

REVIEW ARTICLE

Factors Associated with Childhood Vaccine Hesitancy or Refusal in Malaysia: A Systematic Review

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ABSTRACT

Vaccine hesitancy and refusal have emerged as a significant public health concern worldwide. In Malaysia, despite the long establishment of the National Immunization Programme (NIP) since the early 1950s, childhood vaccine refusal cases are showing an upgoing trend. This has led to resurgence of vaccine-preventable diseases like measles and diphtheria in recent years. This systematic review aims to synthesize existing evidence on the prevalence and factors associated with childhood vaccine hesitancy or refusal in Malaysia. A comprehensive literature search was conducted across electronic databases including Scopus, ScienceDirect, and PubMed. The review followed PRISMA 2020 guidelines. Eligibility criteria included English-language articles published between 2015 and 2025, focusing on parental hesitancy or refusal on childhood vaccination in Malaysia. The quality of included studies was assessed using the Joanna Briggs Institute (JBI) critical appraisal tool. The review included six high-quality studies done in Malaysia. Prevalence of childhood vaccine hesitancy in the studies ranged from 6.8% - 11.6%. Key risk factors identified included sociodemographic characteristics (parental employment status, education level, religion and parity), concern about vaccine safety, knowledge and awareness about vaccines, cultural and religious belief, mistrust in healthcare system / modern medicine, external influence and risk perception. In order to sustain high

immunisation coverage in the country, implementation of culturally sensitive, evidence-based strategies that strengthen public trust, enhance provider communication and counter misinformation is essential.

INTRODUCTION

Childhood vaccination is considered as one of the most effective public health interventions for the prevention and control of infectious diseases. Through the introduction of antigens, which are harmless components or weakened forms of a pathogen, vaccines stimulate the body's natural immune response without causing the actual disease. This process trains the immune system to recognize and combat future infections by the same pathogen. As a result, vaccinated children are less likely to contract life-threatening forms of infectious diseases. In addition to protecting individual health, widespread vaccination contributes to herd immunity, reducing the overall circulation of infectious agents in the community and protecting those who are ineligible to receive vaccines, such as newborns or immunocompromised individuals. Immunization currently prevents an estimated 3.5 to 5 million deaths each year worldwide (World Health Organization [WHO], 2024).

History of vaccination started with the development of the smallpox vaccine in 1796. Since then, vaccines have played a major role in preventing the spread of infectious diseases. One of the greatest achievements in medical history is the global eradication of smallpox in the 1980s, following international vaccination efforts led by the WHO (Centres for Disease Control and Prevention [CDC]). Similarly, sustained immunization efforts have led to significant reduction in polio and measles cases globally (Auzenberg et al., 2023).

In Malaysia, the National Immunisation Programme (NIP), initiated in the 1950s, offers free vaccinations to all Malaysian children

under the age of 15. The program currently includes immunizations against 13 major childhood diseases, which include measles, mumps, rubella, diphtheria, pertussis, tetanus, poliomyelitis, tuberculosis, hepatitis B, haemophilus influenzae type b, Japanese encephalitis (in Sarawak), pneumococcal disease and human papilloma virus (HPV). These vaccines are administered according to a structured schedule, with specific doses given at designated ages to ensure optimal protection (Ministry of Health [MOH] Malaysia). The NIP has achieved high coverage rates, with annual vaccination coverage reported consistently above 90%, contributing to the significant decline of vaccine-preventable diseases in the country over decades (WHO, 2024).

However, the upgoing trend of childhood vaccination refusal cases has emerged as a public health concern in Malaysia. From 2013 to 2016, there was a steady rise in reported cases of vaccine refusal, with 1,600 cases recorded in 2016 alone, up from just above 600 in 2013 (Kusnin, 2017). Vaccine hesitancy is defined as the delay in acceptance or refusal of vaccines despite availability of vaccination services (WHO, 2019). While vaccine refusal refers to complete rejection of vaccination (Tekin et al, 2023).

