

Tools for Eliminating Dog-Mediated Human Rabies: Designing Effective Dog Vaccination Programs

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Evolution of a Dog Vaccination Program

- 3 phases
 1. Preparation
 2. Scale-up
 3. Sustainability

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

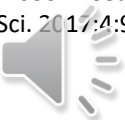
 Ryan M. Wallace*,  Eduardo A. Undurraga,  Jesse D. Blanton,  Julie Cleaton and  Richard Franka

National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, GA, USA

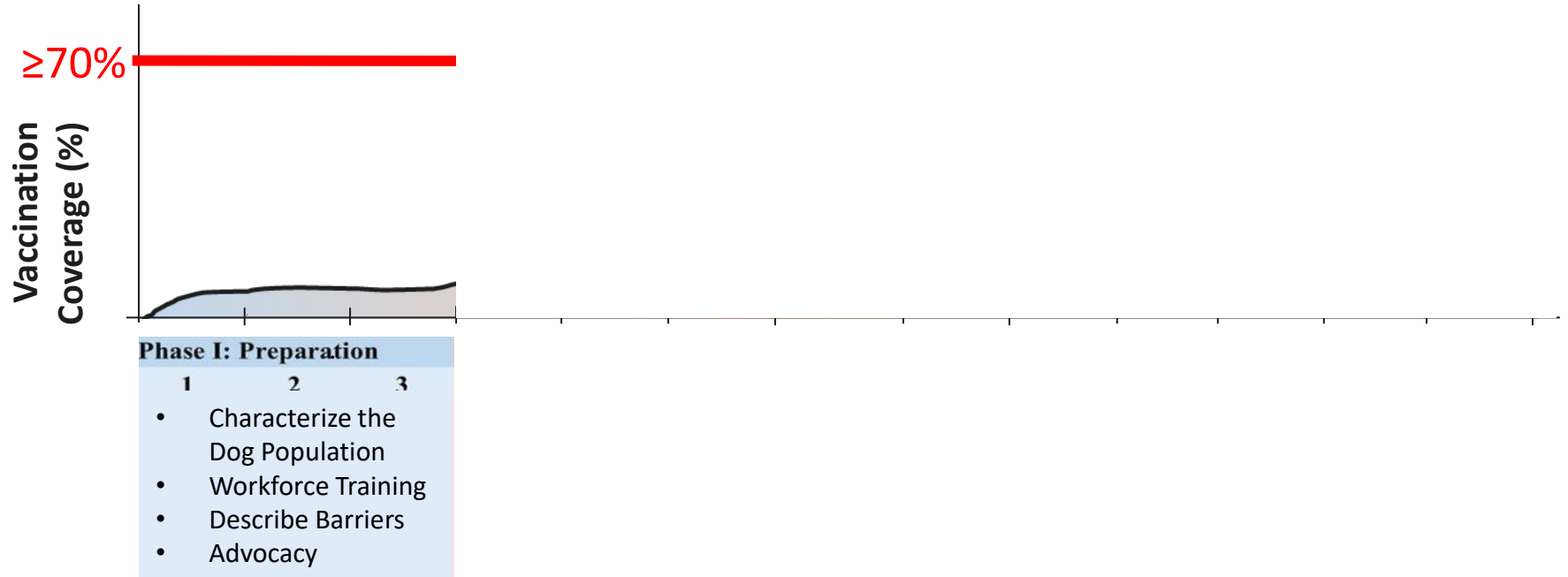
caninerabiesblueprint.org

a blueprint for the control of rabies
in dog populations

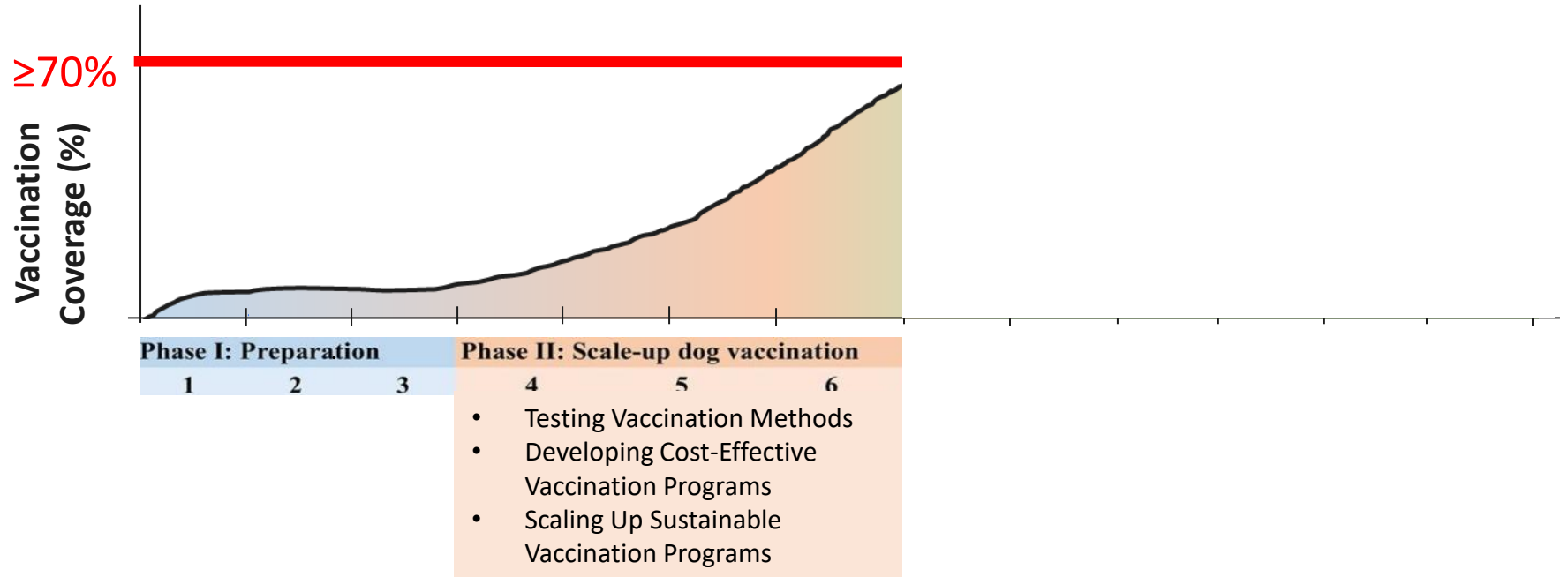
Wallace RM, et al. Elimination of Dog-Mediated Human Rabies Deaths by 2030: Needs Assessment and Alternatives for Progress Based on Dog Vaccination. Front Vet Sci. 2017;4:9.



