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Advancing AI Powered One Health Approach to Rabies Elimination in the Philippines

DJ Darwin Bandoy

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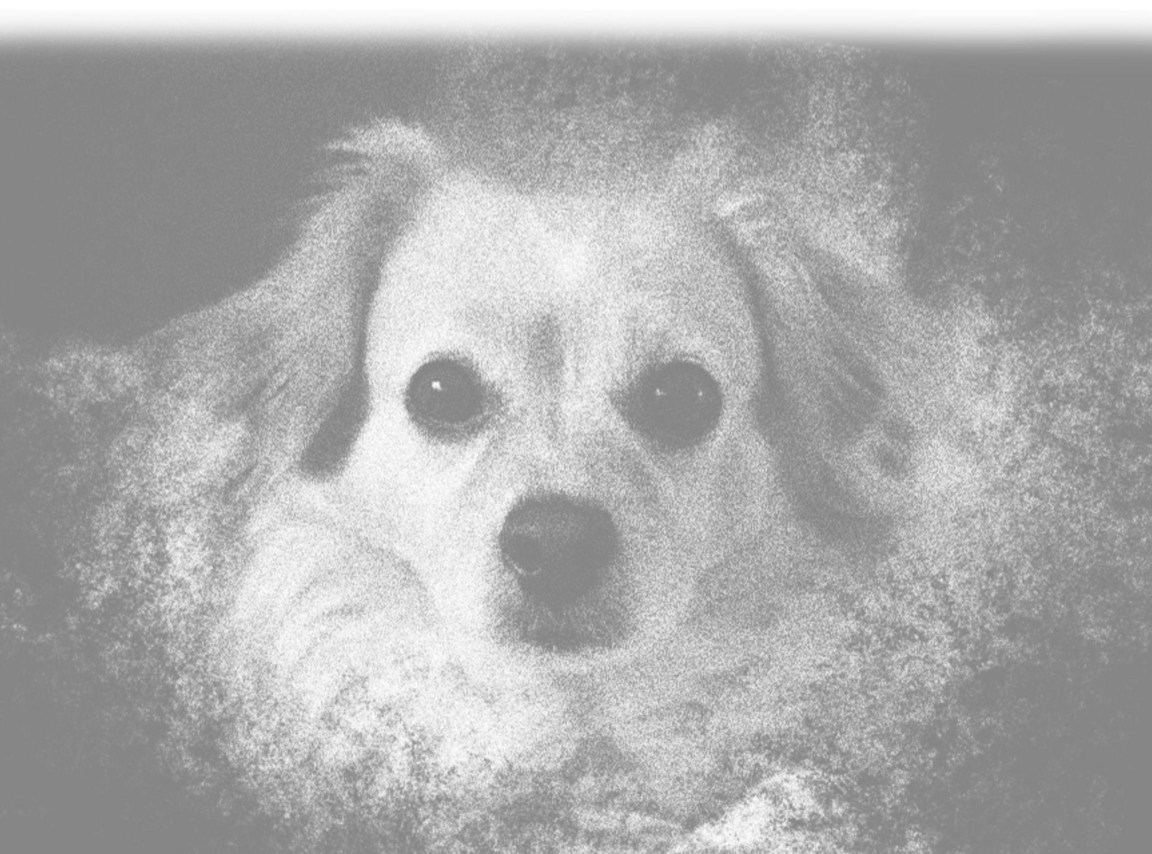

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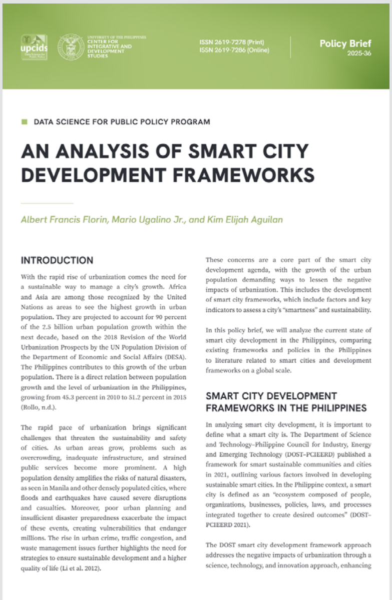
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Policy Brief
2025-36

DATA SCIENCE FOR PUBLIC POLICY PROGRAM

AN ANALYSIS OF SMART CITY DEVELOPMENT FRAMEWORKS

Albert Francis Florin, Mario Ugalino Jr., and Kim Elijah Aguilan

INTRODUCTION

With the rapid rise of urbanization comes the need for a sustainable way to manage a city's growth. Africa and Asia are among those recognized by the United Nations as areas to see the highest growth in urban population. They are projected to account for 90 percent of the 2.5 billion urban population growth within the next decade, based on the 2018 Revision of the World Urbanization Prospects by the UN Population Division of the Department of Economic and Social Affairs (DESA). The Philippines contributes to this growth of the urban population. There is a direct relation between population growth and the level of urbanization in the Philippines, growing from 45.3 percent in 2010 to 51.2 percent in 2015 (Rollo, n.d.).

