

Supplemental material 5. Additional tables**Additional table 1. Characteristics of participants for cross-sectional surveys in Lao****PDR**

Characteristics	Malaria program stakeholder (N=28)	Malaria service providers (N=37)	Overall (N=65)
Province, n (%)			
Huaphan	0	4 (10.8)	4 (6.2)
Khammouane	10 (35.7)	21 (56.8)	31 (47.7)
Luangprabang	10 (35.7)	5 (13.5)	15 (23.1)
Savannakhet	8 (28.6)	7 (18.9)	15 (23.1)
District, n (%)*			
Sopbao	0	4 (10.8)	4 (6.2)
Boulapha	4 (14.3)	14 (37.8)	18 (27.7)
Thakhek	2 (7.1)	7 (18.9)	9 (13.8)
Phoukhoun	9 (32.1)	5 (13.5)	14 (21.5)
Vilabouli	8 (28.6)	7 (18.9)	15 (23.1)
Age in years, median (IQR)	53 (36, 58)	36 (30, 39)	38 (32, 53)
Sex, n (%)			
Male	23 (82.1)	15 (40.5)	38 (58.5)
Female	5 (17.9)	22 (59.5)	27 (41.5)
Highest education level, n (%)			
No formal education	0	1 (2.7)	1 (1.5)
Primary school level	0	6 (16.2)	6 (9.2)
Lower-secondary school level	1 (3.6)	10 (27.0)	11 (16.9)
Upper-secondary school level	5 (17.9)	4 (10.8)	9 (13.8)
Diploma or degree holder	22 (78.6)	16 (43.2)	38 (58.5)
Years of experience in current position, median (IQR)	10 (4, 15)	4 (3, 8)	5 (3, 12.5)

* Missing values present.

Additional table 2. Characteristics of participants for focus group discussions and semi-structured interviews in Lao PDR

Characteristics	Malaria program stakeholder	Malaria service providers	Mobile and migrant population
Number of discussion and interviews			
Focus group discussions	5	6	4
Semi-structured interviews	4	0	0
Number of participants	18	24	20
Province, n (%)			
Huaphan	4 (22.2)	6 (25.0)	0
Khammouane	5 (27.8)	10 (41.7)	3 (15.0)
Luangprabang	5 (27.8)	8 (33.3)	6 (30.0)
Savannakhet	4 (22.2)	0	11 (55.0)
Age in years, median (IQR)*	45 (35, 55)	37 (32, 49)	37 (31, 45)
Sex, n (%)			
Male	14 (77.8)	11 (45.8)	14 (70.0)
Female	4 (22.2)	13 (54.2)	6 (30.0)
Years of experience in current position, median (IQR)	8 (3, 12)	4 (3, 10)	NA

* Missing values present.

NA=Not applicable

Additional table 3. Practice of case notification and case investigation in Lao PDR as reported by surveyed participants

Practice of case notification and case investigation	Malaria program stakeholder (N=28)	Malaria service providers (N=37)	Overall (N=65)
Reporting method for malaria positive cases, n (%) *			
Paper-based reporting	24 (85.7)	21 (56.8)	45 (69.2)
Phone call	13 (46.4)	28 (75.7)	41 (63.1)
Electronic reporting using mobile phone/tablet	25 (89.3)	7 (18.9)	32 (49.2)
Messaging through mobile application (e.g., WhatsApp)	4 (14.3)	6 (16.2)	10 (15.4)
Supervisor or personnel in-charge for case investigation, n (%) * †			
District Malaria Control Unit/ District Health Office	20 (71.4)	12 (32.4)	32 (49.2)
Health Center	11 (39.3)	9 (24.3)	20 (30.8)
Province Malaria Control Unit/ Provincial Center	8 (28.6)	1 (2.7)	9 (13.8)
Village Health Volunteer	8 (28.6)	1 (2.7)	9 (13.8)
Rapid response team	5 (17.9)	0	5 (7.7)
CDC/ District Epidemiology Team	5 (17.9)	0	5 (7.7)
Laboratory staff	4 (14.3)	0	4 (6.2)
Malaria Health Workers/ Malaria Unit	4 (14.3)	0	4 (6.2)
Involvement of malaria service providers in case investigation, n (%)			
Always	NA	18 (48.6)	NA
Sometimes	NA	5 (13.5)	NA
Never	NA	14 (37.8)	NA

* Multiple responses were allowed.

