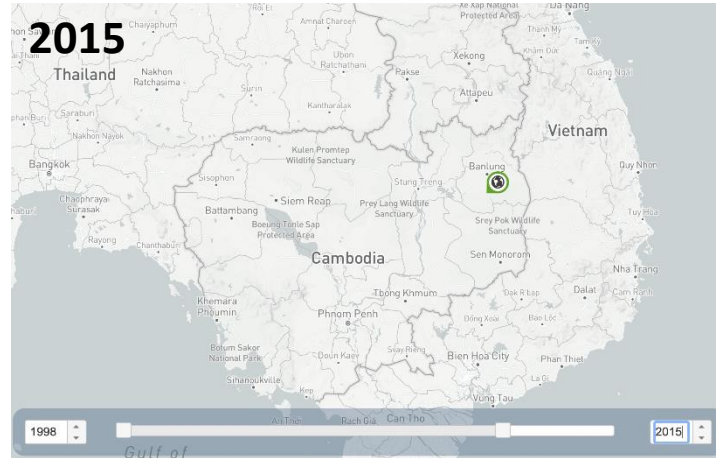
Longitude (decimal)
>

Cassava Mosaic Virus Disease (CMD)

- In May 2015, Sri Lankan cassava mosaic virus (SLCMV) was reported for the first time infecting cassava in Eastern Cambodia.
- The report consisted of positive virus detection from a single commercial plantation with symptomatic plants in Ratanakiri province



CMD Distribution



Source: <https://www.pestdisplace.org>

ផែនទីបង្ហាញការចម្លងជំងឺប្រូតេអ៊ីនប្រភេទកូរ៉ូណា
The Primary Epidemic Map of CMD in Cambodia

សហភាពកម្ពុជា
ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

សហភាពកម្ពុជា
ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

សញ្ញាស្ថានីយ៍
 □ ព្រំប្រទល់ខេត្ត
 ● ទីរួមខេត្ត

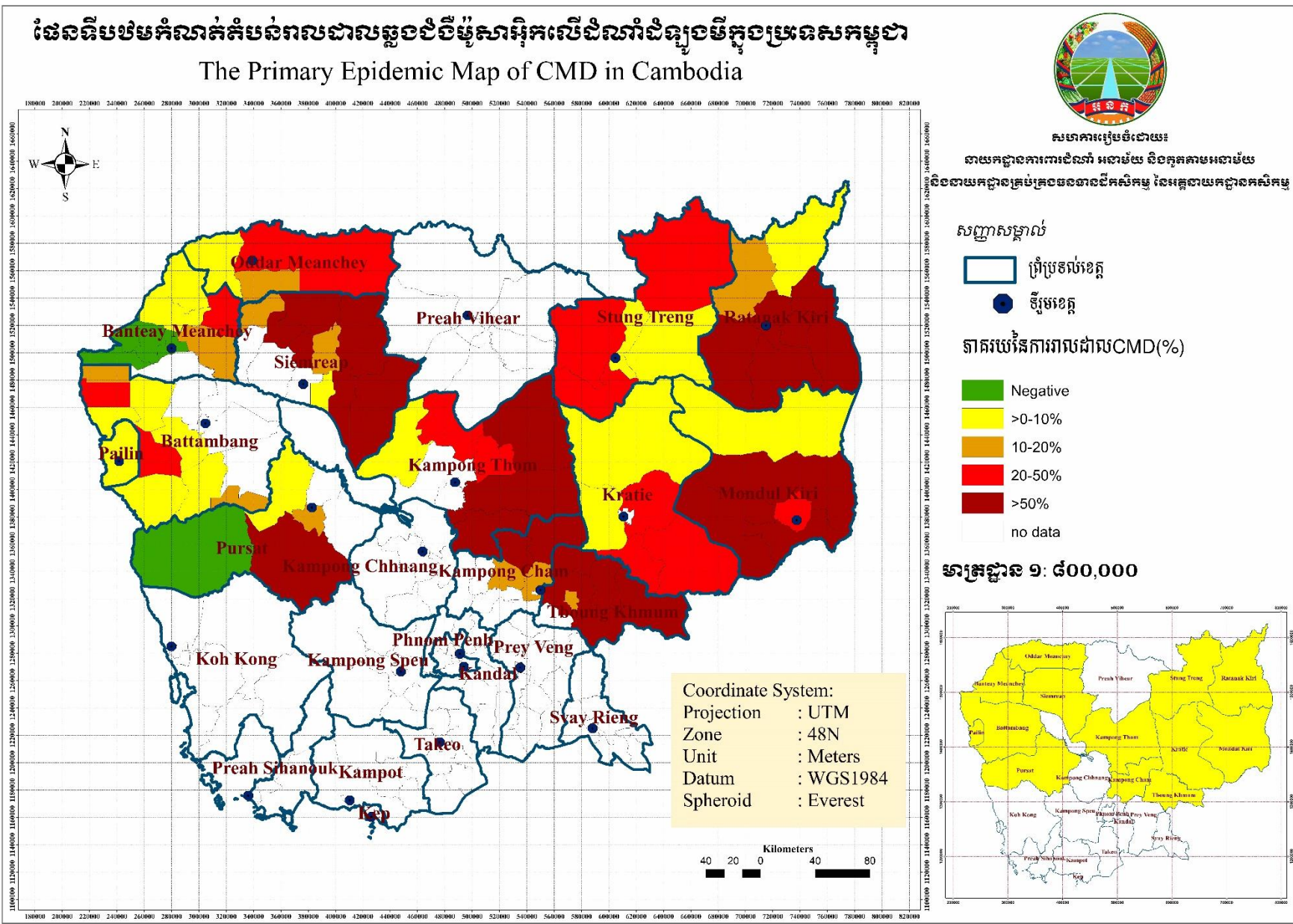
ភាគរយនៃការរាលដាលជំងឺប្រូតេអ៊ីនប្រភេទកូរ៉ូណា (%)

- Negative
- >0-10%
- 10-20%
- 20-50%
- >50%
- no data

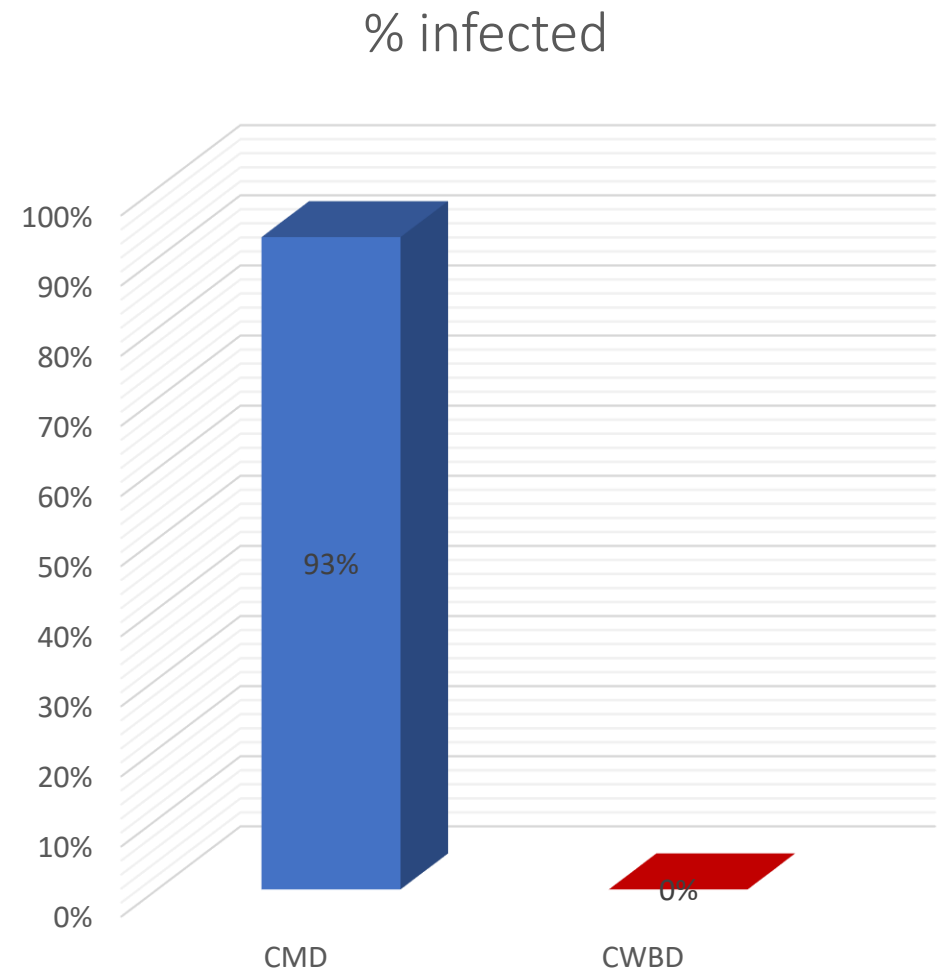
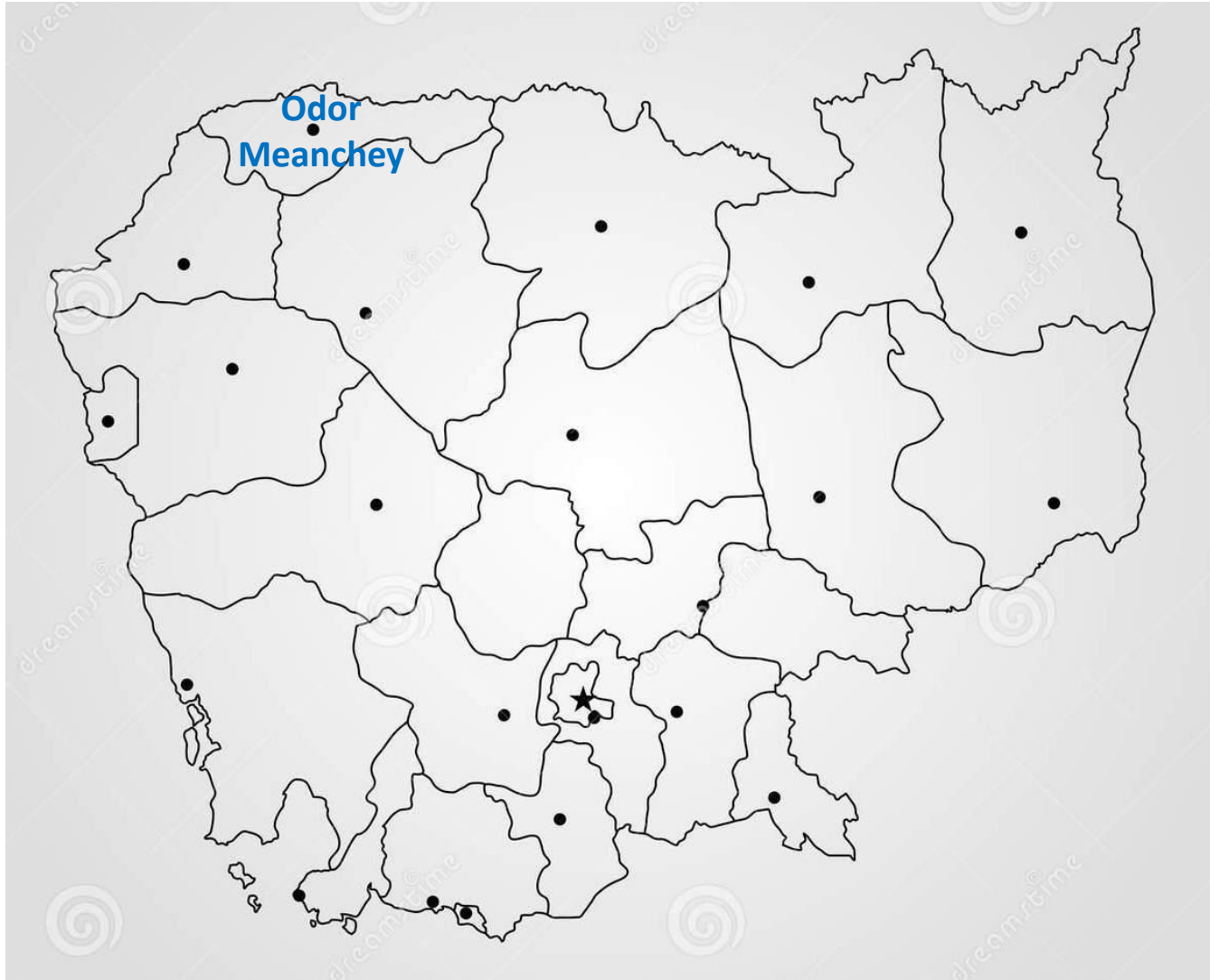
ឯកត្យាង្គ ១: ៨០០,០០០