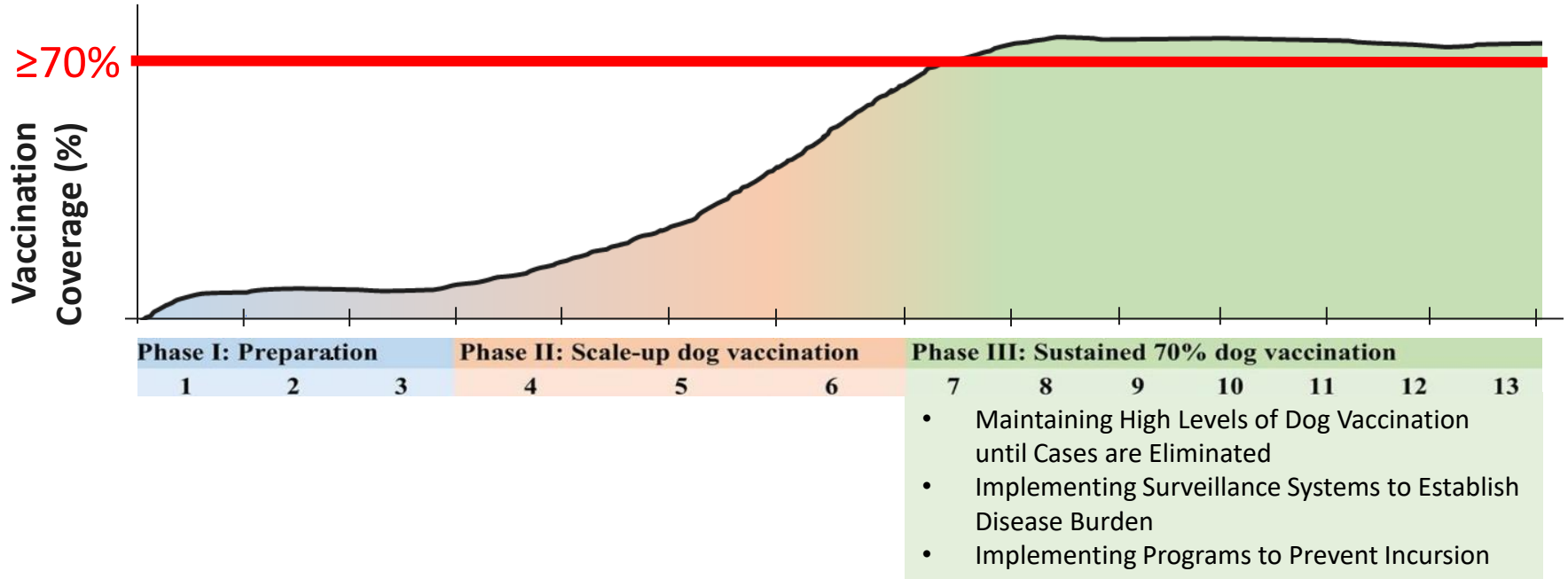
Evolution of Dog Vaccination Programs: Early Years



