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Privatisation of ruminant vaccination services in Malaysia: stakeholder perspectives and policy feasibility

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ABSTRACT

Vaccination is fundamental to livestock productivity and food security all over the world. In Malaysia, ruminant-disease control is largely managed by the Department of Veterinary Services (DVS). Recurrent vaccine shortages, delivery delays, and fiscal limitations have piqued the interest in privatising vaccination through possible public–private partnerships (PPPs). This study shows the economic and management feasibility of PPP. A mixed-methods study design combined quantitative surveys of 120 farmers with qualitative interviews of 10 stakeholders. Eighty-five percent of respondents supported private participation, anticipating gains in accessibility and profitability; fifteen percent voiced cost and quality concerns. Statistical analysis showed a significant correlation ($r = 0.63$, $p < 0.01$) between willingness-to-pay and perceived productivity improvement. Qualitative themes emphasised regulatory readiness, affordability, and workforce expansion. Economic simulation suggested that a hybrid PPP could possibly lower government expenditure by 20 percent over five years while maintaining herd-immunity thresholds. This study concludes that Malaysia has the potential to strengthen animal-health governance through regulated collaboration that balances efficiency with equity.

1. INTRODUCTION

The Ruminant production plays a crucial role in Malaysia's agro-food system by supporting the national food security, rural livelihoods, and downstream agro-industries (Department of Statistics Malaysia, 2023). Despite sustained public investment, infectious diseases such as foot-and-mouth disease, haemorrhagic septicaemia, and lumpy skin disease continue to constrain productivity and profitability within the sector (Ahmad et al., 2022). In Malaysia, vaccination services are predominantly delivered by the Department of

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Veterinary Services (DVS), reflecting a traditional public-sector model of disease control. However, the recurrent vaccine shortages, delayed field deployment, and increasing fiscal pressure have raised questions about the long-term sustainability of exclusive public provision (Abdullah & Ismail, 2021).

Globally, many countries such as Mali, Vietnam and many more have adopted public–private partnership (PPP) arrangements in veterinary services to improve operational efficiency while retaining public oversight. Evidence from Asia, Latin America, and Oceania suggests that regulated PPPs can enhance vaccine coverage and cost efficiency when governance mechanisms are robust (OECD, 2021; WOAH, 2022; Silva et al., 2020). In Malaysia, recent policy frameworks emphasise greater private-sector participation in agri-food value chains (MAFS, 2023), yet empirical evidence on the feasibility of privatised vaccination remains limited.

Although previous studies have demonstrated the benefits of public-private partnerships in veterinary services, most evidence originates from high-income or international settings where governance structures, financing mechanisms, and veterinary workforce capacity differ substantially from those in Malaysia. Furthermore, existing studies primarily focus on vaccination outcomes and service delivery efficiency, with limited attention given to stakeholder acceptance, willingness-to-pay, and governance readiness within the Malaysian livestock sector. Consequently, there remains a lack of empirical evidence to guide policymakers on the feasibility of introducing a regulated PPP model for ruminant vaccination services in Malaysia. This study addresses these knowledge gaps through an integrated mixed-methods approach combining farmer perceptions, stakeholder interviews, and economic simulation.

This study therefore aims to assess the economic and management feasibility of introducing a PPP-based ruminant vaccination system in Malaysia, focusing on farmer acceptance, cost implications, and governance considerations. This study does not evaluate vaccine efficacy but instead provides policy-relevant evidence to inform service-delivery reform, consistent with recent calls for adaptive governance in livestock health systems (Zhou et al., 2024; Sánchez-Vizcaíno et al., 2022).

1.1 Global Experience

Public–private collaboration in veterinary services has transformed disease-control outcomes in several regions. India's National Dairy Development Board engaged private cooperatives to deliver vaccines, increasing national coverage by 60 percent (Kumar et al., 2019). In Brazil, licensed private veterinarians perform 80 percent of bovine vaccinations, helping cut FMD incidence dramatically (Silva et al., 2020). Australia's tuberculosis-eradication initiative demonstrated sustainable cost-sharing between producers and government (OIE, 2020). These examples suggest that private participation indicates service efficiency when robust governance may help ensure biosecurity and equity.

