

Brucellosis Incidence Rate

2023-12-05

Descriptive Statistics

The results reported in this file were coded in the county_models.R file

Among Camels, the majority of cases (91.30%) are clinically confirmed, with a smaller proportion (8.70%) being lab confirmed; no cases were post-mortem. In the case of Cattle, clinical confirmation dominates (55.34%), followed by lab confirmation (41.26%), and a minor portion through post-mortem (3.40%). Goats show a significant reliance on clinical confirmation (82.16%), while lab confirmation accounts for 17.84%, and no post-mortem cases were reported. Humans exhibit a considerable reliance on lab confirmation (77.98%), with clinical confirmation comprising 22.02%, and no post-mortem cases. Sheep cases are predominantly clinically confirmed (79.27%), with lab-confirmed cases making up 20.73%, and no instances of post-mortem diagnosis.

Table 1: Number of cases according to the type of Diagnosis

Species	Diagnosis	Cases	Percent(%)
Camels	Clinically confirmed	21.0	91.30
Camels	Lab confirmed	2.0	8.70
Camels	Post Mortem	0.0	0.00
Cattle	Clinically confirmed	228.0	55.34
Cattle	Lab confirmed	170.0	41.26
Cattle	Post Mortem	14.0	3.40
Goats	Clinically confirmed	815.0	82.16
Goats	Lab confirmed	177.0	17.84
Goats	Post Mortem	0.0	0.00
Humans	Clinically confirmed	904217.3	22.02
Humans	Lab confirmed	3202945.0	77.98
Humans	Post Mortem	0.0	0.00
Sheep	Clinically confirmed	65.0	79.27
Sheep	Lab confirmed	17.0	20.73
Sheep	Post Mortem	0.0	0.00

The descriptive statistics for the incidence rate of Brucellosis among Camels, Cattle, Goats, Humans, and Sheep are presented in the table 2

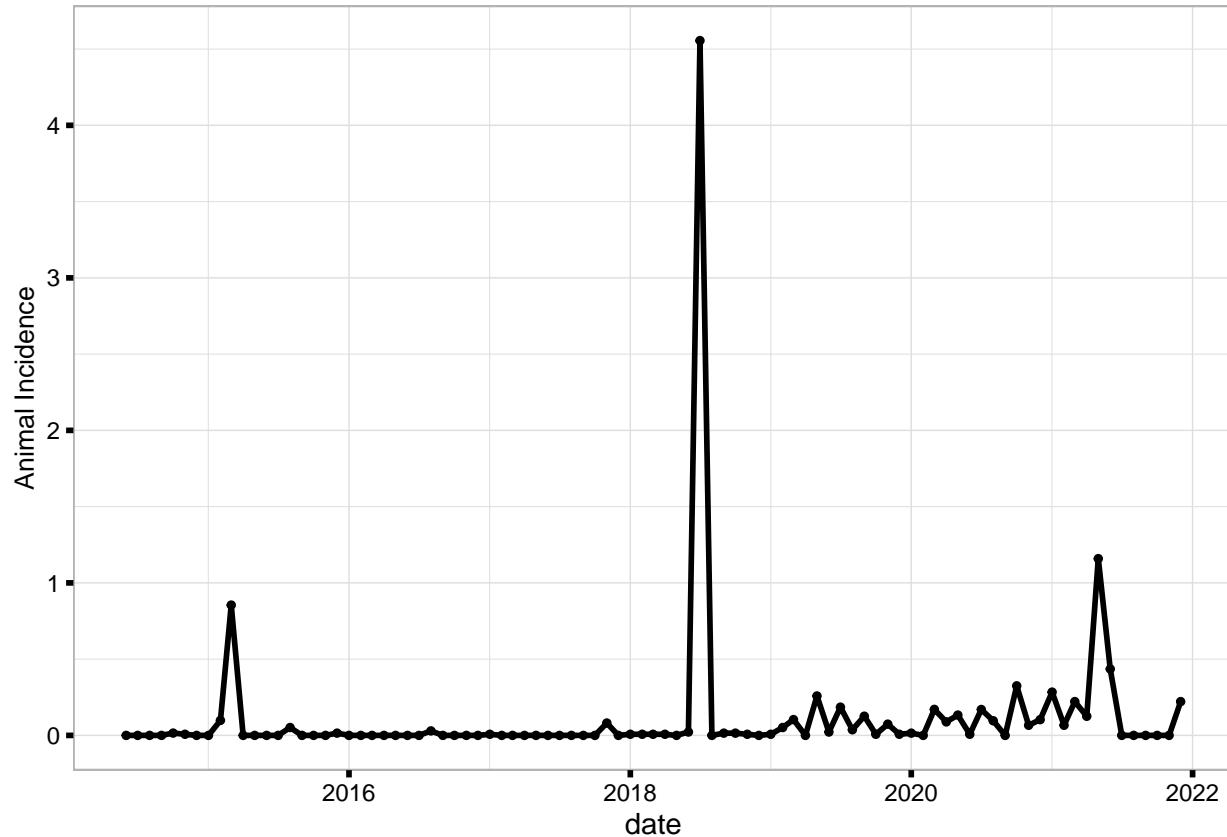
Table 2: Descriptive Statistics for Incidence Rate

Species	Mean Incidence Rate	Minimum	Median	Maximum	Standard Deviation
Human	1.0890892	0.0007	0.71	12	1.14
Goat	0.2116064	0.0000	0.00	235	4.37
Cattle	0.1983081	0.0000	0.00	690	10.64
Camel	0.0303408	0.0000	0.00	122	1.88