Coordinate System:
 Projection : UTM
 Zone : 48N
 Unit : Meters
 Datum : WGS1984
 Spheroid : Everest

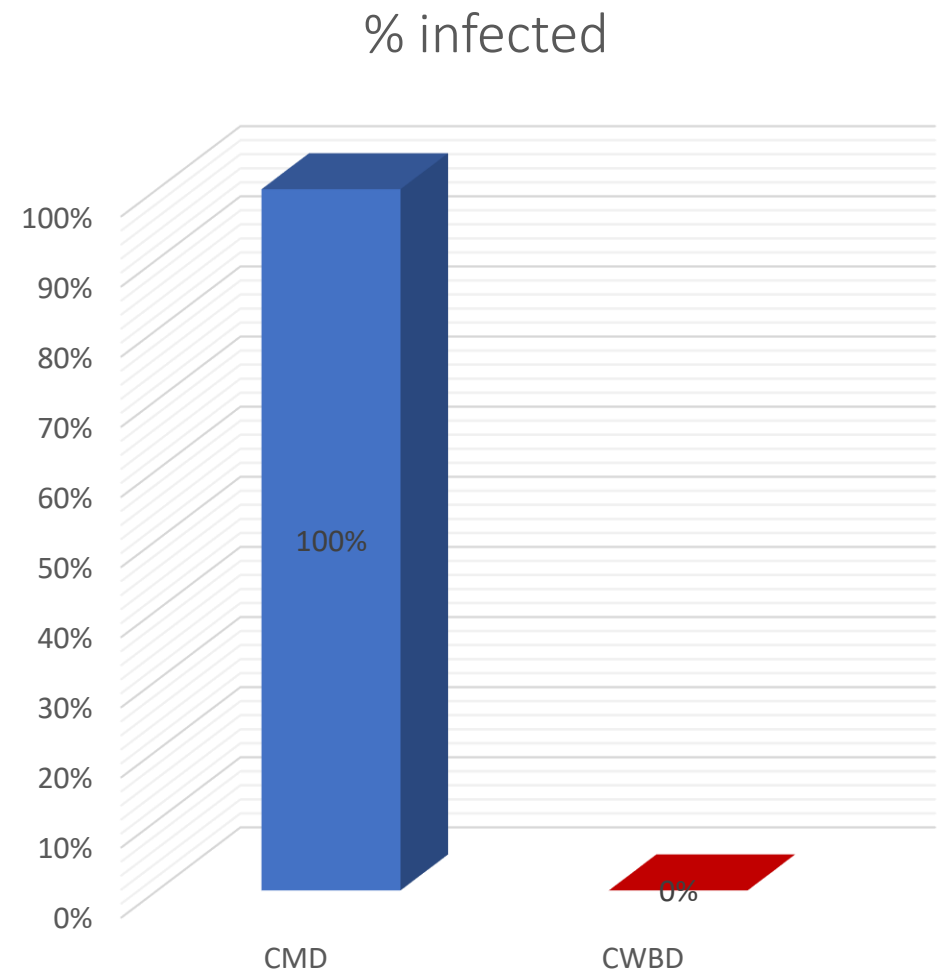
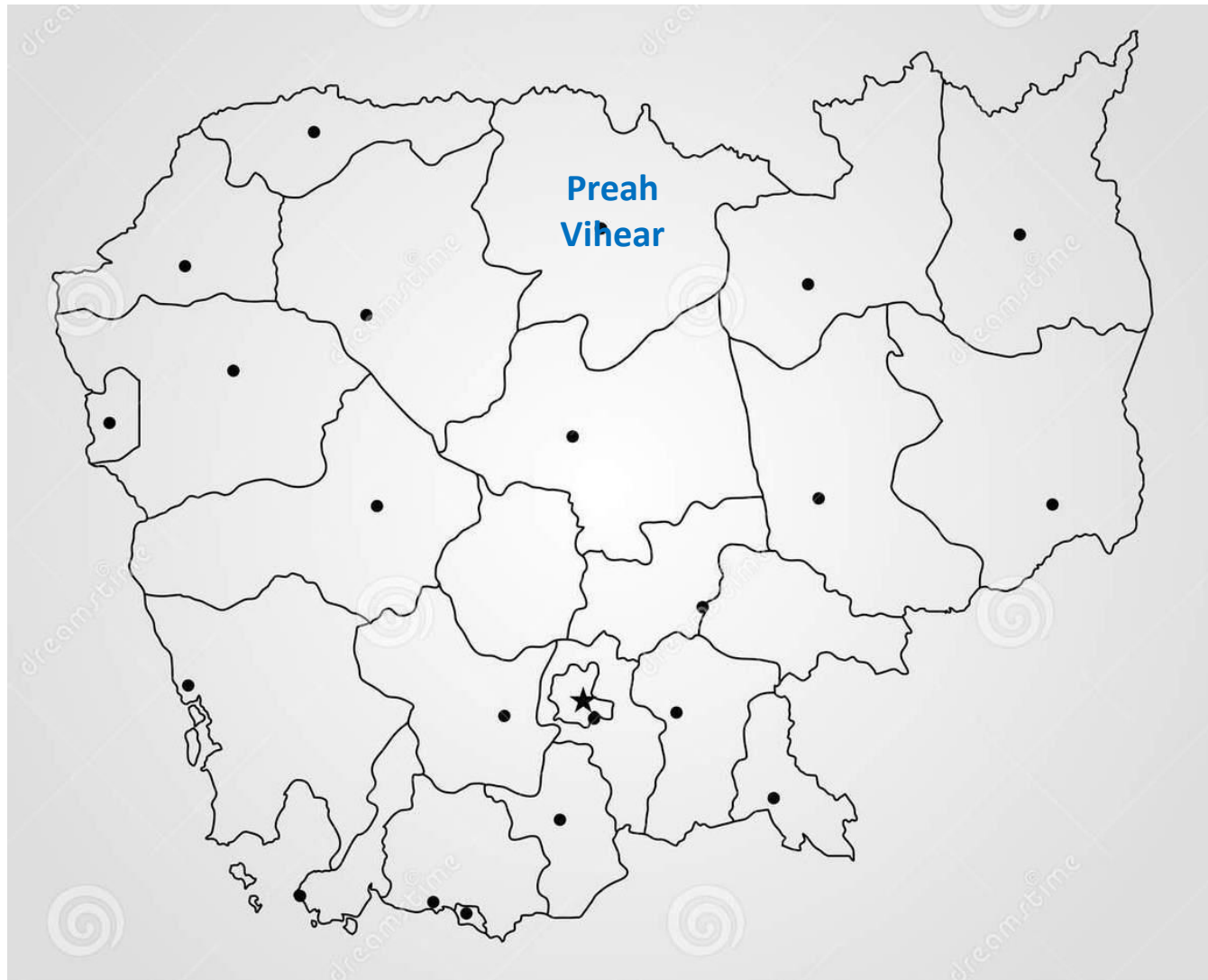
Kilometers
 40 20 0 40 80



