

SITUATION EPIDEMIOLOGIQUE DE LA RAGE CANINE AU MAROC



**Réunion pour la Région Afrique du Nord
sur l'élimination de la rage canine**

Tunis, 24 et 25 Juillet 2019

Situation de la rage au Maroc



Principaux indicateurs épidémiologiques



Grands axes de la stratégie de lutte



Contraintes





Impact Santé Publique

- Maladie enzootique depuis plusieurs décennies;
- Problème majeur de santé publique:
Moyenne annuelle de 21 cas de rage humaine (2004-2018)



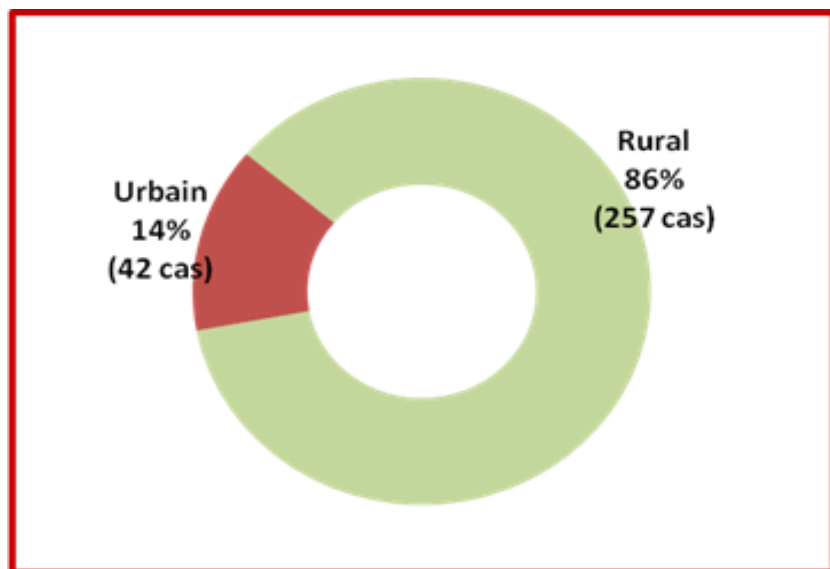
Impact économique

- Le chien : vecteur et réservoir principal (21,4% des cas) / Origine de toutes les contaminations
- Une moyenne annuelle de 323 cas de rage animale (toutes espèces confondues : 2004-2018)



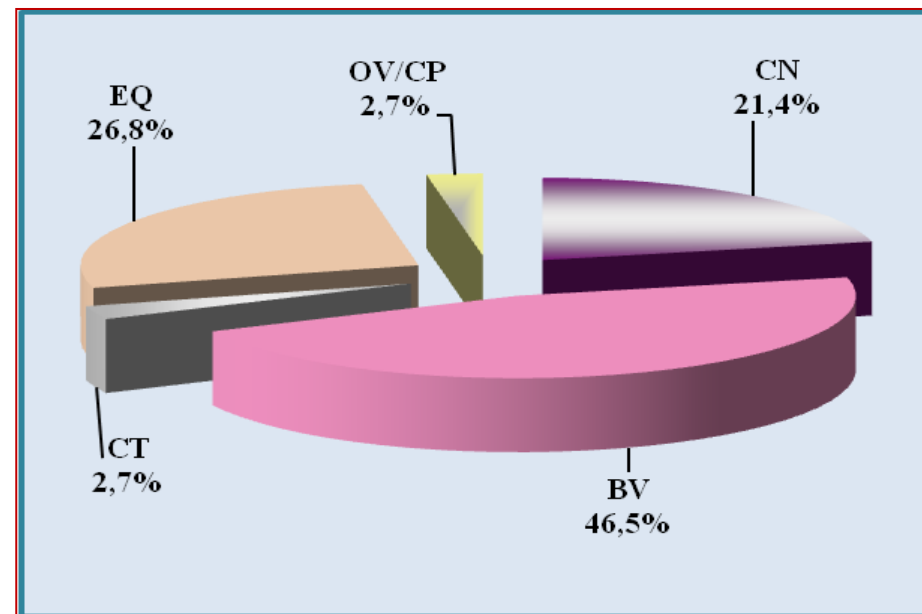
Le milieu rural accuse le plus grand nombre de Cas de rage animale

(Moyenne 2004-2018)