The rapid pace of urbanization brings significant challenges that threaten the sustainability and safety of cities. As urban areas grow, problems such as overcrowding, inadequate infrastructure, and strained public services become more prominent. A high population density amplifies the risks of natural disasters, as seen in Manila and other densely populated cities, where floods and earthquakes have caused severe disruptions and casualties. Moreover, poor urban planning and insufficient disaster preparedness exacerbate the impact of these events, creating vulnerabilities that endanger millions. The rise in urban crime, traffic congestion, and waste management issues further highlights the need for strategies to ensure sustainable development and a higher quality of life (Li et al. 2012).

These concerns are a core part of the smart city development agenda, with the growth of the urban population demanding ways to lessen the negative impacts of urbanization. This includes the development of smart city frameworks, which include factors and key indicators to assess a city's "smartness" and sustainability.

In this policy brief, we will analyze the current state of smart city development in the Philippines, comparing existing frameworks and policies in the Philippines to literature related to smart cities and development frameworks on a global scale.

SMART CITY DEVELOPMENT FRAMEWORKS IN THE PHILIPPINES

In analyzing smart city development, it is important to define what a smart city is. The Department of Science and Technology-Philippine Council for Industry, Energy and Emerging Technology (DOST-PCIEERD) published a framework for smart sustainable communities and cities in 2021, outlining various factors involved in developing sustainable smart cities. In the Philippine context, a smart city is defined as an "ecosystem composed of people, organizations, businesses, policies, laws, and processes integrated together to create desired outcomes" (DOST-PCIEERD 2021).

The DOST smart city development framework approach addresses the negative impacts of urbanization through a science, technology, and innovation approach, enhancing

POLICY BRIEF

An Analysis of Smart City Development Frameworks

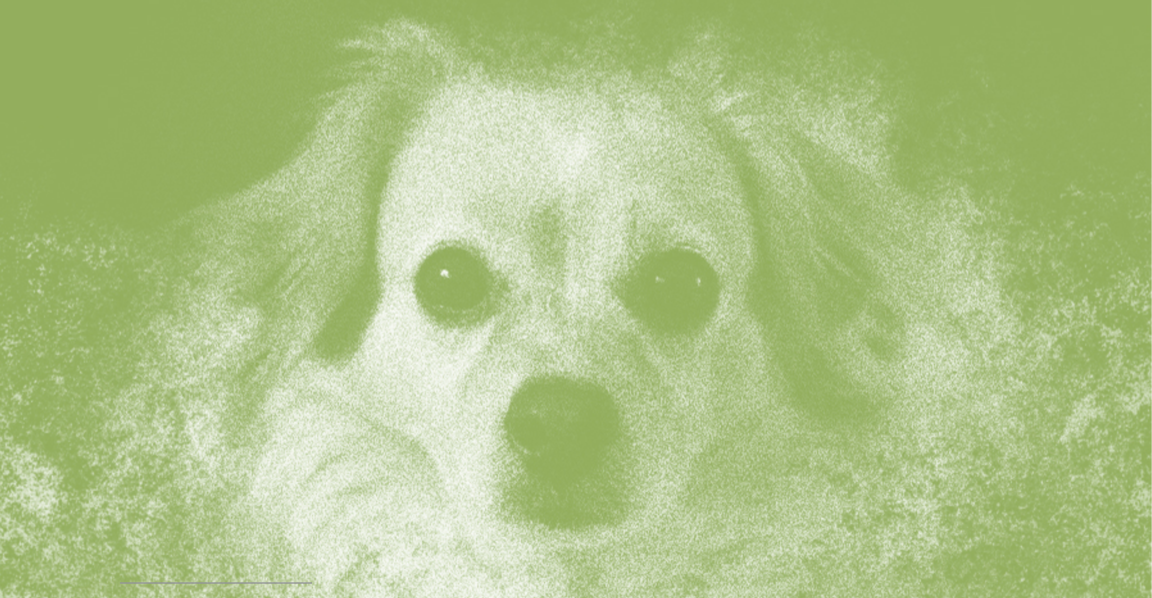
DISCUSSION PAPER

Data science vs. Dynasty: Uncovering and Shattering the Structures of Political Dynasties in the Philippines through Data Science

