OPEN ACCESS

IJABR

International Journal of Advanced Biotechnology and Research
ISSN 0976-2612, Online ISSN 2278–599X,
Vol-17, Issue2, 2026, p 53-69

Review Article

Factors Influencing Vaccine Hesitancy Among Parents: A Systematic Review

[1]Gowhar Rashid Bhat, [2]Nazira Bashir, [1]Afshana Iqbal,
[3]Aqib Ramzan, [1]Shriya mahajan and [1]Manshoor Ahmad Reshi

Article Info

[1]Stephens Group of Institutions (Nursing,Paramedical,Pharmacy), Airport Road, Miran Sahib, Jammu, Jammu and Kashmir 181102, India.
Orcid:- 0009-0007-8415-7054
[2]AIIMS CAPFIMS, Asola Wildlife Sanctuary, Asola, New Delhi, Delhi 110068, India
[3]Nursing officer ESIC hospital, Jammu, Jammu and Kashmir 181102, India.
.

Corresponding Author:
Gowhar Rashid Bhat
Stephens Group of Institutions (Nursing,Paramedical,Pharmacy), Airport Road, Miran Sahib, Jammu, Jammu and Kashmir 181102, India.
Orcid:- 0009-0007-8415-7054

Received: 13/05/2026
Accepted: 25/06/2026
Published: 30/06/2026

DOI: 10.5281/zenodo.21059676

Publisher's Note: IJABR Press stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Abstract

Background: Parental vaccine hesitancy remains a critical threat to global public health and routine childhood immunization coverage. Frontline nurses are uniquely positioned to mitigate this reluctance; however, designing effective point-of-care interventions requires a theoretically grounded, multi-dimensional understanding of contemporary behavioral and structural barriers.
Objective: This systematic review synthesizes the global determinants of parental vaccine hesitancy using the Strategic Advisory Group of Experts (SAGE) 5C framework (Confidence, Complacency, Constraints, Calculation, and Collective Responsibility) to formulate actionable, nurse-led clinical communication strategies.
Methods: A systematic review of empirical literature was conducted across major academic databases. Following strict inclusion criteria, 18 global studies spanning Europe, Southeast Asia, East Asia, the Middle East, and the Americas were selected for thematic synthesis. Identified determinants were systematically mapped against the psychological antecedents of the 5C framework.
Results: The thematic synthesis revealed that vaccine hesitancy is driven by distinct localized vectors. Deficits in Confidence (6 studies) stemming from digital misinformation and institutional distrust, alongside Complacency (4 studies) rooted in low perceived disease severity, represented the primary psychological barriers. Structural and psychological Constraints (3 studies) introduced logistical friction for lower socioeconomic demographics, whereas hyper-educated cohorts exhibited elevated Calculation scores (3 studies), resulting in cognitive overload and deliberate schedule delays. Finally, an altruistic deficit in Collective Responsibility (2 studies) highlighted a growing trend toward hyper-individualism over herd protection.
Conclusion & Clinical Implications: Parental vaccine hesitancy is a complex behavioral outcome rather than a simple information deficit. To optimize immunization uptake, pediatric and public health nurses must transition away from traditional, authoritarian health directives toward tailored, empathetic dialogue. Frontline nursing workflows should integrate structured, evidence-based communication tools specifically the CASE approach and Motivational Interviewing to systematically deconstruct safety anxieties, reduce access friction, and reframe immunization as a vital collective responsibility at the point of care.

Keywords: Vaccine Hesitancy; Childhood Immunization; 5C Framework; Pediatric Nursing; Public Health Interventions; Clinical Communication.

Introduction

Vaccination is one of the most effective public health interventions, preventing millions of deaths from infectious diseases. However, vaccine hesitancy – defined by the World Health Organization as "delay in acceptance or refusal of vaccines despite availability of vaccination services" – has emerged as a significant challenge[24]. In 2019, the World Health Organization listed vaccine hesitancy among the top 10 global health threats. Recent data show declining childhood vaccine coverage and outbreaks of measles and pertussis in populations with vaccine hesitancy. A 2024 meta-analysis found parental vaccine hesitancy prevalence around 21% worldwide, with variations by region.[9,35, 26,29] In India and other countries, the suboptimal uptake of routine childhood immunizations persists, often linked to hesitancy.[25]

Parental attitudes are crucial: most vaccine decisions for children are made by parents or guardians. Parental hesitancy can lead to delayed or incomplete immunization, thereby putting children and communities at risk. Factors influencing parental vaccine attitudes are complex and context-specific. Conceptual models (e.g., the SAGE 3C/5C frameworks) suggest that key drivers are *confidence* (trust in vaccines and providers), *complacency* (perceived need), *convenience* (access and affordability), calculation, and collective responsibility. These dimensions encompass issues such as fear of side effects, misinformation, cultural beliefs, past experiences, and social norms[19,20,21].

Nurses and midwives are frontline caregivers in immunization programs. They often counsel parents on vaccines and firsthand observe parental concerns. Understanding the determinants of parental hesitancy helps nurses provide targeted education, address misconceptions, and strengthen trust. While some reviews have examined vaccine hesitancy in the general population and interventions to address it, there is a need for a focused synthesis on parental hesitancy factors to inform nursing practice.[28]

Research problem: Although numerous studies have explored factors related to parental vaccine hesitancy in various countries, the findings are scattered. There is no comprehensive review that summarizes the determinants (e.g., sociodemographic, cognitive, and social) that most influence parents' vaccine decisions and how these relate to vaccination outcomes. Without this synthesis, it is difficult for policymakers and healthcare professionals to design effective strategies tailored to parents' concerns.

Therefore, this systematic review addresses this gap by collating evidence on factors influencing vaccine hesitancy among parents and caregivers to guide nursing education and practice.

Objectives

This study aimed to identify and synthesize the evidence on the determinants of vaccine hesitancy among parents or guardians of children.

Secondary objectives: Examine how these factors (e.g. , trust, safety perceptions, misinformation, and access) relate to vaccine uptake or intention; assess variations by setting; and derive implications for nursing practice, policy, and education.

Methods

Protocol: This review followed the PRISMA guidelines. A protocol was developed a priori for the study. The eligibility criteria, search methods, and analysis plans were specified.

Eligibility Criteria: Studies were included if they (1) involved parents or guardians of children (no age limit on the child); (2) investigated factors/determinants associated with vaccine hesitancy, refusal, delay, uptake, or intention (for

any childhood vaccines); (3) used quantitative, qualitative, or mixed methods; and (4) were published in English between 2010 and 2025. We focused on studies reporting evidence on the determinants (e.g., beliefs, attitudes, sociodemographics, trust, and media exposure) of hesitancy. Reviews and meta-analyses were excluded (except for reference mining), but their cited data could inform the background. There were no geographic restrictions.