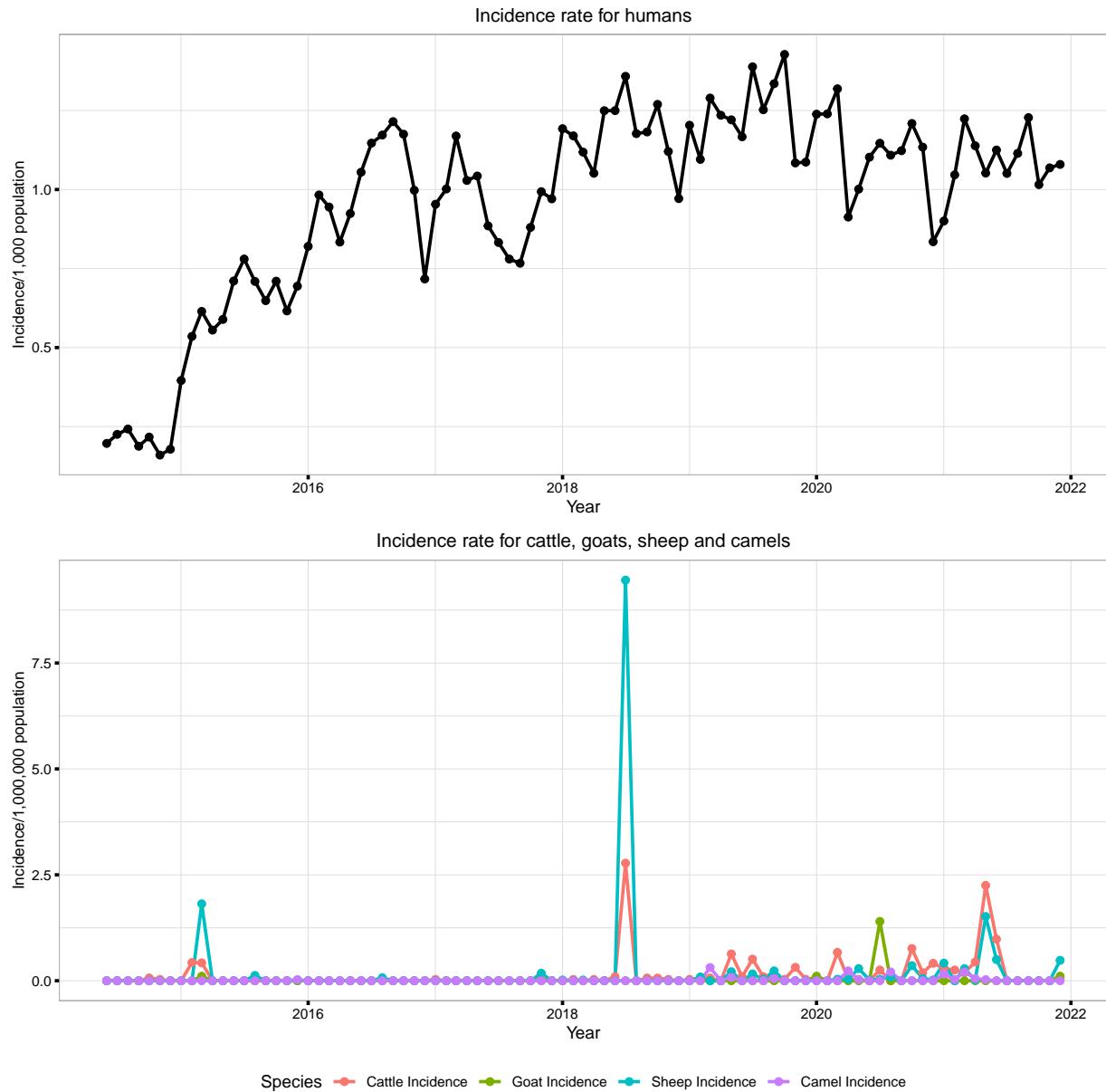
Species	Mean Incidence Rate	Minimum	Median	Maximum	Standard Deviation
Sheep	0.0162596	0.0000	0.00	45	0.71