Data for Good

Advancing AI Powered One Health Approach to Rabies Elimination in the Philippines

DJ Darwin Bandoy[1]



1 Associate Professor of Epidemiology, College of Veterinary Medicine, UP Los Baños

Key Highlights

- **Main argument:** Rabies elimination in the Philippines is feasible, but current planning underestimates the true canine population and leaves implementation gaps underfunded. The paper argues for an auditable One Health workflow that uses large language models to accelerate evidence synthesis while keeping human expert review, source traceability, and explicit calculations at the center of policy analysis.

- **Policy landscape:** The analysis is framed by the global Zero by 30 goal, WHO guidance on achieving at least 70% dog vaccination coverage, the National Rabies Prevention and Control Program, and Philippine legal mandates such as the Anti-Rabies Act. These frameworks already identify the right interventions, but execution depends on realistic denominators, local ownership, financing, surveillance, and coordination across veterinary and public health systems.

- **Methods:** The study compared OpenAI ChatGPT 5 with Deep Research and Anthropic Claude Sonnet 4.5 using a standardized prompt and an AI-assisted evidence synthesis workflow. Outputs were evaluated for factual grounding, numerical fidelity, traceability, policy specificity, ambiguity handling, and supervision effort, with quantitative claims checked against primary or authoritative sources.

- **Findings:** Both models were useful but complementary: Deep Research performed better for web-grounded synthesis and source breadth, while Claude was stronger for long-document handling and structured editable outputs. Substantively, the analysis found that dog-to-human ratios, vaccination coverage math, budget planning, surveillance quality, and fragmented institutional ownership are central barriers to rabies elimination.

- **Policy recommendations:** Recalculate vaccination targets using locally validated dog-population estimates, budget for canine vaccination and human post-exposure prophylaxis using realistic denominators, strengthen municipal veterinary capacity and cold-chain logistics, reconcile PhilAHIS and Rabies Data Share System records, assign quarterly targets to accountable program owners, and integrate humane dog-population management with vaccination campaigns.

Introduction

Rabies remains endemic in parts of the Philippines and is almost entirely dog-mediated. The National Rabies Prevention and Control Program sets a vision of a rabies-free Philippines by 2030 and specifies actions that include mass dog vaccination, access to human post-exposure prophylaxis (PEP), and surveillance (NRPCP 2020). International frameworks such as the United Against Rabies (UAR) "Zero by 30" strategy and guidance from the World Health Organization (WHO) emphasize the importance of reaching a minimum of 70 percent dog vaccination coverage to effectively interrupt rabies transmission in humans (WHO et al. 2018; WHO 2018). In contrast, operational planning in the Philippines has traditionally used an assumed dog-to-human ratio of 1:10. However, recent studies specific to the Philippine context challenge this assumption. For example, data from Central Luzon indicates a ratio closer to 1:3.7, while national estimates suggest a dog population exceeding 23 million (Dizon et al. 2022; Chaudhari et al., 2022). These updated figures significantly affect planning benchmarks, budget needs, and projected outcomes. If vaccination totals are two to three million dogs in a recent year, then the national coverage is closer to seven to eleven percent rather than the seventy percent target. This gap is consistent with the Department of Health (DOH) report of 426 human rabies deaths in 2024 (Untalan 2025). Policymakers and implementers must reconcile these denominators with budgets, the veterinary workforce, the cold chain, and data systems. The question we examine is whether modern large language AI models, used under strict rules, can shorten the path from evidence to action while maintaining scientific rigor (Taylor et al. 2017; Ferguson et al. 2015; Amparo et al. 2018).

Methods

I conducted a structured comparison of two practitioner-facing LLM systems. ChatGPT 5 with Deep Research is a multistep agent that plans, searches, reads, and synthesizes sources into a report with citations. It is intended to operate like a junior analyst that can audit its own steps and produce an organized output (OpenAI 2025). Meanwhile, Claude Sonnet 4.5 is positioned by Anthropic as a strong coding and agentic model and is optimized for tool use and long context document work. It is also available on Amazon Bedrock for enterprise workflows (Anthropic 2025).