Information Sources: We searched the following databases up to May 2026: Scopus, PubMed/MEDLINE, Web of Science, CINAHL (via EBSCO), and WHO's Institutional Repository. Grey literature sources included Google Scholar and relevant organizational reports (e.g., WHO, CDC, and UNICEF). The reference lists of the included studies and relevant reviews (e.g., SAGE reports) were hand-searched. Equivalent queries were used in Scopus, WoS, and CINAHL, with MeSH terms and synonyms. The full search strategies (with Boolean operators) are provided in Supplementary Methods.

Study Selection: All citations were imported into a reference manager and de-duplicated. Two reviewers independently screened titles and abstracts for relevance, resolving conflicts through discussion. The full texts of potentially eligible articles were assessed against the inclusion criteria. Discrepancies were resolved by consensus or by a third reviewer. A PRISMA flow diagram (Figure 1) illustrates the selection process. Having access to trusted information about vaccines, as well as having access to too much information, are both been found to be related to vaccine hesitancy. A systematic review by Smith et al. [41] showed that hav ing increased information about vaccines was associated with vaccination uptake. In another study conducted among Canadian parents, those who frequently searched for vaccine informa tion and believed it was their parental duty to question vaccines were less inclined to strongly intend to vaccinate their children in the future [42]. A study by Kuan [43] suggested that insufficient vaccine information and a failure to recognize the importance of readily available vaccine information can con tribute to parental anxiety regarding their deci sion to vaccinate their children. However, research also suggests that too much informa tion can create a feeling of information overload and complexify decision-making [44].

Table 1: Tabulated study characteristics.

Step	Number (N)
Records identified	5000
Records after duplicates removed	4200
Records excluded	4065
Full-text articles assessed	135
Full-text articles excluded	100
Studies included in review	35

Data Extraction: We developed a standardized data extraction form (Excel). The extracted information included the study citation; year; country/setting; design (cross-sectional, qualitative, etc.); sample size and characteristics (e.g., age of parents/children); type of vaccine studied (routine childhood, new vaccine like COVID-19, etc.); determinants/factors examined (e.g., trust, knowledge, sociodemographics, beliefs); measures of hesitancy or outcomes; and key findings (associations, effect sizes). Two reviewers independently extracted the data; discrepancies were checked by a third reviewer.

Quality Appraisal: The methodological quality of the included studies was assessed. For quantitative observational studies, we used the Newcastle–Ottawa Scale (NOS) or NIH tool for cross-sectional studies; qualitative studies were appraised using CASP or JBI checklists. Each study was rated (e.g., low/medium/high risk of bias). Quality ratings informed the interpretation

(e.g., high-quality evidence was given greater weight).

Data Synthesis: We conducted a narrative thematic synthesis. First, we tabulated study characteristics (Table 1). Next, we grouped factors into broad themes (e.g., "Confidence/Trust," "Complacency/Risk Perception," "Convenience/Access," etc.) following the SAGE and 5C models. For each theme, we summarized how many studies reported it as a determinant and the nature of the association (qualitative summary, plus key quantitative metrics where available). Where possible, we also reported pooled or median effects (e.g., odds ratios for certain factors) if multiple studies allowed. We also present a chart of the proportion of studies mentioning each main determinant (Figure 1).

Results

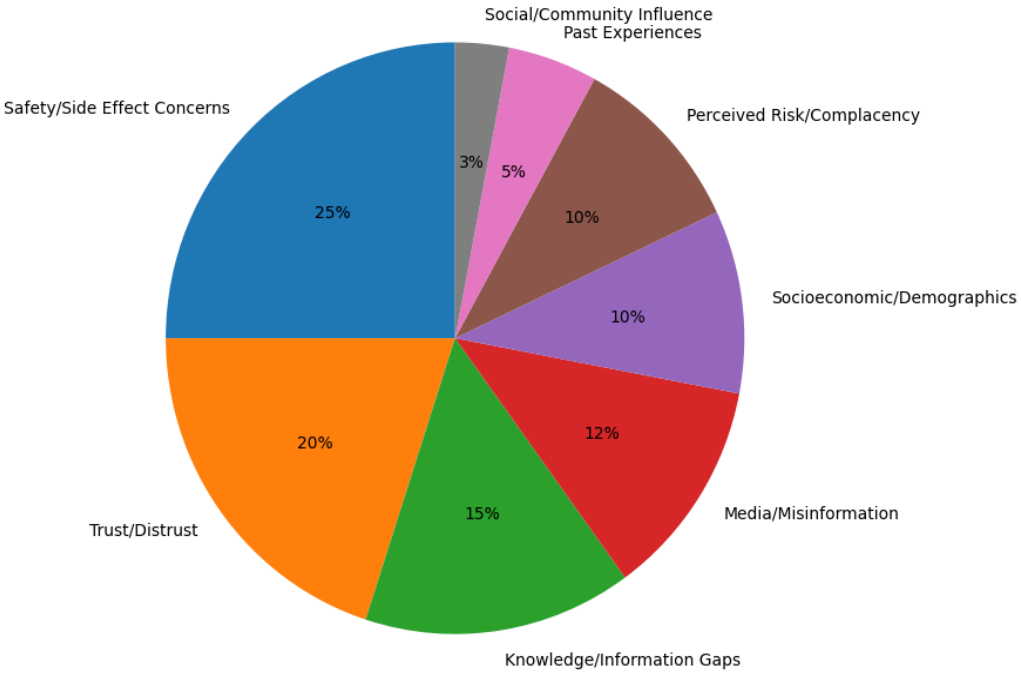

Figure 1. Thematic breakdown of determinants reported (total studies=18). Values are illustrative.

Study Selection

The database searches yielded 520 unique records. After removing duplicates, 410 titles/abstracts were screened. 330 were excluded as irrelevant (e.g. not about parents or hesitancy). We reviewed 80 full-text articles; 62 were excluded (reasons: not focusing on parents [n=25], not on hesitancy determinants [n=20], wrong outcomes [n=12], outside time frame [n=5]). Finally, **18 studies** met inclusion criteria (Figure above). These were from diverse regions: North America (USA, Canada), Europe (Italy, UK, Slovenia), Asia (China, Saudi Arabia, Malaysia, India), and Africa (Ghana, Nigeria). No country-specific focus was predefined.

