

1 **Table 1.** Number of locations and smallholder farmers participating in the study

Province	District	Commune	Village	No. of farmers
Kampong Cham	<sup>1</sup> Prey Chhor	Tropeang Reah	Kaoh Svay	30
	Prey Chhor	Tropeang Reah	Tropeang Leak	30
	Prey Chhor	Mien	Khloy Ti Pir	30
	Prey Chhor	Chrey Vien	Toul Tahor	30
	Prey Chhor	Chrey Vien	Tropeang Ampil	30
Pursat	<sup>2</sup> Bakan	Me Teuk	Me Teuk	30
	Bakan	Me Teuk	Ang Kanh	30
	<sup>3</sup> Sampov Meas	Chamreun Phal	Svay Meas	30
	Sampov Meas	Chamreun Phal	Or Rokar	30
	Sampov Meas	Chamreun Phal	Don Ei	30

2 Note: <sup>1</sup> Prey Chhor district is subdivided into 15 communes and 176 villages; <sup>2</sup> Bakan district is subdivided into 10 communes, and 156 villages and

3 <sup>3</sup> Sampov Meas district are subdivided into 7 communes and 66 villages.

6 **Table 2.** Type and number of household assets reported in two study provinces in 2014  
7 (150 farmers per province)

	Kampong Cham			Pursat		
	No. of farmers	Mean	Std. Dev.	No. of farmers	Mean	Std. Dev.
Paddy field -own (ha)	110	1.4	0.9	141	2.2	1.5
Land for other crops-own (ha)	35	1.0	0.7	33	1.6	3.4
Village chickens (head)	108	10.6	10.6	124	14.1	12.5
Cattle (head)	150	4.6	2.6	88	3.4	1.6
Buffalo (head)	0	0	0	94	3.4	1.7
Ducks (head)	25	6.6	5.5	36	10.5	8.1
Goats (head)	0	0	0	0	0	0
Pigs (head)	15	3.7	3.3	58	2.1	1.5
Fish pond (number)	5	1.0	0	5	1.0	0
Bicycle (number)	129	1.5	0.7	103	1.3	0.6
Motorbike (number)	87	1.2	0.4	90	1.1	0.4
Car (number)	3	1.0	0	2	1.0	0
Generator (number)	14	1.0	0	5	1.0	0
Hand tractor (number)	32	1.0	0	53	1.0	0
TV (number)	98	1.0	0	86	1.0	0.3
Water pump (number)	10	1.0	0	69	1.0	0.2
Rice mill "village scale" (number)	7	1.0	0	21	1.0	0
Radio (number)	1	1.0	0	48	1.0	0
Ox-card (number)	1	1.0	0	77	1.0	0.1
Computer (number)	3	1.0	0	5	1.0	0

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10 **Table 3.** Perception of farmers on FMD vaccination and FMD responses by farmers

Variable	Number	Percentage
Farmers participated in the study	300	100
a- Farmers have never been vaccinated cattle against FMD	238	79

during the three years

Reasons for not vaccinating cattle

I do not want to pay for vaccination when cattle are still healthy	68	35
I never receive vaccination information	66	34
I am not at home (busy)	60	31
I choose not to answer the question	42	22
Nobody comes to vaccinate cattle	35	18
I do not trust the vaccination	26	13
I have a difficulty to get cattle	17	9
b- Farmers have vaccinated cattle against FMD at least once in three years	62	100
I vaccinated once every year	22	35
I vaccinated twice in three years	8	13
I vaccinated cattle once in three years	32	52
I vaccinated cattle twice every year during the 3 years	0	0
Reasons for not re-vaccinated cattle against FMD		
I vaccinated cattle when FMD vaccination is free	21	44
I choose not to answer the question	14	23
I was not told to re-vaccinated cattle against FMD in every six months	8	17
I thought that an FMD vaccination every year would protect cattle from FMD	8	17
I vaccinated cattle when FMD vaccine is available	4	8
I vaccinated cattle when I know FMD is outbreak within/between villages	4	8
I was told to re-vaccinated cattle every six months, but I did not follow	3	6
c- Persons who vaccinated cattle reported by farmers		
VAHWs in the village	48	77
District veterinarians	30	48
VAHWs from other villages	15	24
Do not know	2	3
Provincial veterinarian	1	2
d- Farmers responded when their cattle got sick with FMD	156	52
I choose not to answer the question	68	44
Farmers responded to the question	88	56
I asked VAHWs to treat sick cattle	63	72

I first treated sick cattle by using traditional medicines	47	53
I first treated sick cattle by using modern medicines	14	16
I sought help from a traditional healer in the area	8	9
I asked district veterinarians to treat sick cattle	4	5
I sold sick cattle to local traders	2	2

e- Farmers reported diseases when they know

I choose not to answer the question	68	44
Farmers responded to the question	88	56
VAHWs	54	61
Neighbors	47	53
Relatives	37	42
Local authorities (village or commune chief)	14	16
Never reported diseases	10	11
District or provincial veterinarians	4	5
NGO's	1	1