Trend

The trend for all animal incidence rate combined was as shown below

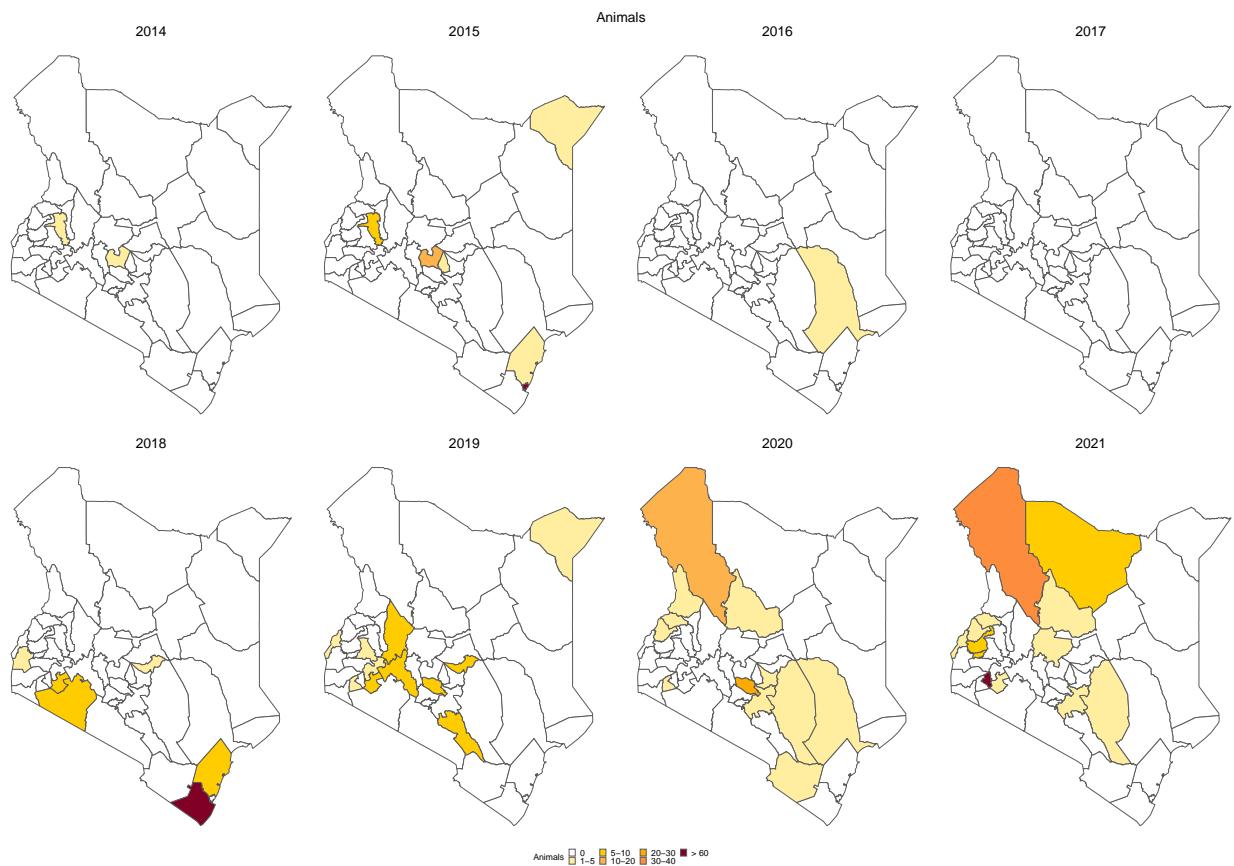


The trend for humans as well as individual species was as shown below

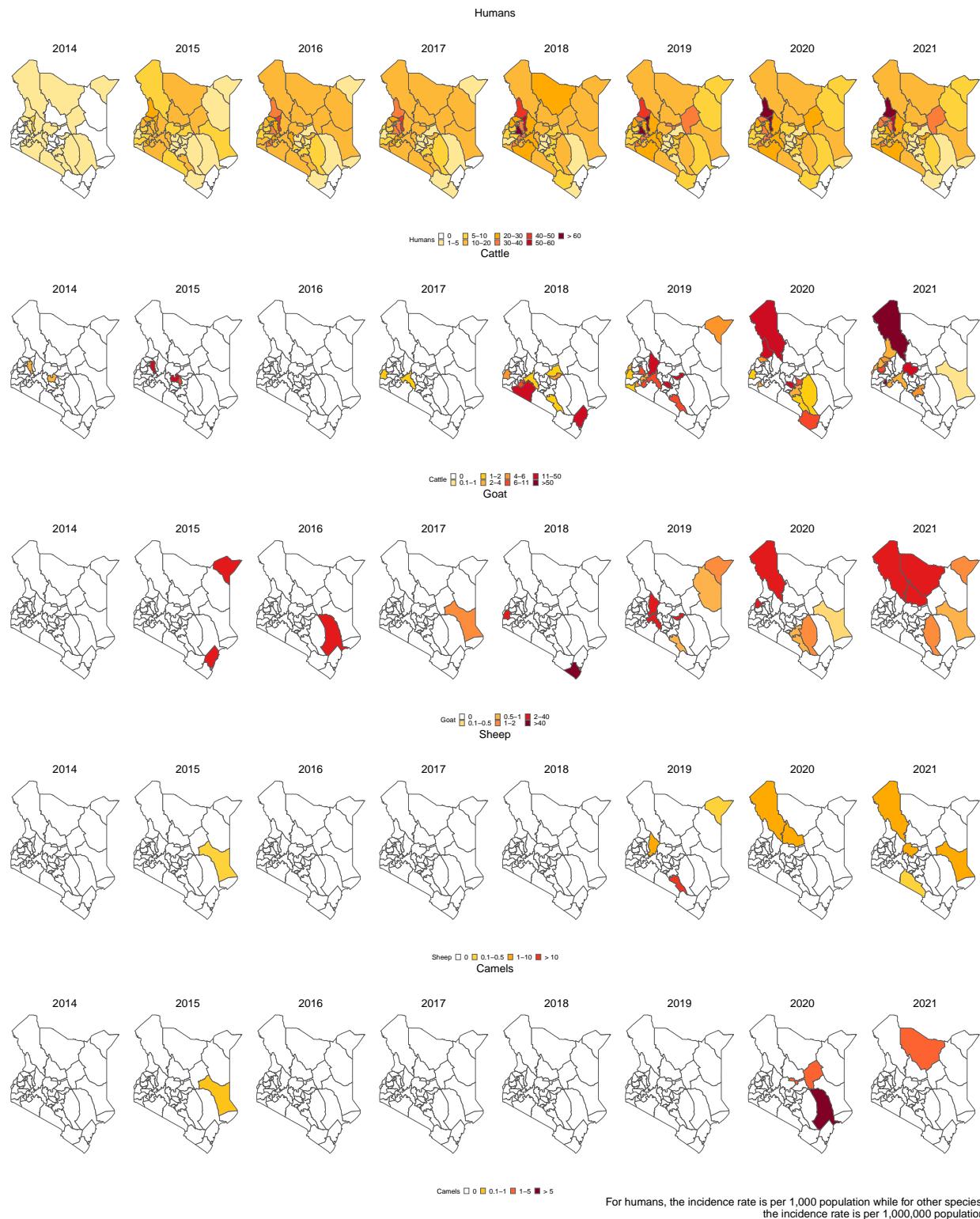


Spatial

The spatial distribution of the incidence rate of Brucellosis in animals combined was as shown below

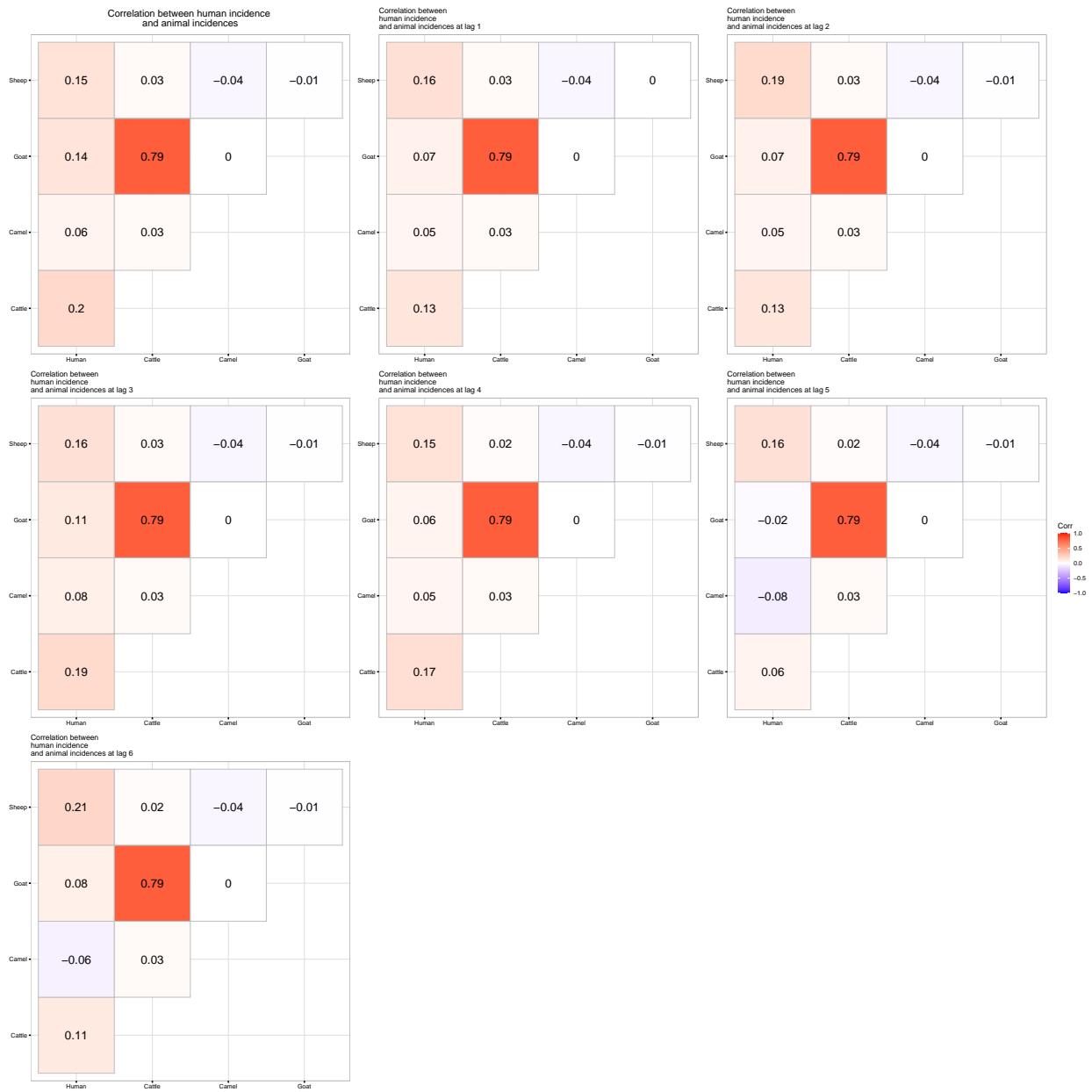


The spatial distribution of the incidence rate of Brucellosis among Camels, Cattle, Goats, Humans, and Sheep are presented in the below,



Correlation

The correlation between the incidence rate of Brucellosis among Camels, Cattle, Goats, Humans, and Sheep were calculated in different lags. There was a high correlation between cattle and goat incidence across all lags. This correlation plot was used to determine the best lag to test for association between the human incidence and animal incidences. The incidence rates for this plot were not differenced.