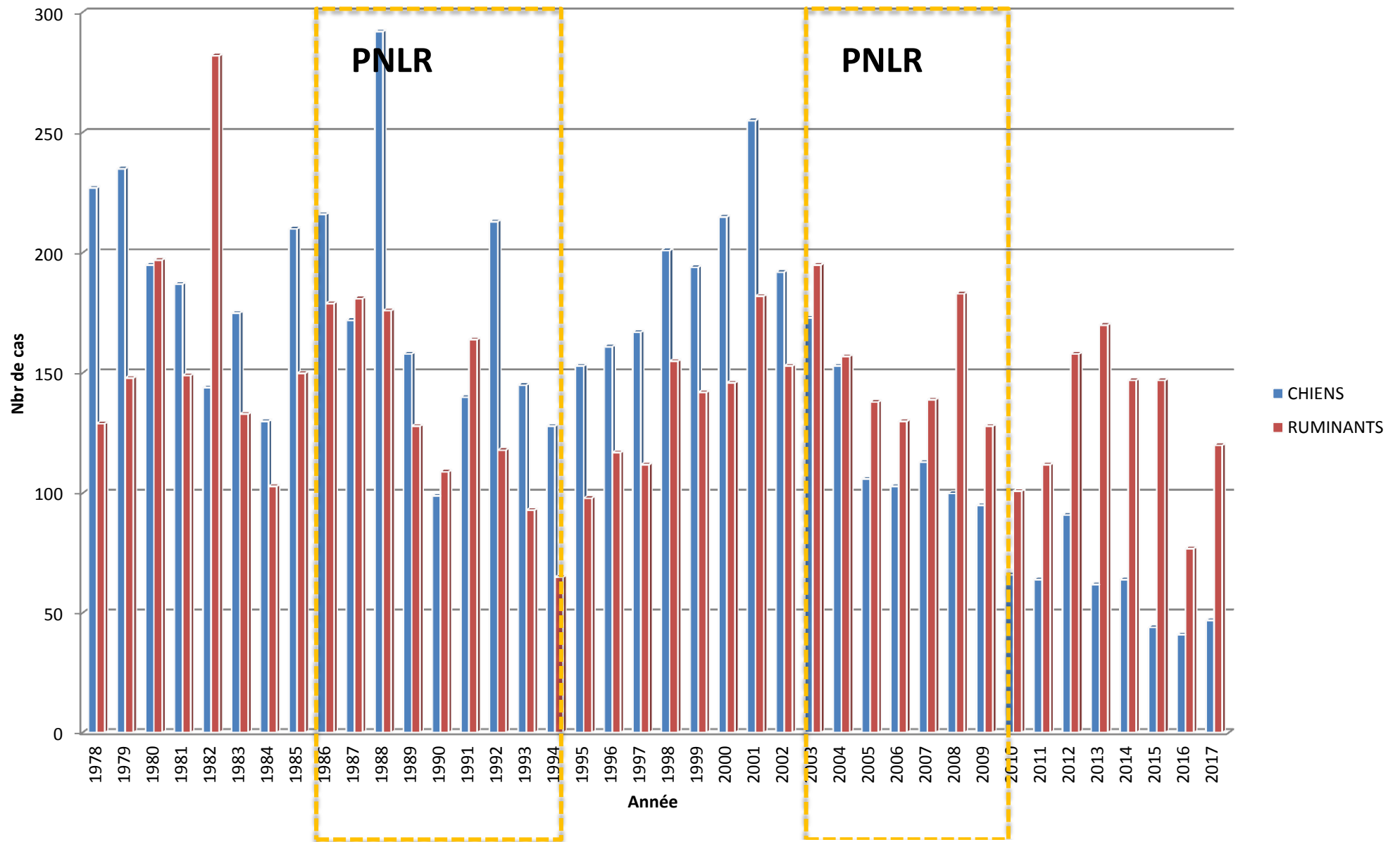


Renforcer la lutte au niveau de la zone rurale

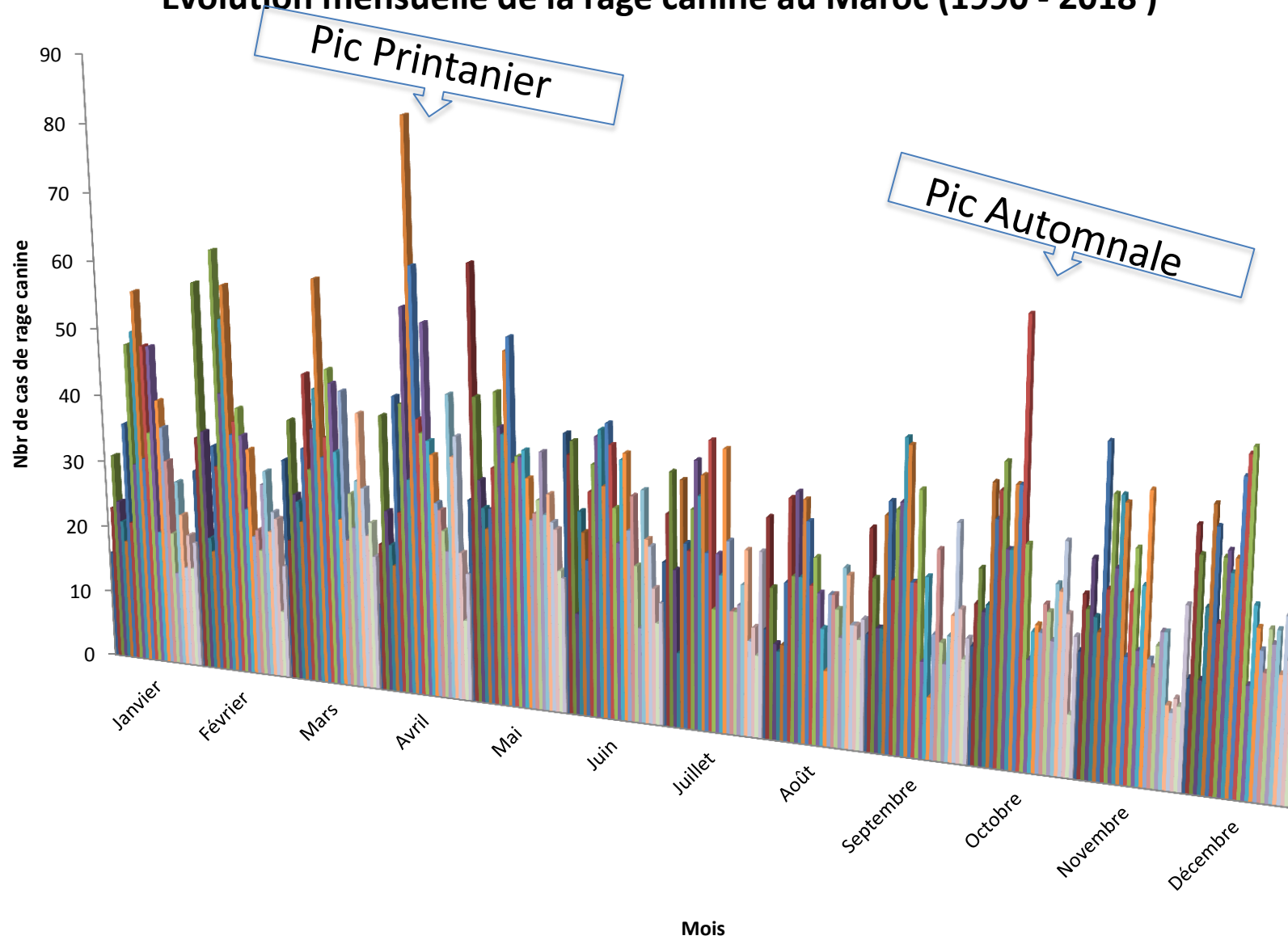
(Moyenne 2004-2018)



Evolution temporelle de la rage animale au Maroc (1978 - 2017)

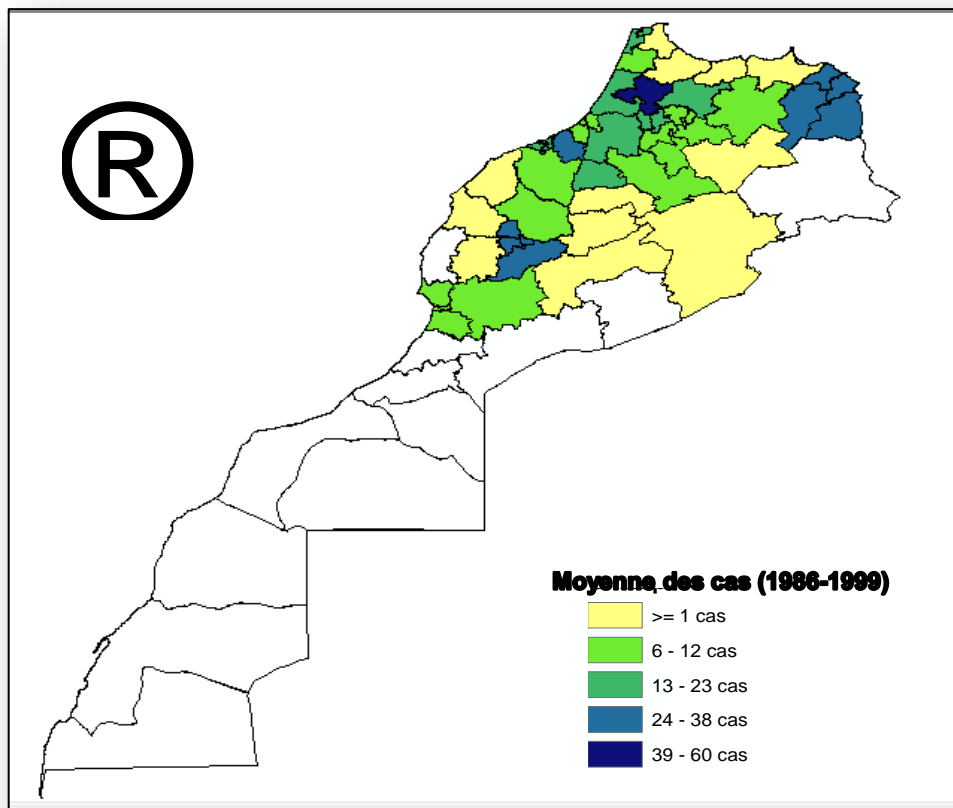


Evolution mensuelle de la rage canine au Maroc (1990 - 2018)