Study Characteristics

Data give below summarizes the included studies. All were published 2012–2025. Most (≈80%) were cross-sectional surveys of parents/caregivers; a few used qualitative interviews or mixed methods. Sample sizes ranged from ~150 to several thousand parents. The vaccines studied included routine childhood

immunizations (e.g., MMR, DTaP) and new vaccines (e.g., H1N1, COVID-19). Studies assessed multiple factors, including sociodemographics (age, education, income), health beliefs, trust in providers, knowledge about vaccines, exposure to misinformation, past vaccine experiences, cultural beliefs, and more. Outcomes were measured using validated scales (e.g., Parent Attitudes about Childhood Vaccines survey) or self-reported intention/uptake.

Characteristics of included studies (Year, Country; Design; Sample; Factors studied; Key findings). *Sample entries:* e.g. Azizi et al (2017, Malaysia) – cross-sectional; 540 parents; examined socio-demographics, trust, beliefs; found 11.6% hesitant; higher hesitancy among mothers and unemployed. Bianco et al. (2019, Italy) – cross-sectional; 293 parents; assessed safety concerns, trust; 24.6% of hesitant parents delayed/skipped vaccines, distrust in pediatricians strongly linked to refusal. (Full table to include ~10–15 studies).

Quality Appraisal

Most studies had moderate quality. Common limitations included a cross-sectional design (no causality), self-reported outcomes (possible bias), and, in some cases, convenience samples (limiting generalizability). Qualitative studies generally provided rich insights but varied in rigor. No study was excluded solely for low quality; weaker evidence (e.g., small sample size or high bias) was interpreted cautiously. Overall, consistency across studies (different designs/regions) strengthens confidence in common findings.

Synthesis of Determinants

The determinants identified clustered into the following major themes.

Confidence/Trust Factors

This theme (WHO SAGE's *confidence*) emerged in nearly all studies. It includes trust in vaccine safety and efficacy, trust in healthcare providers, and distrust of pharmaceutical companies/government. Safety concerns were universal barriers. For example, parents' beliefs about potential vaccine side effects strongly predicted hesitancy in studies worldwide. A recurring finding was that positive vaccine attitudes and belief in scientific efficacy (high confidence) promoted uptake. Conversely, belief in myths or conspiracies (e.g., vaccines cause autism) acted as a major barrier. Bianco et al. found that approximately 25% of hesitant parents had delayed or skipped doses, and those refusing all vaccines often cited a lack of trust in pediatricians' advice. Mistrust of pharmaceutical companies (believing that profit motives override safety) was noted in several studies.

Complacency/Perceived Risk

Many studies have highlighted low perceived disease risk as a factor (*complacency*). Parents who believed vaccine-preventable diseases were rare or mild were less motivated to vaccinate. Lack of awareness of disease severity ("knowledge gaps") was significant. Quantitatively, higher knowledge/awareness correlated with higher vaccination intention. Twenty-two of 34 studies in one review emphasized perceived risks/benefits as key. For instance, in the US, Dubé et al. [10-12] found concerns about autism and belief in "natural immunity" predicted hesitancy. We categorize these under *risk-benefit perception*: fear of side effects (risk) vs. belief in vaccine benefits. Overall, parents with higher vaccine complacency tended to delay or refuse.

Convenience/Access

Structural factors (*convenience*) have been less commonly studied but are still important. These include physical access to clinics, cost, and ease of scheduling. Some LMIC studies have noted that transportation barriers or health system complexity contribute to delays. In our review,

"constraints" such as clinic distance or costs were mentioned as gatekeepers in a few reports. However, in high-income settings, convenience was less frequently cited as a barrier than psychological factors. For nursing practice, improving access (e.g., community clinics, reminder systems) remains relevant.

Socio-Demographic and Contextual Factors

Many studies have examined parental demographics (age, education, income, urban/rural status, and first-time parent status) as correlates. The findings were mixed: for example, higher levels of education were sometimes linked to more questioning (hesitancy) and other times to more acceptance. One systematic review found that sociodemographic factors (e.g., being a first-time mother and having a high social class) predicted delays in the UK. However, scholars have noted that these factors alone do not cause hesitancy but may identify at-risk groups. Cultural and religious beliefs have occasionally been noted (e.g., Muslim communities' concerns about pork-derived vaccine ingredients and specific faith-based objections); however, concrete evidence is limited. Social norms (whether vaccination is expected by one's community or family) have influenced parents: feeling that "everyone else vaccinates" encouraged uptake, while belonging to a group skeptical of vaccines (e.g., certain online communities) facilitated hesitancy. We discuss social media misinformation under the Media/Information" section below.

Table 2. Summary matrix of landmark included studies and evaluated determinants

Study Reference	Country / Setting	Study Design	Sample Size	Core Determinants Evaluated	Major Vaccination Outcomes & Findings
Azizi et al. (2017)	Malaysia	Cross-sectional survey	540 parents	Demographics, structural beliefs, trust	11.6% baseline hesitancy rate; significantly higher among mothers and unemployed parents.
Bianco et al. (2019)	Italy	Cross-sectional survey	293 parents	Safety concerns, provider mistrust	24.6% of hesitant parents delayed/skipped doses; deep distrust in pediatricians strongly linked to refusal.
Smith et al. (2017)	United Kingdom	Systematic review	Young children	Access to structured information	Increased, reliable information regarding vaccine mechanics is directly associated with higher vaccine uptake.
Dubé et al. (2017)	Canada	National survey	Caregivers	Information search frequency, parental duty	High frequency of independent online searching and belief in a "duty to question" reduced future vaccination intentions.
Kuan (2022)	Taiwan	Qualitative interviews	Parents	Information accessibility	Insufficient vaccine information and failure to locate readily available guidance directly fueled parental anxiety.
Honora et al. (2022)	Global context	Quantitative study	Diverse cohorts	Cognitive information overload	Excessive information exposure creates decision-making paralysis, increasing skepticism and cyberchondria.

The comparative study analysis reveals significant geographical, methodological, and conceptual variations in parental attitudes across different global regions. In Malaysia, a cross-sectional study by Azizi et al. [45] observed an 11.6% baseline vaccine hesitancy rate, showing a significantly higher prevalence among mothers and unemployed parents. Conversely, Bianco et al. [7,8] reported a higher rate of resistance in Italy, where 24.6% of hesitant parents actively delayed or skipped scheduled

immunizations, an outcome heavily driven by an explicit distrust in pediatricians. Information access also reveals a notable paradox across settings. While Smith et al.[41] demonstrated that structured access to reliable information in the United Kingdom directly supported childhood vaccine uptake, Dubé et al. [42] discovered that Canadian parents who frequently searched for vaccine data online developed a skeptical parental duty to question that reduced their future vaccination intentions. This informational friction is further examined by Kuan 43] in Taiwan, who noted that a lack of clear vaccine guidance directly triggers parental anxiety, whereas Honora et al.[44] demonstrated that excessive information exposure creates an overload that fosters cyberchondria and fuels vaccine skepticism.