Models

1. Non Differenced Case

We first fit a time series linear model to the original data (original data implying non-differenced) at different lags. Lag 1 to Lag 6. The results of the models were as tabulated in the tables below. Note that the significance was calculated at **10% level of significance**.

In the folder,you can find the full data frames as follows;

1. *non_diff_individual.csv* - Results for non-differenced individual species model.
2. *non_diff_full.csv* - Results for non-differenced all species combined species model.
3. *diff_individual.csv* - Results for differenced individual species model.
4. *diff_full.csv* - Results for differenced all species combined model.

Table 3: Time Series Linear Model results for no lag (lag = 0)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.924	0.035	26.223	0.000	0.866	0.982	Significant
Camel incidence	0.129	0.216	0.598	0.551	-0.226	0.484	Not Significant
Sheep incidence	0.808	0.600	1.346	0.182	-0.180	1.796	Not Significant
Cattle incidence	0.182	0.129	1.415	0.161	-0.030	0.394	Not Significant
Goat Incidence	-0.016	0.051	-0.320	0.750	-0.101	0.068	Not Significant

Table 4: Time Series Linear Model results at lag 1

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.941	0.035	27.029	0.000	0.884	0.998	Significant
Camel incidence	0.090	0.212	0.422	0.674	-0.260	0.439	Not Significant
Sheep incidence	0.849	0.590	1.441	0.153	-0.121	1.819	Not Significant
Cattle incidence	0.129	0.127	1.013	0.314	-0.080	0.337	Not Significant
Goat Incidence	-0.020	0.050	-0.400	0.690	-0.103	0.063	Not Significant

Table 5: Time Series Linear Model results at lag 2

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.947	0.034	28.062	0.000	0.892	1.003	Significant
Camel incidence	0.102	0.204	0.499	0.619	-0.234	0.439	Not Significant
Sheep incidence	1.009	0.568	1.777	0.079	0.075	1.943	Significant
Cattle incidence	0.123	0.122	1.008	0.316	-0.078	0.324	Not Significant
Goat Incidence	-0.019	0.049	-0.400	0.690	-0.099	0.060	Not Significant

Table 6: Time Series Linear Model results at lag 3

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.951	0.033	29.145	0.000	0.898	1.005	Significant
Camel incidence	0.135	0.196	0.685	0.495	-0.189	0.458	Not Significant

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
Sheep incidence	0.812	0.545	1.488	0.141	-0.086	1.709	Not Significant
Cattle incidence	0.172	0.117	1.465	0.147	-0.021	0.365	Not Significant
Goat Incidence	-0.024	0.047	-0.513	0.610	-0.101	0.053	Not Significant

Table 7: Time Series Linear Model results at lag 4

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.963	0.032	30.555	0.000	0.912	1.015	Significant
Camel incidence	0.078	0.188	0.415	0.679	-0.232	0.388	Not Significant
Sheep incidence	0.708	0.523	1.352	0.180	-0.153	1.569	Not Significant
Cattle incidence	0.197	0.113	1.745	0.085	0.011	0.382	Significant
Goat Incidence	-0.047	0.045	-1.046	0.299	-0.120	0.027	Not Significant

Table 8: Time Series Linear Model results at lag 5

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.986	0.031	32.262	0.000	0.936	1.037	Significant
Camel incidence	-0.136	0.181	-0.750	0.456	-0.434	0.162	Not Significant
Sheep incidence	0.687	0.504	1.363	0.177	-0.142	1.516	Not Significant
Cattle incidence	0.126	0.109	1.164	0.248	-0.052	0.305	Not Significant
Goat Incidence	-0.044	0.043	-1.020	0.311	-0.115	0.027	Not Significant

Table 9: Time Series Linear Model results at lag 6

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.992	0.029	34.634	0.000	0.945	1.040	Significant
Camel incidence	-0.090	0.169	-0.534	0.595	-0.368	0.188	Not Significant
Sheep incidence	0.885	0.469	1.885	0.063	0.113	1.657	Significant
Cattle incidence	0.076	0.101	0.754	0.453	-0.090	0.242	Not Significant
Goat Incidence	-0.007	0.040	-0.167	0.868	-0.073	0.059	Not Significant

A model was also fit for all the animal incidences combined, and at different lags (lag 1 to lag 6), as shown in the tables below;

Table 10: Time Series Linear Model results for no lag (lag = 0)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.951	0.033	29.148	0.000	0.897	1.005	Significant
Animal Incidence	0.097	0.064	1.520	0.132	-0.008	0.203	Not Significant

Table 11: Time Series Linear Model results at lag 1

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.965	0.032	30.084	0.000	0.912	1.018	Significant
Animal Incidence	0.052	0.063	0.832	0.407	-0.051	0.155	Not Significant

Table 12: Time Series Linear Model results at lag 2

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.973	0.031	31.141	0.000	0.922	1.025	Significant
Animal	0.050	0.061	0.830	0.409	-0.050	0.150	Not Significant
Incidence							

Table 13: Time Series Linear Model results at lag 3

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.979	0.030	32.372	0.000	0.929	1.028	Significant
Animal	0.075	0.058	1.281	0.204	-0.021	0.171	Not Significant
Incidence							

Table 14: Time Series Linear Model results at lag 4

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.991	0.029	33.894	0.000	0.943	1.039	Significant
Animal	0.045	0.056	0.797	0.427	-0.048	0.137	Not Significant
Incidence							

Table 15: Time Series Linear Model results at lag 5

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	1.006	0.028	35.708	0.000	0.959	1.052	Significant
Animal	0.000	0.054	0.002	0.999	-0.088	0.089	Not Significant
Incidence							

Table 16: Time Series Linear Model results at lag 6

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	1.011	0.026	38.232	0.000	0.967	1.054	Significant
Animal	0.042	0.050	0.827	0.411	-0.041	0.124	Not Significant
Incidence							

2. Differenced Case

Time series models were also fit for the differenced data, and at different lags (lag 1 to lag 6), as shown in the tables below;

Table 17: Time Series Linear Model results for no lag (lag = 0)
(differenced)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.010	0.014	0.717	0.475	-0.013	0.032	Not Significant
Camel incidence	0.031	0.066	0.466	0.643	-0.078	0.140	Not Significant
Sheep incidence	0.003	0.187	0.016	0.987	-0.305	0.311	Not Significant
Cattle incidence	0.028	0.049	0.570	0.570	-0.053	0.109	Not Significant
Goat Incidence	0.007	0.018	0.400	0.690	-0.022	0.036	Not Significant

Table 18: Time Series Linear Model results at lag 1 (differenced)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.010	0.014	0.695	0.489	-0.013	0.032	Not Significant
Camel incidence	-0.021	0.067	-0.317	0.752	-0.132	0.089	Not Significant
Sheep incidence	-0.093	0.190	-0.487	0.627	-0.405	0.220	Not Significant
Cattle incidence	-0.047	0.050	-0.933	0.354	-0.129	0.036	Not Significant
Goat Incidence	0.005	0.018	0.278	0.782	-0.024	0.034	Not Significant