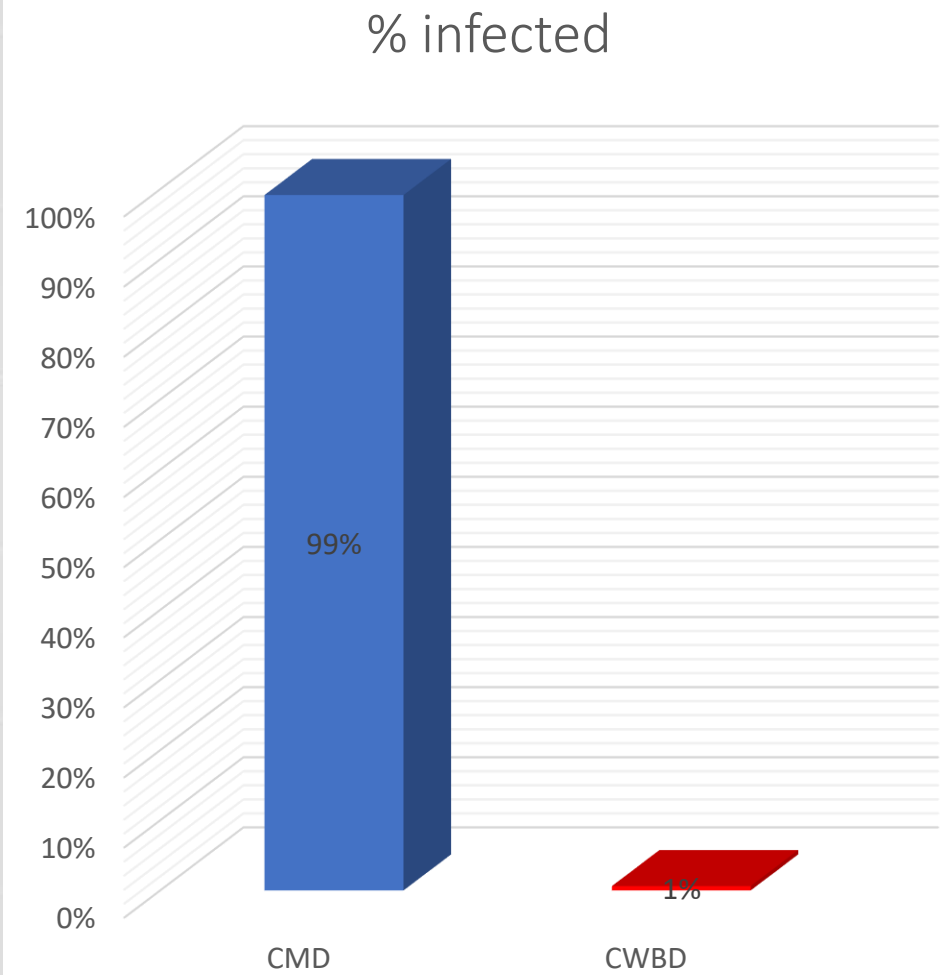
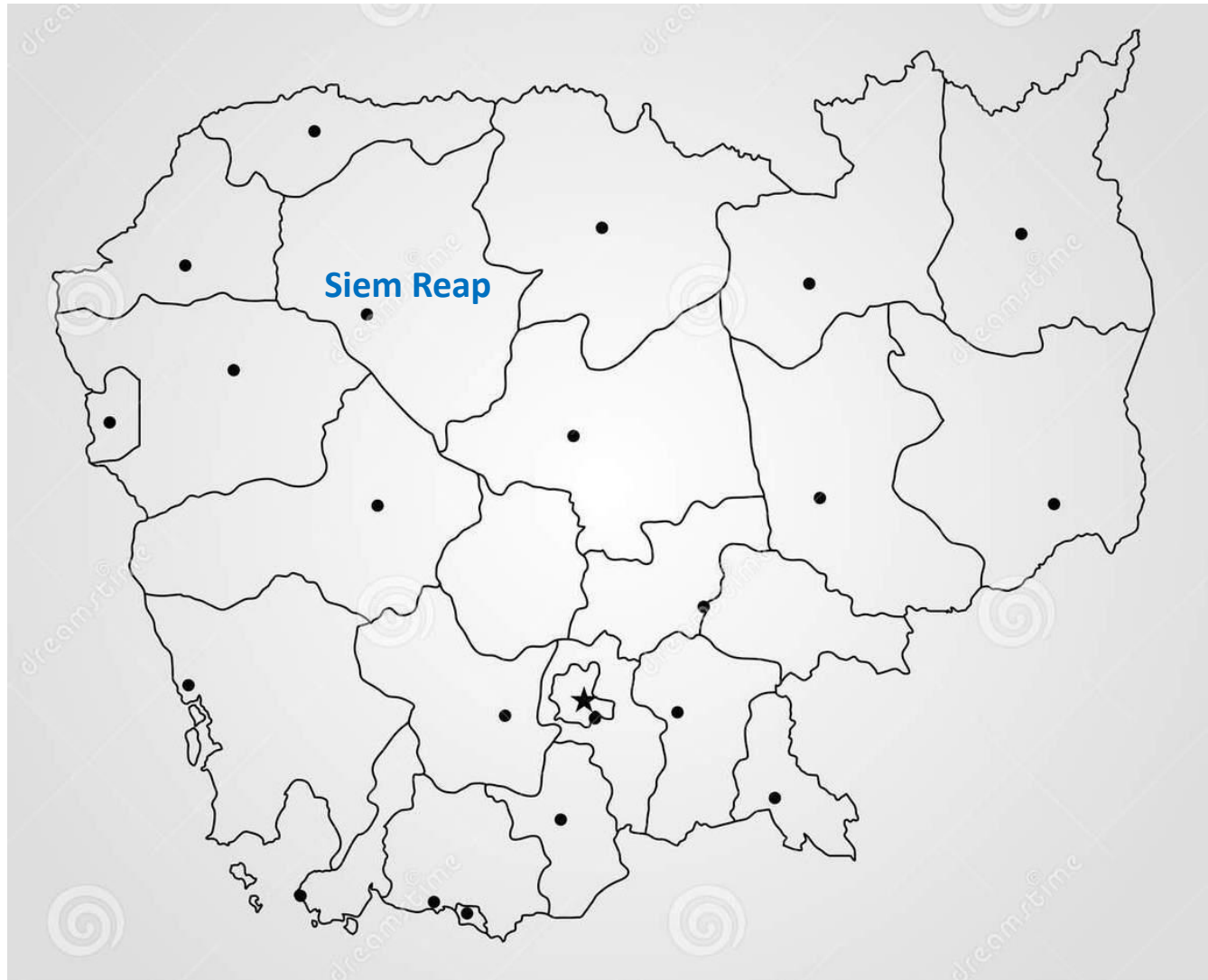
Results



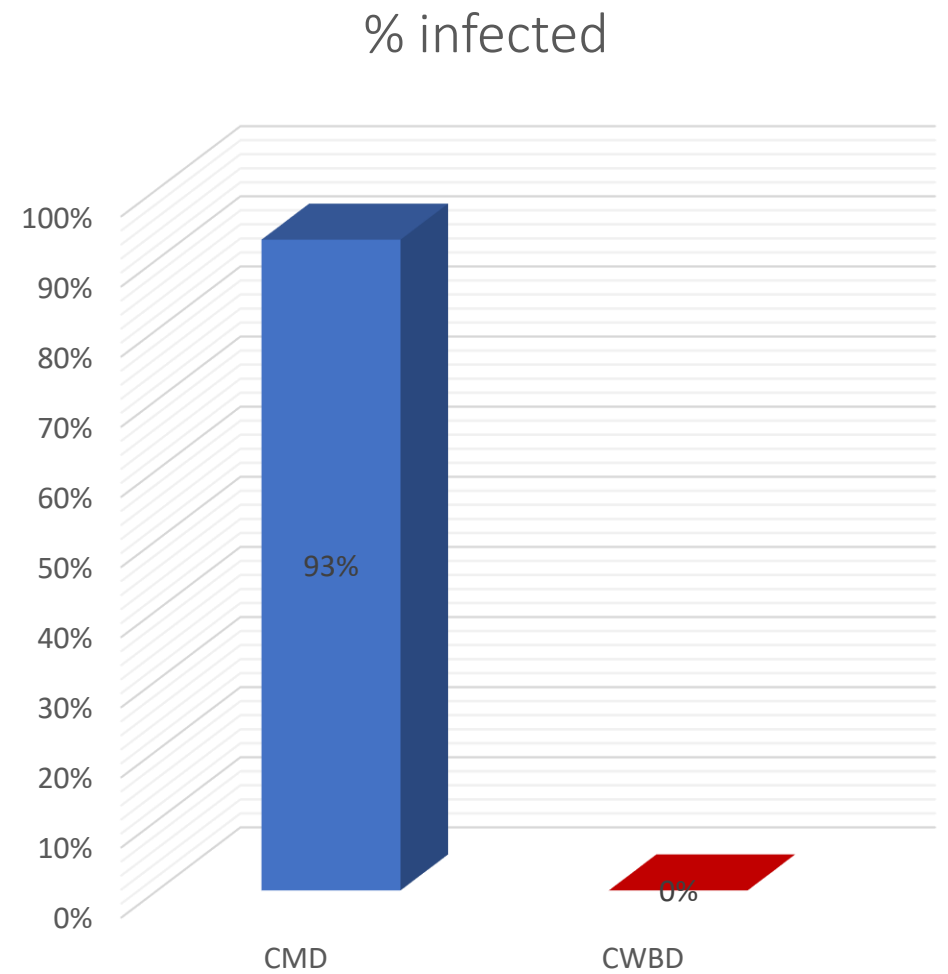
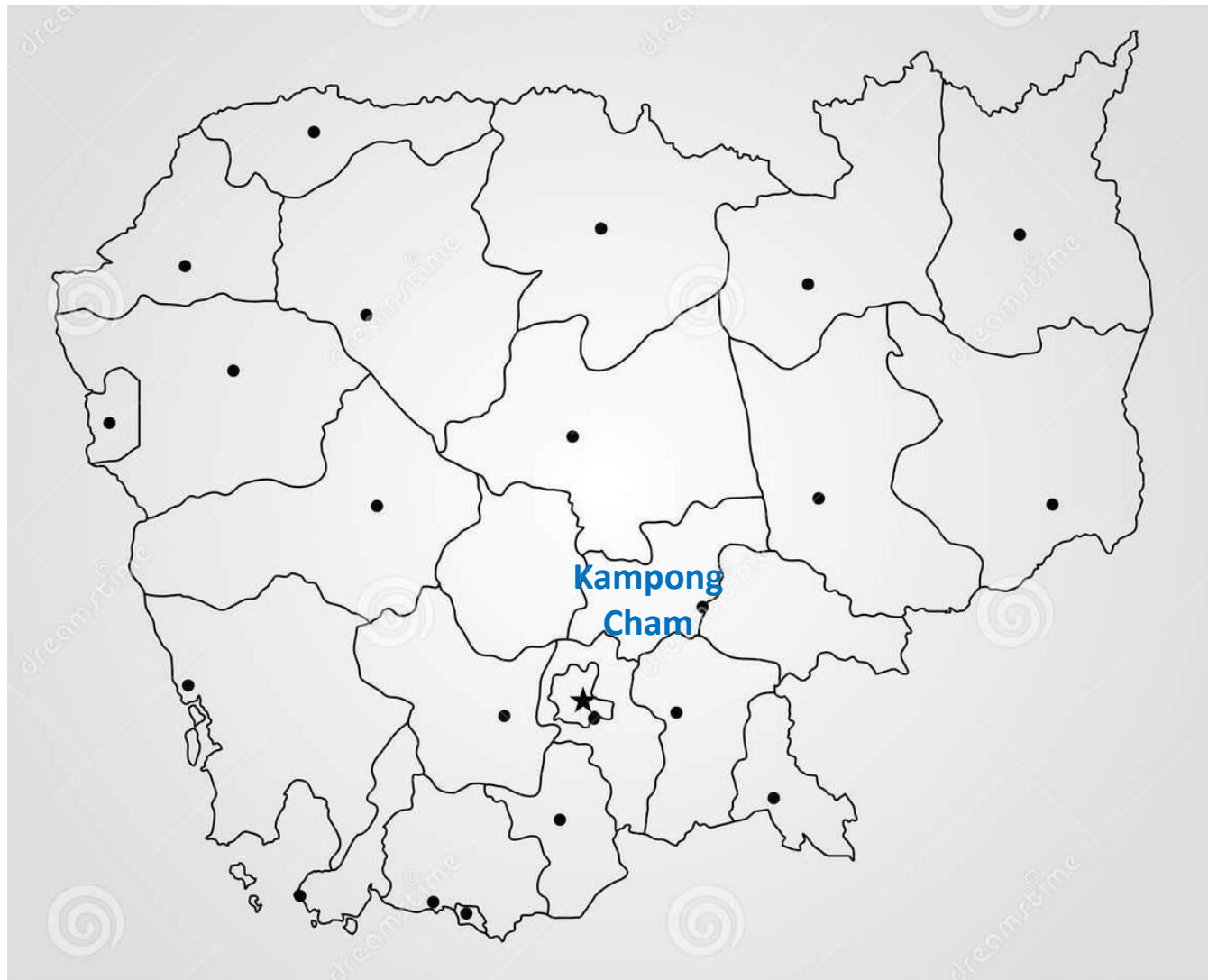
Results



