Outils pour la planification d'un programme de vaccination canine

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Etapes clés d'un programme de vaccination canine

1. Planification
2. Extension de la couverture vaccinale
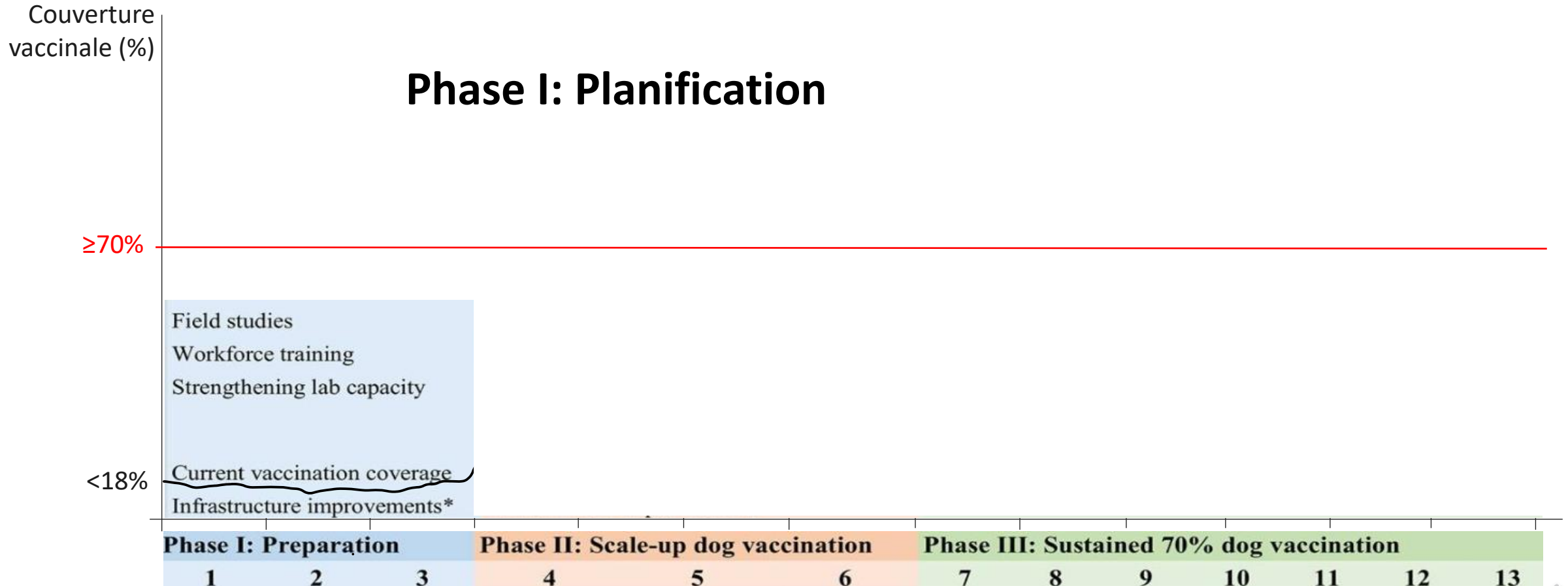3. Maintient de la couverture vaccinale

Elimination of Dog-Mediated Human Rabies Deaths by 2030: Needs Assessment and Alternatives for Progress Based on Dog Vaccination

Ryan M. Wallace*, Eduardo A. Undurraga, Jesse D. Blanton, Julie Cleaton and Richard Franka