Table 19: Time Series Linear Model results at lag 2 (differenced)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.010	0.014	0.680	0.498	-0.013	0.033	Not Significant
Camel incidence	0.004	0.068	0.063	0.950	-0.107	0.115	Not Significant
Sheep incidence	0.165	0.191	0.864	0.390	-0.150	0.480	Not Significant
Cattle incidence	-0.037	0.050	-0.739	0.462	-0.120	0.046	Not Significant
Goat Incidence	0.005	0.018	0.291	0.772	-0.024	0.035	Not Significant

Table 20: Time Series Linear Model results at lag 3 (differenced)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.010	0.014	0.728	0.469	-0.013	0.033	Not Significant
Camel incidence	0.038	0.068	0.568	0.571	-0.073	0.150	Not Significant
Sheep incidence	-0.027	0.192	-0.139	0.890	-0.342	0.289	Not Significant
Cattle incidence	0.020	0.051	0.390	0.697	-0.063	0.103	Not Significant
Goat Incidence	0.007	0.018	0.369	0.713	-0.023	0.036	Not Significant

Table 21: Time Series Linear Model results at lag 4 (differenced)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.010	0.014	0.710	0.480	-0.013	0.033	Not Significant
Camel incidence	0.073	0.068	1.079	0.284	-0.038	0.184	Not Significant
Sheep incidence	0.036	0.191	0.186	0.853	-0.279	0.350	Not Significant
Cattle incidence	0.073	0.050	1.455	0.150	-0.010	0.156	Not Significant
Goat Incidence	-0.020	0.018	-1.132	0.261	-0.050	0.009	Not Significant

Table 22: Time Series Linear Model results at lag 5 (differenced)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.011	0.014	0.784	0.435	-0.012	0.034	Not Significant
Camel incidence	-0.135	0.066	-2.056	0.043	-0.243	-0.027	Significant
Sheep incidence	-0.182	0.186	-0.982	0.329	-0.487	0.123	Not Significant
Cattle incidence	-0.026	0.049	-0.525	0.601	-0.106	0.055	Not Significant
Goat Incidence	-0.012	0.017	-0.670	0.505	-0.040	0.017	Not Significant

Table 23: Time Series Linear Model results at lag 6 (differenced)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.011	0.014	0.767	0.445	-0.013	0.035	Not Significant
Camel incidence	-0.017	0.068	-0.251	0.802	-0.129	0.095	Not Significant
Sheep incidence	0.094	0.193	0.489	0.626	-0.223	0.411	Not Significant
Cattle incidence	-0.042	0.054	-0.791	0.431	-0.131	0.046	Not Significant
Goat Incidence	0.030	0.019	1.584	0.117	-0.001	0.061	Not Significant

A model was also fit for all the animal incidences combined, differenced and at different lags (lag 1 to lag 6), as shown in the tables below;

Table 24: Time Series Linear Model results for no lag (lag = 0) (differenced)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.010	0.013	0.729	0.468	-0.012	0.032	Not Significant
Animal Incidence	0.033	0.019	1.762	0.082	0.002	0.064	Significant

Table 25: Time Series Linear Model results at lag 1 (differenced)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.010	0.014	0.704	0.483	-0.013	0.032	Not Significant
Animal Incidence	-0.021	0.019	-1.097	0.276	-0.053	0.011	Not Significant

Table 26: Time Series Linear Model results at lag 2 (differenced)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.010	0.014	0.687	0.494	-0.013	0.032	Not Significant
Animal	-0.013	0.019	-0.672	0.503	-0.045	0.019	Not Significant
Incidence							

Table 27: Time Series Linear Model results at lag 3 (differenced)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.010	0.014	0.739	0.462	-0.013	0.033	Not Significant
Animal	0.027	0.019	1.394	0.167	-0.005	0.059	Not Significant
Incidence							

Table 28: Time Series Linear Model results at lag 4 (differenced)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.010	0.014	0.707	0.481	-0.013	0.033	Not Significant
Animal	0.007	0.020	0.373	0.710	-0.025	0.040	Not Significant
Incidence							

Table 29: Time Series Linear Model results at lag 5 (differenced)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.011	0.014	0.777	0.439	-0.012	0.034	Not Significant
Animal	-0.043	0.019	-2.247	0.027	-0.074	-0.012	Significant
Incidence							

Table 30: Time Series Linear Model results at lag 6 (differenced)

variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significance
(Intercept)	0.011	0.014	0.740	0.461	-0.013	0.034	Not Significant
Animal	0.034	0.020	1.721	0.089	0.001	0.066	Significant
Incidence							

Model for Each specific County

For individuL Species

Time series linear regression model was fit for all the counties giving the following results. Some counties didn't have results because they contained zero incidences in all the predictors (cattle, goat, sheep, and camel incidence). Also, the models have also been tested only at **lag 3**. The NA in the dataframe, indicates that the variable had zero incidence.

In the folder, you will find the results of the models as follows;

1. *individual_animal_incidence_per_county.csv* - Results for individual animal incidences per county (at lag 3).
2. *all_animal_incidence_per_county.csv* - Results for all animal incidences per county (at lag 3).

Table 31: Time Series Linear Model results at lag 3, for each county

county	variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significant
Baringo	(Intercept)	1.664	0.085	19.609	0.000	1.524	1.803	Significant
Baringo	Cattle incidence	0.451	0.456	0.989	0.326	-0.299	1.201	Not Significant
Baringo	Goat Incidence	0.342	0.243	1.403	0.164	-0.059	0.742	Not Significant
Baringo	Sheep incidence	-1.443	1.536	-0.940	0.350	-3.969	1.083	Not Significant
Baringo	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Bomet	(Intercept)	0.924	0.043	21.610	0.000	0.854	0.995	Significant
Bomet	Cattle incidence	0.075	0.049	1.536	0.128	-0.005	0.156	Not Significant
Bomet	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Bomet	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Bomet	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Bungoma	(Intercept)	1.707	0.082	20.822	0.000	1.572	1.842	Significant
Bungoma	Cattle incidence	0.996	0.546	1.824	0.072	0.098	1.895	Significant
Bungoma	Goat Incidence	0.040	0.085	0.474	0.637	-0.100	0.181	Not Significant
Bungoma	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Bungoma	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Busia	(Intercept)	0.630	0.080	7.855	0.000	0.498	0.762	Significant
Busia	Cattle incidence	-0.047	0.207	-0.226	0.822	-0.386	0.293	Not Significant
Busia	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Busia	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Busia	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Embu	(Intercept)	0.471	0.038	12.364	0.000	0.408	0.534	Significant
Embu	Cattle incidence	0.164	0.071	2.306	0.023	0.047	0.281	Significant
Embu	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Embu	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Embu	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Garissa	(Intercept)	1.078	0.055	19.747	0.000	0.989	1.168	Significant
Garissa	Cattle incidence	-0.824	5.849	-0.141	0.888	-10.446	8.798	Not Significant
Garissa	Goat Incidence	0.450	0.388	1.161	0.249	-0.188	1.087	Not Significant
Garissa	Sheep incidence	0.047	2.818	0.017	0.987	-4.589	4.683	Not Significant
Garissa	Camel incidence	-1.156	0.834	-1.386	0.169	-2.529	0.216	Not Significant
Isiolo	(Intercept)	1.644	0.133	12.407	0.000	1.426	1.862	Significant
Isiolo	Cattle incidence	NA	NA	NA	NA	NA	NA	NA
Isiolo	Goat Incidence	NA	NA	NA	NA	NA	NA	NA