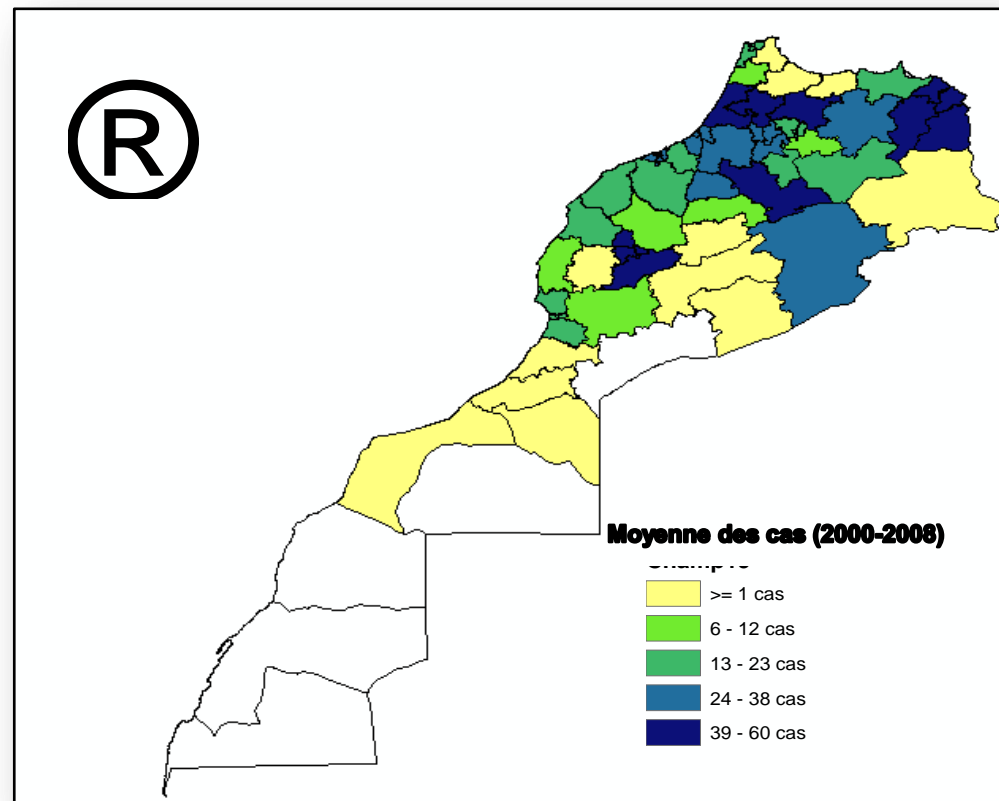




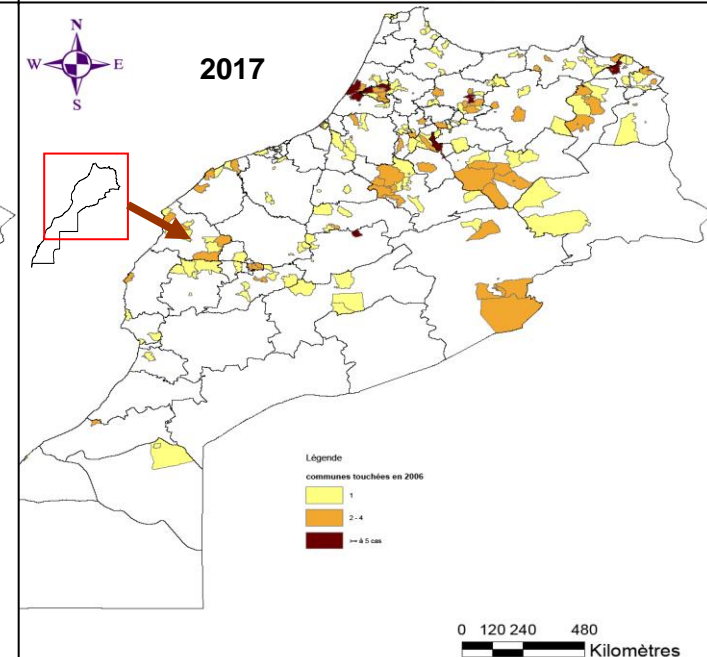
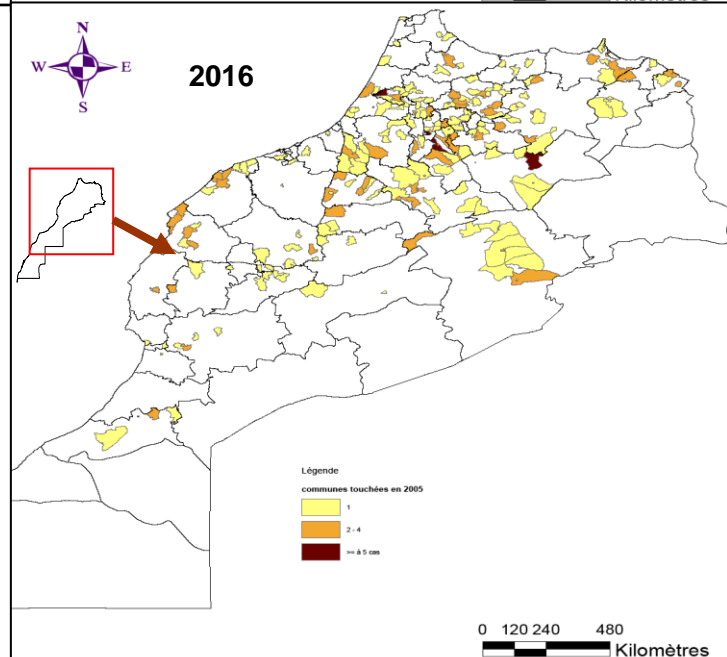
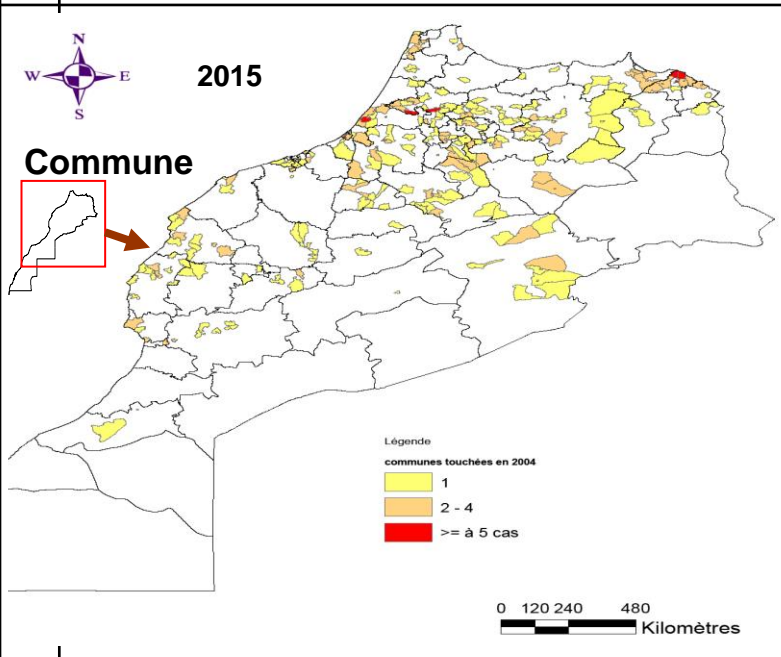
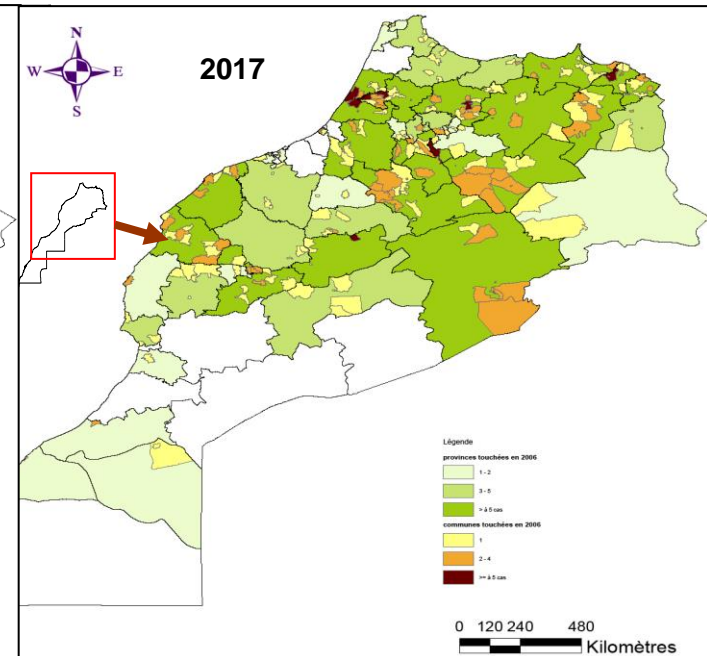
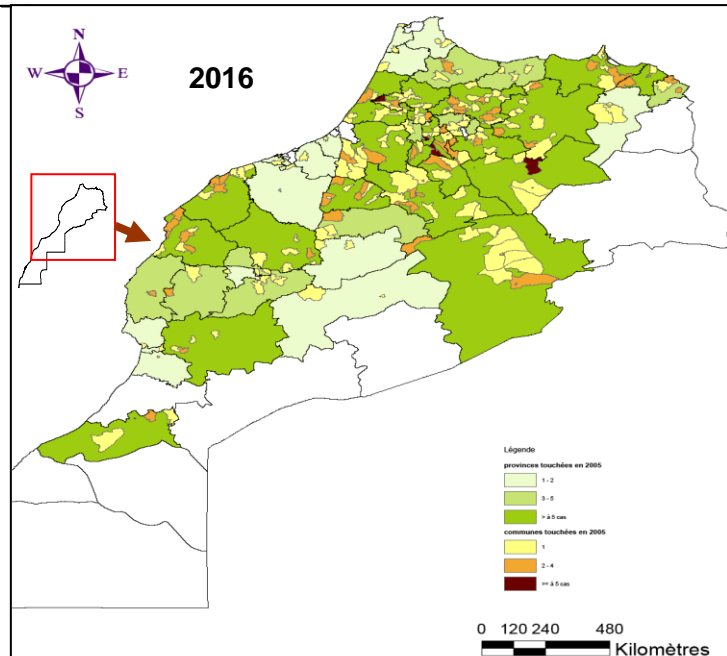
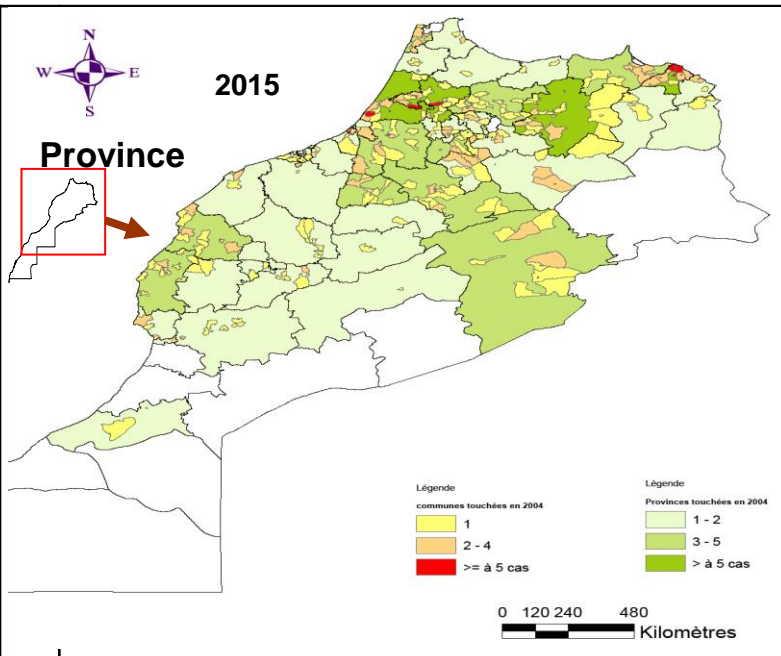
Moyennes établies sur la période :1986 - 1999