National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, GA, USA
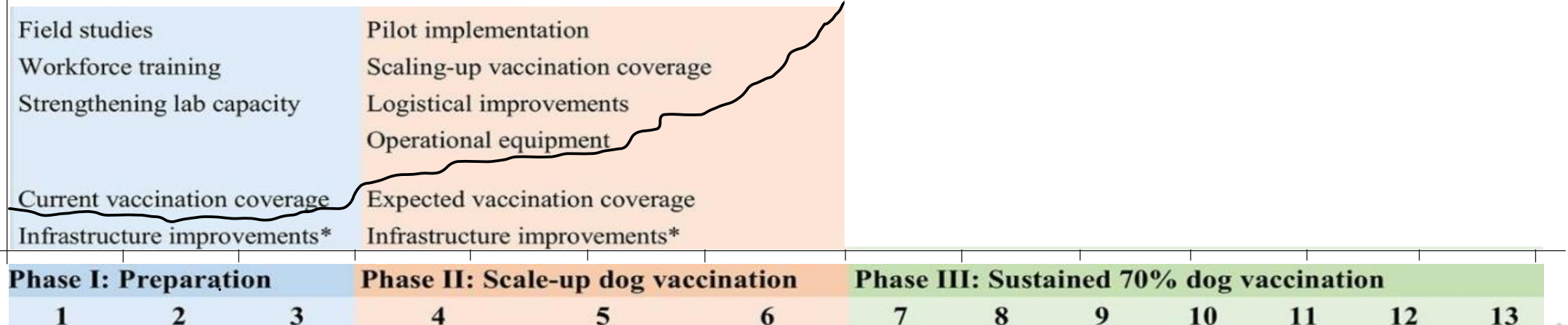
Etapes clés d'un programme de vaccination canine

Phase I: Planification

Couverture vaccinale (%)

≥70%

Field studies

Workforce training

Strengthening lab capacity

<18% Current vaccination coverage

Infrastructure improvements*

Phase I: Preparation			Phase II: Scale-up dog vaccination			Phase III: Sustained 70% dog vaccination						
1	2	3	4	5	6	7	8	9	10	11	12	13

Etapes clés d'un programme de vaccination canine

Couverture vaccinale (%)

Phase II: extension de la couverture vaccinale

≥70%

<18%

Field studies	Pilot implementation
Workforce training	Scaling-up vaccination coverage
Strengthening lab capacity	Logistical improvements
	Operational equipment
Current vaccination coverage	Expected vaccination coverage
Infrastructure improvements*	Infrastructure improvements*

Phase I: Preparation			Phase II: Scale-up dog vaccination			Phase III: Sustained 70% dog vaccination						
1	2	3	4	5	6	7	8	9	10	11	12	13

Etapes clés d'un programme de vaccination canine

Phase III: maintient de la couverture vaccinale

Couverture vaccinale (%)

≥70%

<18%

Field studies	Pilot implementation	Mass vaccination of dog
Workforce training	Scaling-up vaccination coverage	Surveillance to establish disease burden and assess progress
Strengthening lab capacity	Logistical improvements	
	Operational equipment	
Current vaccination coverage	Expected vaccination coverage	Vaccination of 70% of the dog population
Infrastructure improvements*	Infrastructure improvements*	

Phase I: Preparation			**Phase II: Scale-up dog vaccination**			**Phase III: Sustained 70% dog vaccination**						
1	2	3	4	5	6	7	8	9	10	11	12	13

Vaccination en point central

Vaccination parentérale

Campagne porte-à-porte

Vaccination orale

Capture/vaccination/relâcher

Vaccination orale

Confiné

Semi-confiné

Communauté

Féraux
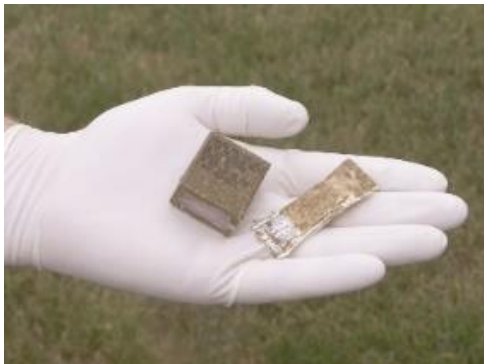
Vax-PLAN: A guide for designing effective vaccination