Table 31: Time Series Linear Model results at lag 3, for each county
(continued)

county	variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significant
Isiolo	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Isiolo	Camel incidence	0.233	0.376	0.620	0.537	-0.386	0.853	Not Significant
Kajiado	(Intercept)	1.138	0.050	22.821	0.000	1.056	1.220	Significant
Kajiado	Cattle incidence	NA	NA	NA	NA	NA	NA	NA
Kajiado	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Kajiado	Sheep incidence	-0.597	1.066	-0.560	0.577	-2.351	1.157	Not Significant
Kajiado	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Kakamega	(Intercept)	0.492	0.018	27.885	0.000	0.463	0.521	Significant
Kakamega	Cattle incidence	0.000	0.036	-0.003	0.998	-0.060	0.060	Not Significant
Kakamega	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Kakamega	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Kakamega	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Kericho	(Intercept)	2.144	0.100	21.427	0.000	1.980	2.309	Significant
Kericho	Cattle incidence	0.586	0.461	1.270	0.207	-0.173	1.345	Not Significant
Kericho	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Kericho	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Kericho	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Kilifi	(Intercept)	0.033	0.004	7.751	0.000	0.026	0.040	Significant
Kilifi	Cattle incidence	-0.001	0.001	-0.395	0.694	-0.003	0.002	Not Significant
Kilifi	Goat Incidence	-0.004	0.006	-0.722	0.472	-0.015	0.006	Not Significant
Kilifi	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Kilifi	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Kirinyaga	(Intercept)	0.269	0.026	10.170	0.000	0.226	0.313	Significant
Kirinyaga	Cattle incidence	-0.020	0.029	-0.686	0.495	-0.067	0.028	Not Significant
Kirinyaga	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Kirinyaga	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Kirinyaga	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Kisii	(Intercept)	2.309	0.096	24.129	0.000	2.151	2.466	Significant
Kisii	Cattle incidence	0.137	0.229	0.598	0.551	-0.239	0.513	Not Significant
Kisii	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Kisii	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Kisii	Camel incidence	NA	NA	NA	NA	NA	NA	NA

Table 31: Time Series Linear Model results at lag 3, for each county
(continued)

county	variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significant
Kitui	(Intercept)	0.716	0.041	17.520	0.000	0.649	0.783	Significant
Kitui	Cattle incidence	-0.063	0.289	-0.216	0.829	-0.538	0.413	Not Significant
Kitui	Goat Incidence	0.115	0.475	0.241	0.810	-0.667	0.896	Not Significant
Kitui	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Kitui	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Kwale	(Intercept)	0.093	0.024	3.816	0.000	0.053	0.133	Significant
Kwale	Cattle incidence	NA	NA	NA	NA	NA	NA	NA
Kwale	Goat Incidence	0.000	0.000	0.345	0.731	0.000	0.001	Not Significant
Kwale	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Kwale	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Laikipia	(Intercept)	0.935	0.058	16.152	0.000	0.840	1.030	Significant
Laikipia	Cattle incidence	-0.023	0.037	-0.625	0.534	-0.085	0.038	Not Significant
Laikipia	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Laikipia	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Laikipia	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Machakos	(Intercept)	0.455	0.024	19.184	0.000	0.416	0.494	Significant
Machakos	Cattle incidence	-0.084	0.082	-1.025	0.308	-0.218	0.051	Not Significant
Machakos	Goat Incidence	0.212	0.308	0.690	0.492	-0.294	0.718	Not Significant
Machakos	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Machakos	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Makueni	(Intercept)	0.687	0.044	15.638	0.000	0.614	0.759	Significant
Makueni	Cattle incidence	-0.157	0.114	-1.372	0.174	-0.345	0.031	Not Significant
Makueni	Goat Incidence	-0.320	0.475	-0.674	0.502	-1.102	0.461	Not Significant
Makueni	Sheep incidence	-0.008	0.009	-0.924	0.358	-0.023	0.006	Not Significant
Makueni	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Mandera	(Intercept)	0.527	0.034	15.483	0.000	0.471	0.583	Significant
Mandera	Cattle incidence	0.136	0.063	2.157	0.034	0.032	0.240	Significant
Mandera	Goat Incidence	-0.031	0.031	-0.979	0.330	-0.082	0.021	Not Significant
Mandera	Sheep incidence	0.531	0.718	0.739	0.462	-0.650	1.712	Not Significant
Mandera	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Meru	(Intercept)	0.346	0.021	16.748	0.000	0.312	0.380	Significant

Table 31: Time Series Linear Model results at lag 3, for each county
(continued)

county	variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significant
Meru	Cattle incidence	0.056	0.122	0.455	0.650	-0.145	0.257	Not Significant
Meru	Goat Incidence	-0.019	0.012	-1.547	0.125	-0.039	0.001	Not Significant
Meru	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Meru	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Migori	(Intercept)	1.197	0.062	19.343	0.000	1.095	1.299	Significant
Migori	Cattle incidence	0.096	0.382	0.253	0.801	-0.531	0.724	Not Significant
Migori	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Migori	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Migori	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Mombasa	(Intercept)	0.055	0.007	7.853	0.000	0.043	0.066	Significant
Mombasa	Cattle incidence	0.000	0.000	-0.669	0.505	-0.001	0.000	Not Significant
Mombasa	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Mombasa	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Mombasa	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Murang'a	(Intercept)	0.128	0.008	16.154	0.000	0.115	0.141	Significant
Murang'a	Cattle incidence	-0.001	0.001	-0.497	0.621	-0.003	0.002	Not Significant
Murang'a	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Murang'a	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Murang'a	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Nakuru	(Intercept)	1.596	0.052	30.490	0.000	1.510	1.682	Significant
Nakuru	Cattle incidence	0.048	0.149	0.322	0.748	-0.197	0.293	Not Significant
Nakuru	Goat Incidence	0.000	0.050	-0.007	0.995	-0.083	0.082	Not Significant
Nakuru	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Nakuru	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Nandi	(Intercept)	2.940	0.191	15.429	0.000	2.626	3.253	Significant
Nandi	Cattle incidence	0.956	0.511	1.872	0.064	0.116	1.797	Significant
Nandi	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Nandi	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Nandi	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Narok	(Intercept)	1.600	0.075	21.206	0.000	1.476	1.724	Significant
Narok	Cattle incidence	0.043	0.031	1.405	0.164	-0.007	0.093	Not Significant
Narok	Goat Incidence	NA	NA	NA	NA	NA	NA	NA