This study employed a mixed-methods comparative AI-assisted evidence synthesis approach to systematically evaluate barriers to rabies eradication in the Philippines. Grounded in the One Health paradigm and policy implementation gap theory, the research examined the intersection of veterinary infrastructure capacity, epidemiological surveillance systems, institutional funding mechanisms, legislative frameworks, and sociocultural factors affecting disease control. A standardized prompt was developed containing pre-identified thematic areas based on preliminary policy analysis, specifically directing both systems to prioritize quantitative data, tabular presentations, and visual representations of complex relationships over narrative summaries. The prompt explicitly required detailed data analysis to ensure outputs focused on evidence suitable for policy analysis rather than general discussion.

Both AI systems retrieved data from multiple source types spanning 2020–25 as the primary temporal focus, with historical context drawn from 1998 to 2019 to establish baseline trends and policy evolution. Government databases included DOH rabies surveillance reports, Department of Agriculture–Bureau of Animal Industry (DA–BAI) statistics, funding allocations from the Department of Science and Technology (DOST) Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) and Philippine Council for Health Research and Development (PCHRD), and World Organisation for Animal Health Philippines strategic plans. Peer-reviewed literature was sourced from PubMed Central epidemiological studies, *The Lancet Regional Health* publications, and *One Health* journal articles, while gray literature encompassed WHO Regional Office reports, Global Alliance for Rabies Control country profiles, and reports from nongovernment organizations (NGOs) such as Humane Society International and Animal Welfare Institute. Legislative documents analyzed included Republic Act (RA) No. 9482 (Anti-Rabies Act of 2007), RA No. 12308 (Animal Industry Development and Competitiveness Act of 2024), and RA No. 8485/10631 (Animal Welfare Act), providing the regulatory framework context for institutional analysis.

AI Output Evaluation and Quality Assurance

The comparative analysis framework evaluated both AI systems across six weighted dimensions: comprehensiveness of coverage for thematic areas (20 percent), data granularity with specific regional and temporal statistics

(20 percent), source credibility distinguishing primary from secondary and official from informal sources (15 percent), quality and clarity of visual presentations (15 percent), analytical depth in identifying causal mechanisms and gaps (15 percent), and citation traceability ensuring verifiability of all claims (15 percent). A multistep quality assurance protocol was implemented to validate outputs. First, factual verification cross-referenced statistics against original government reports, requiring triangulation through a minimum of two sources for all numerical claims and flagging discrepancies for manual investigation. Second, completeness assessment used checklist verification to ensure all themes were addressed, inventoried extracted data types, and documented missing data points. Third, comparative synthesis placed Claude and ChatGPT outputs side-by-side to identify unique contributions from each system and merge complementary data points into a master dataset.

Data Organization, Analytical Framework, and Limitations

The AI-generated content was reorganized into standardized formats including temporal trend tables, comparative tables across entities and metrics, gap analysis tables showing current versus required versus deficit, and cross-jurisdictional comparisons between the Philippines and ASEAN neighbors. All quantitative claims were traced to primary source identification, documented with web retrieval timestamps, referenced to specific tables or sections, and assigned confidence ratings of high for official reports, medium for academic studies, or low for media reports. Each of the thematic areas was analyzed through a three-dimensional lens, examining structural factors such as infrastructure deficits and workforce shortages, financial dimensions including budget inadequacy and misallocation, and institutional aspects encompassing legislative gaps and coordination failures. The synthesized data enabled the construction of feedback loops demonstrating how undercounting perpetuates underfunding, institutional orphaning pathways explaining why dogs fall between PCAARRD and PCHRD mandates, and implementation gaps where policy mandates diverge from practice.

Several methodological limitations required explicit mitigation strategies to ensure research validity. AI-specific limitations included knowledge cutoffs that were addressed by activating real-time web search functions for both models, hallucination risk mitigated through mandatory source citation for all quantitative claims and manual verification of key figures, search bias countered by explicit prompts to search government databases and academic repositories, and language barriers addressed through supplemental manual review of DOH and DA Filipino reports. Data availability constraints included municipal-level data often aggregated only at the regional level, the absence of a nationwide dog census since 2017–18, gaps between budget appropriation and actual disbursement data, and inherently unreliable statistics on the underground dog meat trade economy. These constraints were resolved by clearly labeling estimates, using confidence intervals where applicable, and explicitly acknowledging data gaps in findings. Temporal lag issues where 2024 data appeared in 2025 publications and incomplete 2025 data at the time of analysis in October 2025 were addressed by specifying dates for all time-sensitive statistics and using year-to-date figures where appropriate.