Planning aid for the implementation of dog vaccination campaigns

Input: Enter Values in White Cells

1. Describe the confinement of the dog population in the program area.	Number of Dogs	%
How many dogs are in the program area?	600,000	100.0%
What proportion are **always** under owner confinement?	60,000	10.0%
What proportion are only **sometimes** under owner confinment?*	360,000	60.0%
What proportion are **always** free-roaming?	180,000	30.0%

2. Provide the number of vaccines you plan to procure.	Doses Procured	%
How many **parenteral** vaccines will be procured?	500,000	99.0%
How many **oral** vaccines will be procured?	0	

3. Allocate the vaccines to a vaccination strategy.	Doses Procured	%
What proportion of vaccines will be allocated to **Central Point** vaccination?	165,000	33.0%
What proportion of vaccines will be allocated to **Door to Door** vaccination?	165,000	33.0%
What proportion of vaccines will be allocated to **Capture, Vaccinate, Release**?	165,000	33.0%
Proportion of vaccines allocated to Oral vaccination	0	0.0%

4. Describe the efficacy of the vaccines you have procured.	Percent Efficacious (%)
What is the efficacy of the **parenteral** vaccine?	100%
What is the efficacy of the **oral** vaccine?	100%

5. Expected Vaccination Effectiveness by Method §	Vaccination strategy**			
Confinement status:	CPV	DDV	CVR	ORV
What is the expected coverage among dogs that are **always** confined?	80%	80%	5%	5%
What is the expected coverage among dogs that are only **sometimes** confined?	60%	60%	80%	80%
What is the expected coverage among dogs that are **never** confined?	5%	5%	60%	80%

6. How confident are you in your responses to the input variables?	5

OPTIONAL: Suggested values for vaccination strategy table

What is your current estimated program area vaccination coverage?	45%			
GDREP§ phase:	Phase II b			
Suggested values:	CPV	DDV	CVR	ORV
Always confined	80%	80%	5%	5%
Semi-confined	60%	60%	80%	80%
Never confined	5%	5%	60%	80%

Vaccination campaign costs per vaccinated dog†
Click button to estimate the average cost per dog vaccinated
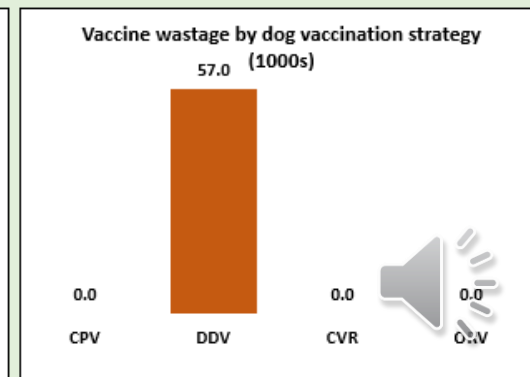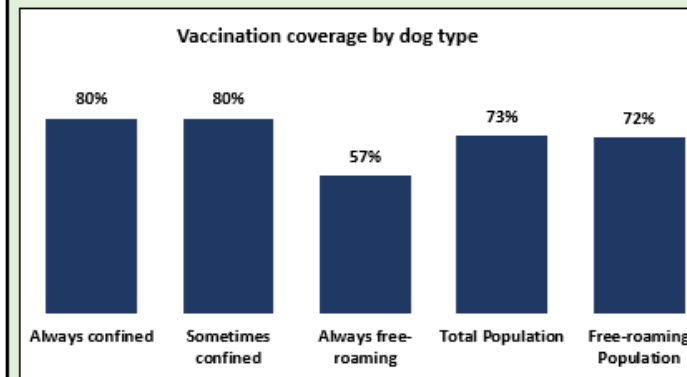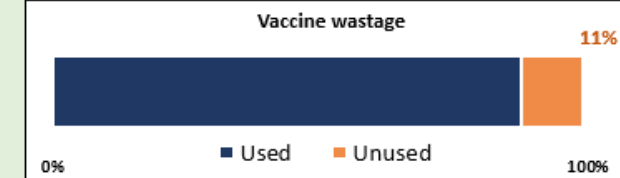
Estimate value