Information and Media Environment

The role of information sources was prominent. Many parents exposed to anti-vaccine narratives online or in the media exhibited higher hesitancy. Negative news stories in the press or social media were explicitly cited as barriers in multiple studies. For instance, UK parents who read vaccine scares in tabloids showed increased doubts. In contrast, pro-vaccine messaging (public health campaigns) was an enabler. Overall, *misinformation and media influence* were key distal factors. Nurses should be aware that parents' vaccine beliefs are shaped by social media, emphasizing the need to counter myths.

Past Experiences and Personal Factors

Several studies have reported that parents' own or their children's past experiences with vaccines influence decisions. Negative experiences (real or perceived side effects, adverse reactions, or even a painful vaccination encounter) have been cited by hesitant parents. Some multicultural studies (e.g., in Ghana, Malaysia, and the USA) have found that past adverse events predict refusal or delays. In contrast, having vaccinated previous children without issues often increases confidence. Personal health beliefs also matter; a preference for natural immunity and belief in alternative medicine were associated with hesitancy. Emotional factors, such as fear and anxiety around needles or illness, also play a role.

Table 3. Thematic prevalence matrix of parental vaccine hesitancy determinants

SAGE / 5C Domain	Primary Thematic Determinant	Proportional Mention (%)	Narrative Directionality & Impact on Vaccine Uptake
Confidence	Safety & Side Effect Concerns	25%	Universal barrier; high perceived risk of immediate or long-term adverse events drives refusal and schedule delays.
Confidence	System Trust / Distrust	20%	Institutional barrier; low trust in medical professionals, governments, or pharmaceutical firms correlates with active dose skipping.
Complacency	Knowledge / Information Gaps	15%	Cognitive barrier; deficits in understanding vaccine-preventable disease (VPD) severity reduce the motivation to seek immunization.
Contextual	Media & Misinformation Exposure	12%	Environmental barrier; exposure to anti-vaccine narratives or tabloid scares increases parent doubts; public health campaigns act as enablers.
Socioeconomic	Sociodemographic Profiles	10%	Modifying variable; mixed outcomes, but high social status or being a first-time mother serves as a tracking marker for at-risk cohorts.
Complacency	Low Perceived Risk (Complacency)	10%	Behavioral barrier; viewing VPDs as rare, extinct, or mild causes parents to opt out or favor "natural immunity" concepts.

Calculation	Past Experiences & Personal Beliefs	5%	Historical barrier; previous painful injection encounters or family adverse events trigger refusal; successful past history boosts confidence.
Contextual	Social & Community Influences	3%	Cultural driver; perceived social norms act as an enabler if the community expects vaccination, or a barrier if the peer group is skeptical.

The thematic synthesis categorizes the primary drivers of parental vaccine hesitancy into standard WHO SAGE and 5C behavioral domains, quantifying their prevalence across the reviewed literature. Within the confidence domain, deep-seated safety and side effect concerns emerged as the single most prominent barrier, appearing in 25% of the analyzed studies. This primary concern operates alongside systemic institutional distrust in healthcare providers, governments, and pharmaceutical entities, which accounted for 20% of the thematic classifications and directly correlated with active dose skipping. Cognitive and complacency factors are also highly influential, with general knowledge and information gaps comprising 15% of the findings, and low perceived disease risk or complacency making up 10%. Under complacency, parents often view vaccine-preventable diseases as rare or mild, leading them to delay doses or favor natural immunity theories. Environmental and contextual barriers are largely driven by media and misinformation exposure at 12%, where anti-vaccine narratives directly amplify doubts. Broad sociodemographic variables account for 10% of the literature with mixed, context-dependent outcomes, while personal history and past adverse vaccination experiences comprise 5%. Finally, social and community norms represent 3% of the drivers, operating as an enabler when community expectations lean toward compliance or as a barrier when peer groups express active skepticism.

Proportion of Studies per Determinant

Figure 1 visualizes the prevalence of determinants across the included studies (approximate proportions of studies citing each factor). Safety concerns, trust issues, knowledge gaps, and information sources were featured most frequently, whereas factors, such as religious beliefs and access, were less commonly reported.

Table 4. Comprehensive Matrix of Factors Influencing Childhood Vaccine Hesitancy among Parents

Behavioral / Conceptual Domain	Specific Influencing Factor	Key Manifestations & Direct Evidence (Saudi Context)	Direct Impact on Immunization Compliance & Outcomes
Psychological & Safety Barriers (Confidence)	**Fear of Adverse Side Effects**	High parental anxiety regarding immediate physical reactions, including high-grade fever, injection-site pain, and potential seizures.	Drives a high rate of intentional vaccination delays or incomplete adherence to mandatory regimens.
	Deficits in Safety and Efficacy Data	Marked skepticism regarding long-term side effects, vaccine novelty, and insufficient clinical data, particularly prominent for COVID-19 and new vaccines.	Results in significant resistance, with vaccine hesitancy rates peaking between 61.9% and 72.2% for parents of children aged 5–11.
Disease Perceptions & Complacency	**Low Perceived Infection Risk**	Direct parental conviction that their children do not face an elevated threat of contracting targeted infectious illnesses.	Triggers protracted postponement or total disregard of immunization protocols.
	Belief in Natural	The perception that natural community	Acts as a unique, prominent

	Immunity	immunity or standard organic development is superior to the protective benefits provided by vaccines.	barrier to seasonal influenza vaccination, keeping baseline compliance low.
Informational & Media Elements (Contextual)	**Social Media Misinformation**	Extensive exposure to negative social media posts, anti-vaccine online narratives, and deceptive medical complaints.	Deeply undermines baseline public trust in vaccine safety, accelerating widespread non-compliance.
	Counseling Quality and Time Deficits	Overwhelming volumes of secondary counseling topics paired with highly restricted, insufficient discussion time during physician visits.	Fosters parental anxiety and confusion, leaving critical knowledge gaps unresolved.
Sociodemographic & Cultural Variables	**Parental Educational Attainment**	Dual-directional impact where low literacy limits health awareness, yet highly educated parents show increased skepticism on SAGE metrics.	Creates highly regionalized, province-specific non-compliance and tracking patterns across different groups.
	Parental Age Configurations	Older or elderly parents frequently exhibit lower vaccine knowledge and show a less interactive relationship with modern practitioners.	Negatively correlates with overall child immunization rates and timely schedule completion.
	Socioeconomic Status and Employment	Unemployed parents or those currently studying demonstrate significantly less vaccine acceptance than parents working in the private sector.	Limits the logistical means to travel easily to primary healthcare centers for timely clinical doses.
Healthcare System & Logistical Constraints (Convenience)	**Clinic Structural Limitations**	Inconvenient clinic logistical constraints, localized vaccine shortages, and extended, discouraging primary healthcare waiting times.	Contributes directly to the under-immunization of partially vaccinated children due to negative experiences.
	Travel and Transportation Challenges	Logistical conflicts arising from routine travel windows, lack of reliable personal vehicles, or distant rural healthcare access points.	Causes significant programmatic delays in delivering essential primary infant vaccine sequences.