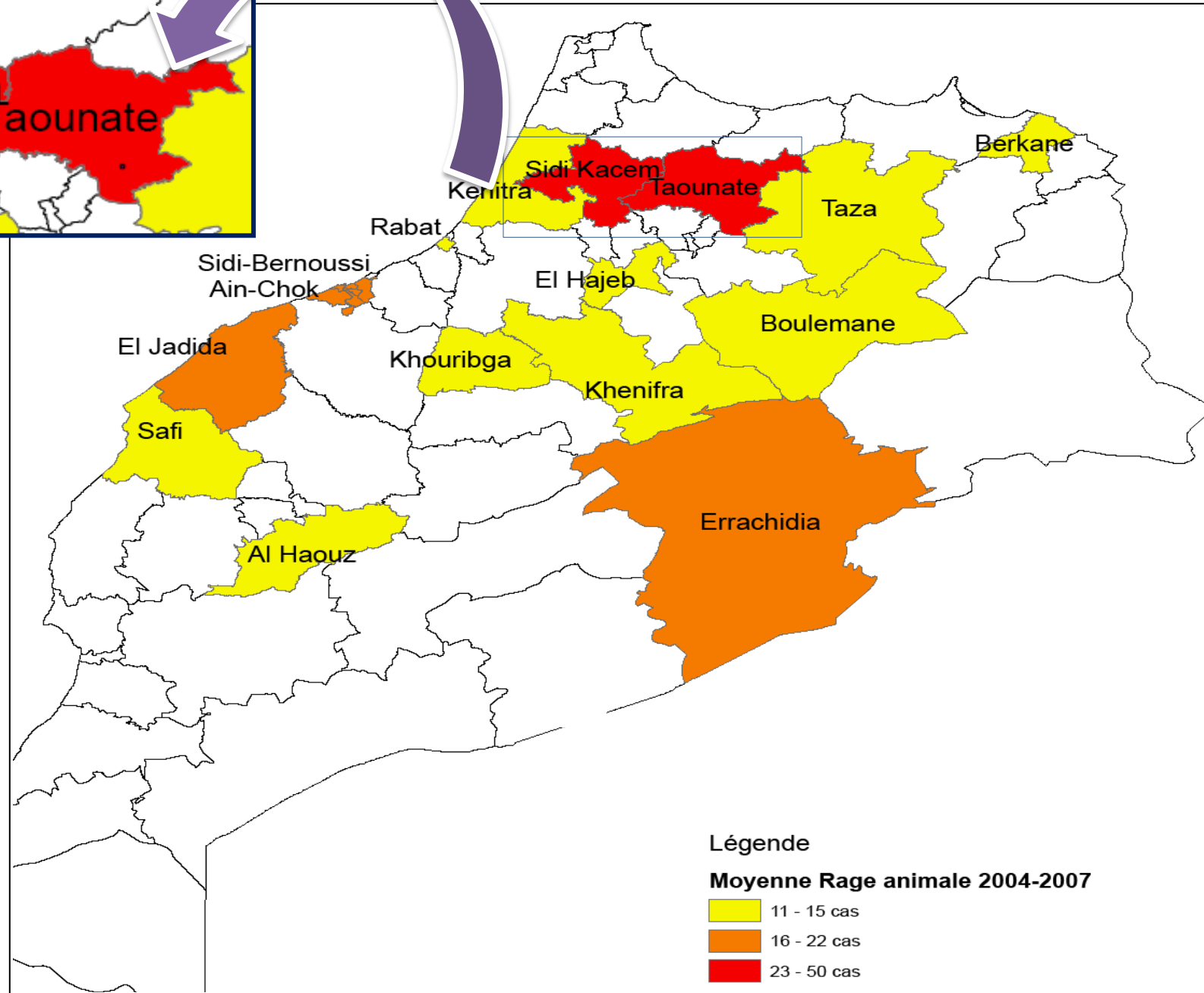
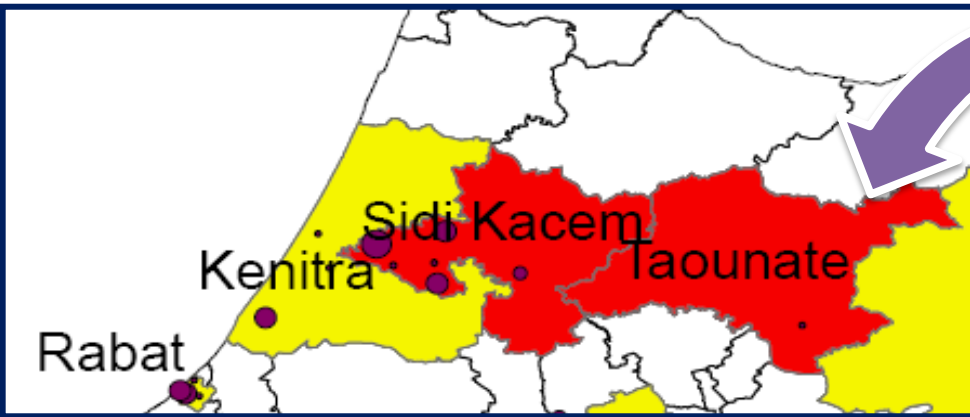
Moyennes établies sur la période : 2000 - 2008



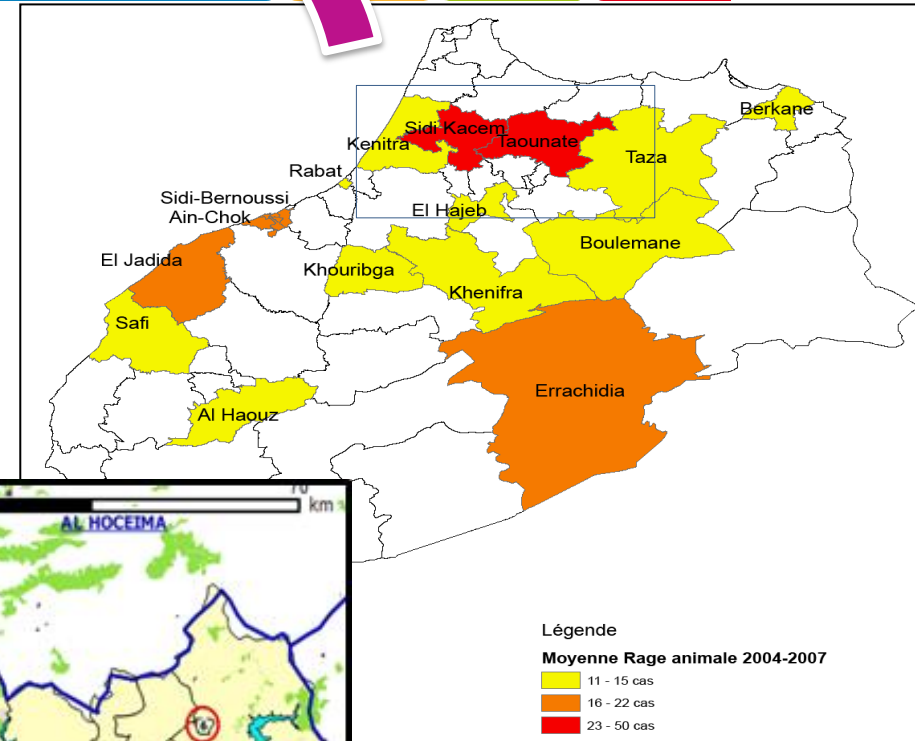
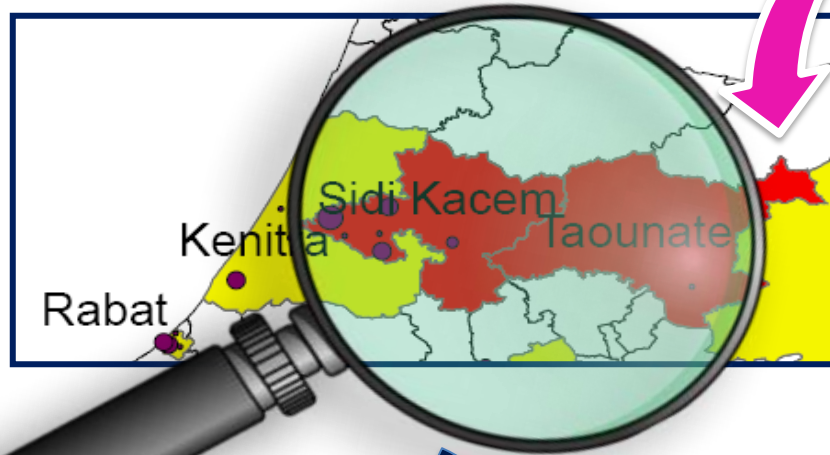
EVOLUTION SPATIALE