Results: calculated values

Vaccination Doses by Strategy	Abbreviation	Procured	Used	Unused
Central Point Vaccination	CPV	165,000	165,000	-
Door to Door Vaccination	DDV	165,000	108,000	57,000
Capture, Vaccinate, Release	CVR	165,000	165,000	-
Oral Vaccine Handouts	ORV	-	-	-

Vaccination doses by dog type	Vaccinated	Unvaccinated	Percent	Lower	Upper	Immunized
				Confidence		
Always confined	48,000	12,000	80%	74%	86%	80%
Sometimes confined	288,000	72,000	80%	74%	86%	80%
Always free-roaming	102,000	78,000	57%	51%	63%	57%

Vaccination coverage by dog type	Dogs	Immunized	Percent	Lower	Upper	Immunized
				Confidence		
Total Population	600,000	438,000	73%	67%	79%	73%
Free-roaming Population	540,000	390,000	72%	66%	78%	72%

Vaccine utilization	Procured	Used	Unused	Lower	Upper
	500,000	88%	11%	5%	20%

Economic costs	Total ($)
Cost per dog vaccinated	$ 3.01
Total Campaign Cost	$ 1,318,656
Lower bound	$ 833,856
Upper bound	$ 1,811,743

Vaccine wastage — 11%
Used / Unused

Vaccination coverage by dog type
- Always confined 80%
- Sometimes confined 80%
- Always free-roaming 57%
- Total Population 73%
- Free-roaming Population 72%

Vaccine wastage by dog vaccination strategy (1000s)
- CPV 0.0
- DDV 57.0
- CVR 0.0
- ORV 0.0

Exemple: pays en développement, communauté urbaine

Population canine
- 5,000 chiens
- 10% confinés
- 40% semi-confines
- 50% communauté

Capacité vaccinateurs
- 50 chiens/jour

Méthode
- 80% point central
- 20% CVR

Planning aid for the implementation of dog vaccination campaigns

Input: Enter Values in White Cells

1. Describe the confinement of the dog population in the program area.

	Number of Dogs	%
How many dogs are in the program area?	0	#DIV/0!
What proportion are **always** under owner confinement?	0	0,0%
What proportion are only **sometimes** under owner confinment?*	0	0,0%
What proportion are **always** free-roaming?	0	0,0%

2. Provide the number of vaccines you plan to procure.

	Doses Procured	%
How many **parenteral** vaccines will be procured?	0	#DIV/0!
How many **oral** vaccines will be procured?	0	

3. Allocate the vaccines to a vaccination strategy.

	Doses Procured	%
What proportion of vaccines will be allocated to **Central Point** vaccination?	0	0,0%
What proportion of vaccines will be allocated to **Door to Door** vaccination?	0	0,0%
What proportion of vaccines will be allocated to **Capture, Vaccinate, Release**?	0	0,0%
Proportion of vaccines allocated to O**ral** vaccination	0	#DIV/0!

4. Describe the efficacy of the vaccines you have procured.

	Percent Efficacious (%)
What is the efficacy of the **parenteral** vaccine?	100%
What is the efficacy of the **oral** vaccine?	100%

5. Expected Vaccination Effectiveness by Method §

Confinement status:	Vaccination strategy**			
	CPV	DDV	CVR	ORV
What is the expected coverage among dogs that are **always** confined?	80%	80%	5%	5%
What is the expected coverage among dogs that are only **sometimes** confined?	80%	60%	80%	80%
What is the expected coverage among dogs that are **never** confined?	5%	5%	60%	80%

6. How confident are you in your responses to the input variables?

	5

OPTIONAL: Suggested values for vaccination strategy table

What is your current estimated program area vaccination coverage?	70%
GDREP§ phase:	Phase III