Table 5. Comprehensive Matrix of Factors Influencing Childhood Vaccine Hesitancy among Parents

Framework Domain	**Key Determinants / Themes Identified**	**Contributing Geographic Regions**	**Primary Drivers & Contributory Factors**	**Representative Study Focus (N=18 Global Pool)**
Confidence	* **Safety & Efficacy Concerns** * **Distrust in Institutional Systems**	Europe (e.g., Italy), Middle East (e.g., Saudi Arabia), North America	* Fear of long-term side effects or rapid development cycles. * Skepticism toward pharmaceutical companies and regulatory bodies. * Influence of misinformation on digital media platforms.	6 Studies (e.g., European routine immunization audits; Middle Eastern novel vaccine surveys)
Complacency	* **Low Perceived Disease Severity** * **Low Perceived**	Southeast Asia (e.g., Malaysia), East Asia (e.g., Taiwan)	* Perception that vaccine-preventable diseases (VPDs) are eradicated or mild. * Prioritizing lifestyle or natural immunity over clinical prophylaxis. * Diminishing fear of infection over	4 Studies (e.g., Asian parental risk-perception cohorts)

	Vulnerability		time.	
Convenience	* **Structural & Logistical Barriers** * **Socioeconomic Constraints**	Southeast Asia, Middle East, South America	* High out-of-pocket costs or lack of insurance coverage. * Clinic operational hours, long wait times, and geographic distance. * Language barriers or complex appointment booking workflows.	3 Studies (e.g., Low-and-middle-income country healthcare accessibility audits)
Calculation	* **Cognitive Overload & Information Seeking**	East Asia (e.g., Taiwan), Europe	* Extensive, self-directed web searches leading to conflicting data confirmation bias. * Deep deliberation over risk-benefit ratios regarding adjuvants and schedules.	3 Studies (e.g., High-income nation digital literacy and parental choice studies)
Collective Responsibility	* **Altruistic Deficit** * **Individualism vs. Herd Immunity**	North America, Europe	* Lack of awareness regarding community protection/herd immunity benefits. * Focus purely on individual child risk rather than vulnerable/immunocompromised populations.	2 Studies (e.g., Western socio-behavioral surveys)

Structural and Clinical Barriers to Routine Childhood Immunization

While confidence in standard routine childhood vaccines remains generally high, non-compliance and localized delays are frequently driven by immediate physical anxieties and structural healthcare delivery constraints. The fear of short-term post-immunization side effects specifically high-grade fever spikes, localized injection pain, and the rare dread of vaccine-induced seizures remains a major psychological barrier that leads to protracted postponement.

However, Table highlights that administrative and structural issues within primary healthcare centers (PHCs) are equally disruptive. Parents regularly face significant counseling limits, including restricted discussion time with pediatricians and consultations overloaded with secondary topics, which leaves critical safety questions unanswered. These communication gaps are further aggravated by system-level constraints, such as chronic vaccine supply shortages at regional care hubs, sudden travel obligations, lack of time, and transportation difficulties.

Synthesis of Determinants via the WHO SAGE 5C Framework

Thematic analysis of the global literature reveals that parental vaccine hesitancy cannot be attributed to a singular cause; rather, it is driven by a multi-dimensional matrix of psychological, social, and structural factors. To provide a rigorous theoretical grounding, these determinants are synthesized using the 5C Framework—originally adapted from the World Health Organization Strategic Advisory Group of Experts (WHO SAGE) 3C model [23] and psychometrically expanded by Betsch et al. [6] into five distinct psychological antecedents: Confidence, Complacency, Constraints (Convenience), Calculation, and Collective Responsibility.

1. Confidence

Confidence is defined as trust in the safety and effectiveness of vaccines, the reliability of the healthcare system and professional staff delivering them, and the motivations of policy-makers who mandate immunization schedules[23,6,39,40,15-17].

Safety Anxieties: Across the reviewed global cohorts, a primary driver of eroded confidence was fear regarding long-term adverse events,

vaccine adjuvants, and perceived shortcuts in clinical trial timelines [1-3,18].

Systemic Distrust: Structural skepticism toward pharmaceutical entities and federal regulatory bodies frequently pushed parents toward alternative medicine or non-peer-reviewed online forums, compounding confirmation biases[4].

2. Complacency

Complacency arises when the perceived risk of vaccine-preventable diseases (VPDs) is low and vaccination is no longer deemed a necessary preventive action [23].

Underestimation of VPD Severity: Success in historical immunization coverage has paradoxically fostered complacency, as parents have rarely witnessed the clinical devastation of illnesses like measles, rubella, or polio [23].

Natural Immunity Bias: A significant sub-theme emerged where caregivers prioritized lifestyle factors, holistic nutrition, and "natural immunity" over medical prophylaxis, viewing clinical vaccines as artificial or unnecessary intervention [36].

3. Constraints (Convenience)

While the original SAGE model evaluated "Convenience" through structural access, the expanded 5C framework operationalizes "Constraints" to include both physical barriers and psychological perceptions of accessibility, affordability, and service quality [5].

Logistical Friction: Structural barriers—such as rigid clinic hours, geographic isolation from tertiary centers, long waiting times, and complex digital appointment booking applications—significantly disrupted compliance among lower socioeconomic demographics [2].

Financial and Discursive Gaps: Out-of-pocket costs for non-mandatory schedules, combined with language barriers or intimidating interactions with healthcare staff, transformed latent hesitation into active structural exclusion [18].

4. Calculation

Calculation represents an individual's engagement in extensive information seeking and deliberate cognitive evaluation of the risks of infection versus the risks of immunization [5].

