THE IMPACT OF GOVERNMENT-INITIATED INTERVENTIONS, DOG CHARACTERISTICS, AND CLIMATE ON RABIES CASES IN DAVAO CITY, PHILIPPINES

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BACKGROUND

- 55,000 estimated annual human rabies deaths in Africa and Asia primarily through dog bites
- Fluctuating and expanding incidence of animal rabies cases around Davao City (Fig. 1) challenges the 2020 rabies-free goal of the Philippines
- Objective: **To assess the impact of Davao City government-initiated interventions and other factors associated with rabies transmission on rabies control**

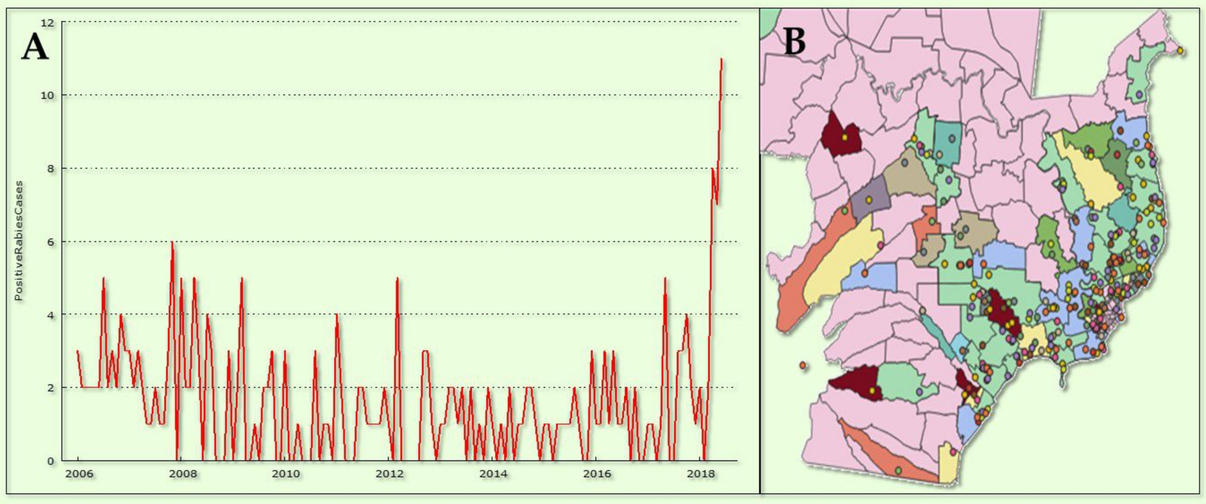


Fig. 1. A) Monthly reported incidence and B) geographical distribution of rabies cases in Davao City from January 2006 to June 2018.

METHODOLOGY

POTENTIAL DRIVERS OF RABIES INCIDENCE

Gov't-Initiated Interventions
Intensified dog vaccination, impounding, castration, and conducting IEC sessions in Davao City

Dog characteristics
The type of ownership (stray or owned) and their locations in the city

Climate conditions
Rainfall, relative humidity, and temperature - climate factors known to affect rabies transmission among dogs

IMPACT ASSESSMENT VIA GLARMA FRAMEWORK

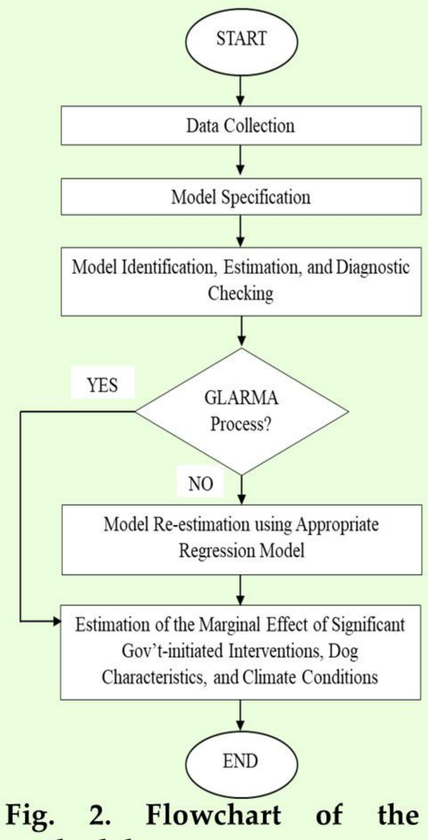


Fig. 2. Flowchart of the methodology.

❑ **Hypothesis**: The monthly reported cases, R, is affected by both its previous value/s and its drivers.

❑ **The Model Structure:**

$$R = x_t^T \beta + \sum_{i=1}^{p} \phi_i \left(Z_{t-i} + e_{t-i} \right) + \sum_{i=1}^{q} \theta_i e_{t-i},$$

where $\boldsymbol{x_t^T}$ are the rabies incidence drivers with $\boldsymbol{\beta}$ coefficients, and $\boldsymbol{\phi}$**(AR)** and $\boldsymbol{\theta}$ **(MA)** are the time-series parameters.