Evolution of Dog Vaccination Programs: Middle Years



Evolution of Dog Vaccination Programs: Later Years



Central Point



Door to Door



Capture/Vaccinate/Release



Oral Vaccination



Confined



Semi-Confined



Community



Feral

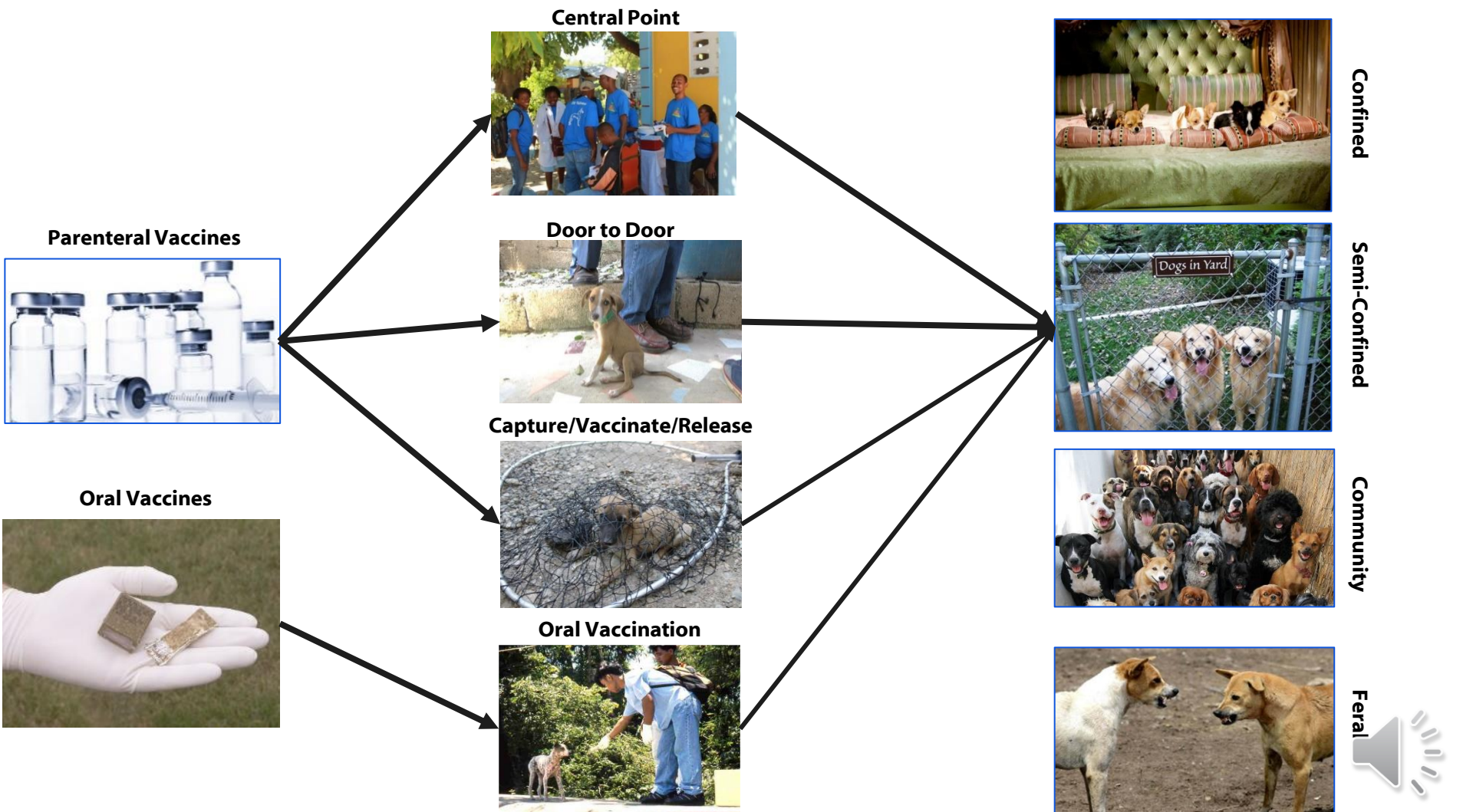


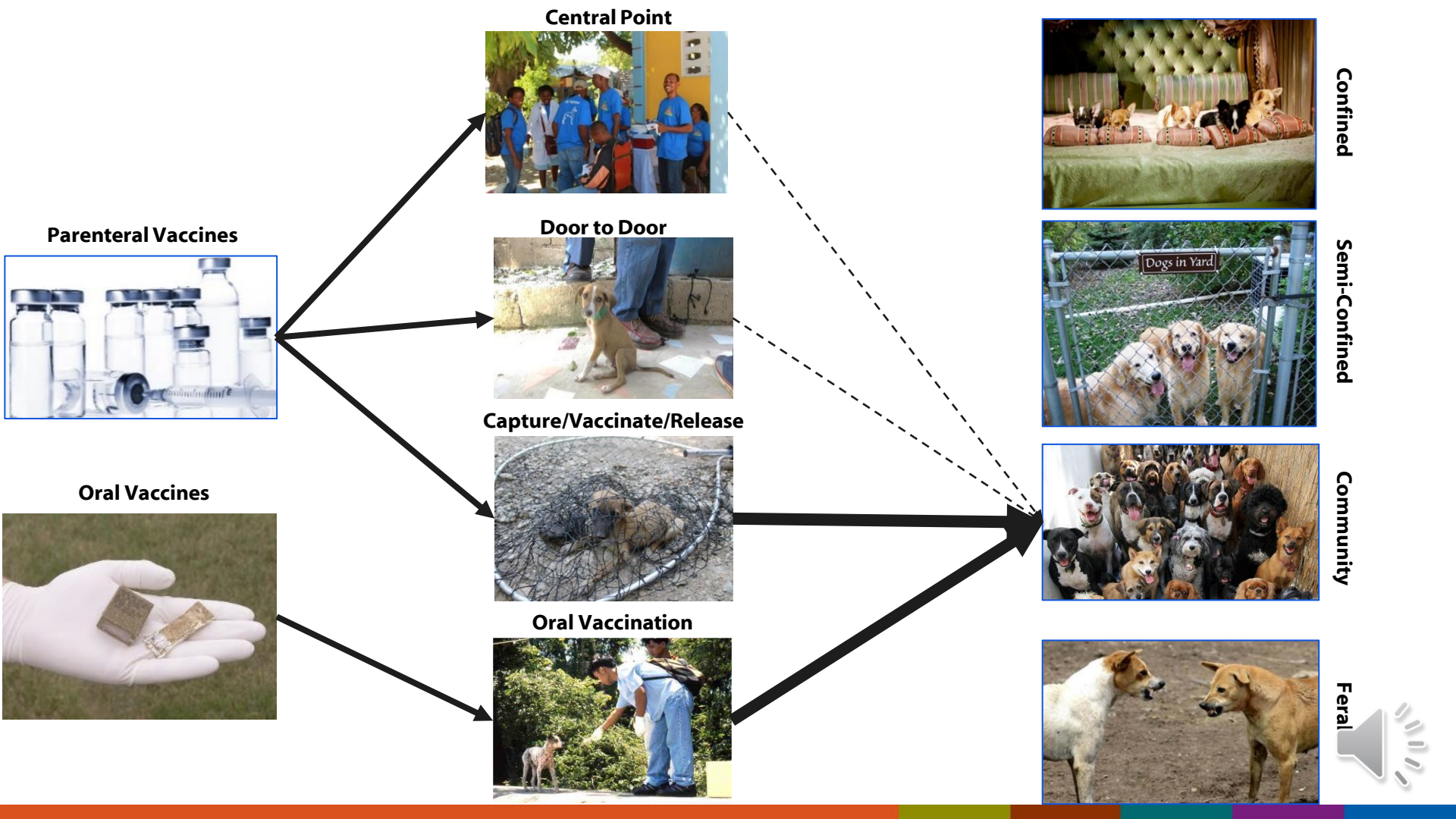
Parenteral Vaccines

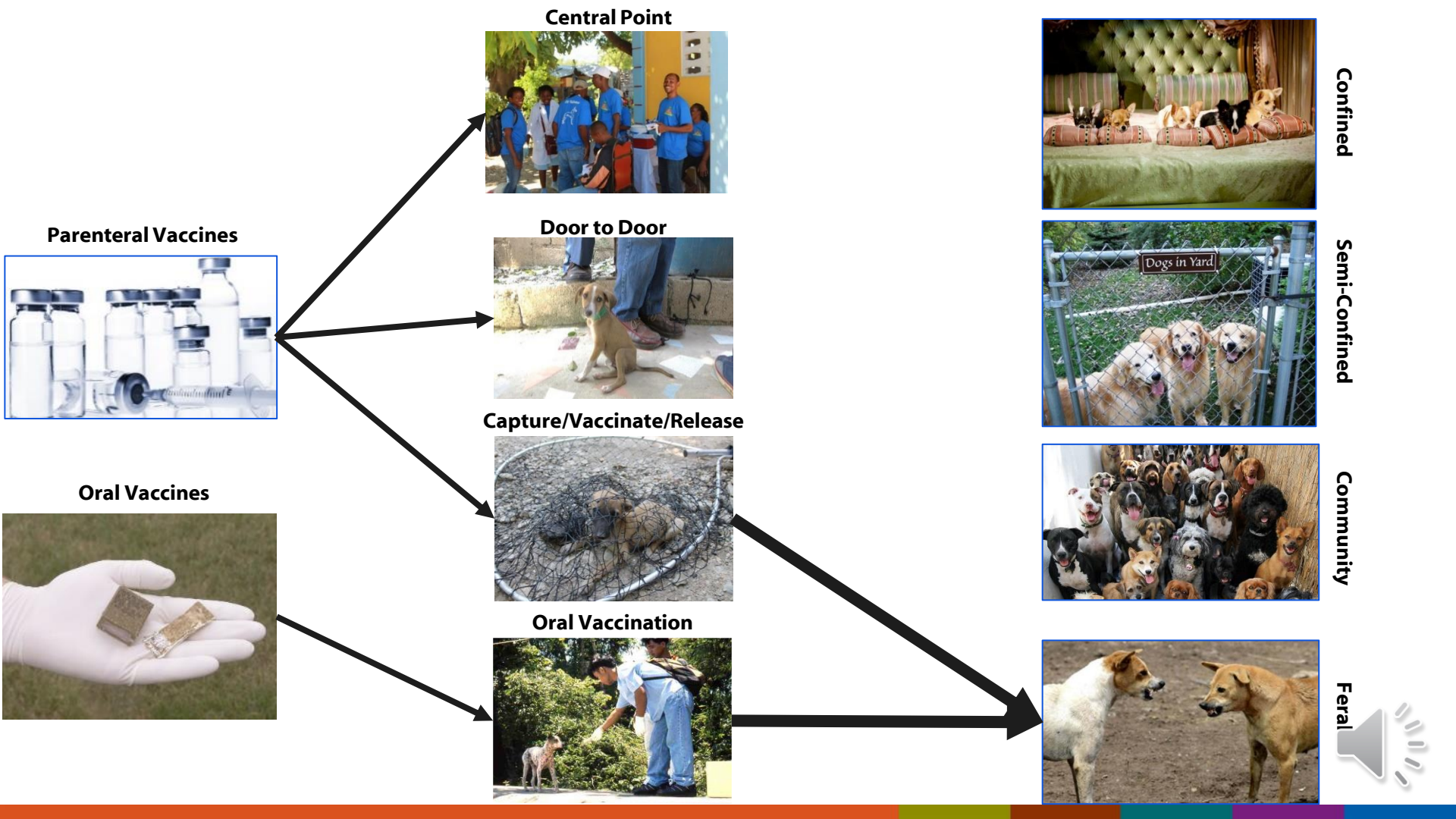


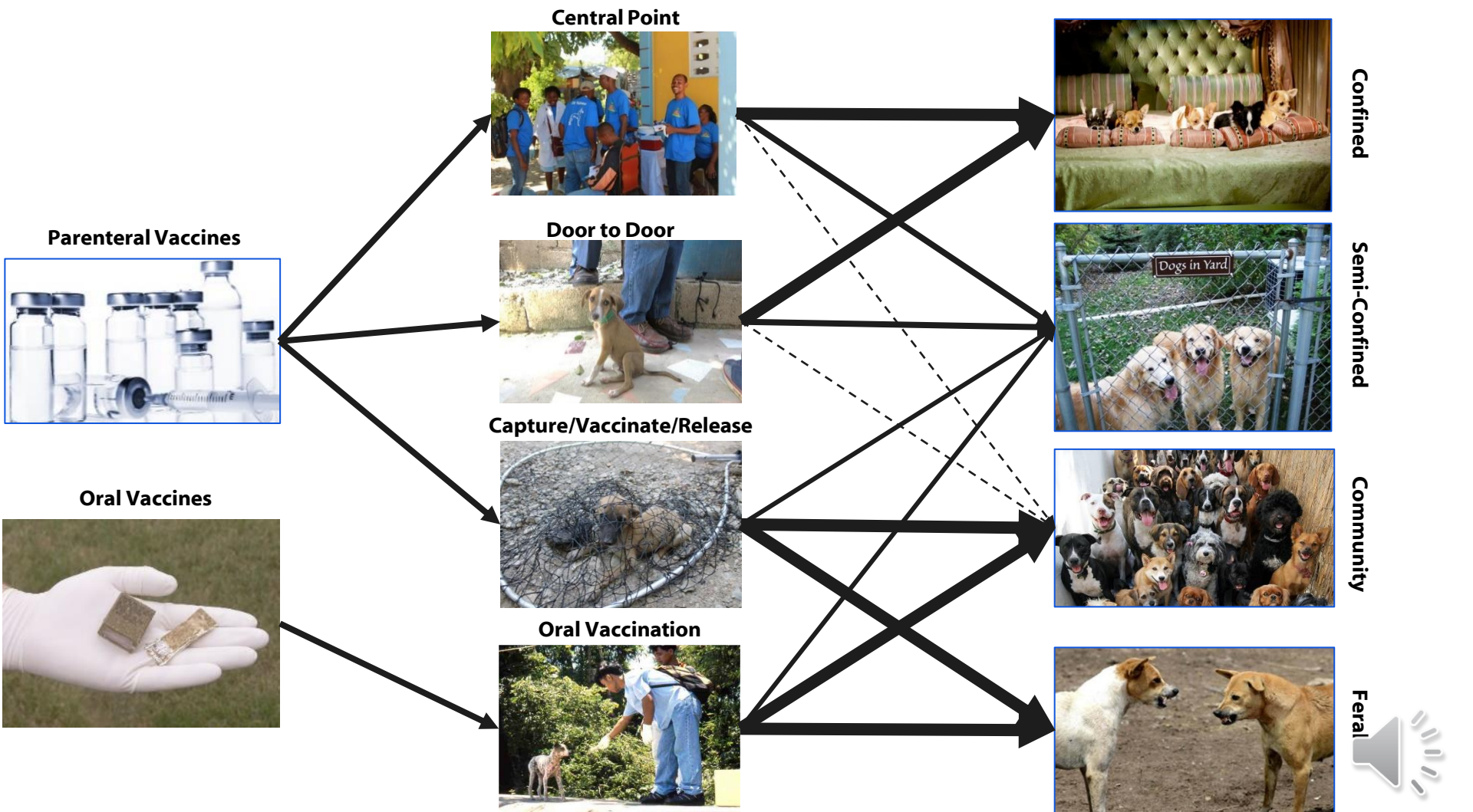
Oral Vaccines











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 confinement?* | 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† | Estimate value |