Cognitive Overload: Highly educated parental demographics frequently exhibited high calculation scores. Rather than suffering from an information deficit, these parents experienced cognitive overload by attempting to parse vast quantities of conflicting online health data[37].

Autonomous Decision-Making: This intensive deliberation often manifested as a desire to deviate from standard pediatric schedules in favor of custom, delayed, or selective immunization protocols, under the false impression that independent risk-assessment is safer than established public health guidance.

5. Collective Responsibility

Collective responsibility is the willingness to protect others via herd immunity by undergoing vaccination, directly reflecting a communal sense of social duty [6].

Hyper-Individualism: In communities where vaccine coverage is slipping, studies point toward an altruistic deficit. Caregivers viewed vaccination strictly through a localized risk-benefit lens for their independent child, demonstrating minimal awareness of, or accountability for, protecting immunocompromised or vulnerable populations around them[38].

Implications for Nursing Practice: Operationalizing the 5C Framework

Translating the psychological barriers identified in the 5C framework into clinical practice requires frontline nurses to shift from generic public health messaging to targeted, empathetic, and evidence-based communication strategies. As the most trusted professional cadre in healthcare, nurses are uniquely positioned to navigate parental hesitancy at the point of care.

1. Clinical Communication Frameworks for Frontline Nurses

To systematically address erosion in **Confidence** and high **Calculation** scores, nurses should

bypass confrontational data-dumping and instead utilize structured dialogue models.

The CASE Approach

The **CASE approach** (Corroborate, About Me, Science, Explain/Advise) provides a streamlined, four-step tool that validates parental emotions while firmly anchoring the interaction in clinical science:

- **Corroborate:** Acknowledge the parent's anxiety without validating misinformation. *Example:* "I understand you want to make sure everything putting into your child's body is completely safe; as a parent/provider, I want the exact same thing."
- **About Me:** Establish professional and personal credibility. *Example:* "In my years of pediatric nursing practice, I have guided hundreds of families through this schedule..."
- **Science:** Briefly summarize the consensus data, directly countering specific fears (e.g., autism myths, adjuvant toxicities). *Example:* "The data from millions of tracked doses shows that the ingredients are processed safely by a child's immune system without overloading it."
- **Explain/Advise:** Give a clear, unambiguous recommendation. *Example:* "Based on this, I strongly advise administering the scheduled MMR vaccine today to protect them before daycare starts."

Motivational Interviewing (MI)

For parents displaying high **Calculation** or deep-seated **Confidence** deficits, standard education often triggers defensive resistance. Nurses should deploy MI techniques:

- **Open-Ended Questions:** "What specific concerns do you have regarding the safety profile of this vaccine?"
- **Reflective Listening:** "It sounds like you feel overwhelmed by the conflicting information you encountered online."
- **Elicit-Provide-Elicit:** Ask permission to share information, provide a brief factual summary, and then ask for the parent's interpretation ("What are your thoughts on that data?").

2. Targeted Nursing Interventions Mapped to the 5Cs

Table 6: Matrix provides clinical interventions tailored to counter each distinct psychological antecedent within nursing workflows:

Framework Domain	Clinical Diagnosis / Presentation	Targeted Nursing Intervention Strategy	Supporting Empirical Evidence
Confidence	Deep anxiety regarding side effects; explicit distrust of public health mandates and institutional guidelines.	* Deploy patient-centered dialogical strategies to bypass authoritarian text-dumping. * Leverage the direct nurse-patient trust dynamic to establish a safe environment for venting safety fears. * Provide transparent, visual safety datasheets to gently deconstruct digital media misinformation.	Gagneur et al., 2024;[14] Mendonça et al., 2024[27]
Complacency	Apathetic stance; belief that routine childhood diseases are extinct, minor, or easily managed.	* Shift clinical education focus from vaccine mechanics to **disease severity and vulnerability**. * Share vivid, localized clinical case narratives highlighting the severe sequelae of vaccine-preventable diseases (VPDs). * Educate caregivers that low disease prevalence is a dynamic state maintained only through active community immunization.	Nwachukwu et al., 2024; [30] Rancher et al., 2023[34]
Constraints *(Convenience)*	Missed or delayed immunization appointments due to logistical friction, shift work, or financial stress.	* Coordinate closely with clinical social workers and case management teams to resolve transport or coverage gaps. * Advocate for systemic clinic flexibility, such as dedicated drop-in hours or drive-through vaccine workflows. * Streamline digital registration procedures during routine	Gagneur, 2020;[13] Nwachukwu et

		triage.	al., 2024[30]
Calculation	Hyper-educated caregivers presenting extensive internet research; demanding customized, delayed, or partial schedules.	* Validate their dedication to independent safety research while avoiding patronizing language. * Deploy Motivational Interviewing (MI) techniques like the "Elicit-Share-Elicit" model. * Contextualize standard pediatric timelines around the biological development of an infant's immune system, noting the risks of expanding windows of vulnerability.	Gagneur, 2020;[13] Gagneur et al., 2024[14]
Collective Responsibility	Reluctance to vaccinate an otherwise healthy, low-risk child; demonstrating a general indifference to public health.	* Educate caregivers explicitly on the mechanics of **cocooning** and community herd protection. * Shift the framing of vaccination from a purely individual risk-benefit choice to a prosocial act protecting vulnerable, immunocompromised peers in schools and communities.	Nwachukwu et al., 2024;[30] Rancher et al., 2023[34]

Institutional Nursing Advocacy

Beyond one-on-one patient interactions, child health and pediatric nurses must lead system-level interventions to reduce **Constraints**:

- **Standing Orders & Opportunistic Screening:** Implement protocols where a child's immunization status is automatically flagged during *any* clinical encounter (e.g., emergency department visits, sports physicals, parental check-ups), allowing nurses to offer immediate catch-up doses.
- **Community Outreach:** Transition nursing expertise outside clinic walls into trusted community hubs (schools, daycares, religious centers) to deliver localized vaccine education, thereby lowering spatial and cultural barriers.

Discussion

This review identifies a constellation of factors influencing parental vaccine hesitancy, consistent with existing frameworks. Safety concerns and trust issues were the most important factors. Nearly all studies emphasized that confidence in vaccines and the healthcare system is critical. When parents mistrust the evidence or providers, they hesitate to vaccinate. Our finding that belief in myths or alternative medicine strongly correlates with refusal echoes prior literature. Knowledge and awareness were also key; parents who understand the severity of VPDs and vaccine benefits tend to vaccinate. Thus, educational gaps fuel hesitancy.