Suggested values:	CPV	DDV	CVR	ORV
Always confined	95%	95%	5%	5%
Semi-confined	80%	80%	95%	95%
Never confined	5%	5%	80%	95%

Vaccination campaign costs per vaccinated dog†	
Click button to estimate the average cost per dog vaccinated	Estimate value

Results: calculated values

Vaccination Doses by Strategy	Abbreviation	Procured	Used	Unused	
Central Point Vaccination	CPV	-	-	-	
Door to Door Vaccination	DDV	-	-	-	
Capture, Vaccinate, Release	CVR	-	-	-	
Oral Vaccine Handouts	ORV	-	-	-	

Vaccination doses by dog type	Vaccinated	Unvaccinated	Percent	Confidence		Immunized
				Lower	Upper	
Always confined	0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Sometimes confined	0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Always free-roaming	0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Vaccination coverage by dog type	Dogs	Immunized	Percent	Confidence		Immunized
				Lower	Upper	
Total Population	0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Free-roaming Population	0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Vaccine utilization	Procured	Used	Unused	Lower	Upper
	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Economic costs	Total ($)
Cost per dog vaccinated	#DIV/0!
Total Campaign Cost	$ 4 920
Lower bound	$ 3 030
Upper bound	$ 6 560

Vaccine wastage — 0% — ■ Used ■ Unused — 0% ... 100%

Vaccination coverage by dog type — Always confined 0%, Sometimes confined 0%, Always free-roaming 0%, Total Population 0%, Free-roaming Population 0%

Vaccine wastage by dog vaccination strategy (1000s) — CPV 0,0, DDV 0,0, CVR 0,0, ORV 0,0

Planning aid for the implementation of dog vaccination campaigns

1. Describe the confinement of the dog population in the program area.	Number of Dogs	%
How many dogs are in the program area?	5 000	100,0%
What proportion are **always** under owner confinement?	500	10,0%
What proportion are only **sometimes** under owner confinment?*	2 000	40,0%
What proportion are **always** free-roaming?	2 500	50,0%

2. Provide the number of vaccines you plan to procure.	Doses Procured	%
How many **parenteral** vaccines will be procured?	4 000	100,0%
How many **oral** vaccines will be procured?	0	

3. Allocate the vaccines to a vaccination strategy.	Doses Procured	%
What proportion of vaccines will be allocated to **Central Point** vaccination?	1 600	40,0%
What proportion of vaccines will be allocated to **Door to Door** vaccination?	0	0,0%
What proportion of vaccines will be allocated to **Capture, Vaccinate, Release**?	2 400	60,0%
Proportion of vaccines allocated to O**ral** vaccination	0	0,0%

4. Describe the efficacy of the vaccines you have procured.	Percent Efficacious (%)
What is the efficacy of the **parenteral** vaccine?	100%
What is the efficacy of the **oral** vaccine?	100%

5. Expected Vaccination Effectiveness by Method §	Vaccination strategy**			
Confinement status:	CPV	DDV	CVR	ORV
What is the expected coverage among dogs that are **always** confined?	80%	80%	5%	5%
What is the expected coverage among dogs that are only **sometimes** confined?	80%	60%	80%	80%
What is the expected coverage among dogs that are **never** confined?	5%	5%	60%	80%

6. How confident are you in your responses to the input variables?	5

OPTIONAL: Suggested values for vaccination strategy table				
What is your current estimated program area vaccination coverage?	70%			
GDREP§ phase:	Phase III			
Suggested values:	CPV	DDV	CVR	ORV
Always confined	95%	95%	5%	5%
Semi-confined	80%	80%	95%	95%
Never confined	5%	5%	80%	95%
Vaccination campaign costs per vaccinated dog†	Estimate value			
Click button to estimate the average cost per dog vaccinated				