Table 31: Time Series Linear Model results at lag 3, for each county
(continued)

county	variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significant
Narok	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Narok	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Nyamira	(Intercept)	1.735	0.074	23.414	0.000	1.613	1.857	Significant
Nyamira	Cattle incidence	-0.006	0.009	-0.679	0.499	-0.021	0.009	Not Significant
Nyamira	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Nyamira	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Nyamira	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Nyandarua	(Intercept)	1.429	0.059	24.116	0.000	1.332	1.527	Significant
Nyandarua	Cattle incidence	-0.275	0.135	-2.031	0.045	-0.497	-0.052	Significant
Nyandarua	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Nyandarua	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Nyandarua	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Nyeri	(Intercept)	0.188	0.008	22.519	0.000	0.174	0.202	Significant
Nyeri	Cattle incidence	0.004	0.002	1.691	0.094	0.000	0.008	Significant
Nyeri	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Nyeri	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Nyeri	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Samburu	(Intercept)	1.272	0.067	19.024	0.000	1.162	1.382	Significant
Samburu	Cattle incidence	NA	NA	NA	NA	NA	NA	NA
Samburu	Goat Incidence	0.020	0.091	0.221	0.826	-0.130	0.170	Not Significant
Samburu	Sheep incidence	0.015	0.090	0.167	0.868	-0.133	0.163	Not Significant
Samburu	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Siaya	(Intercept)	0.425	0.024	17.940	0.000	0.386	0.464	Significant
Siaya	Cattle incidence	0.018	0.060	0.310	0.757	-0.080	0.116	Not Significant
Siaya	Goat Incidence	0.078	0.050	1.554	0.124	-0.005	0.161	Not Significant
Siaya	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Siaya	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Taita Taveta	(Intercept)	0.343	0.026	12.965	0.000	0.299	0.386	Significant
Taita Taveta	Cattle incidence	-0.001	0.041	-0.018	0.986	-0.068	0.067	Not Significant
Taita Taveta	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Taita Taveta	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Taita Taveta	Camel incidence	NA	NA	NA	NA	NA	NA	NA

Table 31: Time Series Linear Model results at lag 3, for each county
(continued)

county	variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significant
Tana River	(Intercept)	0.355	0.043	8.251	0.000	0.284	0.426	Significant
Tana River	Cattle incidence	NA	NA	NA	NA	NA	NA	NA
Tana River	Goat Incidence	0.044	0.120	0.365	0.716	-0.154	0.241	Not Significant
Tana River	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Tana River	Camel incidence	0.002	0.003	0.705	0.483	-0.003	0.008	Not Significant
Tharaka Nithi	(Intercept)	1.490	0.102	14.544	0.000	1.321	1.658	Significant
Tharaka Nithi	Cattle incidence	0.010	0.089	0.113	0.910	-0.137	0.157	Not Significant
Tharaka Nithi	Goat Incidence	0.009	0.171	0.054	0.957	-0.272	0.290	Not Significant
Tharaka Nithi	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Tharaka Nithi	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Trans Nzoia	(Intercept)	2.216	0.084	26.460	0.000	2.078	2.354	Significant
Trans Nzoia	Cattle incidence	0.164	0.147	1.120	0.266	-0.077	0.405	Not Significant
Trans Nzoia	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Trans Nzoia	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Trans Nzoia	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Turkana	(Intercept)	1.004	0.040	25.248	0.000	0.939	1.070	Significant
Turkana	Cattle incidence	-0.001	0.013	-0.104	0.917	-0.022	0.019	Not Significant
Turkana	Goat Incidence	0.021	0.061	0.343	0.733	-0.080	0.122	Not Significant
Turkana	Sheep incidence	0.024	0.073	0.324	0.747	-0.097	0.145	Not Significant
Turkana	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Uasin Gishu	(Intercept)	2.221	0.116	19.178	0.000	2.030	2.411	Significant
Uasin Gishu	Cattle incidence	-0.083	0.075	-1.111	0.270	-0.206	0.040	Not Significant
Uasin Gishu	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Uasin Gishu	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Uasin Gishu	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Vihiga	(Intercept)	0.716	0.041	17.443	0.000	0.648	0.783	Significant
Vihiga	Cattle incidence	0.026	0.070	0.378	0.706	-0.089	0.142	Not Significant
Vihiga	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
Vihiga	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Vihiga	Camel incidence	NA	NA	NA	NA	NA	NA	NA
Wajir	(Intercept)	0.756	0.043	17.673	0.000	0.686	0.827	Significant

Table 31: Time Series Linear Model results at lag 3, for each county
(continued)

county	variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significant
Wajir	Cattle incidence	NA	NA	NA	NA	NA	NA	NA
Wajir	Goat Incidence	-0.294	0.653	-0.451	0.653	-1.368	0.780	Not Significant
Wajir	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
Wajir	Camel incidence	NA	NA	NA	NA	NA	NA	NA
West Pokot	(Intercept)	3.520	0.187	18.811	0.000	3.212	3.828	Significant
West Pokot	Cattle incidence	0.167	0.130	1.290	0.200	-0.046	0.380	Not Significant
West Pokot	Goat Incidence	NA	NA	NA	NA	NA	NA	NA
West Pokot	Sheep incidence	NA	NA	NA	NA	NA	NA	NA
West Pokot	Camel incidence	NA	NA	NA	NA	NA	NA	NA

For all the species combined

The model (at lag 3) for all the animal incidences combined were as follows;

Table 32: Time Series Linear Model results at lag 3, for each county
for all the animal incidences combined

county	variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significant
Bomet	(Intercept)	0.932	0.041	22.493	0.000	0.864	1.000	Significant
Bomet	Animal Incidence	0.142	0.084	1.693	0.094	0.004	0.281	Significant
Bungoma	(Intercept)	1.685	0.084	20.037	0.000	1.547	1.824	Significant
Bungoma	Animal Incidence	0.255	0.144	1.767	0.081	0.018	0.492	Significant
Busia	(Intercept)	0.627	0.080	7.816	0.000	0.495	0.759	Significant
Busia	Animal Incidence	0.009	0.337	0.027	0.978	-0.545	0.563	Not Significant
Elgeyo Marakwet	(Intercept)	3.882	0.196	19.775	0.000	3.559	4.205	Significant
Elgeyo Marakwet	Animal Incidence	0.418	0.823	0.508	0.613	-0.935	1.772	Not Significant
Garissa	(Intercept)	1.066	0.054	19.923	0.000	0.978	1.154	Significant
Garissa	Animal Incidence	0.427	0.327	1.305	0.195	-0.111	0.965	Not Significant
Homa Bay	(Intercept)	0.651	0.039	16.623	0.000	0.586	0.715	Significant
Homa Bay	Animal Incidence	0.072	0.361	0.199	0.843	-0.522	0.666	Not Significant
Kajiado	(Intercept)	1.140	0.050	22.911	0.000	1.058	1.222	Significant
Kajiado	Animal Incidence	-1.911	2.188	-0.874	0.385	-5.510	1.688	Not Significant
Kakamega	(Intercept)	0.492	0.017	28.128	0.000	0.463	0.520	Significant
Kakamega	Animal Incidence	0.030	0.860	0.035	0.972	-1.385	1.445	Not Significant
Kericho	(Intercept)	2.159	0.102	21.201	0.000	1.992	2.327	Significant
Kericho	Animal Incidence	-0.032	0.280	-0.116	0.908	-0.492	0.428	Not Significant
Kiambu	(Intercept)	0.336	0.013	26.463	0.000	0.315	0.357	Significant
Kiambu	Animal Incidence	-0.021	0.090	-0.230	0.819	-0.168	0.127	Not Significant
Kisii	(Intercept)	2.329	0.094	24.692	0.000	2.173	2.484	Significant
Kisii	Animal Incidence	-0.217	0.225	-0.967	0.336	-0.587	0.153	Not Significant
Kisumu	(Intercept)	0.566	0.026	22.081	0.000	0.524	0.608	Significant
Kisumu	Animal Incidence	-0.011	0.080	-0.137	0.891	-0.143	0.121	Not Significant
Kwale	(Intercept)	0.097	0.025	3.899	0.000	0.056	0.137	Significant
Kwale	Animal Incidence	-0.094	0.192	-0.491	0.624	-0.410	0.221	Not Significant
Laikipia	(Intercept)	0.929	0.058	16.022	0.000	0.833	1.024	Significant
Laikipia	Animal Incidence	0.001	0.002	0.455	0.650	-0.002	0.003	Not Significant
Makueni	(Intercept)	0.679	0.043	15.841	0.000	0.608	0.749	Significant
Makueni	Animal Incidence	-0.580	0.335	-1.730	0.087	-1.132	-0.028	Significant
Mandera	(Intercept)	0.533	0.035	15.382	0.000	0.476	0.590	Significant
Mandera	Animal Incidence	0.011	0.067	0.164	0.870	-0.099	0.121	Not Significant