EVOLUTION SPATIALE

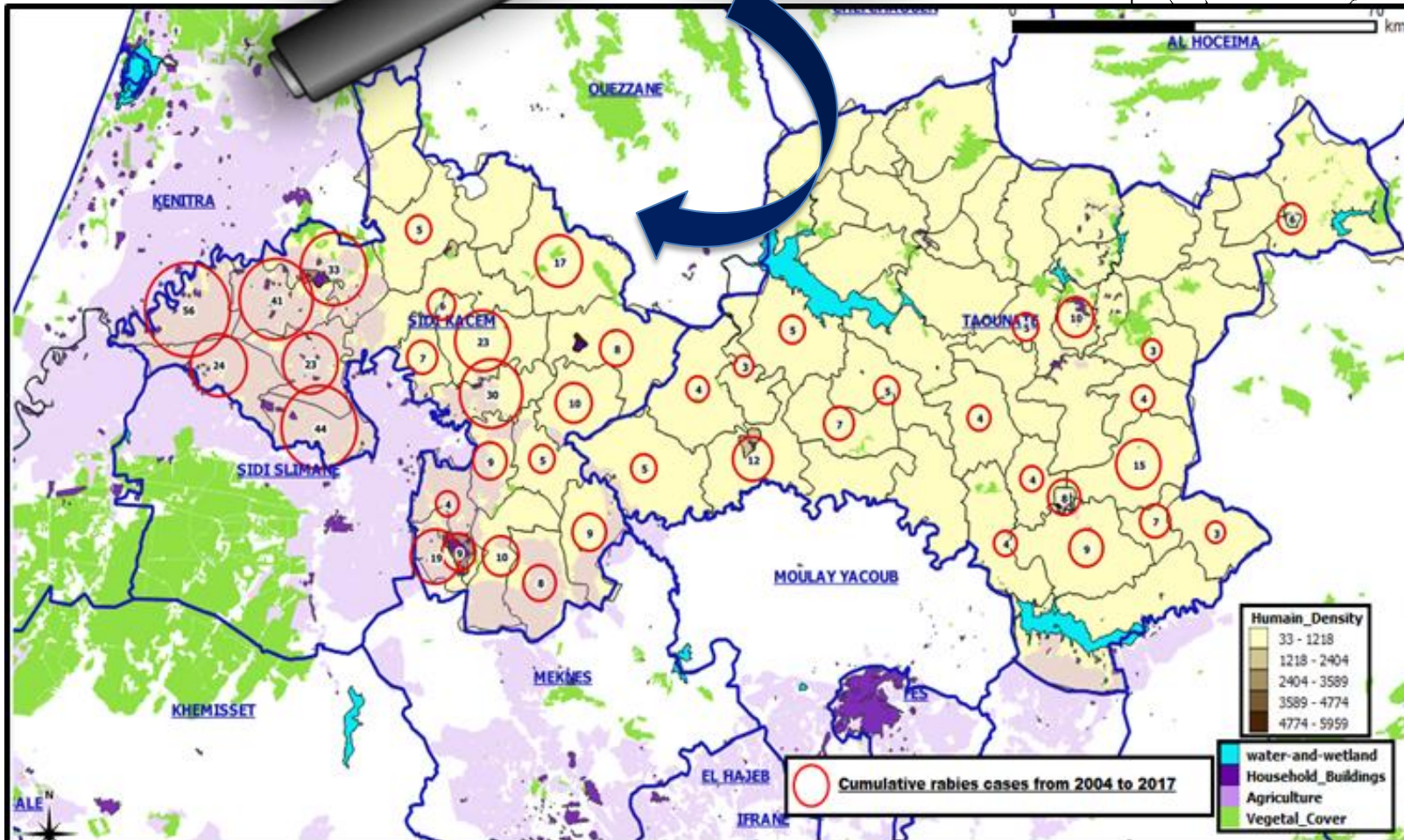


EVOLUTION SPATIALE

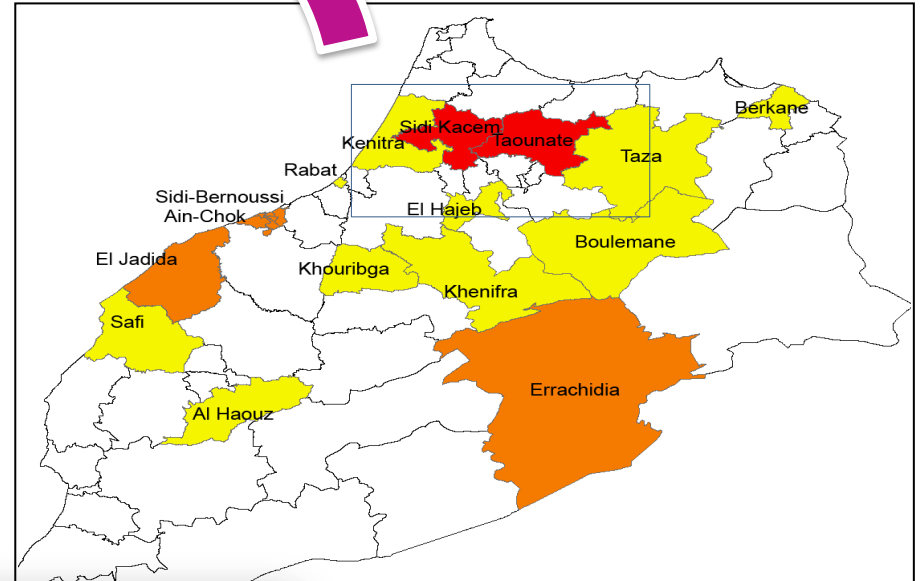
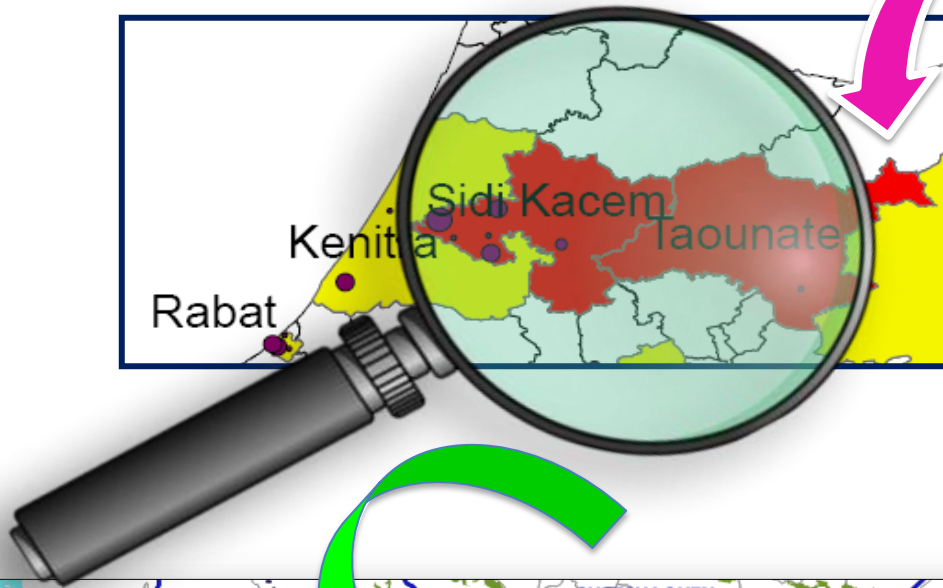


Légende
Moyenne Rage animale 2004-2007

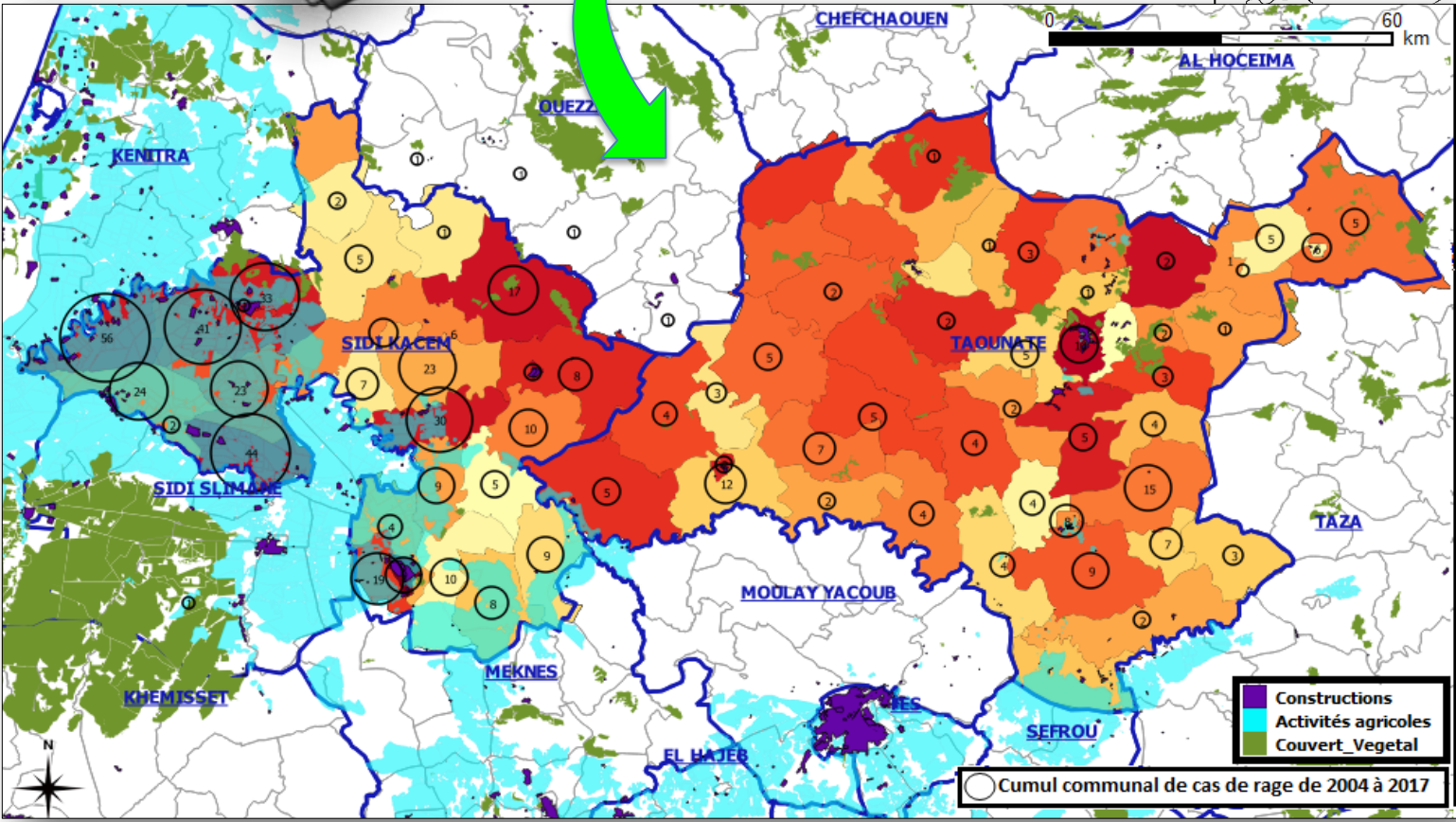
- 11 - 15 cas
- 16 - 22 cas
- 23 - 50 cas