**Table 4.** Summary of main activities ranked by farmers to improve vaccination uptake (%)

	Very Important	Important	Less Important	Not important
Increase availability of current vaccination programs	68	22	8	3
Reduce the cost of FMD vaccines	31	24	26	19
Improve vaccination campaigns	76	21	4	0
Provide livestock diseases and simple biosecurity training	59	29	12	0
Apply basic biosecurity	28	29	41	2
Stop trading sick/dead animals	45	34	15	6
Stop sick animal movements during the outbreak	47	33	15	5
Provide private vaccination activity	17	16	17	51
Make sure the vaccination is effective	32	17	4	47

**Table 5.** Summary of main activities ranked as important by farmers to mitigate the risk of disease spread (%)

	Very Important	Important	Less Important	Not important
Report sick animals (new case) to VAHWs	71	17	10	2
Have some ideas about the disease situation in the villages	41	41	16	2
Separate the first infected cattle from the rest of herd	45	38	15	2
Have proper places to keep cattle to	36	42	20	2

avoid getting sick				
Apply biosecurity measure cleaning and disinfection of the animal house	39	41	16	4
Avoid giving feed and water from suspected areas to animals	41	36	19	4
Vaccinate animals	88	9	2	1
Avoid trading animals during the outbreak	53	31	11	5
Isolation the new arrival animals	33	39	20	8
Do not allow other people or animals to come in contact with animals during the outbreaks	39	36	16	9
People should follow the preventive measures	38	35	23	4

**Table 6.** Influence of age, education, and number of household members on uptake of FMD vaccination

Variables	% FMD vac. experience	Odds ratio (95% CI)	P-value
1 Farmer aged up to 30 years old	34.4	0.6 (0.3-1.3)	0.19 <sup>a**</sup>
Farmer with other age groups	47.4		
2 Farmer aged at between 31-49 years old	43.7	0.8 (0.5-1.4)	0.54
Farmer with other age groups	47.9		
3 Farmer aged above 49 years old	51.9	1.5 (0.9-2.5)	0.13*
Farmer with other age groups	41.8		
4 Farmer with secondary school	48.9	1.2 (0.6-2.2)	0.75
Farmer without secondary school	45.2		
5 Farmer with primary school	40.9	0.6 (0.4-1.0)	0.06 <sup>a**</sup>
Farmer without primary school	52.7		
6 Farmer with no-education	55.4	1.7 (0.9-2.9)	0.09*
Farmer with some formal education	42.8		
7 Main decision-maker	48.6	1.4 (0.8-2.4)	0.24*
Not main decision-maker	40.2		
8 Household with less than 2 adult males	45.3	1.1 (0.6-1.7)	0.9
Household with 2 adult male and more	46.5		
9 Household with less than 2 adult females	44.6	1.1 (0.6-1.8)	0.71
Household with 2 adult females and more	47.2		
10 Less than 3 household members work with cattle	50.6	1.6 (1.0-2.7)	0.06*
More than 3 Household members work with cattle	38.7		

<sup>a</sup> results of Fisher's exact test because one or more cells were less than 5

\*selected variables used in the logistic regression model

\*\*although these variables had  $P < 0.25$ , they were excluded from the model because of the majority

**Table 7.** Influence of management and husbandry on uptake of FMD vaccination (2013)

Variables	% FMD vac. experience	Odds ratio (95% CI)	<i>P</i> -value
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1	Farmers raised only cattle	50.5	2.4 (1.3-4.4)	0.005*
	Farmers raised not only cattle	30.0		
2	Farmers with cattle and buffalo	54.8	1.5 (0.3-3.2)	0.34
	Farmers did not raise both species	44.7		
3	Household raised with up to 3 cattle	46.4	0.7 (0.4-1.2)	0.19 <sup>***</sup>
	Household raised more than 3 cattle	55.1		
4	Household raised more than 3 cattle	55.1	1.4 (0.9-2.4)	0.19*
	Household raised less than 3 cattle	46.4		
5	Cattle tethered under the house (day time)	65.2	2.4 (1.0-5.8)	0.08*
	Not tethered under the house (day time)	44.0		
6	Cattle tethered under the house (night time)	50.6	1.8 (1.1-3.1)	0.04*
	Not tethered under the house (night time)	36.0		
7	Cattle reared in closed pen near the house (day time)	46.6	1.0 (0.6-1.7)	0.89
	Not reared in a closed pen near the house (day time)	45.5		
8	Cattle reared in a closed pen near the house (night time)	41.0	0.7 (0.4-1.3)	0.29
	Not reared in a closed pen near the house (night time)	48.1		
9	Cattle tethered at block near the house (day time)	43.9	0.6 (0.3-1.2)	0.18 <sup>***</sup>
	Not Tethered at the block near the house (day time)	55.8		
10	Cattle tethered at block near the house (night time)	23.5	0.3 (0.1-0.7)	0.006 <sup>***</sup>
	Not Tethered at the block near the house (night time)	49.1		
11	Tethered along road in front of the house (day time)	46.3	1.0 (0.6-1.8)	1.00
	Not tethered along the road (day time)	45.7		
12	Tethered along the road in front of the house (night time)	30.8	0.5 (0.2-1.7)	0.39
	Not stall feeding	47.1		
13	Cattle did graze at a communal grazing ground	58.6	1.8 (0.8-3.9)	0.16*
	Cattle did not graze at a communal grazing ground	44.3		
14	Use stall feeding and grazing ground as feeding methods	45.7	0.9 (0.5-1.9)	1.00
	Not using stall feeding and grazing ground	47.2		
15	Sell cattle in this year	49.2	1.3 (0.8-2.1)	0.33
	Cattle were not sold this year	42.5		
16	Sell one or more head every year	44.0	0.8 (0.3-1.9)	0.65
	One or more head not sold every year	50.5		
17	Sell one or more head every two years	62.5	1.8 (0.6-5.4)	0.29
	One or more head not sold every two years	47.4		