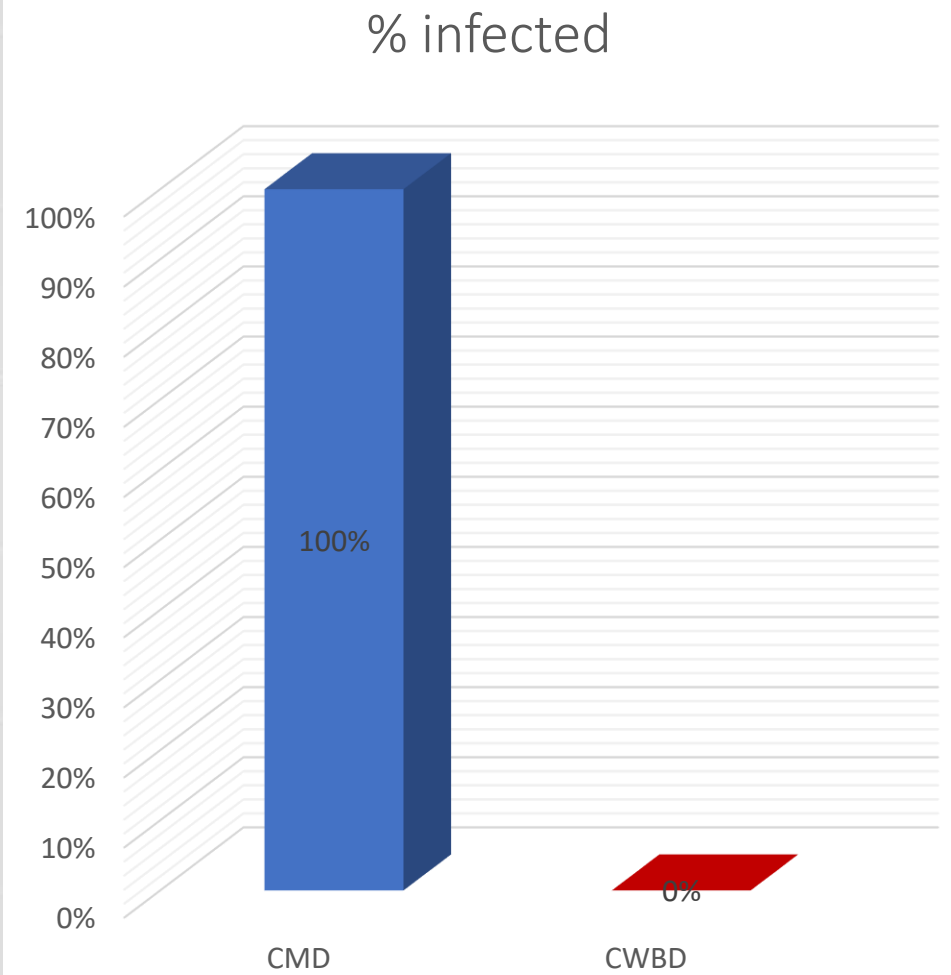
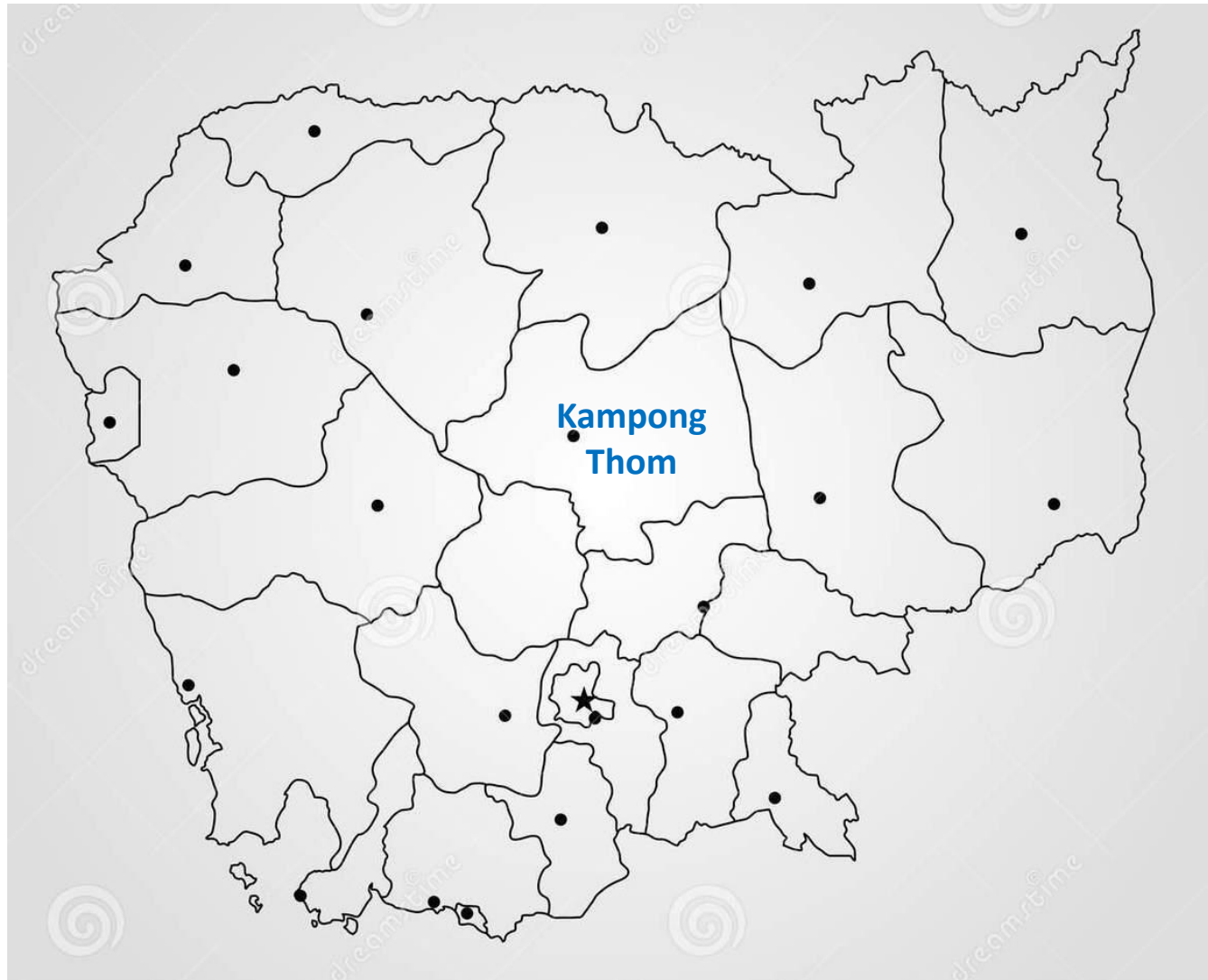
Results