Ethical Considerations and Reproducibility

Full transparency was maintained regarding AI use, with explicit disclosure that evidence synthesis was AI-assisted rather than AI-generated, that human expert validation was conducted on all outputs, and that original sources remained the authoritative reference. The methodology prioritized descriptive analysis over prescriptive recommendations until the final section, incorporated multistakeholder perspectives from government, NGOs, and international agencies, and maintained evidence-based assessment without political bias. Analysis of culturally sensitive topics such as euthanasia practices and dog meat trade was conducted with recognition of cultural contexts, focusing on zoonotic disease control rather than moral judgment, and presenting balanced welfare versus public health considerations. To ensure reproducibility, the standardized prompt was archived with verbatim text documented, LLM versions were specified as Claude Sonnet 4.5 and GPT-5, search dates were recorded as October 2025, source URLs were catalogued in the bibliography, and data extraction sheets were retained for audit trail purposes. An iterative refinement process generated initial AI outputs from both systems, conducted comparative evaluation using the six-criteria framework, identified data gaps prompting supplementary targeted queries, created a synthesis document integrating the best outputs from both LLMs, incorporated expert review revisions based on veterinary and policy feedback, and completed final validation by cross-checking against source documents. This rigorous approach demonstrates how computational efficiency of LLM literature synthesis can be combined with structured evaluation frameworks for quality assurance, human expert validation to ensure accuracy and relevance, and transparent documentation for reproducibility, providing a comprehensive data-driven foundation for rabies eradication policy dialogue in the Philippines.

Policy Questions

We framed six practical questions that correspond to common decisions at national and LGU levels. T1 recalculates vaccination coverage given realistic dog-to-human ratios. T2 estimates the budget logic for canine vaccination and human PEP under alternative denominators. T3 maps municipal veterinary workforce, pound capacity, and cold chain requirements. T4 reviews statutory mandates and identifies the program owner for each action. T5 proposes a data system plan that links PhilAHIS and the Rabies Data Share System with municipal pet registries. T6 proposes a population management package that includes spaying and neutering and enforcement of dog meat prohibitions.

Results

Policy Insights

Dog population denominators and coverage math. Empirical research on dog populations in the Philippines indicates that the commonly used 1:10 dog-to-human planning ratio underrepresents the true scale of the canine population. Estimates based on household surveys and modeling suggest a dog-to-human ratio ranging from 1:3 to 1:5 (Dizon et al. 2022; Chaudhari et al. 2022). To assess vaccination coverage, we define C as the percentage of vaccinated dogs (V) relative to the total estimated dog population (D), where $D = H/r$, with H representing the human population and r the dog-to-human ratio. For example, assuming $H = 110$ million and $r = 5$, the implied dog population is 22 million. If 3 million dogs are vaccinated, this results in a coverage of approximately 13.6 percent. These calculations clearly illustrate that current vaccination efforts fall significantly short of the internationally recommended 70 percent threshold (WHO 2018; DA 2024; Taylor et al. 2017; Ferguson et al. 2015).

Budget logic for vaccination and PEP. Studies have consistently shown that in areas where rabies is endemic, integrating widespread canine vaccination with accessible PEP for humans represents a cost-effective public health intervention (Zinsstag et al. 2009; Bucher et al. 2023). Applying this principle to the Philippine context, the planning process must consider both the scale of the vaccination effort and the realistic population denominator. Strategic budgeting should move away from aggregate activity metrics and instead focus on cost per vaccinated dog, aligned with verified coverage targets. This approach allows for better resource allocation and helps ensure that the financial plan supports the achievement of epidemiologically meaningful outcomes. (Amparo et al. 2018)

Human deaths and surveillance. The DOH reported 426 human rabies deaths in 2024 through media channels. Media reporting is not the same as a peer-reviewed estimate, yet it signals the scale of the problem and the urgency of performance management (Untalan 2025; Cabalza 2025). WHO (2018) emphasizes that human rabies is underreported and that elimination is feasible with sustained dog vaccination and PEP access (Amparo et al. 2018).