|--|----------------|
| Click button to estimate the average cost per dog vaccinated | |

Results: calculated values

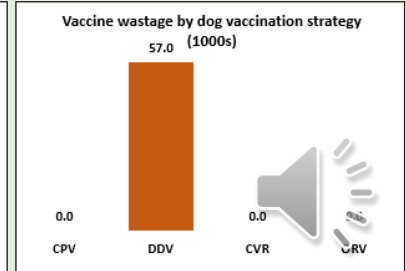
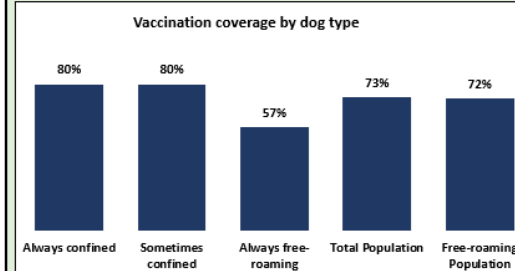
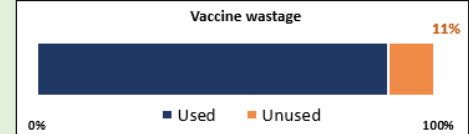
| Vaccination Doses by Strategy | Abbreviation | Procured | Used | Unused |
|-------------------------------|--------------|----------|---------|--------|
| Central Point Vaccination | CPV | 165,000 | 165,000 | - |
| Door to Door Vaccination | DDV | 165,000 | 108,000 | 57,000 |
| Capture, Vaccinate,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

| Vaccination doses by dog type | Vaccinated | Unvaccinated | Percent | Lower | Upper | Immunized |
|-------------------------------|------------|--------------|---------|-------|-------|-----------|
| 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 |
|----------------------------------|---------|-----------|---------|-------|-------|-----------|
| 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 |