EVOLUTION SPATIALE



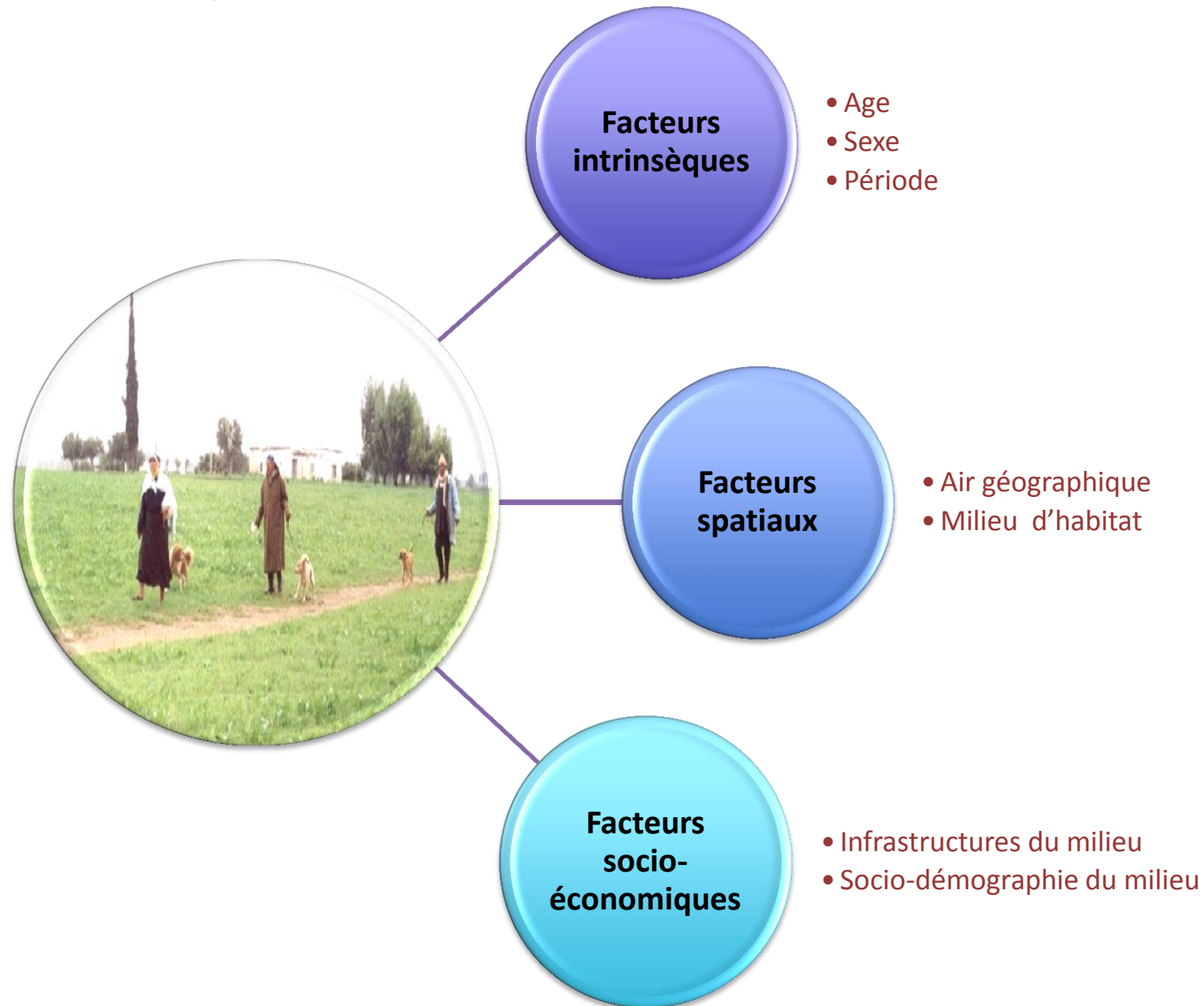
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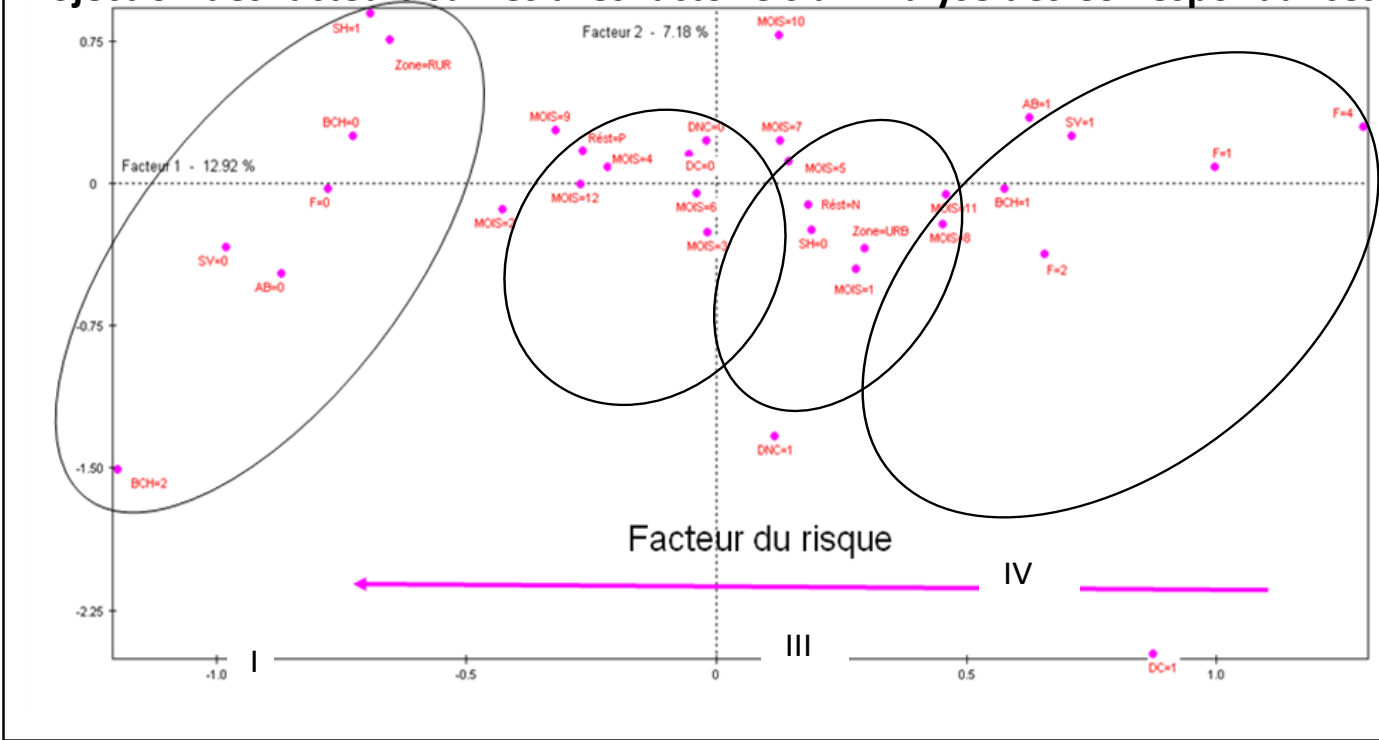
Constructions
 Activités agricoles
 Couvert_Vegetal

○ Cumul communal de cas de rage de 2004 à 2017

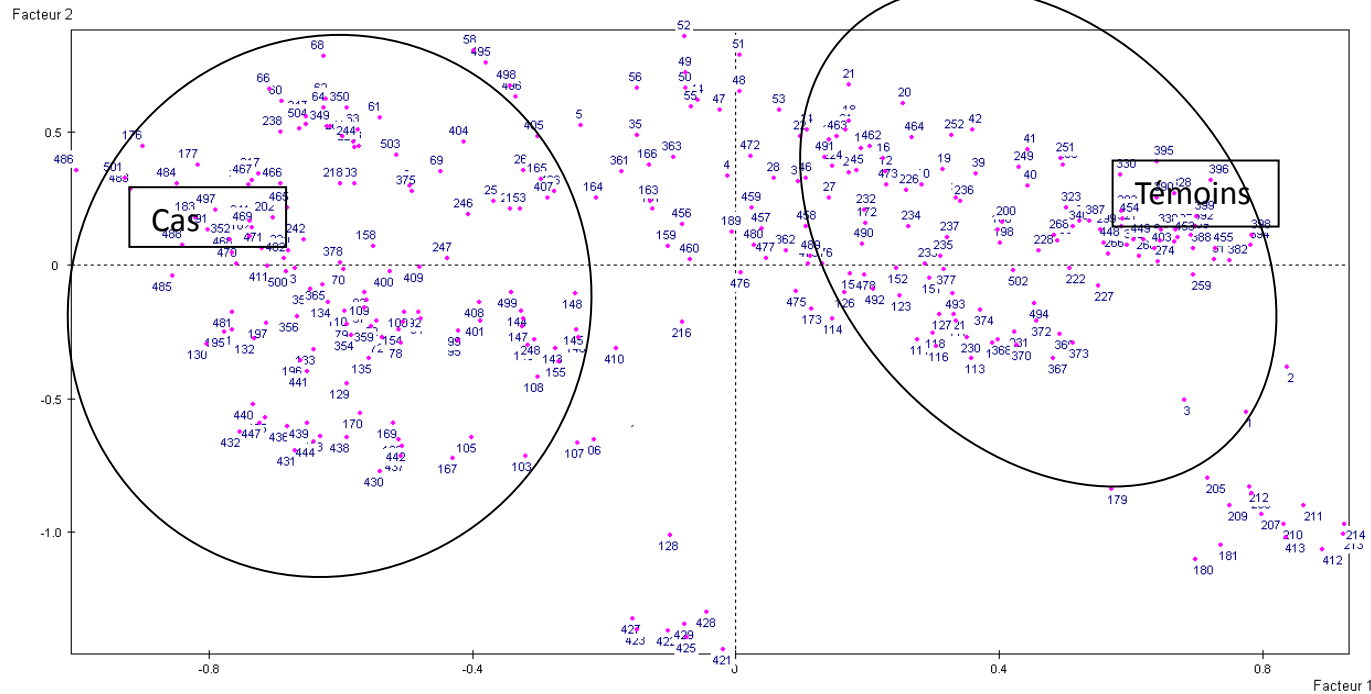
Facteurs de risque étudiés:



Projection des facteurs sur les axes factoriels d' Analyse des Correspondances Multiples (ACM)



Facteur determinant	Code
Zone	Zone
MOIS	MOIS
SEXE	SEXE
Rést	Rést
AGE	AGE
Souk hebdomadaire	SH
Abattoir	AB
Distance_goudron	DG
Structure_veterinaire	SV
Fourrières	F
BCH	BCH
Indice communal de dévelp	IDC
Décharge contrôlée	DC
Densité Humaine	DH
Décharge non contrôlée	DNC
Distance /lieu production	DLP
Dist/Habit proche	DHP
tonnage journal	TJ



Principaux facteurs de risque

Analyse multi-variée	Facteurs de risque :	N(cas)	(%)	OR apparié	IC 95 %	Valeur P
	Montagne	24	(11)	1,99	1,30-2,84	0,02
	Habitat rural	82	(38)	1,92	1,30-2,84	<0,001
	IDC<35%	16	(7)	3,90	1,47-10,72	0,006
	Souk hebdomadaire	59	(28)	1,95	1,25-3,05	0,001
	Tuerie	40	(35)	1,92	1,12-3,29	0,01
	Distance/ Piste	70	(33)	1,76	1,17-2,65	0,004
	Distance (rural)	64	(78)	4,40	2,27-8,59	<0,001
	Distance (Plaine)	62	(31)	1,82	1,18-2,80	0,004
	Décharge N.contrôlé	42	(20)	1,70	1,03-2,81	0,02
	Absence Clôture	16	(76)	4,27	1,16-16,49	0,01
	Tonnage <100t/j	22	(76)	4,19	1,32-13,76	0,006
	Distance/production	12	(46)	4,63	1,18-19,11	0,01
Densité (H) faible	42	(20)	2,05	1,22-3,44	0,003	
Densité/IDC élevé	17	(9)	4,71	1,71-13,65	0,03	

Principaux facteurs protecteurs

Facteurs protecteurs :	N(cas)	(%)	OR apparié	IC 95 %	Valeur P
Abattoir (IDC>70%)	86	(56)	0,63	0,41-0,96	0,02
Structure vétérinaire	114	(53)	0,64	0,44-0,93	0,01
Fourrière	81	(38)	0,57	0,39-0,82	0,001
BCH	124	(58)	0,65	0,44-0,94	0,01

Original Research

Determinants of Canine Rabies in Morocco: How to Make Pertinent Deductions for Control?

