

Factors Associated with Rabies Vaccination of Dogs in KwaZulu-Natal



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Zoonosis and Public Health *In review*



Rabies

- The dog is still the primary maintenance host and reservoir for rabies in developing countries
- Greater than 99% of human rabies cases result from dog bites
- Over 90% of persons who receive PEP are from canine rabies enzootic countries
 - ~ 15 million persons receive PEP worldwide
- The World Health Organization has recommendations for comprehensive canine rabies control programs



Comprehensive Canine Rabies Programs

- Canine ecology and population studies
- Mass vaccination campaigns
 - Vaccination coverage of at least 70%
 - Will prevent 90% of human infections
 - Most economical way to prevent disease in humans
- Formerly stray dog removal
 - Ineffective and distasteful
- Tie up programs
 - Dog confinement not widely utilized
- Primary Care clinics
- Culturally adapted educational campaigns

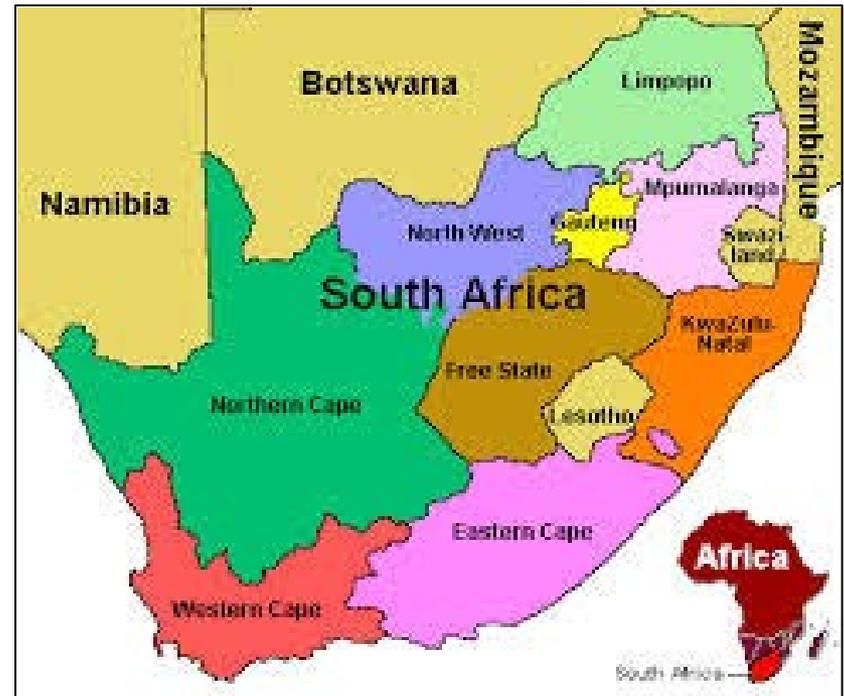


Rabies Program Success

- Central and local political support
- Community participation
- Quality surveillance
- Laboratory diagnostic capability
- Broad based educational programs
 - Medical professionals
 - Veterinary professionals
 - Public schools

Canine Rabies in South Africa

- KwaZulu-Natal province (KZN) has been rabies enzootic since the mid-1970's
- Despite diligent control efforts the disease continues
- Bill and Melinda Gates Foundation project to eliminate the disease





Rabies Control in KwaZulu-Natal

- Mass vaccination campaigns
- Preventative health clinics
 - Sterilization, other vaccinations, internal and external parasite control, husbandry education
- Provincial Rabies Advisory Group
 - One Health
- Educational programs
 - Physicians meetings
 - Public school messages
- Media releases

KZN Mass Campaigns



Roadside and Door-to-Door



Primary Care Clinics



Vaccinations and Surgeries



Food Supplies and Education





Farm Visits



Successful Mass Vaccination Campaigns

- Accessibility to dogs
 - Timing of campaigns
- Structure
 - Central point vs. door to door
- Marketing through appropriate channels
- Culture can affect all of the above





Goals of the Study

- Elucidate why canine rabies persists in the face of decades of considerable control efforts which include mass vaccination programs
- Clearly the ideal target of 70% is not being reached
 - Why?
- Neither the owned nor un-owned dog population had not been quantified



Study Design

- September 2009 to January 2011
- Cross-sectional survey
- Cluster or 'area' design
- Six communities
 - 52% rural
 - 33% urban
 - 15% peri-urban
- Microsoft Excel
- SAS 9.3 (SAS Institute Cary, NC, USA)
 - Descriptive statistics
 - Modeling



Results

- Response rates ranged from 92-100%
- 1992 households
- 38% of all households owned one or more dogs (range 1-19, median = 2)
- Data collected on 1667 dogs over suckling age
- Complete rabies information available from 1620