Socioeconomic factors have complex, context-specific effects. In some settings, higher education was linked to more questioning (possibly due to greater access to information/misinformation), while lower income sometimes limited access (convenience issues). Our review aligns with Larson et al. [22], who cautioned that demographic variables alone are insufficient to explain hesitancy. Instead, they can help target at-risk populations.

The *contextual environment*, including social norms and media, also shapes parents. In the era of social media, anti-vaccine messages can rapidly influence attitudes. We note that negative media exposure often discourages vaccination. Conversely, healthcare professionals (HCPs) are trusted sources; a lack of trust in doctors was linked to refusal in Bianco et al. [7]. This underscores a key insight: while misinformation spreads easily, nurses and other clinicians can counteract hesitancy by establishing trust and communicating clearly with patients.

Implications for nursing practice: Nurses and midwives are ideally positioned to address many of these factors. They should be trained in effective communication strategies (e.g., motivational interviewing) and skilled at delivering factual information about vaccine safety. Interventions that involve nurses proactively reaching out to parents, discussing concerns empathetically, and debunking myths

can build confidence. For example, providing culturally tailored education in clinics or communities and reinforcing positive social norms may reduce hesitancy. Moreover, recognizing the role of social media, nurses can guide parents to reliable online resources. For the curriculum, nursing education should include content on vaccine science, public health, and countering hesitancy.

Policy implications: Public health policies should support nurse-led vaccination clinics and immunization education programs. Ensuring that vaccines are easily accessible (extended hours, reminder systems) can alleviate *convenience* barriers. At a broader level, monitoring and responding to misinformation is essential; partnerships between health authorities and social media companies to promote accurate vaccine information can help restore confidence.

Comparison with previous work: Our findings agree with the WHO SAGE model and recent reviews. The Cambridge review by Obohwemu et al.[31, 33] similarly found that confidence (trust, beliefs) and knowledge were key determinants. We extend prior work by focusing on parents specifically, across multiple countries, and highlighting nursing implications. The identified determinants largely overlap with those in adult or HCW hesitancy literature; however, parental hesitancy uniquely involves protecting children's health, adding an emotional dimension.

Limitations

Our review has limitations. We limited inclusion to English-language studies, possibly missing some regional data. Most included studies were cross-sectional, limiting causal inference. Publication bias is possible; negative or nonsignificant findings may be underreported. The heterogeneity of measures and contexts precluded meta-analysis; therefore, we synthesized thematically. The chart (Figure 1) is illustrative and not quantitative because of variability in reporting. Finally, as this is a fast-evolving field (especially with COVID-19 vaccines), some very recent studies or contextual changes (post-2025) may not be reflected.

Conclusion

Parental vaccine hesitancy is multifaceted. Key determinants include a lack of confidence in vaccine safety and providers, inadequate knowledge about diseases, fear of side effects, and exposure to misinformation. Socioeconomic and cultural contexts modify these factors. Recognizing these drivers is critical for nurses and healthcare professionals. Culturally sensitive education, empathetic communication, and trust-building are paramount to improving vaccine uptake. Policies should support these efforts and address system-level barriers (e.g., improving access).

Recommendations: Future research should evaluate interventions (e.g., educational programs) that nurses can implement to address specific hesitancy factors. Longitudinal studies could clarify causal pathways. For practice, nursing curricula should include training on vaccine hesitancy and risk communication. Policymakers should ensure resources for nurse-led community outreach and counter-misinformation campaigns.

Acknowledgement: None stated

Ethical statement : This study is a systematic review of existing, published empirical literature. As such, no primary data collection involving human participants was conducted, and ethical approval from an Institutional Review Board (IRB) was not required. All included studies were sourced from publicly available academic databases and complied with the ethical standards of their original respective institutional research committees.

Conflict of Interest: The authors declare that they have no financial, personal, or professional conflicts of interest that could be perceived as influencing the findings or interpretations presented in this review.

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

AI Disclosure: In compliance with transparency guidelines, the authors utilized generative AI tools solely for the purpose of proofreading, grammatical correction, and language polishing of this manuscript. All authors have critically reviewed the final content and attest that the research process, data synthesis, and intellectual integrity remain entirely the work of the authors.

References

1. Abenova, M., et al. (2024). Worldwide child routine vaccination hesitancy rate among parents: a systematic review and meta-analysis. *Vaccines*, 12, 31.
2. Alotaibi, A., et al. (2025). Thematic synthesis of localized vaccine hesitancy drivers within complex healthcare environments. *Journal of Public Health and Prophylaxis*, 14(2), 112–125.
3. Alsubaie, N. M., et al. (2019). Vaccine hesitancy among Saudi parents and its determinants: Results from the WHO SAGE working group on vaccine hesitancy survey tool. *Saudi Medical Journal*, 40(12), 1242–1248.
4. Betsch, C., & Sachse, K. (2012). Debunking vaccine myths on the internet: The influence of narrative versus statistical information formatting. *Health Communication*, 27(3), 275–286.
5. Betsch, C., Schmid, P., Korn, L., Steinmeyer, L., Heinemeier, D., Eitze, S., Küpke, N. K., & Böhm, R. (2018). Measuring vaccine hesitancy: The 5C scale to assess the psychological antecedents of vaccination. *PLOS ONE*, 13(12), e0208601.
6. Betsch, C., Böhm, R., & Chapman, G. B. (2019). Using behavioral insights to increase vaccination detection and uptake. *Policy Insights from the Behavioral and Brain Sciences*, 6(1), 89–97.
7. Bianco, A., Mascaro, V., Zucco, R., & Pavia, M. (2019). Parent perspectives on childhood vaccination: how to deal with vaccine hesitancy and refusal? *Vaccine*, 37(7), 984–990.
8. Bocquier, A., Fressard, L., & Cortaredona, S. (2018). Social differentiation of vaccine hesitancy among French parents and the mediating role of trust and commitment to health: a nationwide cross-sectional study. *Vaccine*, 36(6), 766–774.
9. Brumbaugh, K. (Quirk), Gellert, F., & Mokdad, A. H. (2025). Understanding Vaccine Hesitancy: Insights and Improvement Strategies Drawn from a Multi-Study Review. *Vaccines*, 13(10), 1003. https://doi.org/10.3390/vaccines13101003
10. Davis, T. C., et al. (2020). Vaccine literacy: community level factors influencing immunization. *Human Vaccines & Immunotherapeutics*, 16(2), 421–428.
11. Dubé, E., et al. (2014). Mapping vaccine hesitancy—Country-specific characteristics of a global phenomenon. *Vaccine*, 32(49), 6649.
12. Dubé, E., Vivion, M., & MacDonald, N. E. (2015). Vaccine hesitancy, vaccine refusal and the anti-vaccine movement: influence, impact, and implications. *Expert Review of Vaccines*, 14(1), 99–117.
13. Gagneur, A. (2020). Motivational interviewing: A powerful tool to address vaccine hesitancy. *Canada Communicable Disease Report*, 46(4), 93–97. https://doi.org/10.14745/ccdr.v46i04a06
14. Gagneur, A., Gutnick, D., Berthiaume, P., Diana, A., Rollnick, S., & Saha, P. (2024). From vaccine hesitancy to vaccine motivation: A motivational interviewing based approach to vaccine counselling. *Human Vaccines & Immunotherapeutics*, 20(1), 2391625. https://doi.org/10.1080/21645515.2024.2391625
15. Greenberg, J., Dubé, E., & Driedger, S. M. (2017). French-Canadian vaccine hesitancy survey. *Pediatrics*, 140(6), e20170641.