1.2 Malaysian Policy Context

Malaysia's Ruminant Industry Transformation Plan (2011–2020) set a self-sufficiency target of 50 percent but achieved less than 30 percent (Rais & Margarita, 2022). The Agro-Food Policy Blueprint 2023–2030 (MAFS, 2023) calls for enhanced private investment and digital innovation across veterinary supply chains. Legal frameworks under the Veterinary Surgeons Act 1974 and Animal Welfare Act 2015 permit

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private vaccination under DVS supervision (DVS Malaysia, 2023). These conditions make PPP adoption institutionally feasible.

1.3 Economic Rationale

Competition stimulates efficiency and innovation (Porter, 1998). In livestock health, private operators can optimise logistics and capitalise cold-chain investment (Rich et al., 2019). Nevertheless, unregulated markets risk excluding smallholders. Hybrid PPPs employing subsidies or tiered pricing preserve inclusion while leveraging efficiency (Alonso et al., 2020). Studies from Africa and South Asia confirm that such models expand vaccine coverage and improve fiscal sustainability (Bett et al., 2021).

1.4 Governance and Risk Management

WOAH (2022) identifies transparency, accountability, and performance metrics as central to PPP success. OECD (2021) emphasises independent audits and open tendering to deter monopoly behaviour. Malaysia's Veterinary Information System (VETIS) already supports digital tracking of vaccine distribution (MacGillivray et al., 2022). Together these mechanisms establish the managerial foundation for a PPP vaccination framework.

1.5 Conceptual Framework

This study is underpinned by Stakeholder Theory (Freeman, 1984), which proposes that successful policy implementation depends on balancing the interests and expectations of all parties affected by organisational decisions. In the context of ruminant vaccination services, key stakeholders include farmers, the Department of Veterinary Services (DVS), private veterinary practitioners, and policymakers, each possessing different priorities that influence acceptance and implementation of vaccination privatisation. Stakeholder Theory therefore provides a useful conceptual lens for understanding willingness-to-pay, governance readiness, perceived benefits, and implementation challenges associated with the proposed public–private partnership (PPP) model.

2. METHODOLOGY

2.1 Study Design and Setting

This study employed a mixed-methods, cross-sectional design conducted between January and June 2024. The quantitative component involved a structured survey of ruminant farmers, while the qualitative component consisted of semi-structured interviews with key stakeholders. The study focused on Peninsular Malaysia, where the majority of commercial ruminant operations are concentrated.

A mixed-methods approach was selected because quantitative survey data enabled measurement of farmers' attitudes, willingness-to-pay, and support for vaccination privatisation, whereas qualitative interviews provided deeper insights into governance readiness, implementation challenges, and stakeholder expectations. Combining both approaches allowed triangulation of findings and produced a more comprehensive assessment of the feasibility of introducing a public–private partnership (PPP) model than either method alone.

https://doi.org/10.24191/ji.v21i2.11255

2.2 Study Population and Sampling

The target population comprised ruminant farmers registered with the Department of Veterinary Services. Inclusion criteria were: (i) active operation for at least two years, (ii) participation in at least one government-led vaccination programme, and (iii) consent to participate. Farmers who were inactive, unregistered, or exclusively involved in backyard subsistence farming were excluded. Stratified random sampling was applied based on herd size to ensure representation of small (<50 animals), medium (50–200 animals), and large (>200 animals) farms. A total of 120 farmers were recruited, with equal distribution across the three strata.

For the qualitative component, ten stakeholders were purposively selected based on their involvement in veterinary policy, service delivery, or regulation. These included DVS officers, private veterinarians, and policy experts.

2.3 Data Collection Instruments

The farmer questionnaire was developed following a review of published literature on livestock vaccination, public–private partnerships, and willingness-to-pay studies. The questionnaire comprised four sections:

(i) demographic characteristics;
(ii) awareness of vaccination privatisation;
(iii) attitudes towards private service delivery; and
(iv) willingness-to-pay.

Responses were measured using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). The questionnaire measured four principal constructs: awareness, perceived benefits, perceived risks, and support for privatisation. Face validity was assessed by three experts in veterinary public health and agricultural economics before pilot testing among 15 farmers. Minor wording revisions were made following expert feedback. Internal consistency demonstrated good reliability (Cronbach's $\alpha = 0.82$).

Stakeholder interviews followed a semi-structured guide exploring governance readiness, affordability mechanisms, workforce capacity, and information systems. Interviews were audio-recorded with consent and transcribed verbatim.

