REVIEW ARTICLE

Annals of Agricultural and Environmental Medicine
www.aaem.pl

Socio-economic determinants of childhood vaccination coverage in high-income countries – a scoping review

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A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of the article

Nowicka PM. Socio-economic determinants of childhood vaccination coverage in high-income countries: a scoping review. Ann Agric Environ Med. doi:10.26444/aaem/211083

Abstract

Introduction and Objective. Vaccination remains a cornerstone of global public health, projected to prevent 51 million deaths between 2021–2030. Recent surges in vaccine-preventable diseases, including record measles cases in the USA, a rising number of pertussis outbreaks in Europe and the Americas, increased pneumococcal infections in Australia, signal deteriorating vaccination coverage in high-income countries. These emerging threats highlight the urgent need to examine the socio-economic variables associated with routine childhood immunization. The aim of this scoping review is to identify the socio-economic determinants of childhood vaccine coverage in high-income countries.

Review Method. Four databases: PubMed, Scopus, Embase and the Web of Science Core Collection were searched for relevant studies published between January 2016 – July 2025.

Brief description of the state of knowledge. Thirty-nine studies met the inclusion criteria. Childhood vaccination was associated with a variety of socio-economic factors. Key determinants of childhood vaccination coverage were: parental education, geographic location, ethnicity, household size and household income and insurance. While higher education, income, institutional support and living in an urban area were generally associated with higher coverage, hesitancy among educated and affluent groups also appeared. Lower vaccination coverage was associated with larger families, minority status, single parenthood, lack of insurance, deprivation, institutional district, and certain individual factors.

Summary. The review underscores that vaccination coverage reflects broader societal systems, economic security, healthcare infrastructure, cultural context, and trust in institutions. Structural advantages in high-income countries may mask underlying inequities. Addressing these dimensions is essential for closing immunization gaps.

Key words

vaccination coverage, childhood immunization, socio-economic determinants, vaccination

INTRODUCTION

Vaccination stands among the most impactful and economically efficient public health interventions. It is estimated that between 2021–2030, global immunization efforts will avert approximately 51 million deaths [1]. The World Health Organization (WHO), United Nations Children's Emergency Fund (UNICEF) and the Vaccine Alliance (Gavi) warn that these efforts face escalating challenges due to widespread misinformation, population growth, humanitarian emergencies, and reductions in financial support.

Re-emergence of vaccine-preventable diseases (VPDs) highlights the fragility of current vaccination coverage [2]. In 2025, the United States of America (USA) has recorded the highest number of measles cases since the disease was declared eliminated nationally in 2000 [3]. Cases of diphtheria, previously rare in Europe, had risen to 320 in 2022 [4]. A surge of pertussis outbreaks was observed globally: since 2022 across European countries and since 2024 in the Americas and Japan [5, 6, 7]. Rates of invasive pneumococcal disease in Australia have not been higher since 2004 [8]. Compared to other continents, vaccination confidence is lower in Europe, while Japan ranks among the countries with the lowest vaccine confidence worldwide [9]. As the outbreaks of VPDs continue to emerge across regions and populations, it is vital to understand the socio-economic determinants of childhood vaccination coverage. These determinants encompass an array of factors that influence health outcomes, including the environmental, economic, and societal conditions under which individuals are born, live, work and age. They are shaped by broader structural forces, such as public policies, economic systems and socio-cultural norms [10].

The bibliographic search found a lack of reviews designed to present the socio-economic determinants of the routine childhood vaccination coverage in high-income countries covering the period 2016–2025. Therefore, a scoping review was performed to identify and synthesize literature examining social and economic variables associated with childhood vaccination coverage.

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Received: 30.07.2025; accepted: 17.09.2025; first published: 25.09.2025

MATERIALS AND METHOD

The review followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for Scoping Reviews (PRISMA-ScR) checklist [11].

Search strategy. Four databases: PubMed, Scopus, Embase and the Web of Science Core Collection were searched for relevant studies published between January 2016-July 2025 on socio-economic determinants of childhood vaccination coverage in high-income countries. The only identified review of quantitative studies found on the topic of socio-economic differences in childhood vaccination in developed countries encompassed the period from 1 January 2000–12 April 2016 [12]. Consequently, the current review was designed to examine the literature published from 2016 onward.

Search strategy included the terms 'socio-economic determinants', 'socioeconomic determinants', 'childhood vaccination coverage', and 'childhood vaccine uptake'. A data chart was created in Microsoft Excel to extract the following information from the publications: authors, title, year of publication, study design, aim, study location, type of vaccination, determinants of immunization.