Governance and mandates. The legal framework for rabies control in the Philippines is principally guided by RA No. 9482, known as the **Anti-Rabies Act of 2007,** which outlines responsibilities across various levels of government, including provisions for dog registration, vaccination, impoundment, and the prohibition of dog meat trade. This is reinforced by RA No. 10631, which amends the Animal Welfare Act to strengthen enforcement and promote humane animal handling practices. Collectively, these laws provide the statutory foundation for national-to-local government coordination on rabies elimination efforts. To improve operational outcomes, one recommendation is to clearly delegate ownership of vaccination targets and dog registry updates to municipal governments, while aggregating and visualizing data at the provincial and national levels (RA No. 9482; RA No. 10631).

Data systems. PhilAHIS and the Rabies Data Share System provide national platforms for case tracking and vaccination reporting. These systems need to accept unique identifiers for pets and owners and allow routine reconciliation of municipal registries with provincial and national views (PhilAHIS RaDSS) (BAI-PhilAHIS 2025; BAI 2022).

Population management. Low sterilization rates, unmanaged free-roaming dogs, and illegal dog meat trade sustain a large susceptible dog population. WHO and WOAH now publish pragmatic guidance for oral rabies vaccination in dogs, which can be integrated alongside parenteral campaigns to raise coverage (WHO 2023 ORV; WOAH 2023 ORV). Population management through spay neuter and targeted impoundment reduces the rate at which susceptible dogs reenter the population (RA 10631; WHO 2018).

Model Comparison

Deep Research scored higher on breadth of synthesis and traceability of external citations, while Claude scored higher on table quality and speed of producing document-centric outputs. Numeric fidelity was comparable once both models were forced to show math. Supervision effort was lower for Claude on file-centric tasks and lower for Deep Research on evidence synthesis tasks.

Failure modes and mitigations. Both models can produce fluent text that hides assumptions if prompts are loose. Requiring formulas, denominators, and per claim source tags prevents this failure mode. Source over collection by an autonomous agent is mitigated by a top-five rule with reasons for inclusion. Policy over generalization is mitigated by binding every recommendation to a program owner and a legal basis (RA 9482; NRPCP 2020).

Discussion

This work does not propose that large language models (LLMs) replace expert human judgment. Rather, its contribution lies in the design of a structured and auditable workflow that bridges internal datasets and regulatory frameworks to produce transparent, evidence-based policy recommendations. The workflow adheres to three core principles: (1) anchor calculations using locally validated denominators and show all formulas, (2) constrain sources to a curated set with clear relevance, and (3) ensure each recommendation includes an assigned responsible actor and legal basis. These practices support traceability and align with guidance from global health authorities such as the WHO and the United Against Rabies partnership (WHO 2018; WHO et al. 2018).

The Mathematical Impossibility of Success Under Current Assumptions

The most interesting insight from the Philippine rabies data is the mathematical impossibility embedded in the national control strategy. Official government policy bases vaccine procurement and program planning on a dog-to-human ratio of 1:10, yielding an estimated national dog population of 11–12 million animals requiring approximately 7.7–8.4 million vaccine doses to achieve the WHO-recommended 70 percent coverage threshold for herd immunity. However, comprehensive household surveys conducted between 2017 and 2018 across multiple Philippine regions documented actual ratios ranging from 1:3.7 in rural areas to 1:4.8 in urban centers, with a weighted national average closer to 1:4, suggesting the true dog population is between 22 and 28 million. This means that even if the government achieves 100 percent vaccination of their estimated target population, they would in reality be reaching only 25–35 percent actual coverage, falling short of the 70 percent herd immunity threshold required to interrupt rabies transmission cycles. The data reveals that the Philippines has been systematically undercounting its dog population by a factor of two to three for decades, creating a scenario where public health officials believe they are approaching their vaccination targets while the virus continues circulating unabated through an invisible majority of unvaccinated animals. This discrepancy explains the paradox observed in regions like Davao City, which reported 80.59 percent coverage using official estimates, yet continues experiencing regular human rabies deaths, because their true coverage likely hovers around 30 percent. The implications are profound: every policy discussion, budget allocation, procurement decision, and elimination timeline projection has been built on a foundation of systematically flawed denominator data, rendering four decades of rabies control efforts structurally incapable of success regardless of implementation quality or resource dedication (Teman 2025; NRPCP 2020; Taylor et al. 2017; Ferguson et al. 2015; Dizon et al. 2022; Chaudhari et al. 2022).