Rabies Vaccination of Owned Dogs

- 537 (71%) dog owning households said they presented dogs at the last campaign held in their area
- 1360 (84%) owned dogs had been vaccinated previously in their lifetime
- 64% within 12 months prior to survey
- 82% of owners said they could provide proof of vaccination for these dogs

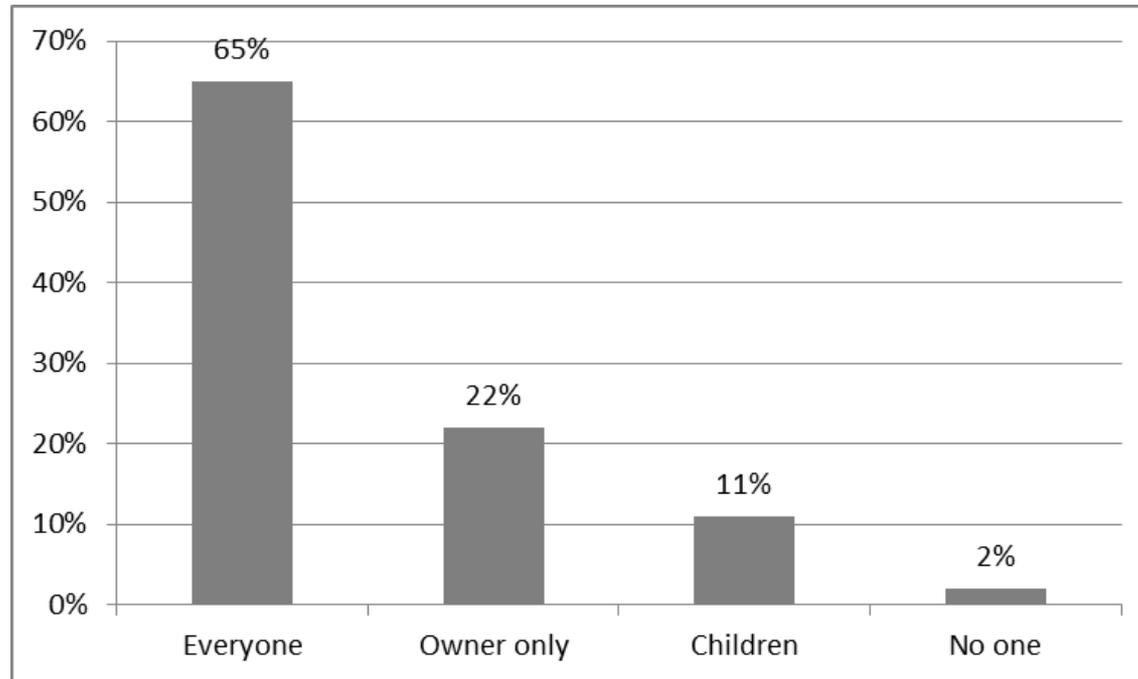


Table 1. Reasons provided by KZN dog owners why they had not attended recent vaccination campaigns between September 2009 and January 2011 (n = 222).

Categories	Count
Away from home	80
Did not know about campaign	52
Did not want vaccine	5
Too far to travel	4
Other reasons – dog too young	81
dog ran away	
new dog to household	

*91% of dog owners were not willing to travel further than one kilometer .