Concurrently, Malaysia has experienced a resurgence of certain vaccine-preventable diseases (VPDs) in recent years. The Ministry of Health reported a nearly 900% surge in measles cases in Malaysia over a span of five years, rising from 195 cases in 2013 to 1,934 cases in 2018. Additionally, the number of measles cases among those who were not vaccinated increased from 125 cases (69%) in 2013 to 1,467 cases (76%) in 2018. (WHO, 2019; Wong et al., 2020). In the same year, Malaysia reported six deaths due to measles, all involving unvaccinated individuals; five deaths from diphtheria (four unvaccinated); and 22 deaths from pertussis (19 unvaccinated) (MOH Malaysia, 2019).

Understanding the factors associated with childhood vaccine hesitancy or refusal among parents in Malaysia is crucial to curb the increasing trend of vaccine refusal and subsequently preventing emergence and re-emergence of VPDs. To date, there has been no recent systematic review that specifically synthesises evidence on childhood vaccine hesitancy or refusal in the Malaysian context, with existing literature largely limited to individual primary studies or broader narrative discussions. Therefore, this review addresses an important gap by collating and critically appraising local data on parental attitudes toward routine childhood immunisation and subsequently guide targeted strategies for improving vaccine acceptance in Malaysia.

MATERIALS AND METHODS

Literature Search Strategy

This study aims to explore the prevalence of childhood vaccine hesitancy or refusal and its associated factors in Malaysia. A search was conducted across several electronic databases, including Scopus, ScienceDirect, and PubMed. Boolean operators were used to search for relevant articles; factor* OR determinant* AND (childhood AND vaccin* AND hesitancy OR refusal) AND Malaysia. The systematic review was conducted following the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 (Page et al., 2021).

Eligibility Criteria

All gathered studies were screened based on their title and abstract, eliminating any duplicates. The articles were then evaluated for suitability based on a set of predefined selection criteria. The eligibility criteria included the following: (1) Time: published articles in English language with open access from year 2015 to year 2025. (2) Study participants: the study population consisted of adult parents living in Malaysia. (3) Study design: quantitative and qualitative observational studies of any size that includes prevalence

and / or its associated factors. (4) Study site: studies conducted in health facilities or among communities in Malaysia.

Scoping, narrative and systematic reviews are not included in this study. In defining the scope, studies on hesitancy or refusal towards Covid-19 vaccines for children are intentionally excluded because Covid-19 represents a newly emerging disease and the corresponding vaccines were rapidly developed and introduced under pandemic conditions, often with evolving recommendations and heightened public uncertainty. These contextual factors are likely to result in substantially different patterns and levels of vaccine acceptance compared to long-established routine childhood vaccines under the NIP, which have been implemented for decades based on sufficient evidence of safety and effectiveness. By focusing on routine childhood vaccination, this review aims to provide a clearer and more stable picture of underlying determinants of hesitancy and refusal in Malaysia, without the confounding influence of the unique circumstances surrounding the Covid-19 pandemic.

Quality Assessment

Each of the articles included in this study are critically appraised by authors using the checklist for analytical cross-sectional studies and qualitative research, a standardized critical appraisal tool developed by the Joanna Briggs Institute (JBI). A score of 1 was given for a positive response and a score of 0 for 'No', 'Unclear' or 'Not applicable'. All critical appraisal scores were reported as a percentage of the assigned total numerical scores instead of individuals points and determined an overall score. A high quality: score is >80%, moderate quality score 50-80% and a low-quality score is <50%. Two reviewers (A.A. and P.J.) independently scored all reviews. Any disagreements were resolved through discussion to reach a mutual consensus on the final score.

RESULTS

The systematic search produced 157 study articles in total. 2 duplicates were removed. Subsequently, 104 articles were removed after title screening, and 35 more articles removed after abstract screening. 16 articles passed the screening process for full-text evaluation. Ten were rejected due to incorrect study population and Covid-19 vaccine hesitancy studies. Figure 1 displays a summary of the study selection procedure. At the end of the selection, this systematic review contained 6 appropriate study papers.