The Institutional Orphaning and Perpetual Funding Crisis

Perhaps the most structurally insidious finding is how dogs occupy a uniquely disadvantaged position within Philippine government institutional architecture, creating what can only be described as an "orphaned species" phenomenon that guarantees perpetual underfunding. The data demonstrates that the DOST–PCAARRD channels hundreds of millions of pesos annually into livestock research covering cattle, swine, poultry, goats, and carabao, explicitly defining its mandate around agricultural productivity and food security, thereby categorically excluding dogs as non-productive animals. Simultaneously, the DOST–PCHRD focuses health research funding on major human disease burdens such as cancer, tuberculosis, and diabetes, with zoonotic diseases receiving minimal attention, and dog-specific rabies epidemiology is essentially unfunded because dogs themselves are not considered a health research priority distinct from the human disease outcome. This institutional bifurcation was starkly illustrated by the passage of Republic Act No. 12308, or the Animal Industry Development and Competitiveness Act (AIDCA). This law allocated ₱200 billion over ten years for livestock, poultry, and dairy development. However, it explicitly excluded dogs from both its definition of covered species and its funding provisions, despite dogs being the primary rabies vector responsible for 300–426 human deaths annually. The DA receives approximately ₱8 million annually for animal rabies vaccination programs despite consistently requesting ₱110 million, representing a 92.7 percent funding deficit. Meanwhile, the newly created ₱20 billion annual livestock fund remains legally inaccessible for canine rabies control because dogs are not livestock. This creates a bizarre situation where the Philippines invests billions in protecting livestock from diseases while systematically defunding protection of humans from a 100 percent fatal zoonotic disease transmitted by an animal species that falls outside all major institutional mandates, resulting in a policy architecture where rabies control operates in perpetual crisis mode, dependent on sporadic local government initiative, donor fatigue-prone international grants, and Executive Orders whose mandated appropriations are routinely ignored during budget execution. (DA 2024; NRPCP 2020).

The Detection Illusion and Data System Dysfunction

The third critical insight concerns the dangerous illusion created by inadequate diagnostic infrastructure and dysfunctional data management systems, which allows the misinterpretation of surveillance failure as disease control success. Multiple provinces and municipalities across the Philippines report "zero rabies cases" in both humans and animals, achievements that are frequently celebrated as elimination milestones and used to justify resource reallocation away from rabies programs. However, the data strongly suggest these zeros represent measurement failure rather than genuine disease absence. In Oriental Mindoro, Integrated Bite Case Management documented 28 laboratory-confirmed animal rabies cases from 2020 to 2022, and routine passive surveillance typically confirms under 2 percent of circulating infection (Swedberg et al., 2023). That makes meaningful surveillance epidemiologically impossible. This pattern reflects a systemic reality where most Philippine provinces lack dedicated diagnostic laboratories capable of performing direct fluorescent antibody testing on animal brain specimens, where specimen transport costs to regional reference laboratories create financial barriers to testing, where the culturally preferred 10-day observation period substitutes for definitive diagnosis but routinely misses rabid animals that die or escape during observation, and where the absence of integrated digital surveillance systems means that animal bite data in local animal bite treatment centers rarely connects to veterinary reports of suspect animals or laboratory confirmation results. The Philippines has developed two parallel surveillance systems, the Philippine Animal Health Information System (PhilAHIS) for animal health and the National Rabies Information System (NaRIS) for human rabies cases. Yet fewer than 20 percent of local government units consistently report into these systems, real-time data updates are rare, and no systematic interoperability exists between them. This creates information siloes where veterinarians cannot access human exposure data, and physicians cannot confirm animal diagnosis status. This dysfunction has profound implications. One is that policymakers are making elimination timeline decisions based on reported case counts that likely represent only a fraction of actual disease burden. Another implication is that "rabies-free" declarations in areas with limited detection capability create false confidence that redirects resources and attention away from ongoing transmission. Furthermore, the absence of reliable denominator data on total dog populations, vaccination coverage, and bite incidence makes it mathematically impossible to calculate the most fundamental epidemiological metric, the true disease reproduction number, without which elimination strategies are essentially being designed in the dark. The data suggest that the Philippines may be confusing the ability to detect rabies with the actual control of rabies, a distinction with life-and-death consequences for the 300–400 people who continue dying annually from a disease the government believes it is steadily conquering (NRPCP 2020; BAI–PhilAHIS 2025)