Example 1: High Income, Urban Community

CAMPAIGN DESIGN

- Dog Population
 - 5,000 dogs
 - 80% confined
 - 20% semi-confined
- Vaccines
 - 4,000 purchased
- Vaccinators
 - 50 dogs per day





Planning aid for the implementation of dog vaccine campaigns to prevent and control rabies†

Government perspective

February 10, 2018

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This spreadsheet is a beta test version. It has not been officially cleared by the funding agency. The use of this version is for testing purposes only. The methodology used, findings, and conclusions produced from this software are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.



Start

Example 2: Low Income, Urban Community

CAMPAIGN DESIGN

- Dog Population
 - 5,000 dogs
 - 10% confined
 - 40% semi-confined
 - 50% community
- Vaccinators
 - 50 dogs per day
- Method
 - 80% Central Point
 - 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 confinement?* | 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 | #DIV/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 Oral 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 § | 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? | 55% | | | |
|---|------------|-----|-----|-----|
| 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† | Estimate value |
| Click button to estimate the average cost per dog vaccinated | [Button] |

Results: calculated values

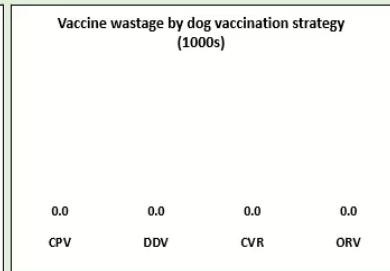
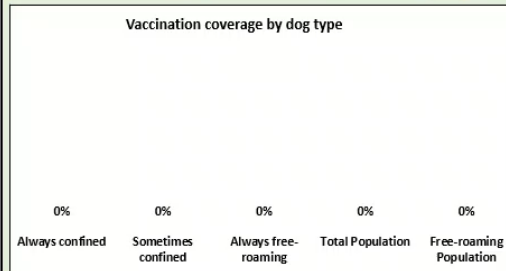
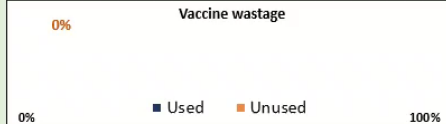
| Vaccination Doses by Strategy | Abbreviation | Procured | Used | Unused |
|-------------------------------|--------------|----------|------|--------|
| Central Point Vaccination | CPV | - | - | - |
| Door to Door Vaccination | DDV | - | - | - |
| Capture, Vaccinate, Release | CVR | - | - | - |
| Oral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

| Vaccination doses by dog type | Vaccinated | Unvaccinated | Percent | Lower | Upper | Immunized |
|-------------------------------|------------|--------------|---------|---------|---------|-----------|
| 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 | Lower | Upper | Immunized |
|----------------------------------|------|-----------|---------|---------|---------|-----------|
| 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 |



† 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.

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 confinement?* | 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? | 1,800 | 45.0% |
| 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 ? | 2,200 | 55.0% |
| 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? | 55% | | | |
|---|----------------|-----|-----|-----|
| 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 [†] | Estimate value | | | |
| Click button to estimate the average cost per dog vaccinated | | | | |

Results: calculated values

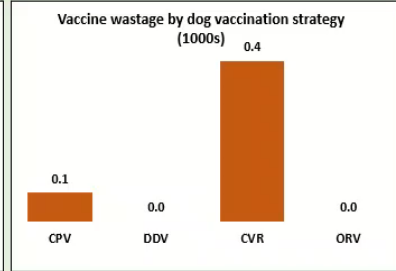
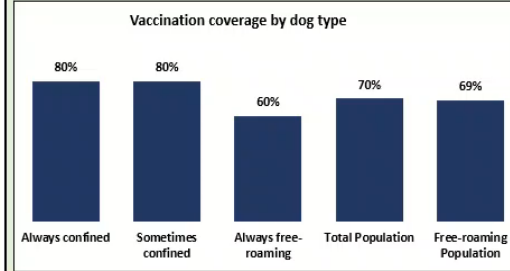
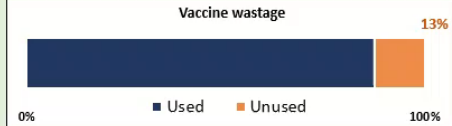
| Vaccination Doses by Strategy | Abbreviation | Procured | Used | Unused | |
|-------------------------------|--------------|----------|-------|--------|--|
| Central Point Vaccination | CPV | 1,800 | 1,725 | 75 | |
| Door to Door Vaccination | DDV | - | - | - | |
| Capture, Vaccinate, Release | CVR | 2,200 | 1,775 | 425 | |
| Oral Vaccine Handouts | ORV | - | - | - | |

| Vaccination doses by dog type | Vaccinated | Unvaccinated | Percent | Lower | 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 | Lower | 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 |
|---------------------|----------|------|--------|-------|-------|
| | 4,000 | 88% | 13% | 5% | 20% |

| Economic costs | Total (\$) |
|-------------------------|------------|
| Cost per dog vaccinated | \$ 3.91 |
| Total Campaign Cost | \$ 13,699 |
| Lower bound | \$ 8,592 |
| Upper bound | \$ 18,616 |



* 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.