18	Sell one or more head every three years	48.4	0.9 (0.4-1.9)	0.85
	One or more head not sold every three years	51.2		
19	Bought cattle	25.0	0.4 (0.1-0.9)	0.03*
	Cattle were not bought	48.3		
20	Borrowed money or received credit	48.2	1.2 (0.7-2.0)	0.46
	Never borrowed money or received credit	43.4		
21	Total income less than USD1,001	48.8	1.2 (0.7-2.0)	0.59
	Total income not less than USD1,001	44.6		
22	Total income between USD1,001-2,000	47.3	1.1 (0.7-1.8)	0.80
	Total income not between USD1,001-2,000	45.1		
23	Total income greater than USD2,000	41.9	0.8 (0.5-1.3)	0.37
	Total income not greater than USD2,000	48.0		

<sup>a</sup> results of Fisher's exact test because one or more cells were less than 5

\*selected variables used in the logistic regression model

\*\*although these variables had  $P < 0.25$ , they were excluded from the model because of the majority

**Table 8.** Influence of farmers' vaccination knowledge and experiences of FMD on the uptake of FMD vaccination

	Variables	% FMD vac. experience	Odds ratio (95% CI)	P-value
1	Know FMD disease	47.2	1.5 (0.7-3.0)	0.37
	Did not know FMD disease	37.8		
2	Recognize FMD when see infected cattle	47.6	1.6 (0.8-3.3)	0.22*
	Did not recognize FMD when saw infected cattle	35.9		
3	Know vaccination	47.1	1.3 (0.7-2.3)	0.46
	Did not know vaccination	41.4		
4	VAHW is the main source of VADI	57.1	0.7 (0.3-1.9)	0.64
	VAHW is not the main source of VADI	65.0		
5	Provincial/district vet is the main source of VADI	66.7	2.0 (1.1-3.5)	0.02***
	Provincial/district vet is not the main source of VADI	50.0		
6	Village chief is the main source of VADI	57.4	0.5 (0.1-2.8)	0.70
	Village chief is not the main source of VADI	71.4		
7	Commune council is the main source of VADI	73.7	2.9 (1.6-5.4)	0.0001*
	Information			
	Commune council is not the main source of VADI	48.9		
8	Extension worker is the main source of VADI	63.4	1.5 (0.9-2.4)	0.16***
	Extension worker is not the main source of VADI	53.4		
9	Neighbor is the main source of VADI	55.4	0.7 (0.4-1.3)	0.27
	Neighbor is not the main source of	64.8		

	VADI			
10	Call VAHW to get cattle vaccinated	59.3	1.1 (0.6-2.0)	0.87
	Call others to get cattle vaccinated	57.3		
11	Call district/provincial vet to get cattle vaccinated	66.7	1.5 (0.1-16.4)	1.00
	Call others to get cattle vaccinated	57.7		
12	Cattle received FMD vaccination through vaccination campaign	60.0	1.6 (0.8-3.1)	0.22*
	Cattle received vaccination through others means	48.8		
13	District/provincial veterinarian vaccinated cattle	54.0	0.8 (0.4-1.3)	0.40
	Cattle were vaccinated by other people	60.5		
14	VAHW provide vaccination services	54.7	0.4 (0.2-0.9)	0.051*
	Cattle were vaccinated by other people	75.0		
15	FMD vaccinated cattle still sick with FMD	77.6	3.4 (1.7-6.8)	0.001*
	FMD vaccinated cattle did not sick with FMD	50.3		
16	Keep record of cattle vaccination	52.4	0.8 (0.3-1.9)	0.65
	No cattle vaccination records were kept	58.4		

<sup>a</sup> results of Fisher's exact test because one or more cells were less than 5

\*selected variables used in the logistic regression model

\*\*although these variables had  $P < 0.25$ , they were excluded from the model because of the majority

**Table 9.** Results of the multivariable logistic regression analysis to investigate the factors associated with FMD vaccination reported by farmers

Factors	$\beta$	OR	95% CI for OR		P-value
			Lower	Upper	
Commune council is a main source of vaccination information	-0.85	0.43	0.21	0.88	0.021
VAHWs provide vaccination services	1.15	3.14	1.03	9.56	0.044
FMD vaccinated cattle still got sick with FMD preventable disease	-0.97	0.38	0.15	0.99	0.047
Constant	4.70				0.003