2.4 Statistical and Analytical Methods

Quantitative data were analysed using SPSS version 26. Descriptive statistics summarised respondent characteristics and attitudes. Pearson correlation analysis assessed associations between willingness-to-pay and perceived productivity gains. Multiple linear regression was performed to identify predictors of support for privatisation. Statistical significance was set at $p < 0.05$.

Qualitative data were analysed using NVivo version 12 following Braun and Clarke's reflexive thematic analysis approach. Transcripts were read repeatedly to achieve familiarisation before initial codes were generated inductively. Codes were subsequently reviewed and refined into broader themes through iterative discussion among the researchers until consensus was achieved. This process enhanced the credibility and trustworthiness of the qualitative findings.

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3. RESULTS

This chapter presents the empirical findings from the mixed-methods analysis. Quantitative survey results are followed by the qualitative themes derived from stakeholder interviews. Data are interpreted in relation to the study objectives and are organised into five interrelated subsections: respondent profile, awareness and attitudes, willingness-to-pay and economic correlates, expanded economic interpretation, and qualitative themes.

Table 1 summarises the demographic characteristics of the 120 participating farmers, including age, education level, herd size, and farming experience. Table 2 presents farmers' awareness and attitudes toward vaccination privatisation, indicating high levels of support for private participation. Table 3 shows the results of the regression analysis identifying education level, herd size, and prior vaccination compliance as significant predictors of support. Table 4 illustrates the comparative economic simulation between the government-led model and the proposed PPP model, while Table 5 summarises the key qualitative themes derived from stakeholder interviews.

3.1 Respondent Profile

A total of 120 registered ruminant farmers participated, representing small (< 50 animals), medium (50–200 animals), and large (> 200 animals) holdings in equal proportion. The average age was 46 ± 8.3 years, with 11.8 ± 5.1 years of farming experience. Male farmers comprised 80 percent of respondents, while 20 percent were female. Nearly half (48 percent) held tertiary education, reflecting a comparatively educated farming population. The majority (62 percent) operated mixed herds including beef and goat species. These demographic patterns illustrate a heterogeneous industry combining commercial and smallholder enterprises.

Table 1. Demographic Profile of Respondents

Variable	Category	Frequency (n = 120)	Percentage (%)
Age (years)	Mean ± SD	46 ± 8.3	—
Gender	Male / Female	96 / 24	80 / 20
Education level	Primary / Secondary / Tertiary	22 / 40 / 58	18.3 / 33.3 / 48.4
Herd size	Small (< 50) / Medium (50–200) / Large (> 200)	40 / 40 / 40	33.3 / 33.3 / 33.3
Farming type	Beef / Dairy / Mixed	46 / 30 / 44	38.3 / 25 / 36.7
Farming experience (years)	—	11.8 ± 5.1	—

4. AWARENESS AND ATTITUDES

Most farmers (78 percent) were aware of ongoing privatisation initiatives, primarily through DVS extension channels. Eighty-five percent supported private participation in vaccination, citing anticipated improvements in timeliness, accessibility, and professionalism. Only 15 percent expressed reservations, mainly regarding potential cost increases and uncertainty about vaccine quality. The mean attitude score for "private vaccination will improve timeliness" was 4.38 ± 0.55, indicating strong agreement.

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Table 2. Awareness & Attitude Toward Vaccination Privatisation

Statement	Mean (1–5) ± SD	Agree (%)	Disagree (%)
Private vaccination will improve timeliness.	4.38 ± 0.55	87.5	12.5
Privatisation will raise vaccine quality.	4.16 ± 0.61	81.7	18.3
Private fees will be unaffordable.	2.41 ± 1.02	24.2	75.8
Government should remain sole provider.	2.10 ± 0.94	20.0	80.0

4.1 Willingness-To-Pay and Economic Correlates

The mean willingness-to-pay (WTP) was RM 6.10 per animal, approximately 15 percent above the current subsidised rate. Farmers viewed this premium as acceptable compensation for reliable and timely service. Correlation analysis confirmed a strong positive association between WTP and perceived productivity improvement ($r = 0.63$, $p < 0.01$). Regression modelling identified education level, herd size, and prior vaccination compliance as significant predictors of support for privatisation. The regression equation achieved $R^2 = 0.41$ ($F = 22.2$, $p < 0.001$), explaining 41 percent of the variance in support levels.

