


Supplementary Materials

Supplementary Table S1. Questionnaire survey for small mammal species sold in South African pet shops.



Small mammals survey

We are conducting a study about the sale of exotic small mammals in the South African pet shops. Small mammals are becoming popular as pets in South Africa and for this reason we would like to understand which species of small mammals are being sold in SA and which species are popular. This survey forms part of a PhD degree in Zoology at the university of KwaZulu-Natal. Your participation in this survey is voluntary and it will only take 8 minutes to complete as most of the questions are multiple choice. As pet shop owners or workers, it is important that we hear your opinion regarding this study.

The permission to undertake this survey was given by the university of KwaZulu-Natal Human participation committee. Should you have any questions about the study please contact, Ndivhuwo at ndivhuwomaligana@gmail.com and Prof Downs at downs@ukzn.ac.za

Your participation in this survey is very much appreciated.

Thanks!!!!!!

Can you please provide your name and email address (Optional)

Your answer

1. Please indicate your Province

- Limpopo
- Gauteng
- Western Cape
- Eastern Cape
- Free State
- Mpumalanga
- North West
- KwaZulu-Natal
- Northern Cape
- Other: _____

2. Please indicate the number of pet shops you think you have in your province?

- 1
- 2
- 3
- 4
- 5
- Other: _____

3. Which non-native animals do you sell in your pet shop?

- Mammals
- Reptiles
- Fish
- Birds
- Amphibians
- Arthropods
- Other: _____

4. Which of these small mammal pets do you sell?

- Guinea pig (*Cavia porcellus*)
- Rat (*Rattus norvegicus*)
- Mice (*Mus musculus*)
- Rabbit (*Oryctolagus cuniculus*)
- Squirrel (*Sciurus carolinensis*)
- Winter white dwarf hamster (*Phodopus sungorus*)
- Golden hamster (*Mesocricetus auratus*)
- Short-tailed chinchilla (*Chinchilla chinchilla*)
- Long-tailed chinchilla (*Chinchilla lanigera*)
- Gerbil (*Meriones unguiculatus*)
- Ferret (*Mustela putorius furo*)
- Skunk (*Mephitis mephitis*)
- Degu (*Octodon degus*)
- Sugar glider (*Petaurus breviceps*)
- Prairie dog (*Cynomys ludovicianus*)
- Hedgehog (*Atelerix albiventris*)
- Tenrec (*Echinops telfairi*)
- Common squirrel monkey (*Saimiri sciureus*)
- Fennec fox (*Vulpes zerda*)
- Cotton-top tamarin (*Saguinus oedipus*)
- Red-handed tamarin (*Saguinus midas*)
- Kinkajou (*Potos flavus*)
- White-faced capuchin (*Cebus capucinus*)
- Black tufted-ear marmoset (*Callithrix penicillata*)
- Pygmy marmoset (*Cebuella pygmaea*)
- Common marmoset (*Callithrix jacchus*)
- Other: _____

5. Where do you get your small mammals to sell in your pet shop?

Pet shop

Breeder

Online

Overseas

Wild

Rescue

Self-bred

Other: _____

6. Has there been an increase in the selling of your small mammal pets?

Yes

No

7. If yes: since when?

Your answer _____

8. Why do you think the sale is increasing?

High demand

Affordable prices

Other: _____

9. If no, what do you think could be causing the decrease on the sale?

- Regulations (National Environmental Management: Biodiversity Act No. 10 of 2004)
- Competition with other pet shops
- Diseases
- Species are expensive
- Other: _____

10. Do you know about the National Environmental Management: Biodiversity Act No. 10 of 2004?

- Yes
- No

11. Are the small mammals sold a small percentage of your sales?

- Yes
- No

12. If yes, would you continue with the selling of these species?

- Yes
- No

13. Do you think the trade in exotic small mammals should be regulated by the National Environmental Management: Biodiversity Act?