† Missing values present.

Additional table 4. Implementation of case investigation in Lao PDR as reported by surveyed participants

Procedures undertaken during a case investigation*, n (%)	Malaria program stakeholder (N=28)	Malaria service providers (N=37)	Overall (N=65)
Visiting the index case	28 (100.0)	26 (70.3)	54 (83.1)
Checking malaria preventive measures used by the index case	28 (100.0)	27 (73.0)	55 (84.6)
Educating the index case on malaria prevention	28 (100.0)	27 (73.0)	55 (84.6)
Collecting travel history of the index case [†]	28 (100.0)	26 (70.3)	54 (83.1)
Collecting travel history within the residing district [†]	28 (100.0)	25 (67.6)	53 (81.5)
Collecting travel history outside the residing district [†]	23 (82.1)	23 (62.2)	46 (70.8)
Collecting travel history outside the residing country [†]	20 (71.4)	18 (48.6)	38 (58.5)
Mapping the location of the index case [†]	17 (60.7)	21 (56.8)	38 (58.5)

* Multiple responses were allowed.

[†] Missing values present.

Additional table 5. Foci response activities in Lao PDR as reported by surveyed participants

Foci response activities*	Malaria program stakeholder (N=28)	Malaria service providers (N=37)	Overall (N=65)
Awareness raising on malaria transmission	17 (60.7)	17 (45.9)	34 (52.3)
Awareness raising on malaria prevention	7 (25.0)	3 (8.1)	10 (15.4)
Awareness raising on both malaria transmission and prevention	0	10 (27.0)	10 (15.4)
Entomological surveillance	3 (10.7)	1 (2.7)	4 (6.2)
Providing additional vector control if needed	1 (3.6)	2 (5.4)	3 (4.6)
Spot check for mosquito breeding places if entomological surveillance is not feasible	0	1 (2.7)	1 (1.5)
Awareness raising on malaria transmission, prevention and vector control	0	1 (2.7)	1 (1.5)

* Missing values present.

Additional table 6. Completeness and timeliness of reactive surveillance and response activities in Lao PDR during 2018-2022