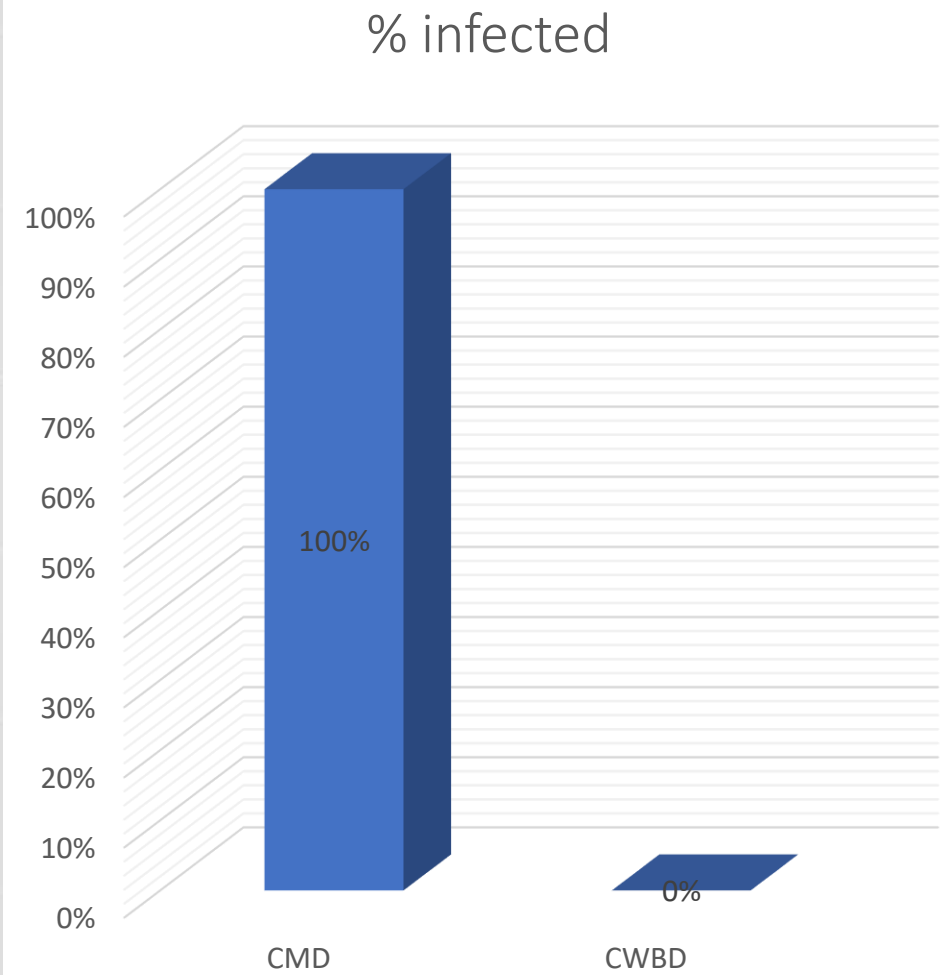
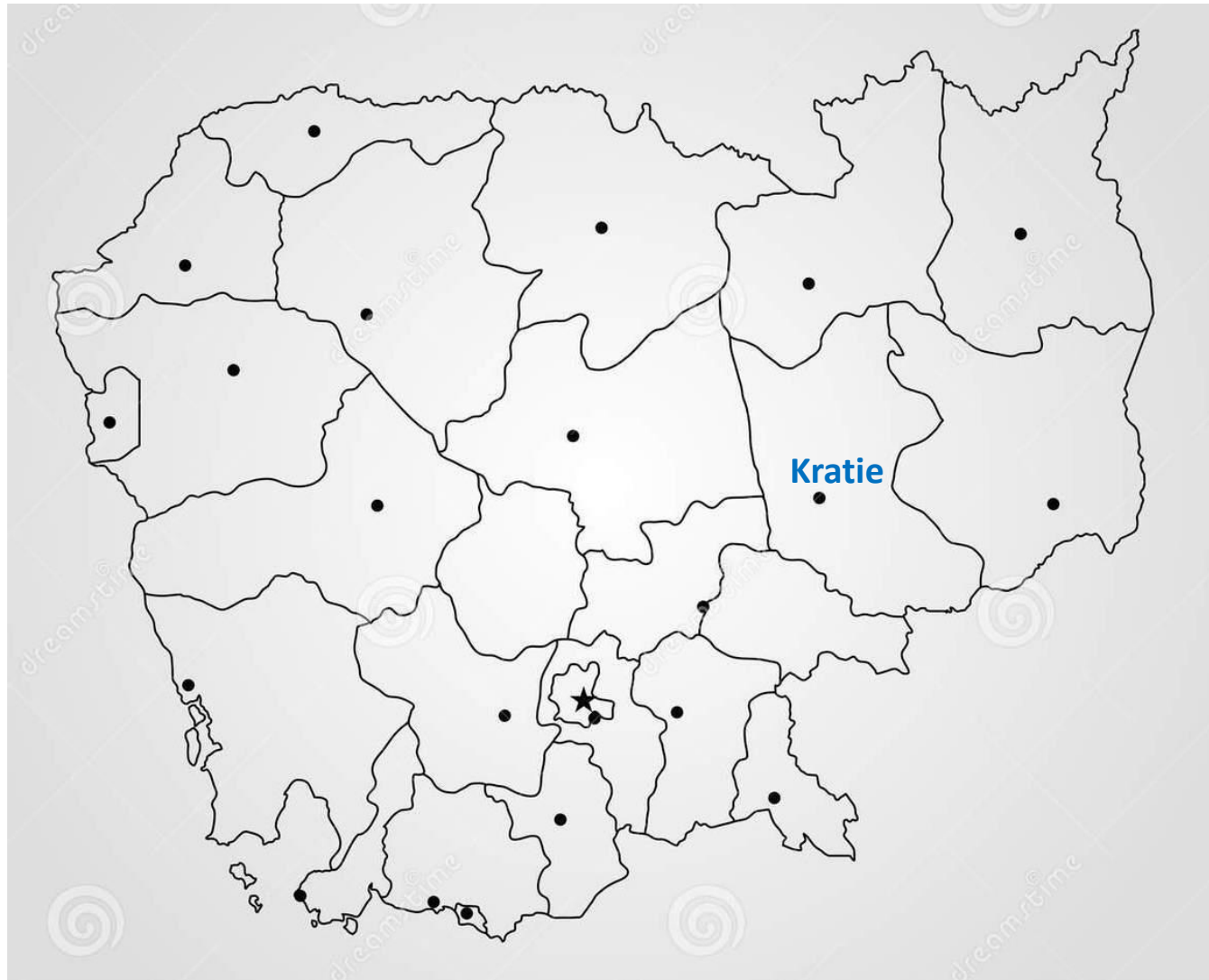
Results



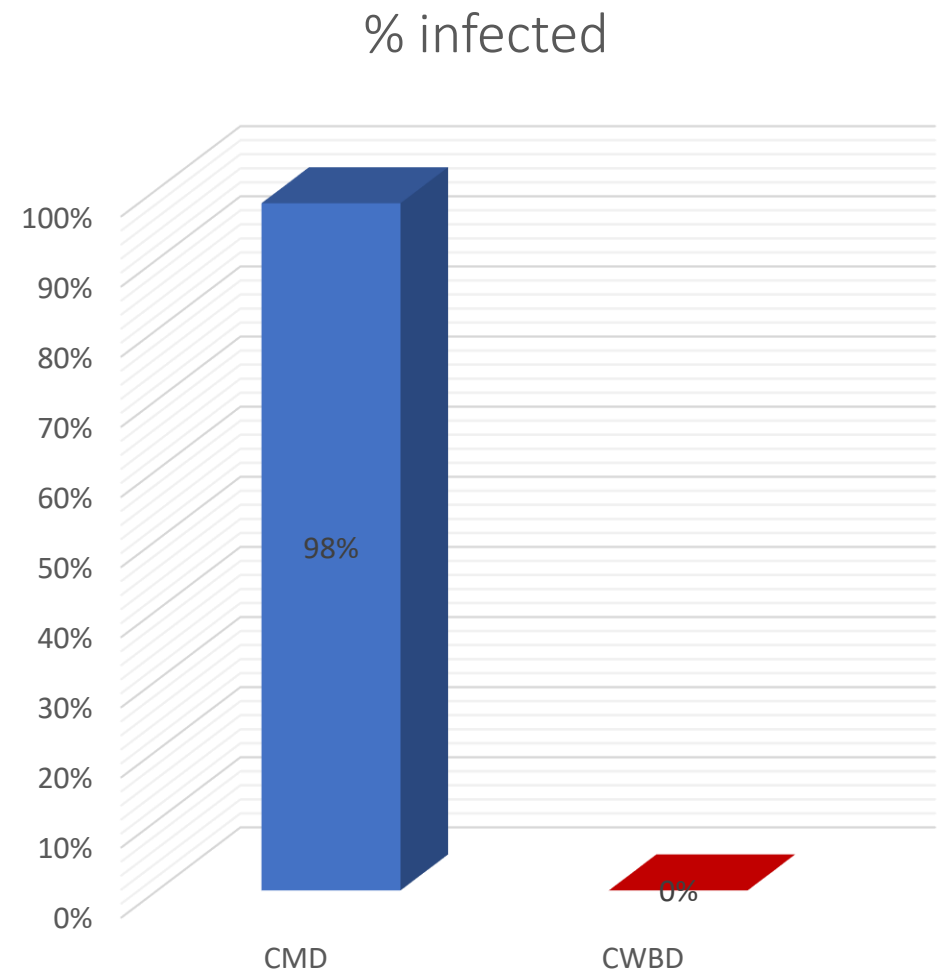
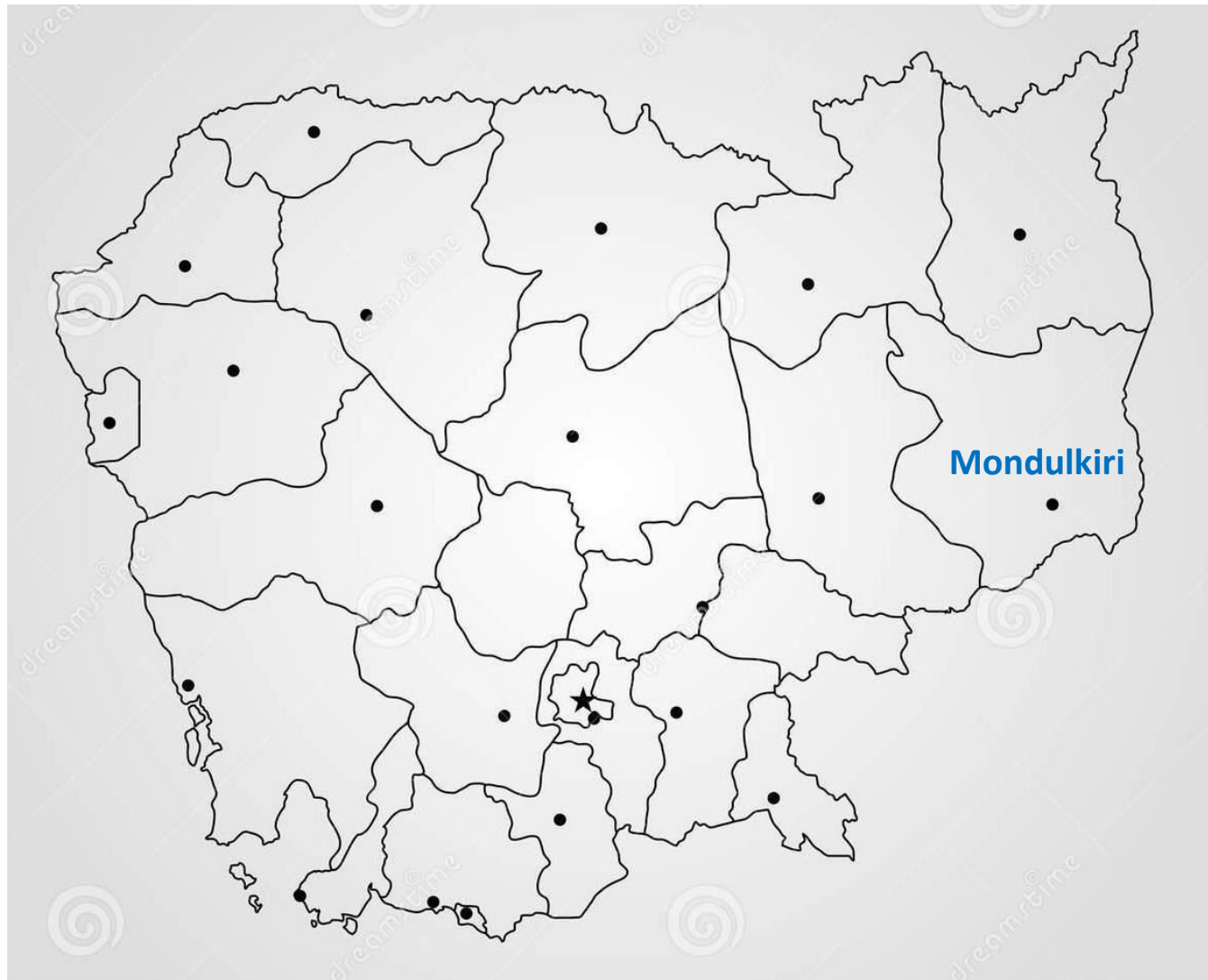
Results