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ABSTRACT

Objective

This case control study aims to highlight risk factors to contract canine rabies, taking into account several factors like geographical affiliation, sex, age, season, socio-economic and demographic characteristics of the environment in which the canine population evolves.

Design

Case-control study at national level in Morocco included non-randomized comparison groups. This approach was chosen to address practical considerations and the data used correspond to a five years period. A group of 215 cases and 215 controls were needed for an odds ratio (OR) of 2.2 and the sample size was calculated for a 1:1 match, with a power of 80% and a risk of the first species at 5% (95% confidence interval).

Setting

Data collection is retrospective and the collection of information on the exposure of cases and controls was conducted in the same way.

Subjects

Target population was the general canine population of Morocco. Criteria related to age group (puppies, young, adult) and gender (female, male) have been considered in the selection of the target population.

Results

The Moroccan rural context characterized by a lack of basic infrastructures (education, health) makes that there are practices and cultural habits that favor the endemicity of rabies in some regions. Thus, the disease is associated with the presence of rural slaughterhouses and animal markets and landfills which appears offering unlimited food sources for stray dogs and then indirectly promotes their reproduction accordingly.

Conclusion

These findings support advocacy efforts for strengthening a global prevention system. In addition, socio-ecological surveys should be carried out to build understanding in depth for a better adaptation of the ongoing prophylactic programs.

Keywords

Rabies; Dogs; Case control study; Risk factors; Rural habitat; Municipal development index; Rural slaughterhouses; Weekly live-stock markets.

Abbreviations

CDI: Communal Development Index; CHB: Communal Hygiene Bureau; LRAR: Regional Laboratory of Analysis and Research.

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tion between the slaughterhouse determinant factor and disease (OR=2.93 [95% CI: 0.34-27.68] $p_1=0.23$); (OR=0.78 [95% CI: 0.32-1.93] $p_2=0.56$). The presence of a slaughter establishment at a communal area with an IDC>70% seems to allow protection against rabies (OR=0.63 [95% CI: 0.41-0.96] $p=0.02$).

The presence in the communal area of public veterinary services is considered a protective factor against the risk of occurrence of rabies (OR = 0.64 [95% CI: 0.44-0.93], $p=0.01$).

The existence of an important distance separating the communal periphery from an asphalt track is associated with rabies (OR=1.76 [95% CI: 1.77-2.65], $p=0.004$). This finding is strongly associated with the risk of rabies occurring in rural areas (OR=4.40 [95% CI: 2.27-8.59]), Table 3) and a geographical area mostly represented by plains (OR=1.82 [95% CI: 1.18-2.80]).

Table 3. Results of the Modeling of Risk Factors Associated with a Canine Rabies

	ORMat	P	OR	p
Weekly Rural Markets	1.95	0.001	7.50	0.006
Rural Habitat	1.92	<0.001	9.07	0.003
Human Density	2.05	0.003	8.76	0.003
Slaughterhouse	1.92	0.01	2.58	0.04

Distance has been proposed in order to see the accessibility of veterinary teams to these communes during vaccination campaigns of dog-to-owner. Municipalities that are far from a road or paved track are with a difficult access for veterinary teams and therefore dogs in this area are less likely to be vaccinated and protect against rabies. We agreed with the HCP experts to define two range: less than 5 km and greater than 5 km.

Pounds are defined as public facilities where abandoned dogs are temporarily kept until a fine is paid by the owner. The presence of municipal pounds is a protective factor against the risk of occurrence of the disease (OR=0.50 [95% CI: 0.34-0.75], $p_1=0.0004$). A statistically significant association between the occurrence of rabies and the number of existing pounds in the communal area ($p_2=0.7$ and $p_3=0.24$) was not found.

Communal Hygiene Bureau (Hygiene communal office) which is a public facility in charge of common space management in terms of the fight against pests, capture of stray dogs, medical care of bitten people by feral dogs and the management of places where we keep stray dogs. The presence of Communal Hygiene Bureau (Hygiene communal office) is also demonstrated as a protective factor against rabies (OR=0.65 [95% CI: 0.44-0.94], $p=0.01$). Controlled landfills tend to be considered protective factors against the risk of rabies occurring. However, this association is not statistically significant since the numbers were very small (OR = 0.62 [95% CI: 0.26-1.47], $p=0.24$).

On the other hand, the presence of an uncontrolled garbage discharge increases the risk of contracting rabies in dogs belonging to a communal area containing this type of landfill (OR=1.70 [95% CI: 1.03-2, 81], $p=0.02$).

The absence of closure for uncontrolled landfills appears to be the most important risk factor in the occurrence of rabies (OR=4.27 [95% CI: 1.16-16.49], $p=0.01$). Landfills with a daily tonnage of less than 100 T/day seem to be more associated with the occurrence of the disease than landfills with a large storage capacity (OR=4.19, 95% CI: 1.32-13), 76], $p=0.006$). The origin of this waste is generally provided by houses located around these sites-mainly on the outskirts of urban agglomerations - which explains why the existence of a reduced distance (less than 5 km) separating the landfill compared to production sites is more associated with the occurrence of the disease in dogs from this communal area (OR=4.63 [95% CI: 1.18-19.11], $p=0.01$).

Socio-Demography of the Environment

Human density: Low human density is considered associated with the occurrence of rabies (OR=2.05 [95% CI: 1.22-3.44], $p=0.003$) which confirms the rural character of rabies canine in Morocco.

Human density and CDI: Taking into account the human density factor according to the IDC, shows a strong association between a low density and the occurrence of rabies in a communal area with an IDC>50% (OR=4.71 [95% CI: 1.71-13.65], p_1 (Fischer exact)=0.57 and $p_2=0.03$), which is particularly characteristic of human agglomerations at the edges of cities or the so-called semi-urban environment.

From the Univariate analysis of this study, several risk factors that contribute to the occurrence of rabies have been identified. In general, the occurrence of rabies remains globally dependent on the level of development of the environment as well as the state of the hygienic and sanitary infrastructures. Protective factors indicate a certain degree of availability in terms of health structures for management and the fight against the stray dog population, as well as the increased interest in upgrades to hygienic establishments of public interest (slaughterhouses). All those factors are summarized in summary Table2.

Multivariate Analysis

Multiple regressions are complicated by the presence of multicollinearity. Indeed, this study, like the majority of similar studies, involves explanatory variables that are correlated. A simple method for detecting too much correlation between independent variables is to make collinearity tests.

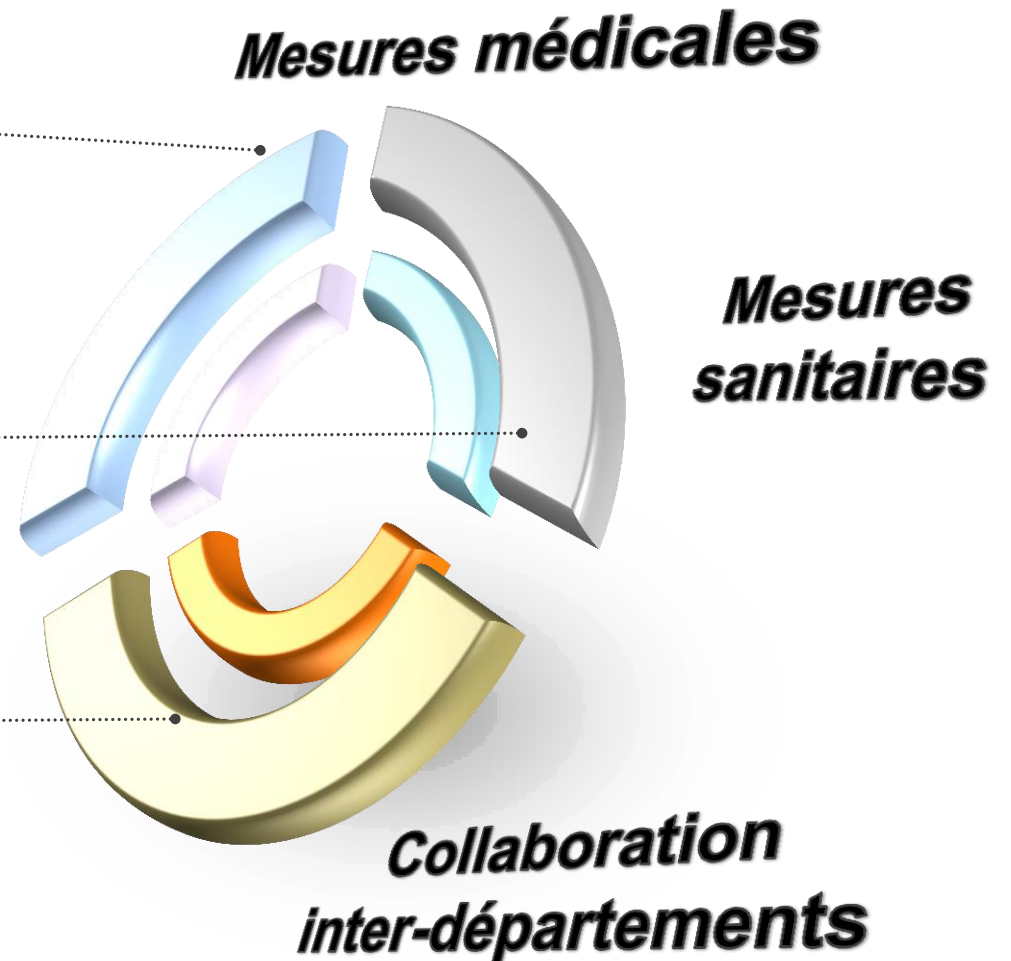
We investigate whether these risk factors influence the likelihood of rabies occurring. We want to determine, among these explanatory variables, the one that best explains this condition of occurrence. A multiple linear regression is realized and we notice that among the variables introduced: the variable distance with respect to the tar, uncontrolled discharges and IDC were particularly affected by this problem and do not contribute significantly to the regression as they present bad collinearity statistics (tolerance and VIF are far from 1 and outside the recommended limits (tolerance>0.3 and VIF<3.3) and therefore are highly correlated with each other. Only 4 of the 12 variables included in multi-varietal