Reporting unit (in alphabetical order)	2018				2019				2020				2021				2022			
	Total malaria cases	Case notification within 1 day	Case investigatio n within 3 days	Foci investigation and response	Total malaria cases	Case notification within 1 day	Case investigatio n within 3 days	Foci investigation and response	Total malaria cases	Case notificatio n within 1 day	Case investigatio n within 3 days	Foci investigation and response	Total malaria cases	Case notification within 1 day	Case investigation within 3 days	Foci investigatio n and response	Total malaria cases	Case notification within 1 day	Case investigation within 3 days	Foci investigati on and response
	n	n (%)	n (%)	n*	n	n (%)	n (%)	n*	n	n (%)	n (%)	n*	n	n (%)	n (%)	n*	n	n (%)	n (%)	n
Bokeo	0				0				0				0				0			
Bolikhambxai	5	0 (0.0%)	0 (0.0%)	0	1	0 (0.0%)	1 (100.0%)	0	2	0 (0.0%)	2 (100.0%)	2	1	1 (100.0%)	1 (100.0%)	0	1	1 (100.0%)	1 (100.0%)	0
Champasak	0				0				6	6 (100.0%)	6 (100.0%)	0	48	46 (95.8%)	47 (97.9%)	6				
Houaphan	0				0				1	0 (0.0%)	1 (100.0%)	0	0				0			
Khammouan	138	0 (0.0%)	11 (8.0%)	6	49	0 (0.0%)	40 (81.6%)	2	183	1 (0.5%)	147 (80.3%)	13	90	88 (97.8%)	90 (100.0%)	16	40	40 (100.0%)	40 (100.0%)	14
Louangnamtha	1	0 (0.0%)	0 (0.0%)	0	1	0 (0.0%)	0 (0.0%)	0	1	0 (0.0%)	1 (100.0%)	1	0				0			
Louangphabang	5	0 (0.0%)	1 (20.0%)	1	5	0 (0.0%)	4 (80.0%)	1	14	0 (0.0%)	14 (100.0%)	1	4	1 (25.0%)	1 (25.0%)	0	0			
Oudomxai	4	0 (0.0%)	2 (50.0%)	1	0				0				0				1	1 (100.0%)	1 (100.0%)	1
Phongsali	82	0 (0.0%)	25 (30.5%)	15	3	1 (33.3%)	2 (66.7%)	1	0				0				0			
Salavan	0				0				0				2	2 (100.0%)	2 (100.0%)	0	8	7 (87.5%)	8 (100.0%)	5
Savannakhet	0				0				0				2	2 (100.0%)	2 (100.0%)	1	38	38 (100.0%)	37 (97.4%)	30
Vientiane	5	0 (0.0%)	0 (0.0%)	0	2	0 (0.0%)	2 (100.0%)	0	1	0 (0.0%)	0 (0.0%)	0	1	1 (100.0%)	1 (100.0%)	1	0			
Vientiane Capital	9	0 (0.0%)	0 (0.0%)	0	9	0 (0.0%)	3 (33.3%)	1	1	0 (0.0%)	1 (100.0%)	0	1	1 (100.0%)	1 (100.0%)	0	5	5 (100.0%)	5 (100.0%)	1
Xainyabouli	3	0 (0.0%)	0 (0.0%)	0	3	0 (0.0%)	1 (33.3%)	1	4	0 (0.0%)	4 (100.0%)	1	0				1	1 (100.0%)	1 (100.0%)	0
Xaisomboun	4	0 (0.0%)	0 (0.0%)	0	3	0 (0.0%)	3 (100.0%)	0	0				0				0			
Xekong	0				0				0				0				3	3 (100.0%)	3 (100.0%)	2
Xiangkhouang	1	0 (0.0%)	1 (100.0%)	0	1	0 (0.0%)	1 (100.0%)	0	0				1	1 (100.0%)	1 (100.0%)	1	2	2 (100.0%)	2 (100.0%)	0
Total	257	0 (0.0%)	40 (15.6%)	23	77	1 (1.3%)	57 (74.0%)	6	207	1 (0.5%)	170 (82.1%)	18	108	103 (95.4%)	105 (97.2%)	19	147	144 (98.0%)	145 (98.6%)	59

* Foci investigation and response activities are not necessary for every positive case and hence percentages were not calculated.

Additional table 7. Barriers for RASR activities in Lao PDR as reported by surveyed participants

RASR activity	Malaria program stakeholder (N=28)	Malaria service providers (N=37)	Overall (N=65)
Case notification within 1 day, n (%)			
No barriers present	9 (32.1)	20 (54.1)	29 (44.6)
Otherwise	19 (67.9)	17 (45.9)	36 (55.4)
Case investigation within 3 days, n (%)			
No barriers present	11 (39.3)	22 (59.5)	33 (50.8)
Otherwise	17 (60.7)	15 (40.5)	32 (49.2)
Foci investigation and response within 7 days, n (%)			
No barriers present	6 (21.4)	20 (54.1)	26 (40.0)
Otherwise	22 (78.6)	17 (45.9)	39 (60.0)

Additional table 8. Telecommunication barrier for RASR activities in Lao PDR as reported by surveyed participants

Telecommunication barrier to conduct	Malaria program stakeholder (N=28)	Malaria service providers (N=37)	Overall (N=65)
Case notification within 1 day, n (%)	18 (64.3)	6 (16.2)	24 (36.9)
Case investigation within 3 days, n (%)	2 (7.1)	1 (2.7)	3 (4.6)
Foci investigation and response within 7 days, n (%)	0 (0.0)	1 (2.7)	1 (1.5)