Table 32: Time Series Linear Model results at lag 3, for each county
for all the animal incidences combined (*continued*)

county	variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significant
Marsabit	(Intercept)	1.293	0.049	26.142	0.000	1.211	1.374	Significant
Marsabit	Animal Incidence	-0.098	0.093	-1.052	0.296	-0.251	0.055	Not Significant
Meru	(Intercept)	0.346	0.021	16.841	0.000	0.312	0.380	Significant
Meru	Animal Incidence	-0.035	0.029	-1.215	0.227	-0.082	0.012	Not Significant
Migori	(Intercept)	1.190	0.061	19.419	0.000	1.089	1.291	Significant
Migori	Animal Incidence	1.265	0.934	1.354	0.179	-0.271	2.801	Not Significant
Mombasa	(Intercept)	0.054	0.007	7.747	0.000	0.043	0.066	Significant
Mombasa	Animal Incidence	0.011	0.071	0.155	0.877	-0.106	0.128	Not Significant
Murang'a	(Intercept)	0.128	0.008	16.244	0.000	0.115	0.141	Significant
Murang'a	Animal Incidence	-0.001	0.001	-0.771	0.443	-0.003	0.001	Not Significant
Nairobi	(Intercept)	0.209	0.010	20.376	0.000	0.192	0.226	Significant
Nairobi	Animal Incidence	0.004	0.004	1.090	0.279	-0.002	0.011	Not Significant
Nandi	(Intercept)	2.945	0.187	15.740	0.000	2.637	3.253	Significant
Nandi	Animal Incidence	0.586	0.250	2.347	0.021	0.175	0.997	Significant
Narok	(Intercept)	1.585	0.076	20.963	0.000	1.461	1.710	Significant
Narok	Animal Incidence	0.600	0.313	1.915	0.059	0.085	1.115	Significant
Nyamira	(Intercept)	1.739	0.074	23.649	0.000	1.618	1.860	Significant
Nyamira	Animal Incidence	-0.128	0.102	-1.250	0.215	-0.296	0.040	Not Significant
Nyandarua	(Intercept)	1.421	0.061	23.439	0.000	1.322	1.521	Significant
Nyandarua	Animal Incidence	-0.006	0.010	-0.622	0.536	-0.023	0.011	Not Significant
Samburu	(Intercept)	1.285	0.066	19.623	0.000	1.178	1.393	Significant
Samburu	Animal Incidence	-0.068	0.048	-1.402	0.164	-0.147	0.012	Not Significant
Siaya	(Intercept)	0.434	0.023	18.819	0.000	0.396	0.472	Significant
Siaya	Animal Incidence	-0.024	0.056	-0.428	0.670	-0.115	0.068	Not Significant
Taita Taveta	(Intercept)	0.329	0.027	12.213	0.000	0.284	0.373	Significant
Taita Taveta	Animal Incidence	0.197	0.113	1.739	0.085	0.011	0.382	Significant
Tana River	(Intercept)	0.361	0.043	8.409	0.000	0.290	0.431	Significant
Tana River	Animal Incidence	-0.037	0.211	-0.177	0.860	-0.384	0.309	Not Significant
Tharaka Nithi	(Intercept)	1.491	0.100	14.974	0.000	1.327	1.654	Significant
Tharaka Nithi	Animal Incidence	0.040	0.190	0.207	0.836	-0.274	0.353	Not Significant
Trans Nzoia	(Intercept)	2.188	0.082	26.563	0.000	2.052	2.323	Significant
Trans Nzoia	Animal Incidence	0.391	0.163	2.403	0.018	0.123	0.659	Significant

Table 32: Time Series Linear Model results at lag 3, for each county
for all the animal incidences combined (*continued*)

county	variable	estimate	std.error	statistic	p.value	conf_low	conf_high	significant
Turkana	(Intercept)	0.999	0.039	25.915	0.000	0.935	1.062	Significant
Turkana	Animal Incidence	0.232	0.128	1.816	0.073	0.022	0.443	Significant
Uasin Gishu	(Intercept)	2.218	0.118	18.878	0.000	2.025	2.411	Significant
Uasin Gishu	Animal Incidence	-0.030	0.049	-0.623	0.535	-0.111	0.050	Not Significant
Vihiga	(Intercept)	0.724	0.041	17.830	0.000	0.657	0.791	Significant
Vihiga	Animal Incidence	-0.061	0.051	-1.198	0.234	-0.145	0.023	Not Significant
Wajir	(Intercept)	0.754	0.043	17.500	0.000	0.683	0.825	Significant
Wajir	Animal Incidence	0.005	0.095	0.049	0.961	-0.152	0.161	Not Significant
West Pokot	(Intercept)	3.564	0.188	18.989	0.000	3.255	3.873	Significant
West Pokot	Animal Incidence	-2.921	6.654	-0.439	0.662	-13.866	8.025	Not Significant
Baringo	(Intercept)	1.658	0.086	19.383	0.000	1.517	1.799	Significant
Baringo	Animal Incidence	0.033	0.220	0.148	0.883	-0.330	0.395	Not Significant
Kirinyaga	(Intercept)	0.271	0.027	10.220	0.000	0.228	0.315	Significant
Kirinyaga	Animal Incidence	-0.026	0.026	-0.985	0.328	-0.070	0.017	Not Significant
Lamu	(Intercept)	0.096	0.018	5.438	0.000	0.067	0.125	Significant
Lamu	Animal Incidence	-0.023	0.037	-0.635	0.528	-0.083	0.037	Not Significant