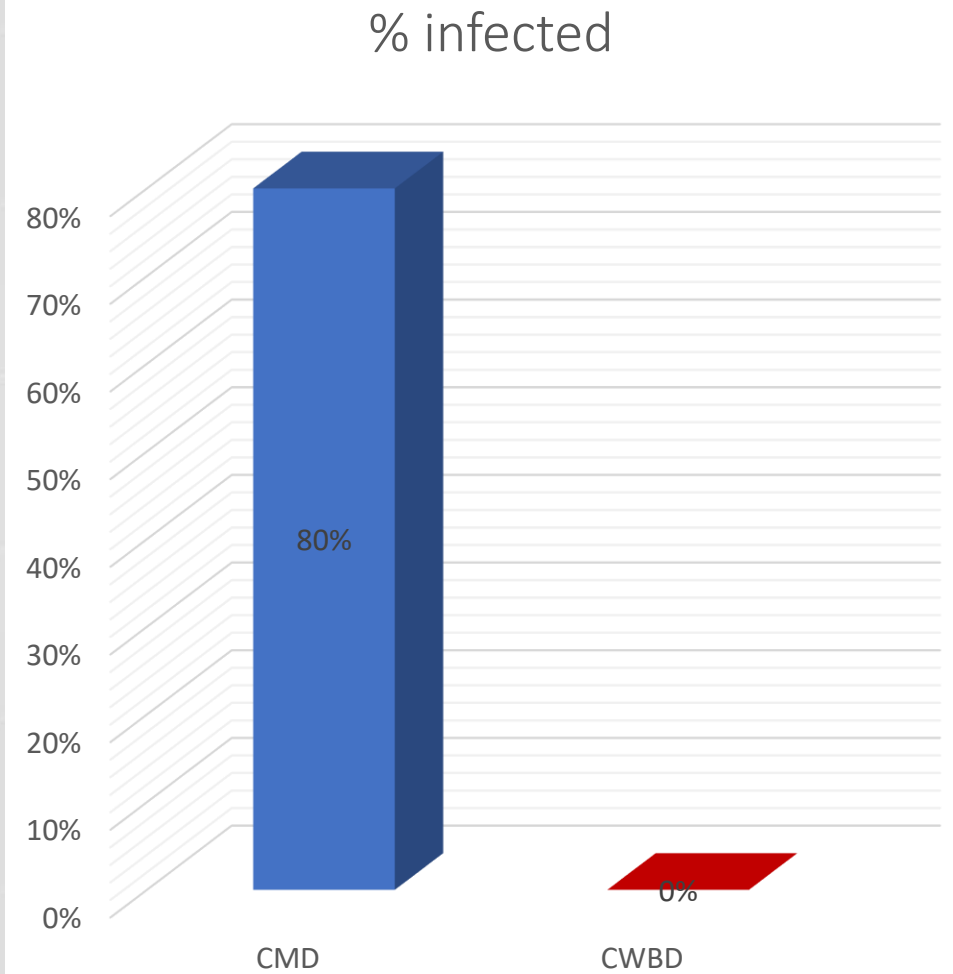
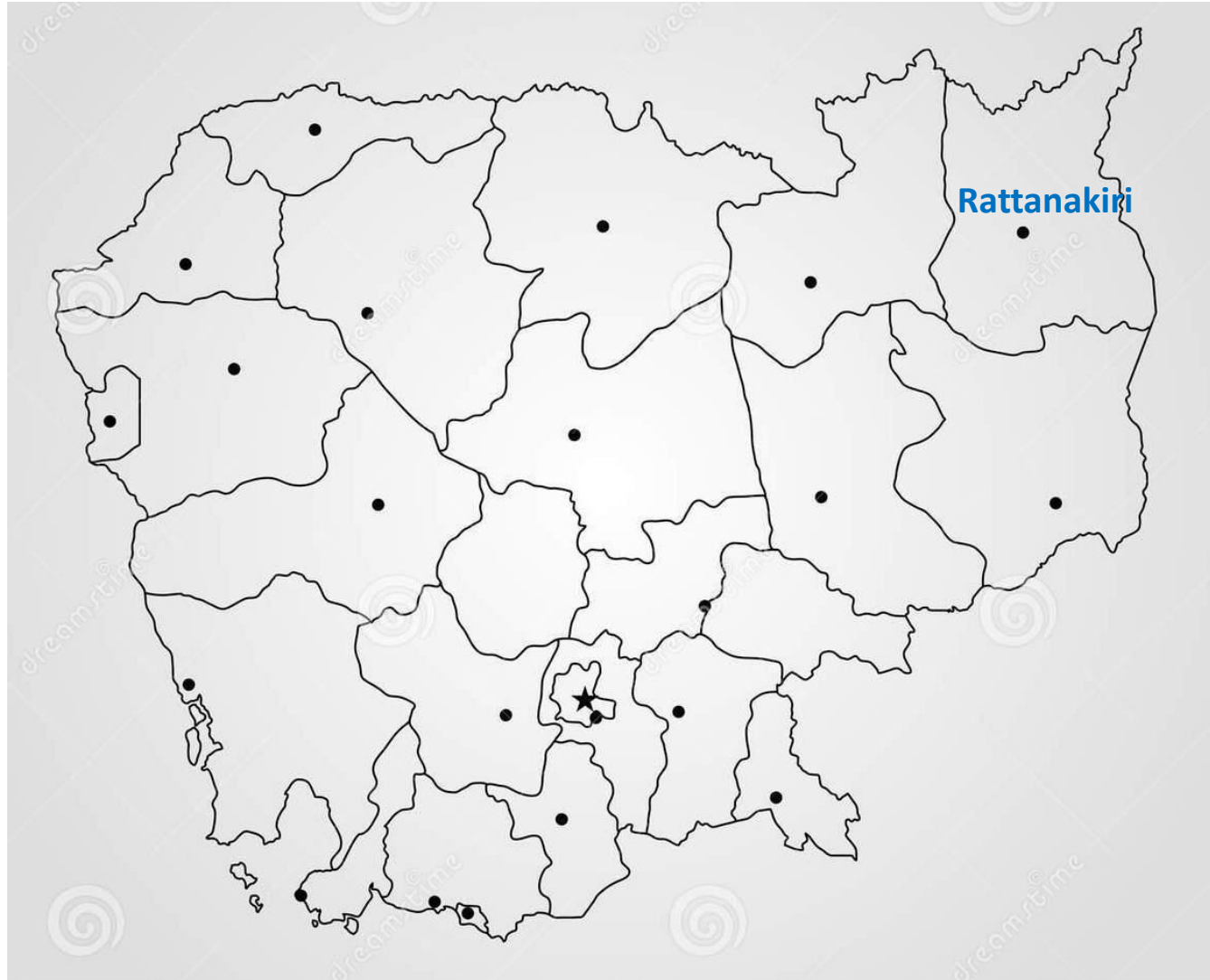
Results



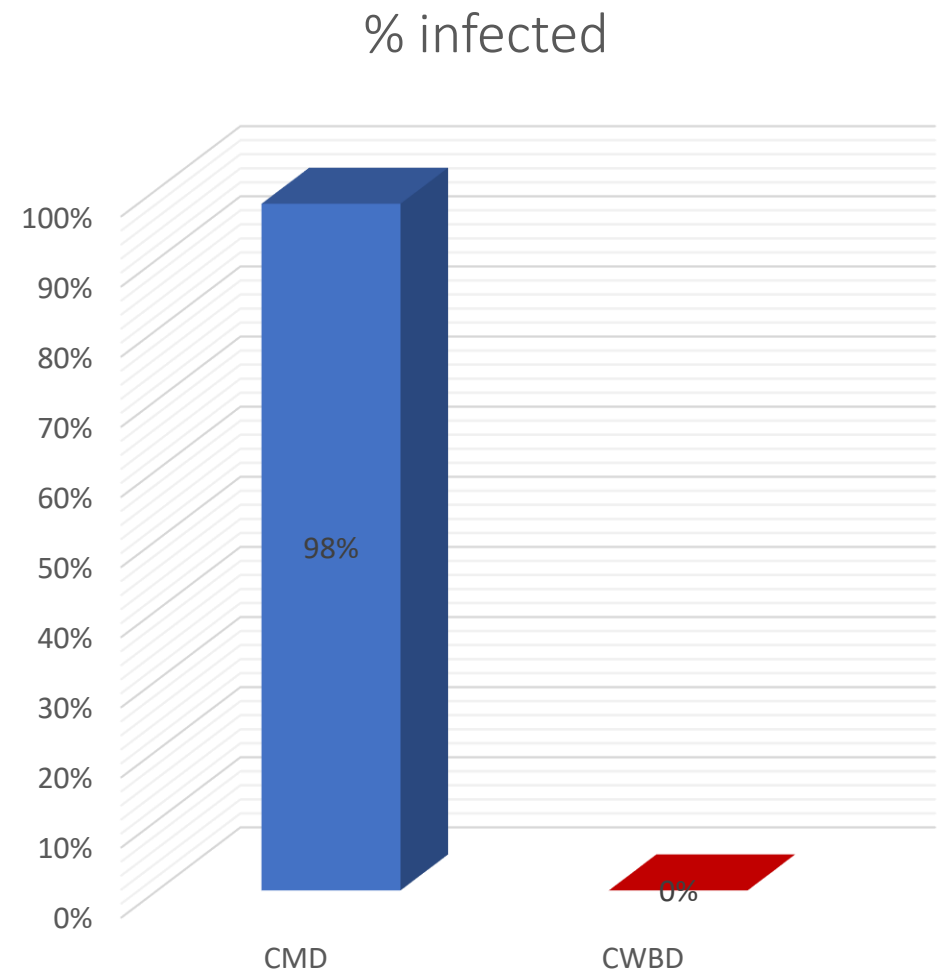
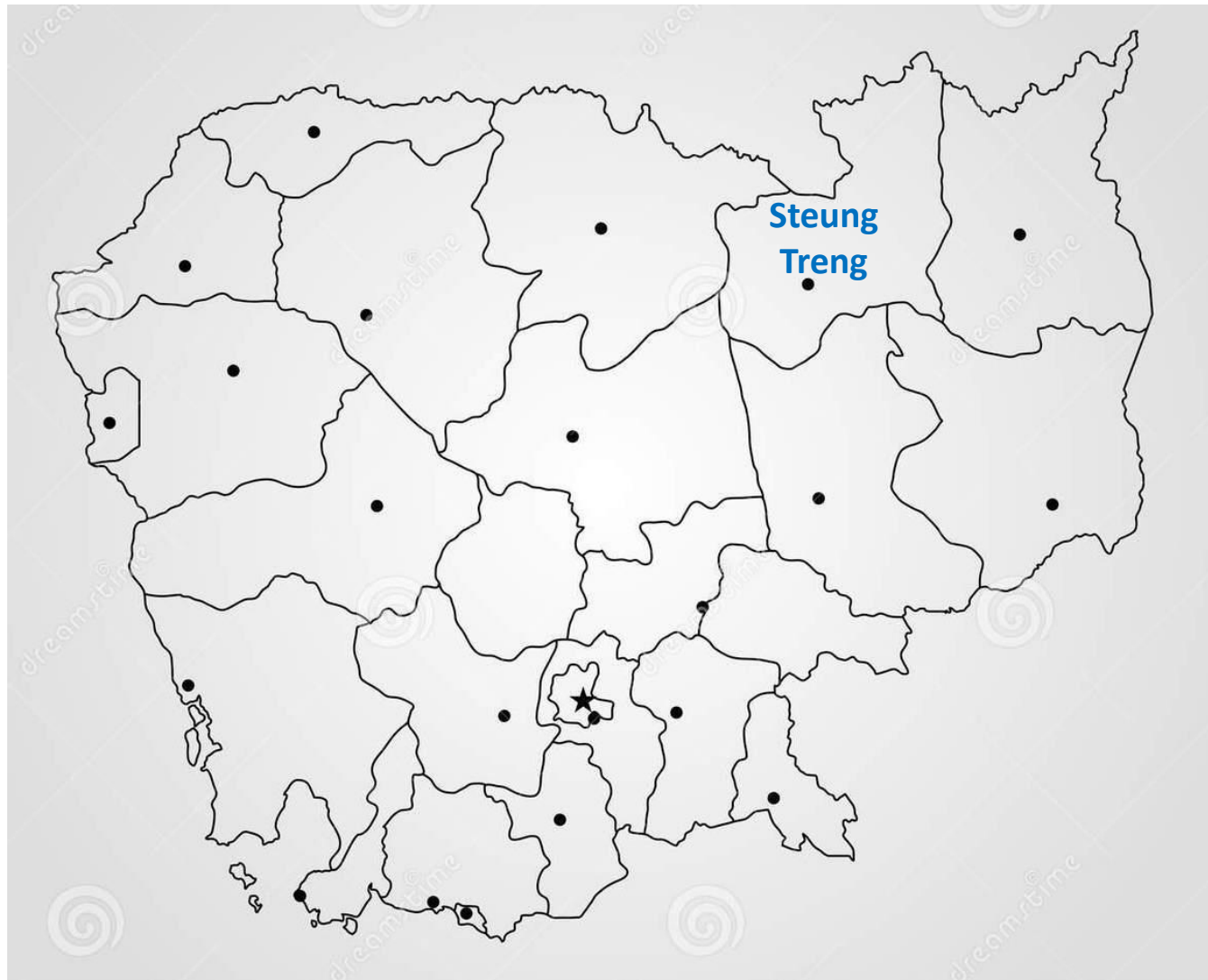
Results