- Yes
- No

14. If yes, how do you think the trade in exotic small mammals should be regulated?

Firm regulations

Impose fines

Other: _____

15. If no, why do you think the trade in exotic small mammals should not be regulated?

Creates jobs

Saves endangered species

Forms part of the economy

Other: _____

16. Do you think the average pet shop loses several small exotic mammals as escapees?

Yes

No

Other: _____

17. Do you have any further comments on the sale of small mammals in pet shops?

Your answer _____

Submit

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Supplementary Table S2. Summary descriptive statistics for the survey questionnaire of pet shop owners in South Africa from September 2018 to September 2019.

Questions	Number of respondents (<i>n</i>)	% respondents	Kruskal-Wallis test by ranks			95% CI
			Chi-square (χ^2)	Degree of freedom	P-value	
Please indicate your Province?	107					
Limpopo	5	4.7%				
Gauteng	38	35.5%				
Western Cape	17	15.9%				
Eastern Cape	7	6.5%				
Free State	7	6.5%				
Mpumalanga	3	2.8%				
North West	7	7.5%				
KwaZulu-Natal	20	18.7%				
Northern Cape	3	2.8%				
Which non-native animals do you sell in your pet shop?	386		26.77	6	8.43e-05**	1-17.5
Mammals	87	22.5%				
Reptiles	67	17.3%				
Fish	97	25.1%				
Birds	103	26.6%				
Amphibians	15	3.8%				
Arthropods	10	2.9%				
Molluscs	2	0.5%				
Other	5	1.3%				

Questions	Number of respondents (n)	% respondents	Kruskal-Wallis test by ranks			95% CI
			Chi-square (χ^2)	Degree of freedom	P-value	
Which of these small mammal pets do you sell?	468		42.60	13	1.52e-05**	0.5-12.5
Short-tailed chinchilla (<i>Chinchilla chinchilla</i>)	11	2.4%				
Long-tailed chinchilla (<i>Chinchilla lanigera</i>)	26	5.5%				
Common marmoset (<i>Callithrix jacchus</i>)	4	0.9%				
Common degu (<i>Octodon degus</i>)	27	5.8%				
Domesticated ferret (<i>Mustela putorius furo</i>)	5	1.1%				
Mongolian gerbil (<i>Meriones unguiculatus</i>)	22	4.7%				
Guinea pig (<i>Cavia porcellus</i>)	63	13.5%				
Golden hamster (<i>Mesocricetus auratus</i>)	38	8.1%				
Winter white dwarf (<i>Phodopus sungorus</i>)	13	2.8%				
Four-toed hedgehog (<i>Atelerix albiventris</i>)	17	3.6%				
House mouse (<i>Mus musculus</i>)	65	13.9%				

Questions	Number of respondents (n)	% respondents	Kruskal-Wallis test by ranks			95% CI
			Chi-square (χ^2)	Degree of freedom	P-value	
European rabbit (<i>Oryctolagus cuniculus</i>)	76	16.2%				
Norwegian rat (<i>Rattus norvegicus</i>)	72	15.4%				
Eastern grey squirrel (<i>Sciurus carolinensis</i>)	5	1.1%				
Sugar glider (<i>Petaurus breviceps</i>)	11	2.4%				
Lesser hedgehog tenrec (<i>Echinops telfairi</i>)	13	2.8%				
Where do you get your small mammals to sell in your pet shop?	197		17.58	6	0.001**	1-11.5
Pet shop	27	13.7%				
Breeder	67	34.0%				
Online	24	12.2%				
Overseas	25	12.7%				
Wild	3	1.5%				
Rescue	31	15.7%				
Self-bred	20	10.2%				
Has there been an increase in the selling of your small mammal pets?	87		2.53	1	0.11	4-10.5
Yes	33	34.0%				
No	54	62.1%				