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 confinement?* | 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? | 1,800 | 100.0% |
| How many oral vaccines will be procured? | 2,200 | |

| 3. Allocate the vaccines to a vaccination strategy. | Doses Procured | % |
|---|----------------|-------|
| What proportion of vaccines will be allocated to Central Point vaccination? | 1,800 | 45.0% |
| 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 Oral vaccination | 2,200 | 55.0% |

| 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? | 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? | 55% | | | |
|---|------------|-----|-----|-----|
| GDREP ⁵ 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 dog¹
 Click button to estimate the average cost per dog vaccinated Estimate value

Results: calculated values

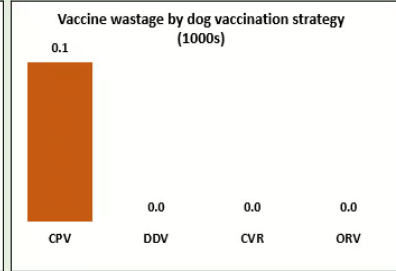
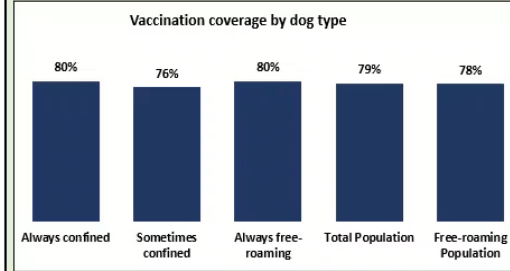
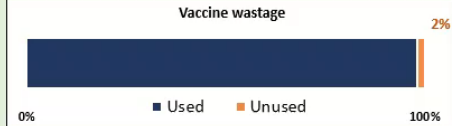
| Vaccination Doses by Strategy | Abbreviation | Procured | Used | Unused | |
|-------------------------------|--------------|----------|-------|--------|--|
| Central Point Vaccination | CPV | 1,800 | 1,725 | 75 | |
| Door to Door Vaccination | DDV | - | - | - | |
| Capture, Vaccinate, Release | CVR | - | - | - | |
| Oral Vaccine Handouts | ORV | 2,200 | 2,200 | - | |

| Vaccination doses by dog type | Vaccinated | Unvaccinated | Percent | Lower | Upper | Immunized |
|-------------------------------|------------|--------------|---------|-------|-------|-----------|
| Always confined | 400 | 100 | 80% | 74% | 86% | 80% |
| Sometimes confined | 1,525 | 475 | 76% | 70% | 82% | 76% |
| Always free-roaming | 2,000 | 500 | 80% | 74% | 86% | 80% |

| Vaccination coverage by dog type | Dogs | Immunized | Percent | Lower | Upper | Immunized |
|----------------------------------|-------|-----------|---------|-------|-------|-----------|
| Total Population | 5,000 | 3,925 | 79% | 72% | 85% | 79% |
| Free-roaming Population | 4,500 | 3,525 | 78% | 72% | 84% | 78% |

| Vaccine utilization | Procured | Used | Unused | Lower | Upper |
|---------------------|----------|------|--------|-------|-------|
| | 4,000 | 98% | 2% | 0% | 9% |

| Economic costs | Total (\$) |
|-------------------------|------------|
| Cost per dog vaccinated | \$ 2.94 |
| Total Campaign Cost | \$ 11,534 |
| Lower bound | \$ 7,976 |
| Upper bound | \$ 14,908 |



* 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.

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 confinement?* | 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? | 1,800 | 45.0% |
| 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 ? | 2,200 | 55.0% |
| 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 &

| 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% | 80% | 80% | 80% |
| What is the expected coverage among dogs that are never confined? | 5% | 5% | 80% | 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? | 55% | | | |
| GDREP [§] phase: | Phase 1 | | | |
| Suggested values: | CPV | DDV | CVR | ORV |
| Always confined | 80% | 80% | 5% | 5% |
| Semi-confined | 60% | 60% | 80% | 80% |
| Never confined | 5% | 5% | 80% | 80% |
| Vaccination campaign costs per vaccinated dog [†] | Estimate value | | | |
| Click button to estimate the average cost per dog vaccinated | [Button] | | | |

Choose option from 1-10 scale
1=not confident
10=very confident

Results: calculated values

Vaccination Doses by Strategy

| Abbreviation | Procured | Used | Unused |
|-----------------------------|----------|-------|--------|
| Central Point Vaccination | 1,800 | 1,800 | - |
| Door to Door Vaccination | - | - | - |
| Capture, Vaccinate, Release | 2,200 | 2,200 | - |
| Oral Vaccine Handouts | - | - | - |

Vaccination doses by dog type

| | Vaccinated | Unvaccinated | Percent | Lower | Upper | Immunized |
|---------------------|------------|--------------|---------|-------|-------|-----------|
| Always confined | 400 | 100 | 80% | 74% | 86% | 80% |
| Sometimes confined | 1,600 | 400 | 80% | 74% | 86% | 80% |
| Always free-roaming | 2,000 | 500 | 80% | 74% | 86% | 80% |