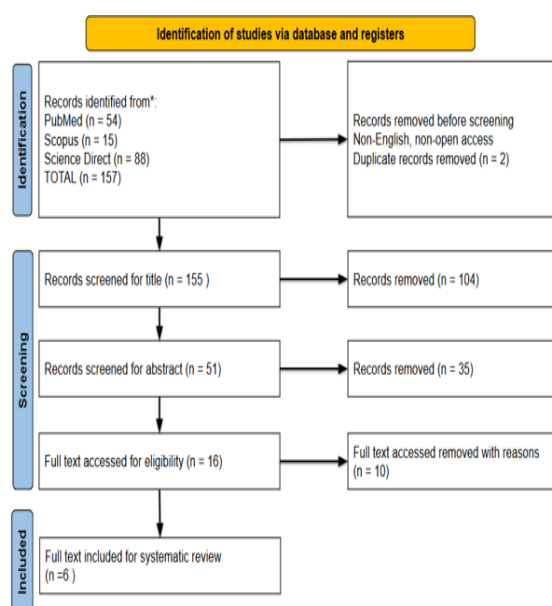


Figure 1: Flow chart for study selection based on PRISMA 2020 guidelines.

DISCUSSION

This systematic review examined six Malaysian studies from the last ten years that explored parental vaccine hesitancy and refusal in relation to childhood immunisation under the NIP. These studies, employing both quantitative and qualitative methodologies, spanned a variety of settings including urban and semi-urban populations, and highlighted diverse determinants of hesitancy and refusal across Malaysia's multicultural context. The prevalence of vaccine hesitancy among Malaysian parents ranged from 6.8% to 11.6%

for childhood immunisations. Voo et al. (2021) recorded a relatively low hesitancy rate of 6.8% among parents attending health clinics in Sandakan, Sabah where the majority of respondents also displayed strong vaccine knowledge and awareness. Kalok et al. (2020) observed a prevalence of 8.0% among pregnant mothers receiving antenatal care in urban Kuala Lumpur, while Azizi et al. (2017) reported a rate of 11.6% among multi-ethnic urban respondents. These data illustrate that even among health clinic attendees, parental hesitancy level varies, likely influenced by sociodemographic factors. Three qualitative studies in this review, Rumetta et al. (2020) and Zin et al. (2022) both offered in-depth insights into vaccine refusal among parents while Wong et al. (2020) explored health practitioners experiences on vaccine hesitancy and the consequential resurgence of vaccine-preventable diseases (VPD).

The determinants of vaccine hesitancy across these studies were multifactorial and intertwined between social, religious, informational and healthcare system dynamics. Sociodemographic characteristics such as education level, employment status and parity played a notable role. Kalok et al. (2020) found that first-time mothers and those with lower educational attainment were significantly more hesitant. This can be attributed to lower health literacy which limits parents' ability to comprehend vaccine-related information and increases their susceptibility to misinformation or pseudoscientific claims. However, Voo et al. (2021) observed that despite high general awareness about vaccines, a small but significant proportion of parents still harboured doubts, indicating that knowledge alone is insufficient to ensure vaccine compliance. These findings resonate with international literature, such as Larson et al. (2016), who demonstrated that both high and low educational levels can correlate with hesitancy, albeit for different reasons. Previous global studies have found that higher levels of education may be associated with greater

Table 1: Prevalence and factors associated with childhood vaccine hesitancy / refusal in Malaysia