Questions	Number of respondents (<i>n</i>)	% respondents	Kruskal-Wallis test by ranks			95% CI
			Chi-square (χ^2)	Degree of freedom	P-value	
Why do you think the sale is increasing?	53		10.75	3	0.01*	0.5-4
High demand	32	60.4%				
Affordable prices	17	32.1%				
Easier to maintain	3	5.7%				
Other	1	1.9%				
If no. what do you think could be causing the decrease in the sale?	66		28.47	4	5.30e-07**	0-8.5
National Environmental Management: Biodiversity Act (NEM: BA)	35	53.0%				
Competition with other pet shops	27	40.9%				
Diseases	2	3.0%				
Species are expensive	0	0.0%				
Other	2	3.0%				
Do you know about the National Environmental Management: Biodiversity Act No. 10 of 2004?	87		14.31	1	0.02*	4-11
Yes	59	67.8%				
No	28	32.2%				
Are the small mammals sold a small percentage of your sales?	87		0.12	1	0.72	7-8

Questions	Number of respondents (<i>n</i>)	% respondents	Kruskal-Wallis test by ranks			95% CI
			Chi-square (χ^2)	Degree of freedom	P-value	
Yes	43	49.4%				
No	44	50.6%				
If yes, would you continue with the selling of these species?	46		10.96	1	0.00**	0.5-7
Yes	41	89.1%				
No	5	10.9%				
Do you think the trade in exotic small mammals should be regulated by the National Environmental Management: Biodiversity Act?	87		12.30	1	0.01*	5-8
Yes	25	28.7%				
No	62	71.3%				
If yes, how do you think the trade in exotic small mammals should be regulated?	36		7.12	3	0.03*	0-3
Firm regulations	15	41.7%				
Impose fines	14	38.9%				
Arrest illegal traders	2	5.6%				
Other	5	13.9%				
If no, why do you think the trade in exotic small mammals should not be regulated?	122		10.48	3	0.01*	1.5-6
Creates jobs	38	31.1%				

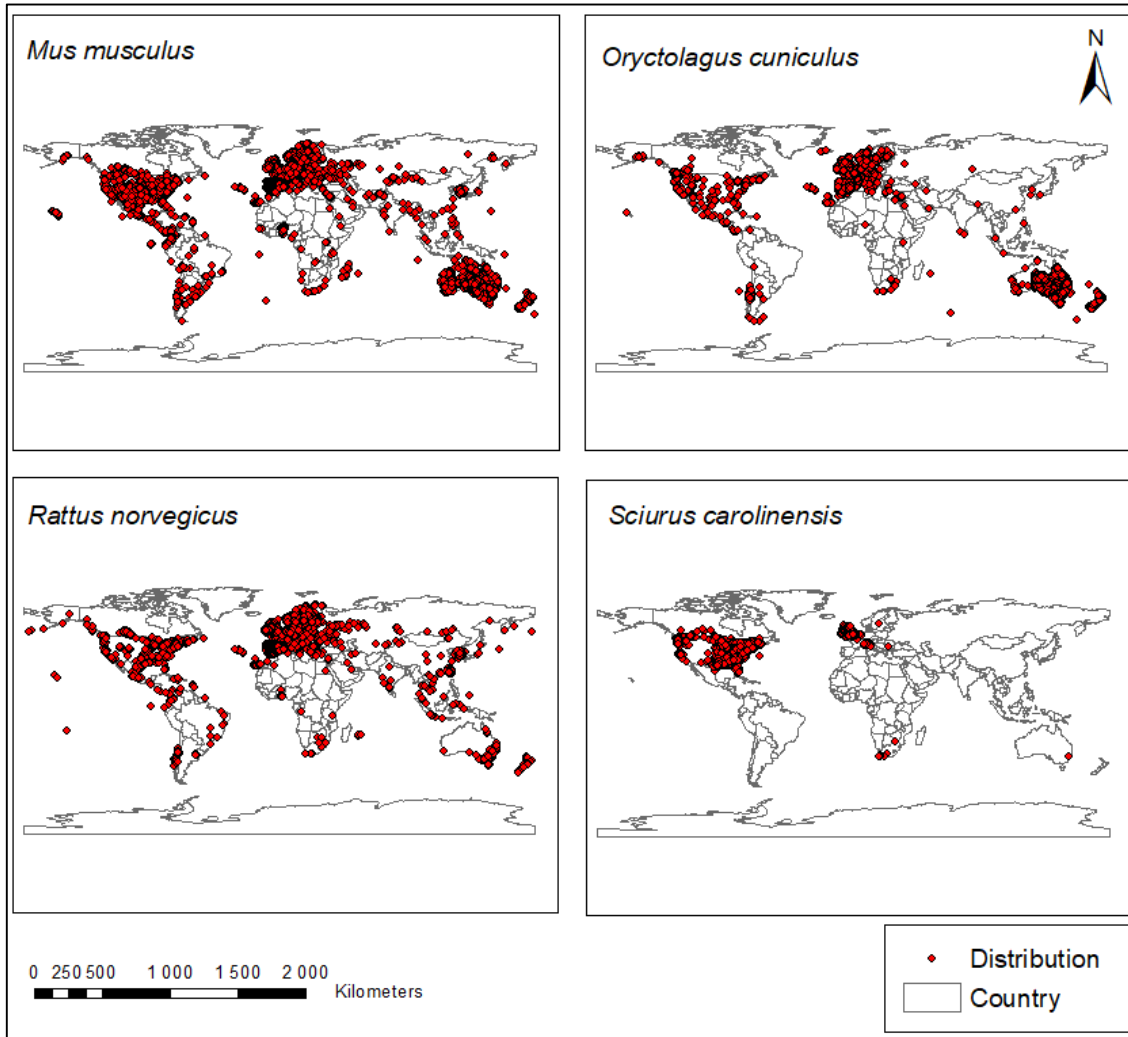
Questions	Number of respondents (<i>n</i>)	% respondents	Kruskal-Wallis test by ranks			95% CI
			Chi-square (χ^2)	Degree of freedom	P-value	
Saves endangered species	43	35.2%				
Forms part of the economy	34	27.9%				
Education	7	5.7%				
Do you think the average pet shop loses several sell exotic mammals as escapees?	87		0.70	1	0.39	6.5-8
Yes	50	57.5%				
No	37	42.5%				