Vaccination coverage by dog type

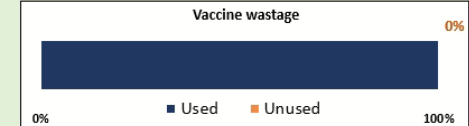
| | Dogs | Immunized | Percent | Lower | Upper | Immunized |
|-------------------------|-------|-----------|---------|-------|-------|-----------|
| Total Population | 5,000 | 4,000 | 80% | 74% | 86% | 80% |
| Free-roaming Population | 4,500 | 3,600 | 80% | 74% | 86% | 80% |

Vaccine utilization

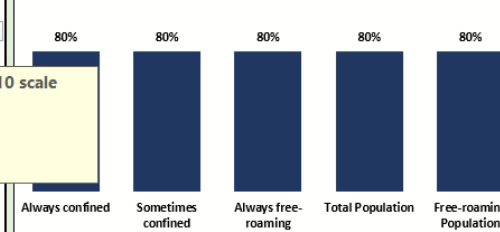
| | Procured | Used | Unused | Lower | Upper |
|--|----------|------|--------|-------|-------|
| | 4,000 | 100% | 0% | 0% | 8% |

Economic costs

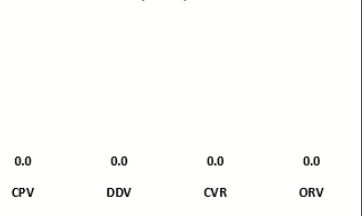
| | Total (\$) |
|-------------------------|------------|
| Cost per dog vaccinated | \$ 3.78 |
| Total Campaign Cost | \$ 15,121 |
| Lower bound | \$ 9,404 |
| Upper bound | \$ 20,653 |



Vaccination coverage by dog type



Vaccine wastage by dog vaccination strategy (1000s)



* 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.

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 confinement?* | 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? | 1,800 | 45.0% |
| 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 ? | 2,200 | 55.0% |
| 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? | 80% | 80% | 80% | 80% |
| What is the expected coverage among dogs that are never confined? | 5% | 5% | 80% | 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? | 55% | | | |
|---|------------|-----|-----|-----|
| 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 [¶] | Estimate value |
| Click button to estimate the average cost per dog vaccinated | |

Results: calculated values

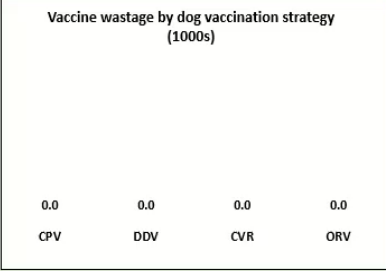
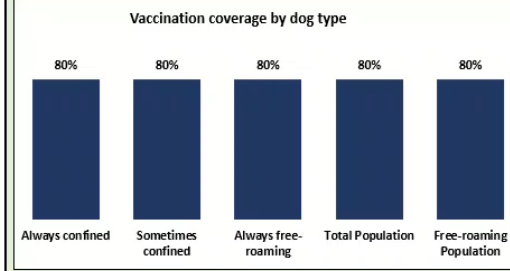
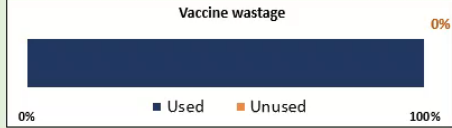
| Vaccination Doses by Strategy | Abbreviation | Procured | Used | Unused | |
|-------------------------------|--------------|----------|-------|--------|--|
| Central Point Vaccination | CPV | 1,800 | 1,800 | - | |
| Door to Door Vaccination | DDV | - | - | - | |
| Capture, Vaccinate, Release | CVR | 2,200 | 2,200 | - | |
| Oral Vaccine Handouts | ORV | - | - | - | |

| Vaccination doses by dog type | Vaccinated | Unvaccinated | Percent | Lower | Upper | Immunized |
|-------------------------------|------------|--------------|---------|-------|-------|-----------|
| Always confined | 400 | 100 | 80% | 74% | 86% | 80% |
| Sometimes confined | 1,600 | 400 | 80% | 74% | 86% | 80% |
| Always free-roaming | 2,000 | 500 | 80% | 74% | 86% | 80% |

| Vaccination coverage by dog type | Dogs | Immunized | Percent | Lower | Upper | Immunized |
|----------------------------------|-------|-----------|---------|-------|-------|-----------|
| Total Population | 5,000 | 4,000 | 80% | 74% | 86% | 80% |
| Free-roaming Population | 4,500 | 3,600 | 80% | 74% | 86% | 80% |

| Vaccine utilization | Procured | Used | Unused | Lower | Upper |
|---------------------|----------|------|--------|-------|-------|
| | 4,000 | 100% | 0% | 0% | 8% |

| Economic costs | Total (\$) |
|-------------------------|------------|
| Cost per dog vaccinated | \$ 3.78 |
| Total Campaign Cost | \$ 15,121 |
| Lower bound | \$ 9,404 |
| Upper bound | \$ 20,653 |



* 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.

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- Mission Rabies Sri Lanka Vaccination Team

Where to find this tool?

- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6805755/>
 - Published in Epidemiology and Infection, 2019
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 - Ryan Wallace – CDC: EUK5@cdc.gov
 - Andy Gibson – Mission Rabies: andy@missionrabies.com
- Online at: <https://rabiestaskforce.com/toolkit/vaxplan>