Vaccination Doses by Strategy	Abbreviation	Procured	Used	Unused
Central Point Vaccination	CPV	1 600	1 600	-
Door to Door Vaccination	DDV	-	-	-
Capture, Vaccinate, Release	CVR	2 400	1 900	500
Oral Vaccine Handouts	ORV	-	-	-

Vaccination doses by dog type	Vaccinated	Unvaccinated	Percent	Confidence		Immunized
				Lower	Upper	
Always confined	400	100	80%	74%	86%	80%
Sometimes confined	1 600	400	80%	74%	86%	80%
Always free-roaming	1 500	1 000	60%	54%	66%	60%

Vaccination coverage by dog type	Dogs	Immunized	Percent	Confidence		Immunized
				Lower	Upper	
Total Population	5 000	3 500	70%	64%	76%	70%
Free-roaming Population	4 500	3 100	69%	63%	75%	69%

Vaccine utilization	Procured	Used	Unused	Lower	Upper
	4 000	88%	13%	5%	20%

Economic costs	Total ($)
Cost per dog vaccinated	$ 3,97
Total Campaign Cost	$ 13 890
Lower bound	$ 8 662
Upper bound	$ 18 928

Vaccine wastage — 13%, Used / Unused, 0% to 100%

Vaccination coverage by dog type — Always confined 80%, Sometimes confined 80%, Always free-roaming 60%, Total Population 70%, Free-roaming Population 69%

Vaccine wastage by dog vaccination strategy (1000s) — CPV 0,0; DDV 0,0; CVR 0,5; ORV 0,0

Planning aid for the implementation of dog vaccination campaigns

Input: Enter Values in White Cells

1. Describe the confinement of the dog population in the program area.

	Number of Dogs	%
How many dogs are in the program area?	5 000	100,0%
What proportion are **always** under owner confinement?	500	10,0%
What proportion are only **sometimes** under owner confinment?*	2 000	40,0%
What proportion are **always** free-roaming?	2 500	50,0%

2. Provide the number of vaccines you plan to procure.

	Doses Procured	%
How many **parenteral** vaccines will be procured?	4 000	100,0%
How many **oral** vaccines will be procured?	0	

3. Allocate the vaccines to a vaccination strategy.

	Doses Procured	%
What proportion of vaccines will be allocated to **Central Point** vaccination?	1 600	40,0%
What proportion of vaccines will be allocated to **Door to Door** vaccination?	0	0,0%
What proportion of vaccines will be allocated to **Capture, Vaccinate, Release**?	2 400	60,0%
Proportion of vaccines allocated to O**ral** vaccination	0	0,0%

4. Describe the efficacy of the vaccines you have procured.

	Percent Efficacious (%)
What is the efficacy of the **parenteral** vaccine?	100%
What is the efficacy of the **oral** vaccine?	100%

5. Expected Vaccination Effectiveness by Method §

Confinement status:	Vaccination strategy**			
	CPV	DDV	CVR	ORV
What is the expected coverage among dogs that are **always** confined?	80%	80%	5%	5%
What is the expected coverage among dogs that are only **sometimes** confined?	80%	60%	80%	80%
What is the expected coverage among dogs that are **never** confined?	5%	5%	60%	80%

6. How confident are you in your responses to the input variables?

	5

OPTIONAL: Suggested values for vaccination strategy table

What is your current estimated program area vaccination coverage?	70%
GDREP§ phase:	Phase III

Suggested values:	CPV	DDV	CVR	ORV
Always confined	95%	95%	5%	5%
Semi-confined	80%	80%	95%	95%
Never confined	5%	5%	80%	95%

Vaccination campaign costs per vaccinated dog†	
Click button to estimate the average cost per dog vaccinated	Estimate value

Results: calculated values

Vaccination Doses by Strategy

	Abbreviation	Procured	Used	Unused
Central Point Vaccination	CPV	1 600	1 600	-
Door to Door Vaccination	DDV	-	-	-
Capture, Vaccinate, Release	CVR	2 400	1 900	500
Oral Vaccine Handouts	ORV	-	-	-