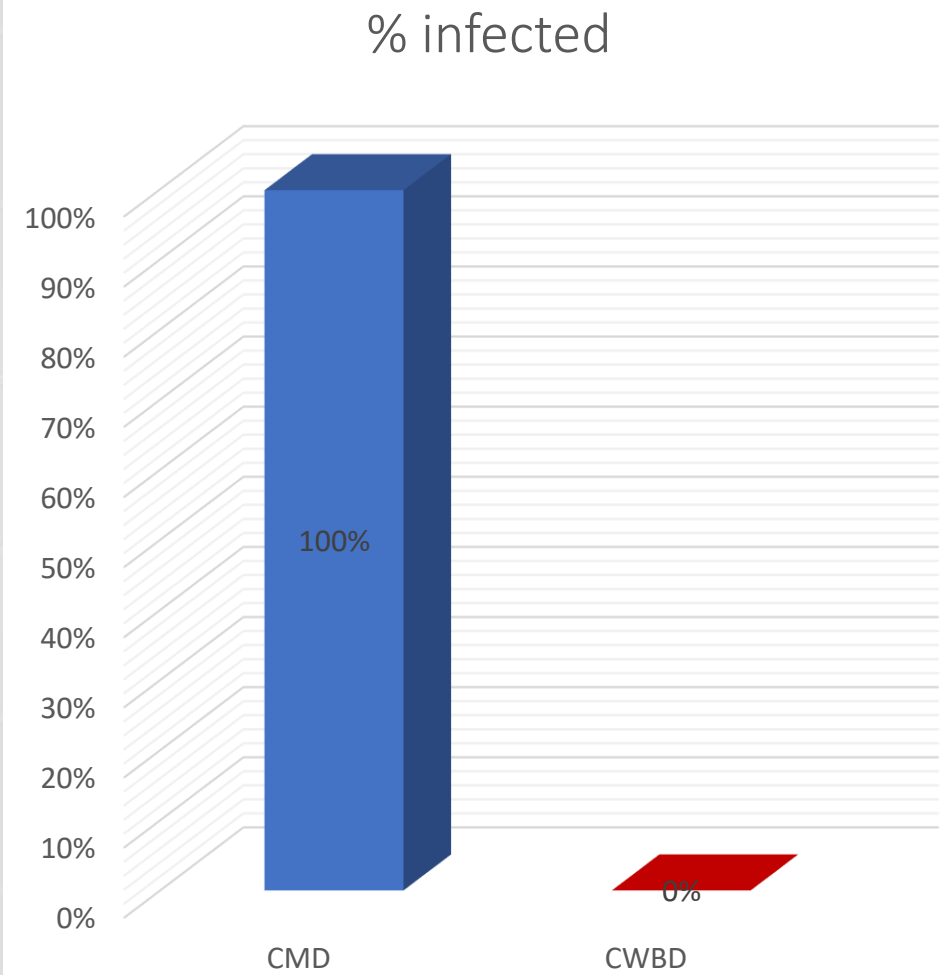
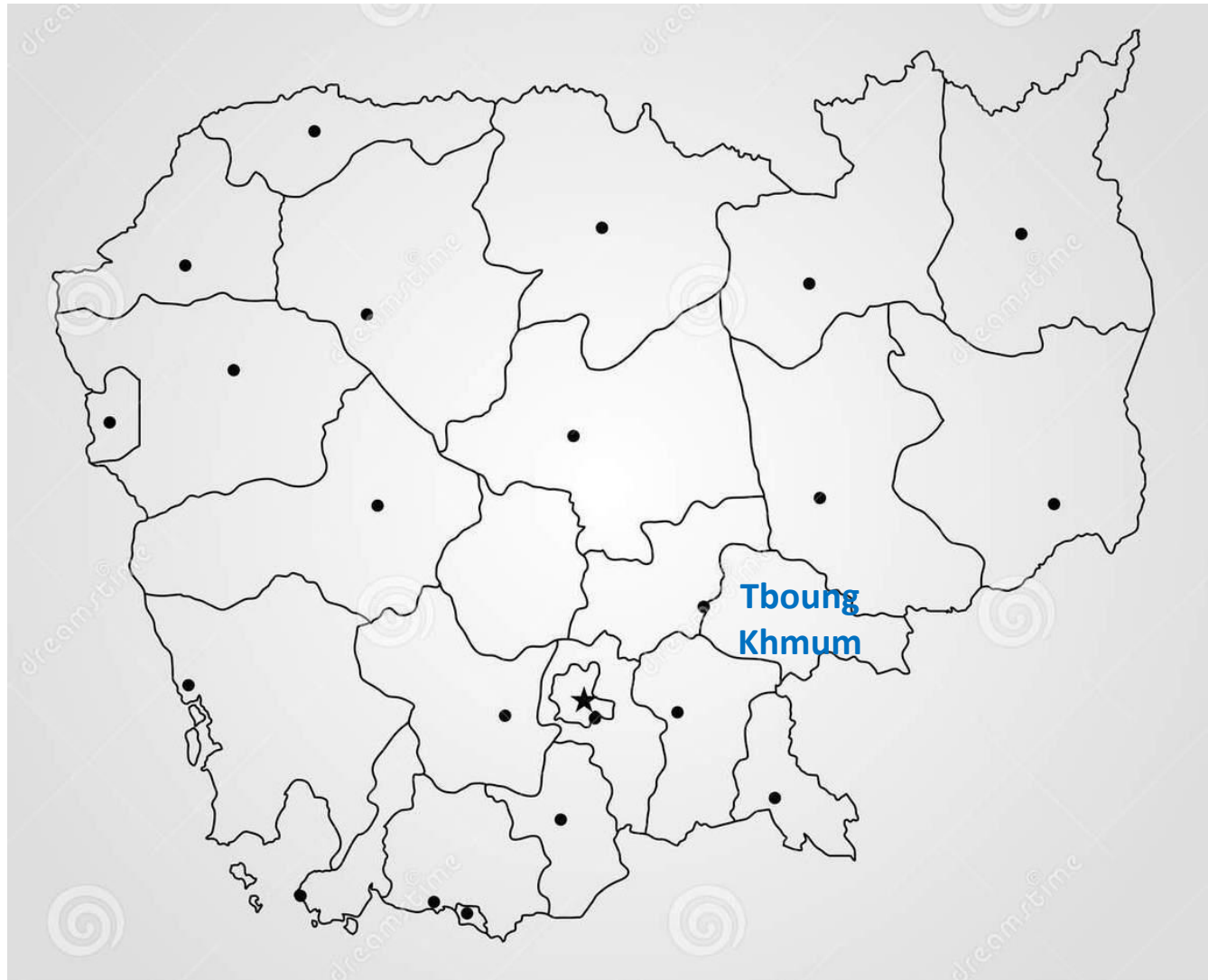
Results