❑ Since the dataset did not exhibit a GLARMA process, the expected R was assumed as a incidence rate μ (e.g. r_i ~ Poisson(μ)), a **Count regression model** was estimated given by $\mu = E(R|X) = \exp(x_t^T \beta)$.

RESULTS AND DISCUSSION

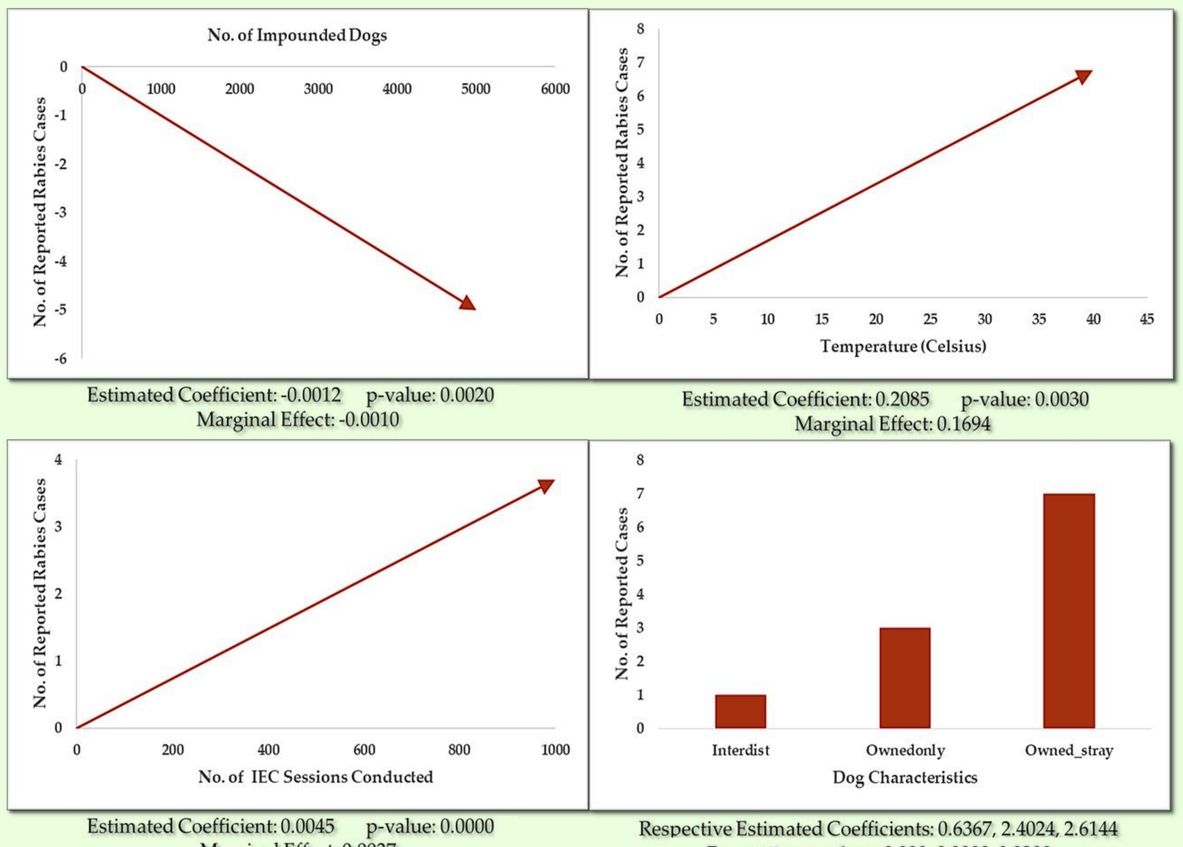
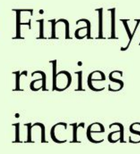
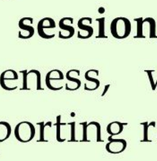
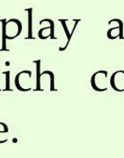
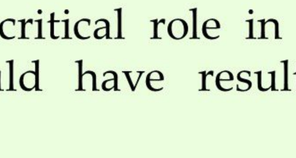
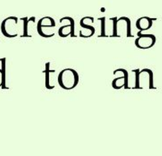


Fig. 3. Graphical representation of the estimated marginal effect of the statistically significant reported rabies cases drivers (*p-value* < 0.05). Poisson Regression Count Model Summary: Prob>chi2 = 0.0000; AIC = 345.85; BIC = 378.96; log-pseudolikelihood = -161.92.

The monthly reported rabies incidence:

↓ by 1	↑ by 4	↑ by 0.2	↑ by 7	↑ by 1
				
per 1000 impounded dogs	per 1000 IEC sessions	per 1°C increase in temp	when cases come from stray dogs aside from the owned	when cases are distributed in more than 1 district

CONCLUSION

- **Stray dogs** are crucial to rabies incidence, highlighting the importance of responsible pet ownership.
- **Control of stray dog population** appears to be an effective strategy, and the climate data suggests that this should be intensified during **summer days**, probably when the dogs tend to be more mobile.
- Finally, **IEC sessions** play a critical role in increasing rabies awareness, which could have resulted to an increased reporting rate.

MAJOR REFERENCES

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