Vaccination doses by dog type

	Vaccinated	Unvaccinated	Percent	Lower	Upper	Immunized
				Confidence		
Always confined	400	100	80%	74%	86%	80%
Sometimes confined	1 600	400	80%	74%	86%	80%
Always free-roaming	1 500	1 000	60%	54%	66%	60%

Vaccination coverage by dog type

	Dogs	Immunized	Percent	Lower	Upper	Immunized
				Confidence		
Total Population	5 000	3 500	70%	64%	76%	70%
Free-roaming Population	4 500	3 100	69%	63%	75%	69%

Vaccine utilization

Procured	Used	Unused	Lower	Upper
4 000	88%	13%	5%	20%

Economic costs

	Total ($)
Cost per dog vaccinated	$ 3,97
Total Campaign Cost	$ 13 890
Lower bound	$ 8 662
Upper bound	$ 18 928

Vaccine wastage

Vaccination coverage by dog type

Vaccine wastage by dog vaccination strategy (1000s)

Planning aid for the implementation of dog vaccination campaigns

Input: Enter Values in White Cells

1. Describe the confinement of the dog population in the program area.

	Number of Dogs	%
How many dogs are in the program area?	5 000	100,0%
What proportion are **always** under owner confinement?	500	10,0%
What proportion are only **sometimes** under owner confinment?*	2 000	40,0%
What proportion are **always** free-roaming?	2 500	50,0%

2. Provide the number of vaccines you plan to procure.

	Doses Procured	%
How many **parenteral** vaccines will be procured?	4 500	100,0%
How many **oral** vaccines will be procured?	0	

3. Allocate the vaccines to a vaccination strategy.

	Doses Procured	%
What proportion of vaccines will be allocated to **Central Point** vaccination?	900	20,0%
What proportion of vaccines will be allocated to **Door to Door** vaccination?	0	0,0%
What proportion of vaccines will be allocated to **Capture, Vaccinate, Release**?	3 600	80,0%
Proportion of vaccines allocated to O**ral** vaccination	0	0,0%

4. Describe the efficacy of the vaccines you have procured.

	Percent Efficacious (%)
What is the efficacy of the **parenteral** vaccine?	100%
What is the efficacy of the **oral** vaccine?	100%

5. Expected Vaccination Effectiveness by Method §

Confinement status:	CPV	DDV	CVR	ORV
What is the expected coverage among dogs that are **always** confined?	80%	80%	5%	5%
What is the expected coverage among dogs that are only **sometimes** confined?	80%	60%	80%	80%
What is the expected coverage among dogs that are **never** confined?	5%	5%	60%	80%

6. How confident are you in your responses to the input variables?

	5

OPTIONAL: Suggested values for vaccination strategy table

What is your current estimated program area vaccination coverage?	70%
GDREP§ phase:	Phase III

Suggested values:	CPV	DDV	CVR	ORV
Always confined	95%	95%	5%	5%
Semi-confined	80%	80%	95%	95%
Never confined	5%	5%	80%	95%

Vaccination campaign costs per vaccinated dog†
Click button to estimate the average cost per dog vaccinated

Estimate value

Results: calculated values

Vaccination Doses by Strategy

	Abbreviation	Procured	Used	Unused
Central Point Vaccination	CPV	900	900	-
Door to Door Vaccination	DDV	-	-	-
Capture, Vaccinate, Release	CVR	3 600	2 600	1 000
Oral Vaccine Handouts	ORV	-	-	-

Vaccination doses by dog type

	Vaccinated	Unvaccinated	Percent	Confidence Lower	Confidence Upper	Immunized
Always confined	400	100	80%	74%	86%	80%
Sometimes confined	1 600	400	80%	74%	86%	80%
Always free-roaming	1 500	1 000	60%	54%	66%	60%