Conclusion and Policy Recommendations

The application of large language models to Philippine rabies eradication policy analysis demonstrates a transformative capacity that extends beyond mere computational efficiency to fundamentally alter the relationship between evidence availability and policy formation. What traditionally would require weeks or months of manual literature review, statistical compilation across fragmented databases, and synthesis of multisectoral documentation spanning veterinary science, public health, legislative archives, and economic data was accomplished within hours through AI-assisted retrieval and structured querying. This temporal compression is not simply a matter of convenience but represents a qualitative shift in policy research methodology, particularly for complex multidimensional problems like rabies eradication, where the relevant evidence base spans governmental silos, academic disciplines, and temporal periods that resist easy integration through conventional search methods. The ability to simultaneously interrogate multiple data domains, identify contradictions between official statistics and field survey results, map institutional funding flows across competing bureaucratic mandates, and construct comparative benchmarks against regional neighbors enabled the revelation of systemic failures that might remain obscured when analyzing any single data stream in isolation. The mathematical impossibility embedded in the 1:10 dog population ratio, the institutional orphaning of canines between PCAARRD and PCHRD mandates, and the detection illusion masquerading as disease control success only became analytically visible when disparate evidence sources were synthesized with sufficient comprehensiveness to expose the contradictions, a task for which LLMs demonstrated particular aptitude given their capacity to process vast reference corpora and execute complex retrieval queries across heterogeneous source types.

However, the methodology also illuminated critical limitations and necessary safeguards that must frame any serious deployment of LLMs in evidence-based policymaking. The requirement for systematic validation protocols, including triangulation of quantitative claims, expert review by domain specialists, and explicit documentation of source provenance, proved essential not merely as academic rigor but as protection against the documented tendency of large language models to generate plausible-sounding fabrications when confronted with knowledge gaps. The comparative evaluation framework that pitted Claude against ChatGPT outputs revealed meaningful variations in source selection, statistical emphasis, and analytical framing that would be invisible in single-model deployments, suggesting that the most robust AI-assisted policy analysis may require multi-model architectures with human-mediated synthesis rather than uncritical acceptance of any individual system's outputs. The data quality rating system and confidence interval specifications imposed on AI-retrieved statistics acknowledged an uncomfortable truth: that LLMs are fundamentally probabilistic text generators rather than deterministic knowledge databases, and their utility for policy analysis depends entirely on the rigor with which their outputs are subjected to verification protocols that many current AI deployments in government and institutional settings systematically neglect. The temporal lag issues, language barriers favoring English-language sources over Filipino government documents, and search algorithm biases toward prominent recent publications over archival regulatory materials all pointed to ways that LLM-assisted research can inadvertently reproduce or amplify existing evidence gaps unless deliberately counteracted through supplementary manual review and targeted validation of underrepresented source categories.

The ultimate value proposition of large language models for rabies policy analysis, and by extension for complex public health challenges generally, lies not in their potential to replace human expertise but in their capacity to radically expand the evidence base that human experts can feasibly engage within decision-relevant time frames. The Philippine rabies eradication challenge has persisted for over four decades, not primarily due to lack of knowledge about effective interventions, which are well-established in veterinary epidemiology and successfully demonstrated in countries like Malaysia and Thailand, but due to institutional inertia, fragmented responsibilities, and policy decisions made in informational vacuums where the full scope of systemic dysfunction remains invisible to any single stakeholder. By enabling the rapid assembly of comprehensive evidence syntheses that span veterinary workforce data, budget execution records, legislative exclusions, surveillance system gaps, and sociocultural factors like dog meat consumption and euthanasia taboos, LLMs create the informational conditions necessary for what political scientists term "punctuated equilibrium" in policy change: moments when the weight of accumulated evidence becomes sufficiently overwhelming and synthesized to overcome institutional resistance and status quo bias. The 12 thematic barriers documented in this analysis were individually known to various stakeholders, veterinarians understood the workforce shortage, budget officers recognized funding inadequacy, epidemiologists noted surveillance gaps, and animal welfare advocates tracked euthanasia policy differences, but the systemic integration of these fragmented insights into a unified analytical framework revealing their interdependencies and cumulative impact required a synthesis capacity that LLMs uniquely provide at the intersection of speed, comprehensiveness, and accessibility. As developing nations confront increasingly complex policy challenges requiring multi-sectoral coordination and evidence integration across administrative boundaries, the thoughtful deployment of AI-assisted research methodologies with appropriate validation frameworks may prove essential not merely for analytical efficiency but for creating the shared evidential foundations upon which transformative policy change becomes politically feasible, socially legitimate, and institutionally sustainable.

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