No	Author	Study location	Study design	Sample size	Prevalence of childhood vaccine hesitancy / refusal	Factors associated with childhood vaccine hesitancy / refusal	Quality
1	Kalok et al., 2020	Kuala Lumpur	Cross sectional	1081	8%	1. Education level - low education (primary and secondary school) more vaccine hesitant (aOR: 3.56, 95% CI:2.10–6.05, $p<0.001$) 2. Religion - non-muslim more vaccine hesitant (aOR: 6.72, CI: 1.18–38.07, $p=0.03$) 3. Concern of hesitant parents: fear of side effects, fear of vaccination pain, lack of trust in pharma industry, preference for alternative medicine	High
2	Azizi et al., 2017	Kuala Lumpur	Cross sectional	545	11.6%	1. Mothers expecting first child are more hesitant (aOR: 3.91, 95% CI: 1.74–8.7, $p<0.001$) 2. Unemployment (aOR: 1.97, 95% CI: 1.08–3.59, $p=0.027$) 3. Other factors: Lack of understanding of VPD, younger parents, non-muslim parents.	High
3	Voo et al.,2021	Sandakan, Sabah	Cross sectional	405	6.8%	1. Education level (low education, more hesitant) $p=0.02$ 2. Employment status (unemployed are more hesitant) $p=0.018$ 3. Vaccine knowledge - negative correlation with VH 4. Vaccine awareness - negative correlation with VH	High
4	Zin et al., 2022	Selangor	Qualitative	27	-	1. Self-principle, influenced by religious doctrines 2. Belief in alternative practices 3. Distrust of health practitioners 4. Domestic burden 5. Social pressure from family and friends 6. Family traditions 7. Concern about effects and content of vaccines 8. Media influence	High
5	Rumetta et al., 2020	Klang Valley	Qualitative	14	-	1. Personal health beliefs a. Lack of confidence b. Pharmaceutical conspiracy c. Natural approach to health and immunity d. deligious beliefs e. Instincts f. Partners with similar beliefs 2. Vaccine-related reasons a. Negative effects of vaccines b. Vaccine contents (religious restrictions, toxic and impure contents) 3. Doubts on necessity of vaccines (Ineffectiveness of vaccines, vaccine preventable diseases not a threat)	High
6	Wong et al., 2020	Kuala Lumpur	Qualitative	8	-	1. Anti-vaccination theories and propaganda 2. Past-experience of Adverse Events Following Immunisations (AEFI) 3. Perceived religious prohibition 4. Belief that traditional and complementary medicine (TCAM) is safer 5. Belief that natural immunity gained via natural infection provides better protection 6. Pseudoscience beliefs such as homeopathic vaccines	High

Table 2: Main factors contributing to childhood vaccine hesitancy / refusal in Malaysia, arranged based on

No	Factor Domains	Description	Articles
1	Sociodemographic factors	Employment status - unemployment is associated with vaccine hesitancy	Azizi et al.
		Voo et al.	
		Education level - lower education (secondary school or lower) is associated with vaccine hesitancy	Kalok et al.
		Voo et al.	
		Religion - non-muslim is associated with vaccine hesitancy	Kalok et al.
		Parity - first time mothers are associated with vaccine hesitancy	Azizi et al.
2	Concern about vaccine safety	- Fear of vaccination side effects - Concern about toxic and impure content of vaccines	Kalok et al. Zin et al. Rumetta et al.
3	Knowledge and awareness	Lack of information, knowledge and understanding of vaccines	Voo et al. Rumetta et al.
4	Cultural and religious belief	- Halal issue of vaccine - Belief in natural approach to health	Rumetta et al. Wong et al.
5	Mistrust in healthcare system / modern medicine	- Lack of trust in pharmaceutical industry - Distrust of health practitioner - Preference for alternative medicine	Kalok et al. Zin et al. Rumetta et al. Wong et al.
6	External influence	- Anti Vaccine propaganda and conspiracy theory - Media influence	Zin et al. Wong et al.
7	Risk Perception	- Perceived low threat of vaccine preventable disease (VPD) - Believe vaccination is not effective as compared to natural remedies	Rumetta et al. Zin et al. Wong et al.

vaccine scepticism (Hak et al., 2005; Larson et al., 2016) especially in regards to vaccine safety and its link to autism (Smith et al., 2011). Azizi et al. (2017) noted that unemployed parents were more likely to display hesitancy, suggesting that socioeconomic vulnerability may reduce access to healthcare information and preventive health services, as well as increase reliance on informal or non-medical advice sources. In this study, Azizi also found that first-time mothers were more vaccine-hesitant compared to those with higher parity. This could be due to a combination of factors such as the unfamiliarity with childhood vaccination, heightened protective instincts towards their firstborn, absence of reinforcing experience unlike multiparous mothers and reliance on social media for information; all of which makes them more sensitive to perceived risks of immunisations.