Table 3. Regression Predicting Support for Privatisation

Predictor variable	B	SE B	β	t	p
Education level	0.213	0.064	0.31	3.32	0.001
Herd size	0.0018	0.0006	0.26	2.92	0.004
Previous vaccination compliance	0.187	0.058	0.29	3.23	0.002
Constant	2.110	0.370	—	5.70	< 0.001

Model summary: $R^2 = 0.41$, adjusted $R^2 = 0.38$, $F(3, 116) = 22.2$, $p < 0.001$. Dependent variable: Support for privatisation.

4.2 Expanded Economic Interpretation

Economic simulations modelled comparative scenarios between current government-led vaccination and proposed PPP delivery. Assuming vaccine cost RM 4.50 and private service fee RM 1.20 per dose, return-on-investment (ROI) reached 2.6 for large farms and 1.4 for small farms. Nationally, productivity gains through reduced morbidity could raise output by RM 96 million annually. Even with subsidies covering 40 percent of smallholder costs, the government would save RM 24 million per year.

The economic simulation was conducted using a scenario-based modelling approach to compare the current government-led vaccination system with a hypothetical PPP model. Assumptions included constant vaccine procurement costs (RM4.50 per dose), private service fees (RM1.20 per dose), stable vaccination coverage, and a five-year implementation period. The simulation was intended to illustrate potential economic implications under specified assumptions rather than predict actual implementation outcomes.

Table 4. Economic Simulation of PPP Vaccination Model

Parameter	Government -led Baseline	PPP Scenario	% Change
Annual vaccination coverage	74 %	84 %	+13.5 %
Average cost per animal (RM)	5.80	6.70	+15.5 % (to farmer)
Government annual expenditure (RM million)	56.0	45.8	–18.2 %

https://doi.org/10.24191/ji.v21i2.11255

Estimated farm-level ROI	1.0	2.1	+110 %
Herd morbidity (cases / 1000 head)	84	58	–30.9 %

Assumptions: vaccine RM 4.50 + RM 1.20 service fee; time horizon = 5 years.

The simulation supports PPP efficiency gains by reducing fiscal burden and improving herd health, aligning with FAO (2022) benchmarks for cost-effective animal-health investment.

4.3 Qualitative Themes

Qualitative interviews with ten stakeholders including DVS officials, policymakers, and private veterinarians provided complementary insights into managerial feasibility. Thematic analysis produced four recurrent domains: regulatory preparedness, affordability mechanisms, workforce capacity, and information systems. Stakeholders collectively endorsed the PPP concept while emphasising that its credibility depends on transparent regulation, equitable cost sharing, and technical competence.

Table 5. Thematic Summary from Stakeholder Interviews

Theme	Illustrative Insight	Managerial Implication
Regulatory preparedness	"Licensing and batch-tracking must be mandatory before rollout."	DVS should enforce certification and traceability protocols.
Affordability mechanisms	"Smallholders need targeted subsidies."	Establish Livestock Health Fund and tiered pricing structure.
Workforce capacity	"Private practice can absorb new graduates."	Expand training and accreditation programmes.
Information systems	"Digital reporting may help ensure transparency."	Integrate private access to VETIS and real-time data dashboards.

The interview evidence complements quantitative results by identifying the enabling conditions for successful implementation. Participants highlighted that regulatory clarity and transparency are the foundation of public trust. When paired with affordable service pricing and adequate human-resource capacity, PPP vaccination could transform the efficiency and reach of Malaysia's livestock-health system

4.4 Integration of Mixed-Methods Findings

Integration of both datasets demonstrated strong convergence between the quantitative and qualitative findings. The high level of farmer support for vaccination privatisation identified in the survey was reinforced by stakeholder interviews, which highlighted regulatory readiness, workforce capacity, and affordability as essential conditions for successful implementation. Likewise, farmers' willingness-to-pay corresponded with stakeholders' perceptions that improved accessibility and service efficiency could justify moderate service charges. Together, these findings indicate that successful implementation depends not only on economic considerations but also on effective governance and stakeholder collaboration.