** = $P < 0.01$; * $P < 0.05$

Supplementary Table S2 continued. Summary descriptive statistics for the survey questionnaire of pet shop owners in South Africa from September 2018 to September 2019.

Please indicate the number of pet shops you think you have in your Province?	Pet shops range	No. of respondents (<i>n</i>)	% respondents per pet shop range	% respondents per province
Limpopo Province	1-10	5	100%	5 (4.7%)

Please indicate the number of pet shops you think you have in your Province?	Pet shops range	No. of respondents (n)	% respondents per pet shop range	% respondents per province
Gauteng Province	10-20	3	7.9%	38 (35.5%)
	20-30	6	15.8%	
	30-40	5	13.2%	
	40-50	8	21.0%	
	50-80	16	42.1%	
Western Cape	1-10	2	11.8%	17 (15.9%)
	10-20	2	11.8%	
	20-30	3	17.6%	
	30-40	10	58.8%	
Eastern Cape	1-10	7	100%	7 (6.5%)
Free State	1-10	7	100%	7 (6.5%)
Mpumalanga	1-10	3	100%	3 (2.8%)
North West	1-10	7	100%	8 (7.5%)
	1-10	3	15.0%	20 (18.7%)
KwaZulu-Natal	10-20	5	25.0%	
	20-30	12	60.0%	
Northern Cape	1-10	3	100%	3 (2.8%)



Supplementary Fig. S1. A map showing the current distribution of the four problematic alien invasive small mammalian species in the world. Distributional data were sourced from (GBIF; GBIF.org. (2021a – 2021d)).

References

GBIF.org. (2021a). GBIF Occurrence (*Mus musculus*) <https://doi.org/10.15468/dl.ucrkn4>
 GBIF.org. (2021b). GBIF Occurrence (*Oryctolagus cuniculus*) <https://doi.org/10.15468/dl.ya9dsx>
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 GBIF.org. (2021d). GBIF Occurrence (*Sciurus carolinensis*) <https://doi.org/10.15468/dl.3v4gzs>