Fear of vaccine safety or adverse events following immunisation (AEFIs) stood

out as another dominant factor. Kalok et al. (2020) observed that many hesitant mothers were particularly concerned about potential side effects. Zin et al. (2022) and Rumetta et al. (2020) echoed these findings, with participants describing a variety of personal and anecdotal stories that reinforced their fears, including those of unproven associations. Their concerns also extended to beliefs that vaccines might contain harmful chemicals or toxins. Wong et al. (2020) highlighted how even minor adverse reactions were amplified through social media, fostering disproportionate fear. This dynamic is consistent with the global findings of Wilson and Wiysonge (2020), who noted that misinformation rapidly disseminated via digital platforms has become one of the most significant drivers of contemporary vaccine hesitancy. In Malaysia, this concern is compounded by the absence of a comprehensive national strategy to monitor and counter online vaccine misinformation.

Religious and cultural beliefs emerged as powerful influences in the childhood vaccination landscape in Malaysia. Rumetta et al. (2020) and Zin et al. (2022) found that Islamic concerns regarding the halal status of vaccines were central to some parents' refusal. Participants in these studies often cited distrust in the ingredients of vaccines and a preference for divine protection or traditional healing methods. These themes are echoed in neighbouring Indonesia, where measles-rubella campaigns faced backlash due to religious decrees (J. Oktavianus & H.L.C. Dewi, 2023) and concerns over halal status of vaccines has led to public resistance in regions such as Aceh (Harapan et al., 2021). This highlights the significant role that religious beliefs and decrees can play in shaping public perception and acceptance of vaccination programs. Interestingly, Kalok et al. (2020) and Azizi et al. (2017) reported that vaccine hesitancy was unexpectedly higher among non-Muslim parents in their respective samples, although the studies did not elaborate on underlying causes. One possible explanation could be that non-Muslims particularly in urban settings may have greater exposure to alternative health philosophies, anti-pharmaceutical sentiments or global anti-vaccine narratives through digital media. Additionally, differing degrees of trust in religious health endorsements may also shape these hesitancy patterns, where formal religious guidance in favour of vaccination will lead to a favourable uptake among the Muslim communities collectively. Mistrust in the healthcare system and its personnel was another recurrent factor. Kalok et al. (2020), Zin et al. (2022), and Rumetta et al. (2020) all described how some parents distrusted healthcare providers, suspecting them of purposely withholding important information on vaccine safety. Some even viewed medical professionals as dismissive or unapproachable. This erosion of trust undermines the provider-parent relationship, which is known to be a critical determinant of vaccine uptake (Dubé et al., 2013). Wong et al. (2020) also highlighted healthcare

professionals' observations that parental suspicion of the pharmaceutical industry and preference for traditional remedies are growing among certain groups. Rumetta et al. (2020) and Zin et al. (2022) reported that parents who refused vaccination often did so because they believed traditional remedies or natural immunity were safer. These beliefs are not confined to just Malaysia, studies from Japan (Nakayama & Iijima, 2015) and Western countries also demonstrate how complementary and alternative medicine (CAM) preference can reduce confidence in biomedical interventions. Therefore, engaging with traditional healers and incorporating respectful discussions around CAM into public health communication may be a crucial step towards improving vaccine acceptance.