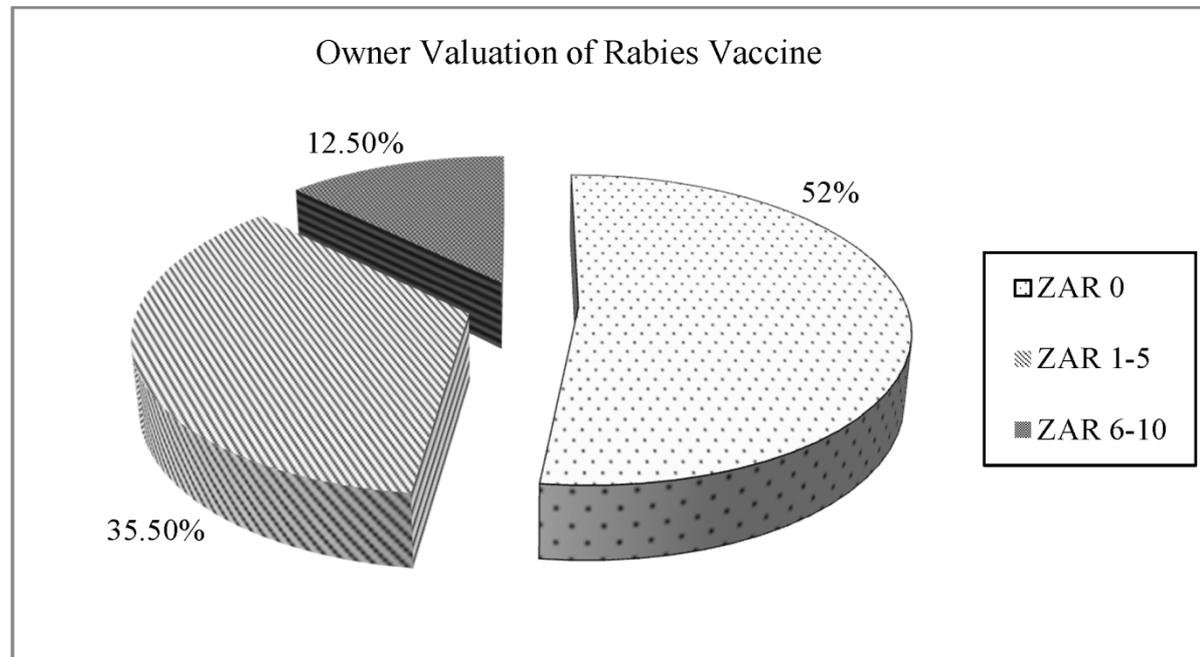
Ability to Handle Dogs



*No dogs in the survey were identified as un-owned or neighborhood dogs.



Owner Valuation of Rabies Vaccine



*1 ZAR = 0.10 USD

Table 2. Dates, dog owner attendance, and coverage estimates of government vaccination campaigns for surveyed areas in KZN 2009 – 2011.

Area	Survey date	Campaign date	% of HH attending campaign	Dogs vaccinated by KZNSDAERD	Estimated dog population	Estimated vaccination coverage
Wembezi	October 2009	July 2009	30%	734	2 916 ⁺	25%
Esikhawini	November 2009	February 2009	74%	240	3 086 ⁺	8%
Ixopo	November 2009	October 2009	73%	1 060 ⁺ 9 285*	1 112 ⁺ 14 982*	95% 62%♦
Umlazi	February 2010	February 2008	40%	6876	24 194 ⁺	28%
Pongola	February 2010	July 2009	58%	2891	17 031*	17%
St. Chad's	January 2011	October 2010	76%	523	2 159 ⁺	24%

(HH = household, *Dog populations calculated for municipality, +Dog populations calculated for local area, ♦Percentage of dogs vaccinated in entire municipality calculated separately).



Risk Model

- Unit of observation was risk of non-vaccination at the dog level due to households with multiple dogs
- Level of significance necessary to enter the model was $p \leq 0.05$
- Constructs were made to deal with convergence and evidence of interactions
- Variables dropped from model
 - Sex of dog
 - Religion of household
 - Culture of household

Variables for Risk Model

- Age of dog
 - <1 years
 - 1-2 years
 - 3 years
 - 4 years
 - >5 years
- Area surveyed
 - 6 areas with 3 community types
- Household construct
 - Low, medium, high
- Dog construct
 - Low, medium, high
- Husbandry construct
 - Low, medium, high

Constructs for Risk Model

- Household
 - Number of dogs in household
 - Livestock ownership
 - Owner knowledge of rabies
- Dog
 - Source
 - Purpose
- Husbandry
 - Provision of shelter
 - Collar
 - Restriction
 - Handle ability
 - Food source



Risk Model Results

Variable	b	S.E.	P	OR	95% CI
Intercept	-0.9957	0.092	<0.0001		
Age					
<1 year	1.1562	0.13	<0.0001	5.6	3.607 – 8.709
Area					
Umlazi	0.8435	0.2404	0.0005	2.675	1.378 – 5.120
Household					
Low	0.4316	0.0992	<0.0001	2.15	1.508 – 3.065
Dog					
Medium	0.2451	0.09	0.0065	1.859	1.392 – 2.484
Husbandry					
Low	0.2078	0.09	0.0209	1.73	1.281 – 2.335



Conclusions

- Age of the dog is important risk factor for non-vaccination against rabies
- Low level husbandry practices and low levels of rabies knowledge are risk factors
- The urban area of Umlazi was at greatest risk
 - Area affect (multifaceted)
- The medium dog construct score may have been a result of the construct itself and not a result of dog value



Resolutions

- Vaccinate all dogs regardless of age or body condition score
- Education and awareness for dog owners and the public regarding rabies disease and vaccination opportunities
- Frequency or timing of campaigns
 - Access to dogs
 - Population turnover

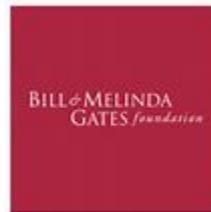
Acknowledgments

- University of Pretoria



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- BMG Foundation



- Humane Society International



**HUMANE SOCIETY
INTERNATIONAL**

- KwaZulu-Natal Government Veterinary Services



Thank You!!!



Questions???