Basée sur:

- La vaccination d'au moins 70% des chiens à propriétaires
- La stérilisation chimique et chirurgicale des chiens errants (F)

Gestion des populations des chiens errants : Ramassage

- Coordination
- Campagnes de sensibilisation
- Mise en place d'infrastructures et d'équipements appropriés



Réalisations en 2017 en matière du sous programme Relatif à la lutte contre la rage

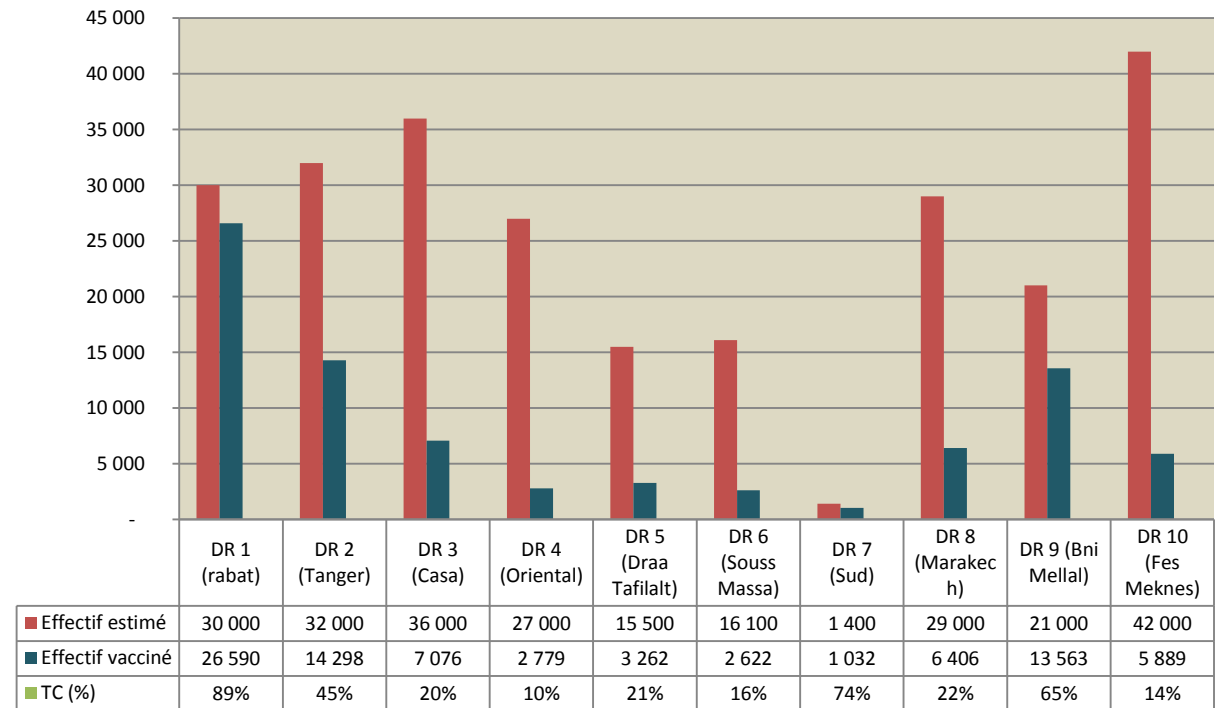


Vaccination des chiens à propriétaire

Le programme de lutte contre la rage canine est axé sur :

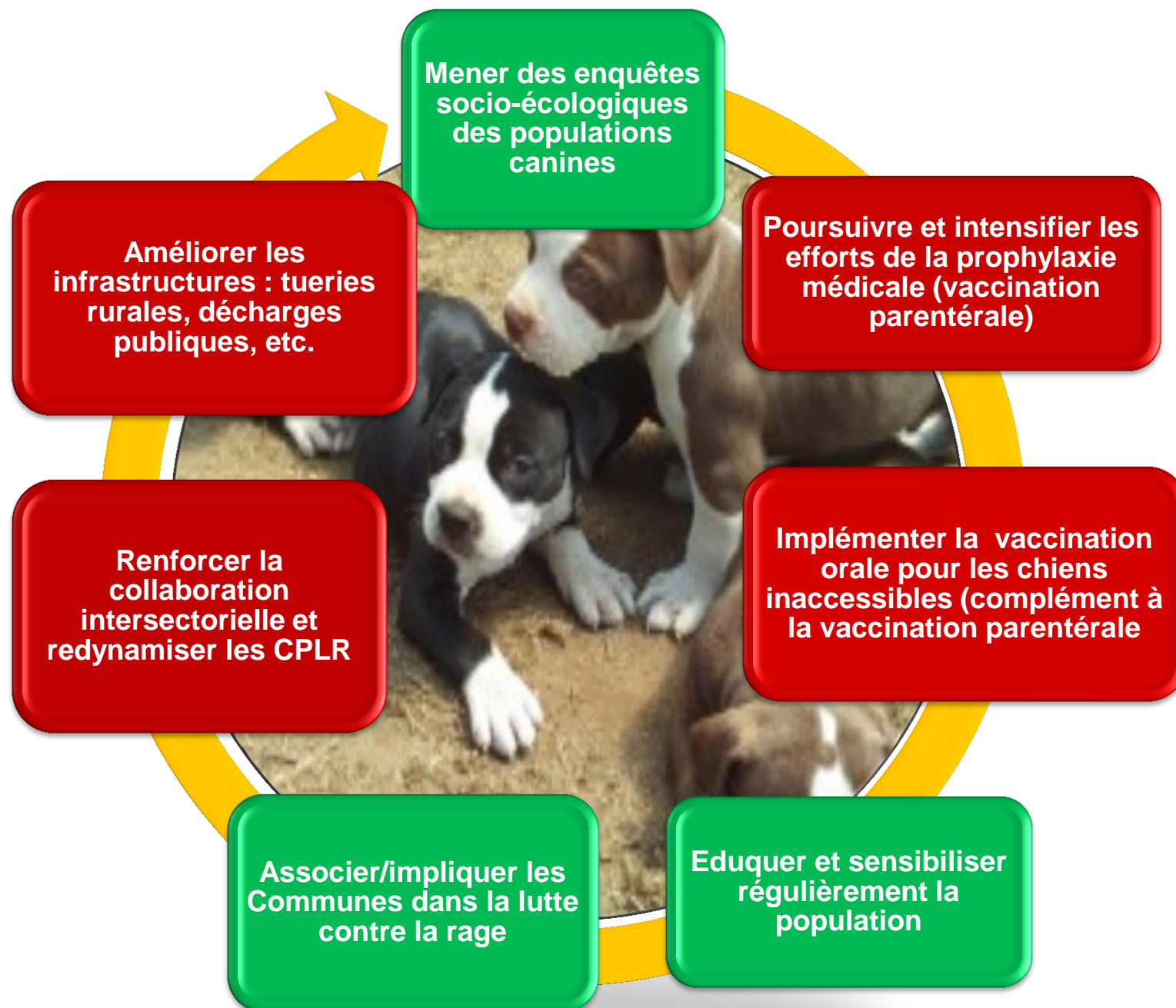
- L'exécution d'une campagne généralisée de vaccination des chiens à propriétaire contre la rage, par les Services Vétérinaires Provinciaux en milieu rural et péri-urbain ;
- La gestion des foyers déclarés de la maladie ;
- La sensibilisation de la population quant à l'importance de la lutte contre la rage animale.

Evolution graphique de l'effectif des chiens à propriétaire vaccinés contre la rage: campagne de vaccination 2017



- ❖ Campagne de vaccination des chiens à propriétaires:
Date: du 28/09/2017 au 29/12/2017.
Effectif vacciné : 83.517 chiens à propriétaire (34% de l'objectif fixé).
- ❖ Contre performance pour toutes les DR à l'exception de la DR1, DR7 et la DR9;
- ❖ Mesures correctives : Prise de contact avec la DGCL pour étudier la possibilité de procéder à la stérilisation des chiens couplée à leur vaccination en collaboration avec les VSM.





Ne laissez pas la rage tuer cette image
Vaccinez les chiens maintenant



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#Rabies

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