5. DISCUSSION

The results of this study confirm that Malaysian farmers overwhelmingly support the introduction of private participation in ruminant-vaccination delivery. The strong correlation between willingness-to-pay and perceived productivity gains indicates that producers recognise vaccination as an investment rather than a cost. This finding resonates with earlier work showing that producers who directly experience the benefits

of reduced morbidity and faster service are more likely to accept cost-recovery mechanisms (Bett et al., 2021; Alonso et al., 2020). Economic simulation in the present study suggests that even modest user fees can generate substantial fiscal savings, suggesting that a PPP approach could release public resources for research, surveillance, and emergency preparedness without compromising herd-immunity thresholds.

These findings can also be interpreted through the lens of Stakeholder Theory (Freeman, 1984), which proposes that successful policy implementation depends on balancing the interests and expectations of multiple stakeholder groups. Farmers primarily valued affordability and improved accessibility, whereas government agencies emphasised regulatory oversight and disease control, while private veterinary practitioners highlighted operational efficiency and workforce capacity. The convergence of these perspectives suggests that successful implementation of a PPP vaccination model requires collaborative governance and continuous stakeholder engagement.

Beyond its financial appeal, privatisation signals a shift in Malaysia's agricultural governance toward shared responsibility between the state and market actors. In this model, the DVS would evolve from being a service provider into a regulator and facilitator that defines standards, accredits vaccinators, and monitors national disease-control indicators. Such a transition mirrors international trends in veterinary governance, where governments focus on stewardship while private partners handle logistics and client interfacing (WOAH, 2022; OECD, 2021). For Malaysia, this evolution could strengthen institutional agility and reduce bureaucratic delay, particularly during transboundary-disease outbreaks.

Similar public–private partnership models implemented in countries such as Brazil, India, and Australia have demonstrated that long-term success depends on sustained regulatory oversight, periodic programme evaluation, and continuous stakeholder collaboration. While these countries reported improvements in vaccination coverage and operational efficiency, successful implementation required gradual policy transition, ongoing government supervision, and adaptive financing mechanisms. These international experiences suggest that Malaysia may benefit from phased implementation beginning with pilot programmes before nationwide adoption.

From a management perspective, the PPP framework must be underpinned by clear contractual design, measurable performance indicators, and transparent reporting mechanisms. The experience of Brazil and India illustrates that accountability frameworks covering cold-chain integrity, coverage targets, and service-quality audits are essential to maintain trust (Silva et al., 2020; Kumar et al., 2019). Malaysia's VETIS digital infrastructure provides an ideal platform for such monitoring. By integrating mobile data entry, GPS tagging, and real-time dashboards, the DVS can maintain continuous oversight while granting operational autonomy to private vaccinators (MacGillivray et al., 2022).

A second managerial implication concerns human-capital development. Privatisation could absorb approximately 250 new veterinary graduates annually, expanding service reach and reducing under-employment among young professionals. However, sustaining quality may depend on continuous professional training, accreditation renewal, and adherence to biosecurity protocols. International evidence emphasises that private-sector involvement can enhance motivation and service efficiency only when strong competency frameworks exist (Sánchez-Vizcaíno et al., 2022). Accordingly, Malaysia should institutionalise joint capacity-building programmes between DVS, universities, and professional bodies.

The expanded discussion also underscores potential risks. Unregulated markets could lead to price escalation, inconsistent vaccine sourcing, or counterfeit products. To mitigate these threats, Malaysia's PPP

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contracts should incorporate ISO 9001-aligned quality-assurance systems (ISO, 2020) and require vaccine traceability through batch numbers and cold-chain documentation. Independent audit panels involving academia and producer associations would further reinforce transparency. Digital certification possibly blockchain-enabled could help prevent product adulteration, as demonstrated in Southeast Asian agrifood chains (Lee & Ng, 2023).

Equity considerations remain central to the feasibility of privatisation. While large producers view PPP vaccination as a rational investment, smallholders depend heavily on government subsidies. Without targeted financial support, privatisation could widen socio-economic disparities. A Livestock Health Fund financed by modest levies on large commercial producers or by public matching grants could subsidise smallholder participation, similar to South Africa's animal-health voucher system (Rich et al., 2019). Transparent fee schedules and open-data reporting would ensure that cost recovery does not evolve into cost exclusion. In addition, effective risk mitigation mechanisms should accompany any future PPP implementation. These may include independent performance audits, transparent pricing mechanisms, periodic review of subsidy allocation, standardised service quality indicators, and accessible farmer grievance mechanisms. Together, these governance measures would help minimise inequitable service delivery while maintaining public confidence in the vaccination programme.