Another salient factor of vaccine hesitancy is risk perception. Several studies suggested that the perceived low threat of vaccine-preventable diseases (VPDs) reduced the urgency to vaccinate. This perception fostered a sense of complacency and diminished perceived need for immunisation. Rumetta et al. (2020) reported that some parents believed that vaccination is no longer necessary as the VPDs they prevented were no longer a threat. Similarly, Zin et al. (2022) reported that parents questioned the relevance of vaccination as even their unvaccinated family members had never acquired any VPD. Wong et al. (2020) documented vaccine-hesitant individuals often believed that allowing children to experience the illness naturally would give them better immunity than the immunity gained from vaccination, and that such diseases could be treated effectively with vitamins or traditional remedies. These perspectives reflect a major underestimation of deadly diseases such as diphtheria, and a misplaced confidence in unproven alternatives. Collectively, these findings are a good example of how the success of immunisation programmes can paradoxically lead to a lower future uptake by reducing the perceived threat of specific diseases, a concept

that was described previously by Betsch et al., 2015.

Compared to global and regional contexts, Malaysia's vaccine hesitancy rates of 6.8% to 11.6% are relatively moderate. According to WHO's global assessments, hesitancy varies widely from less than 5% in countries with robust public health communication to over 30% in settings plagued by misinformation and systemic mistrust. In Malaysia, although childhood immunisation under the NIP demonstrates generally acceptable uptake, newer vaccines face more resistance. For instance, Ng et al. (2022) found that 26.4% of parents were either hesitant or refused COVID-19 vaccination for their children under 12, indicating a likely greater scepticism and hesitancy against newer vaccines.

Addressing vaccine hesitancy in Malaysia requires a multisectoral approach that takes into account the complex social, cultural, informational and systemic factors identified in this systematic review. First, culturally tailored health education initiatives should be strengthened and specifically targeted toward groups identified as more vaccine hesitant such as first-time mothers, individuals with lower educational attainment, unemployed parents and non-Muslim urban populations (Azizi et al., 2017; Kalok et al., 2020; Voo et al., 2021). Interventions should not only convey biomedical facts but also directly address prevalent fears about vaccine safety, halal status and misinformation. Second, training for healthcare providers must focus on trust-building and effective communication. Kalok et al. (2020) and Rumetta et al. (2020) showed how lack of rapport and perceived arrogance from healthcare professionals eroded trust, thus impeding vaccine acceptance. Providers should be equipped to address culturally sensitive concerns and provide clear, factual and empathetic counsel to address parental anxieties.

Third, a robust response to digital misinformation is crucial. Zin et al. (2022) and Wong et al. (2020) detailed how anti-vaccine content on social media fuels doubts and unfounded fears. Public health agencies should invest in authoritative and engaging vaccine information portals, and consider policies to counteract harmful misinformation. Fourth, public health efforts should prioritise community engagement and trust-building. Religious leaders and traditional healers can be effective allies in reducing vaccine hesitancy, especially where cultural or religious beliefs play a role. As noted by Rumetta et al. (2020) and Zin et al. (2022), parents often trust information from religious or alternative sources over formal medical advice. Collaborations with faith-based organisations can help validate vaccine safety and address halal concerns, while fostering culturally respectful dialogue. Lastly, future research must broaden its scope beyond urban centres to explore vaccine attitudes in rural or marginalised communities, involve fathers and caregivers, as well as assess acceptance of new vaccines.

The primary limitation of this review is the limited number of studies, with varying sample sizes and methodologies. Most were cross-sectional thus limiting causal inference. Additionally, some findings were based on self-reported data, potentially introducing social desirability bias. While qualitative studies provided rich narratives, their generalisability to the greater population remains limited. Furthermore, sampling was mostly restricted to urban and clinic-based populations, leaving the marginalised population such as the rural communities and migrants, underexplored. The use of standardized instruments such as the Parent Attitudes about Childhood Vaccines (PACV) survey in some studies, which was originally developed in Western contexts, may have introduced measurement bias. While valuable, this tool may not fully capture cultural or religious contexts specific to Malaysia. Additionally, differences in terminology and

definitions of “hesitancy” versus “refusal” across studies complicated direct comparisons. Lastly, longitudinal research exploring how parental attitudes change over time in response to outbreaks or policy changes is still largely lacking.

CONFLICT OF INTEREST

None to be declared.

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