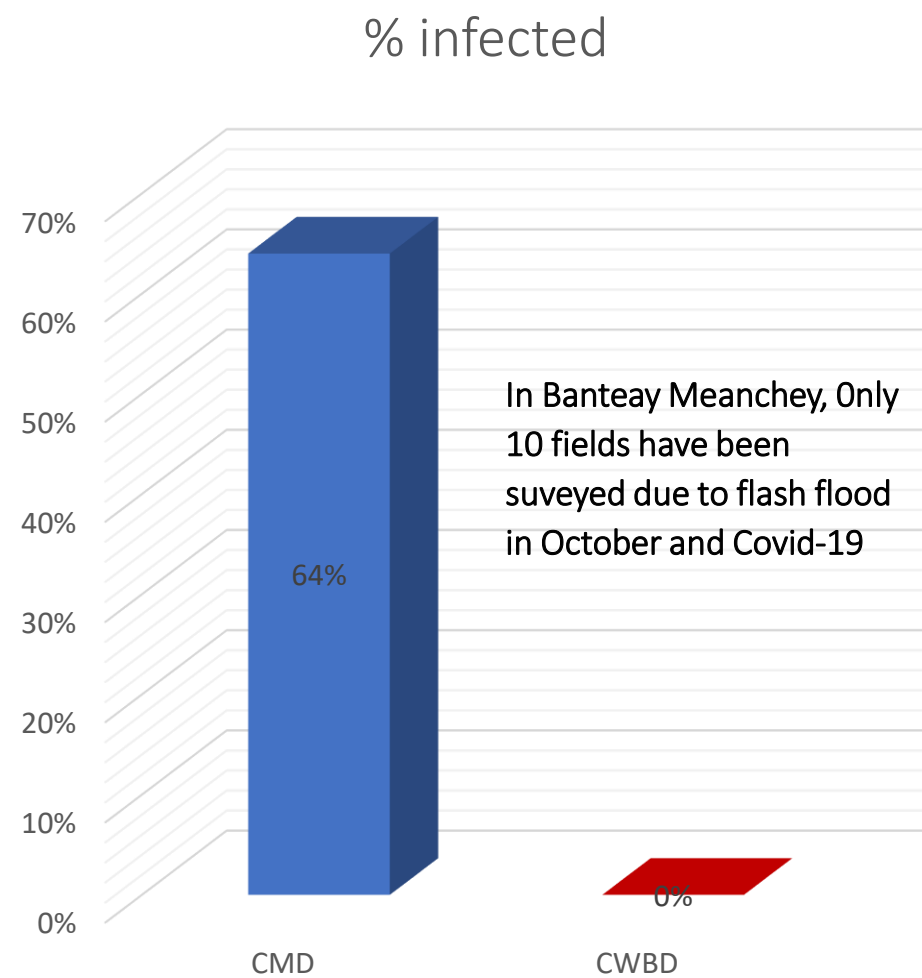
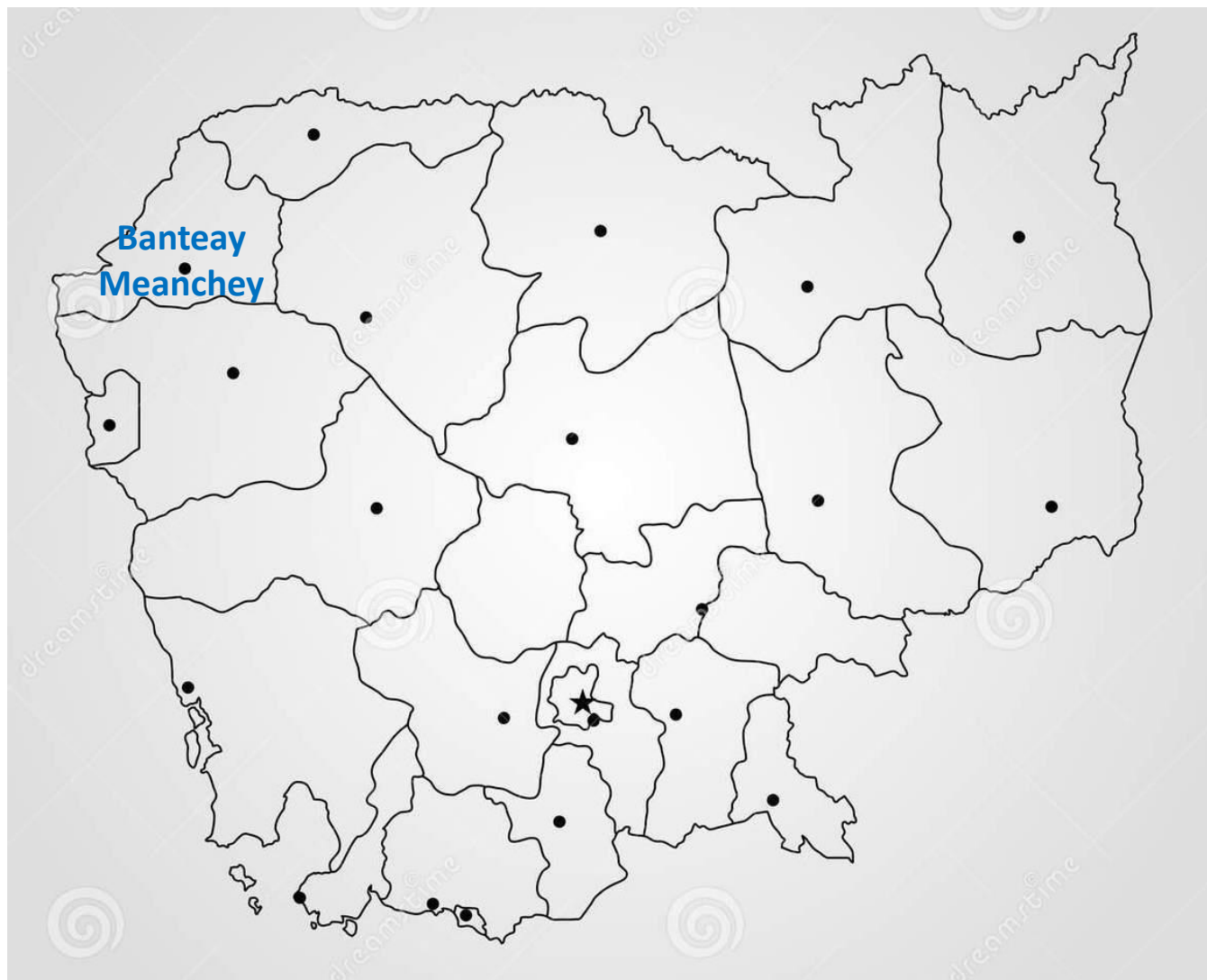
Results



Results



Results



Summary

Province	% Infected	
	CMD	CWBD
Banteay Meanchey	Suveyed 10 of 24 fields = 64%	
Battambang	Not yet surveyed	
Odor Meanchey	93%	0
Pailin	Not yet surveyed	
Preah Vihea	100%	0
Pursat	Not yet surveyed	
Siem Reap	99%	0.6%
Kampong Cham	92%	0
Kampong Thom	100	0
Kratie	100	0
Modulkiri	83%	0
Rattanakiri	80%	0
Steung Treng	98%	0
Tboung Khmum	100%	0

Challenges

- Recently, the flooding was caused by torrential rainfall from tropical storms and has killed at least 12 people and affected more than 30,000 households across 17 provinces nationwide.
- Totally, 47,725 ha has been damaged by flooding on industrial crops such as cassava, corn....

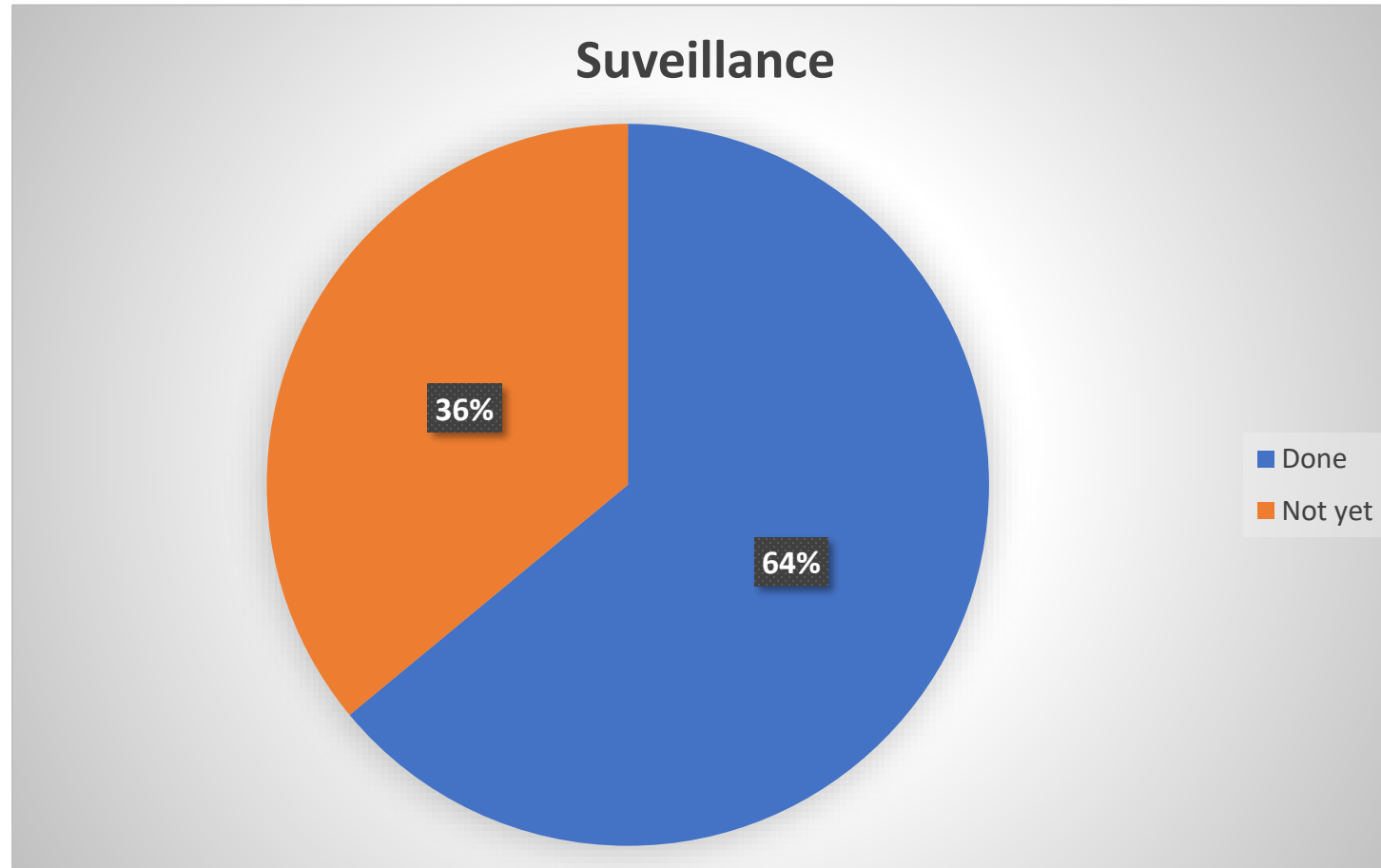


Challenges

- The weather (heavy raining, hot...)
- Traveling and communication
- Covid-19 pandemic
 - ✓ In Cambodia on 3rd November and 28th November, travel restriction in Cambodia.



Project Implement Rate



- 96 fields were completed.
- 56 fields are still conducting the surveillance in Battambang, Banteay Meanchey, Pailin and Pursat.

Next Activities

- Continue to CMD and CWBD and Whitefly surveillance
- Preparing and sending the whitefly sample and cassava leaf sample from Cambodia to CIAT for molecular identification and further research.



Thank You