Culturally, successful PPP implementation may require deliberate communication strategies to reshape farmer expectations. Decades of state-provided services have created a perception that veterinary vaccination is an entitlement rather than a shared responsibility. Behavioural-economics research shows that transition acceptance increases when stakeholders perceive procedural fairness and visible improvements in service reliability (Mohamad et al., 2023). Early pilot programmes that demonstrate efficiency gains can therefore serve as powerful proof-of-concept initiatives before nationwide rollout.

Finally, the study's findings contribute to the broader discourse on agribusiness management in emerging economies. They reveal that economic efficiency and social equity need not be mutually exclusive if managed through adaptive governance. Malaysia's hybrid PPP model could become a regional benchmark for integrating private entrepreneurship with public stewardship in animal-health systems. The anticipated outcomes greater service reliability, lower fiscal burden, enhanced veterinary employment, and sustained smallholder participation align directly with the Sustainable Development Goals on zero hunger and decent work. By institutionalising transparency and continuous evaluation, Malaysia can ensure that privatisation functions as a mechanism for innovation and resilience rather than deregulation.

In essence, the expanded discussion highlights that privatisation of ruminant vaccination in Malaysia is not merely an administrative adjustment but a transformation in policy philosophy, balancing efficiency, accountability, and inclusivity. The challenge lies in constructing a governance ecosystem where profitability and public interest reinforce rather than oppose each other a goal achievable through well-crafted PPP contracts, evidence-based oversight, and sustained stakeholder engagement.

6. LIMITATIONS OF THE STUDY

This study has several limitations that should be acknowledged. First, the cross-sectional design limits causal inference and restricts assessment of long-term impacts of vaccination privatisation (Creswell & Plano Clark, 2018). Second, the geographic focus on Peninsular Malaysia constrains national generalisability, particularly to East Malaysia where livestock systems and service accessibility differ

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substantially (World Bank, 2021). Third, although equal stratification by herd size enhanced comparative analysis, it may not reflect the national herd-size distribution, which is dominated by smallholders (Bett et al., 2021).

Economic simulations were based on assumed vaccine and service-cost parameters derived from published benchmarks rather than observed PPP implementation data, which may affect external validity (FAO, 2022). Finally, farmer attitudes and willingness-to-pay were self-reported and therefore subject to recall and social desirability bias, as noted in previous agribusiness perception studies (Mohamad et al., 2023).

7. CONCLUSION

This study suggests that a regulated public–private partnership model has the potential to improve the delivery of ruminant vaccination services in Malaysia. The findings indicate encouraging levels of stakeholder acceptance, governance readiness, and projected economic benefits. However, these conclusions remain exploratory because they are based on perception-based survey data, stakeholder interviews, and economic simulation rather than actual programme implementation. Future pilot implementation studies, longitudinal evaluations, and comprehensive economic assessments are required to validate these findings before wider policy adoption can be recommended. Nevertheless, this study provides useful preliminary evidence to inform future livestock-health policy reform and contributes to the growing literature on public–private partnerships in veterinary service delivery.

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9. CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

10. AUTHORS' CONTRIBUTIONS

Vinesh Raj.S: Conceptualisation, methodology, formal analysis, investigation and writing-original draft; **Posyhan Manikam**: Conceptualisation, methodology, and formal analysis, writing- review and editing, and validation.

11. DECLARATION OF GENERATIVE AI IN THE WRITING PROCESS

During the preparation of this work, the authors used generative AI tools to assist with language refinement and improvement of clarity. The authors critically reviewed, edited, and validated all content and take full responsibility for the accuracy and integrity of the manuscript.

12. DATA AVAILABILITY/SUPPLEMENTARY MATERIALS

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

13. ETHICS STATEMENT

This study involved a minimal-risk survey and interview-based design conducted among adult participants. No clinical interventions were performed, and no personally identifiable information was collected. Participation was voluntary, and informed consent was obtained from all respondents prior to data collection. In accordance with international research standards, studies involving anonymised survey data and non-sensitive topics may be exempt from formal institutional ethical review. This study was conducted in line with the principles of the World Medical Association and adhered to good research practice. The authors confirm that all procedures complied with relevant ethical standards for social and policy research.

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