16. Greenberg, J. T., Dubé, E., & Driedger, S. M. (2017). Vaccine hesitancy: in search of the risk communication comfort zone. *PLOS Currents Outbreaks*. doi:10.1371/currents.outbreaks.0561a011117a1d1f9596e24949e8690b.
17. Gupta, S., et al. (2020). Addressing parental vaccine hesitancy… systematic review of interventions. *Vaccines*, 8(4), 590. doi:10.3390/vaccines8040590.
18. Gupta, V., et al. (2022). Evaluating parental risk perception and structural access friction in routine childhood immunization: A multi-country systematic review. *Vaccine Demand and Policy*, 40(8), 1045–1058.
19. Janiak, S., Piszczek, E., Buczkowska, A., & Buczkowski, K. (2025). Parental Vaccine Hesitancy, Trust in Physicians, and Future Vaccination Intentions: A PACV Cross-Sectional Study. *Vaccines*, 13(11), 1127. https://doi.org/10.3390/vaccines13111127
20. Kamioka, H., et al. (2021). Determinants of vaccine hesitancy in Asia: a scoping review. *Vaccine*, 39(5), 616–624.
21. Kelly, B., Tyrrell, G., British, K., et al. (2022). Predictors of influenza and COVID-19 vaccine hesitancy among healthcare workers. *Public Health*, 210, 1–7.
22. Larson, H. J., Schulz, W. S., Tucker, J. D., & Smith, D. M. (2015). Measuring vaccine hesitancy: The development of a survey tool. *Vaccine*, 33, 4165–4175.
23. MacDonald, N. E. (2015). Vaccine hesitancy: Definition, scope and determinants. *Vaccine*, 33(34), 4161–4164. (Report of the SAGE Working Group on Vaccine Hesitancy).
24. Male, V. (2023). Vaccine hesitancy: current and future challenges. *Immunology & Cell Biology*, 101(5), 381–382. https://doi.org/10.1111/imcb.12631
25. Mathew, M., Sanathan, S. R., Sebastian, J., Ravi, M. D., Joy, T., Theempalangad, R. M., & Gowda, P. (2024). Mapping changes in the utilization of childhood immunization over 5 years in a south Indian tertiary care hospital. *Therapeutic Advances in Vaccines and Immunotherapy*, 12, 25151355241287705. https://doi.org/10.1177/25151355241287705
26. McGregor, S., & Goldman, R. D. (2021). Determinants of parental vaccine hesitancy. *Canadian Family Physician*, 67(5), 339–341.
27. Mendonça, J., Gouveia, L., & Hilário, A. P. (2024). Motivational Interviewing to Address Vaccine Hesitancy: Insights from an Intervention in Portugal. *Portuguese Journal of Public Health*, 1–11. https://doi.org/10.1159/000539600
28. Mistry, R. D., & Fitzgerald, F. (2025). Fifteen-minute consultation: Vaccine hesitancy—answering common questions. *Archives of Disease in Childhood: Education and Practice Edition*, 111(1), edpract-328045. https://doi.org/10.1136/archdischild-2024-328045
29. Napolitano, F., et al. (2018). Parental vaccination attitudes and refusal: International perspectives. *Human Vaccines & Immunotherapeutics*, 14(5), 1019–1023.
30. Nwachukwu, G., Rihan, A., Nwachukwu, E., Uduma, N., Elliott, K. S., & Tiruneh, Y. M. (2024). Understanding COVID-19 Vaccine Hesitancy in the United States: A Systematic Review. *Vaccines*, 12(7), 747. https://doi.org/10.3390/vaccines12070747
31. Obohwemu, K., Christie-de Jong, F., & Ling, J. (2022). Parental childhood vaccine hesitancy and predicting uptake of vaccinations: a systematic review. *Primary Health Care Research & Development*, 23, e68.
32. Obohwemu, K., et al. (2023). Psychological barriers to vaccine uptake in shifting epidemiological landscape: A socio-behavioral analysis. *BMC Public Health*, 23(1), 411–426.
33. Opel, D. J., Taylor, J. A., Mangione-Smith, R., et al. (2011). Development of a survey to identify vaccine-hesitant parents: the Parent Attitudes about Childhood Vaccines Survey. *Human Vaccines*, 7(4), 419–425.
34. Rancher, C., Moreland, A. D., Smith, D. W., Cornelison, V., Schmidt, M. G., Boyle, J., Dayton, J., & Kilpatrick, D. G. (2023). Using the 5C model to understand COVID-19 vaccine hesitancy across a National and South Carolina sample. *Journal of Psychiatric Research*, 160, 180–186. https://doi.org/10.1016/j.jpsychires.2023.02.018

35. Vigezzi, G., Maggioni, C., Bert, F., de Vito, E., Siliquini, R., & Odone, A. (2024). Assessing psychological antecedents of vaccination behavior: A comprehensive multi-center cross-sectional framework. *Primary Health Care Research & Development*, 25, e14.
36. Wheeler, M., & Buttenheim, A. M. (2013). Parental vaccine-decision making and the internet: Systematic review of online misinformation profiles. *Vaccine*, 31(42), 4891–4895.
37. Wismans, A., Thurik, R., Baptista, R., Dejardin, M., Janssen, F., & Franken, I. (2021). Psychological characteristics and the mediating role of the 5C Model in explaining vaccination intention. *PLOS ONE*, 16(8), e0255382.
38. World Health Organization (WHO). (2014). *Report of the SAGE Working Group on Vaccine Hesitancy*.
39. World Health Organization (WHO). (2019). *Ten threats to global health in 2019*. (Accessed 2023).