Vaccination coverage by dog type

	Dogs	Immunized	Percent	Confidence Lower	Confidence Upper	Immunized
Total Population	5 000	3 500	70%	64%	76%	70%
Free-roaming Population	4 500	3 100	69%	63%	75%	69%

Vaccine utilization

Procured	Used	Unused	Lower	Upper
4 500	78%	22%	15%	29%

Economic costs

	Total ($)
Cost per dog vaccinated	$ 4,65
Total Campaign Cost	$ 16 285
Lower bound	$ 10 061
Upper bound	$ 22 321

Vaccine wastage — 22% — Used / Unused

Vaccination coverage by dog type: Always confined 80%, Sometimes confined 80%, Always free-roaming 60%, Total Population 70%, Free-roaming Population 69%

Vaccine wastage by dog vaccination strategy (1000s): CPV 0,0; DDV 0,0; CVR 1,0; ORV 0,0

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* Dogs that are allowed to roam unsupervised in the community, but come back to a home to receive some level of care are considered "sometimes confined". These may include owned, community owned, or loosely owned dogs.

** Vaccination strategies = CPV: central point vaccination. CVR: Capture, vaccinate, and release. DDV: door to door. ORV: Oral rabies vaccination

§ GDREP stands for Global Dog Rabies Elimination Pathway. See Wallace et al. 2017 for details.

† Use "Dog Vax Cost" help worksheet to estimate vaccination campaign costs (best cost estimate, and lower and upper bounds)
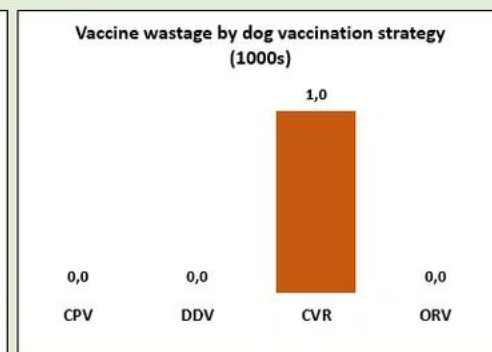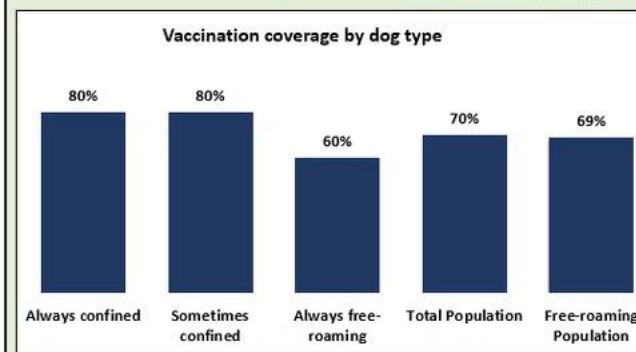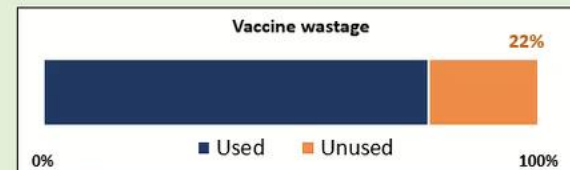
Remerciement

- **Mission Rabies**
  - Andy Gibson
  - Luke Gamble

- **CDC**
  - Jesse Blanton
  - Eduardo Undurraga
  - Emily Pieracci

- **Humane Society International**
  - John Boone

- **Daniel Stewart**

- **Haiti Ministry of Agriculture and Rural Natural Development**

- **Mission Rabies Goa Vaccination Team**

- **Mission Rabies Malawi Vaccination Team**

- **Mission Rabies Sri Lanka Vaccination Team**

Ou puis-je trouver l'outil?

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6805755/

- https://rabiestaskforce.com/toolkit/vaxplan

- Pour toutes questions ou pour obtenir une version à jour:
  - Ryan Wallace (US CDC): euk5@cdc.gov
  - Andy Gibson (Mission Rabies): andy@missionrabies.com