The database search generated 931 results (Fig. 1). After removing duplicates, 913 titles and/or abstracts were screened, 238 full-text articles were assessed for eligibility. Studies which did not focus on socio-economic determinants, childhood routine vaccinations, high-income countries (according to the World Bank Group classification for 2024–2025), were not published in English, studies which focused on HPV vaccination, on specific vulnerable populations or were historical studies – were excluded. Finally, 39 articles were selected for inclusion.

RESULTS

Study characteristics. Of the 39 included articles (Tab. 1), 17 investigated populations and areas in Europe (Italy – 7, United Kingdom – 4, France – 2, Denmark – 1, The Netherlands – 1, Poland – 1, multi-country – 1), 14 in North America (United States – 8, Canada – 5, multi-country – 1), 4 in Asia (Israel – 3, Japan – 1), 2 in New Zealand, 1 in Australia, and 1 had a global scope. 14 studies focused specifically on 1 vaccine: 8 on measles-containing vaccine (MCV), 3 – rotavirus vaccine (RV), 1 – vaccine against diphtheria, tetanus, pertussis (DTP), 1 – hepatitis B vaccine (HBV), 1 – polio vaccine (OPV), 1 study focused on 2 vaccines (MCV and DTP).

The methodological designs included: cohort studies (n=12) [15, 20, 25, 33, 37, 38, 40, 43, 45, 46, 47, 48], survey-based studies (n=11) [17, 19, 21, 22, 29, 32, 35, 42, 44, 49, 50], ecological studies (n=10) [14, 18, 23, 26, 27, 28, 36, 39, 41, 51], retrospective observational studies (n=3) [30, 31, 34], mix-methods studies (n=2) [13, 24], and a descriptive study (n=1) [16]. 23 studies used data at the national level, 10 at the regional level and 6 at the city level.

Table 2 outlines the determinants of vaccine uptake identified according to study design. Identified variables were classified into 7 thematic categories: social, socio-economic, economic, healthcare-related/economic, healthcare-related, environmental, and individual.

SOCIAL DETERMINANTS

Parental education. In 13 studies higher parental education was associated with higher vaccination coverage/uptake, higher compliance with the vaccination reminder, higher vaccine confidence or lower risk of vaccination exemption. In one study, higher parental education was associated with higher vaccination coverage only in earlier cohorts (children born between 1995–2000), while in later cohorts (children born between 2006–2019) higher education was associated with lower vaccination coverage [47].

Ethnicity, race, citizenship. Authors of 13 studies explored the association of ethnicity, race and/or citizenship with immunization. Foreign childbirth was associated with lower coverage in 3 studies conducted in Canada, Japan, and the United Kingdom (UK) [23, 36, 49]. In the Italian context, cohort analysis revealed a shift in the association between citizenship status and vaccine uptake: in the earlier cohort foreign citizenship was associated with lower uptake, while in later cohorts, lower uptake was associated with Italian citizenship [47]. In The Netherlands, lower MCV uptake was observed in infants whose parents' country of birth was unknown [46]. A study from the UK described that white British children were less likely to be fully immunized if their mother was born outside the UK; however in case of Pakistani children, the chance of being fully immunized was higher if their mother was born outside the UK [33]. Another UK-based study reported that individuals of white ethnicity were significantly more likely to have received at least one MCV dose than those from all other ethnic groups combined [16].

In Canada and the USA, lower vaccination coverage was recorded among children from black, indigenous backgrounds [13]. Infants in the USA had higher odds of being vaccinated against HBV during the birth hospitalization if they were Hispanic, non-Hispanic black or Asian compared to non-Hispanic white [40]. In New Zealand, the highest immunization coverage was noted in areas with a high proportion of the population that were of European ethnicity [31]. A study from Israel showed that delayed vaccination was more common among the Jewish vs. Arab population, and delayed first dose was predictive of future delays [48]. Two studies from the USA examined vaccination exemptions. Among predictors of high risk of total vaccination exemptions was a high percentage of the Hispanic population, while a predictor of high risk of non-medical vaccination exemptions was high percentage of the white population [28]. Conscientious USA vaccination exemption rates were positively correlated with the percentages of students that self-report as of two or more races, Pacific Islander, and White [34].

Household size/birth order. In the studies from the UK and Israel, high birth order was associated with lower vaccination uptake and timeliness [23, 48]. In France, the presence of older siblings was independently associated with incomplete vaccination [20]. Larger household size correlated with reduced vaccination completion. Families with more children in the USA, UK and Canada, particularly those with four or more [22, 37], demonstrated lower odds of completing immunization schedules [33]. In Canada, delays were notably pronounced among later-born children at key vaccination milestones [42].

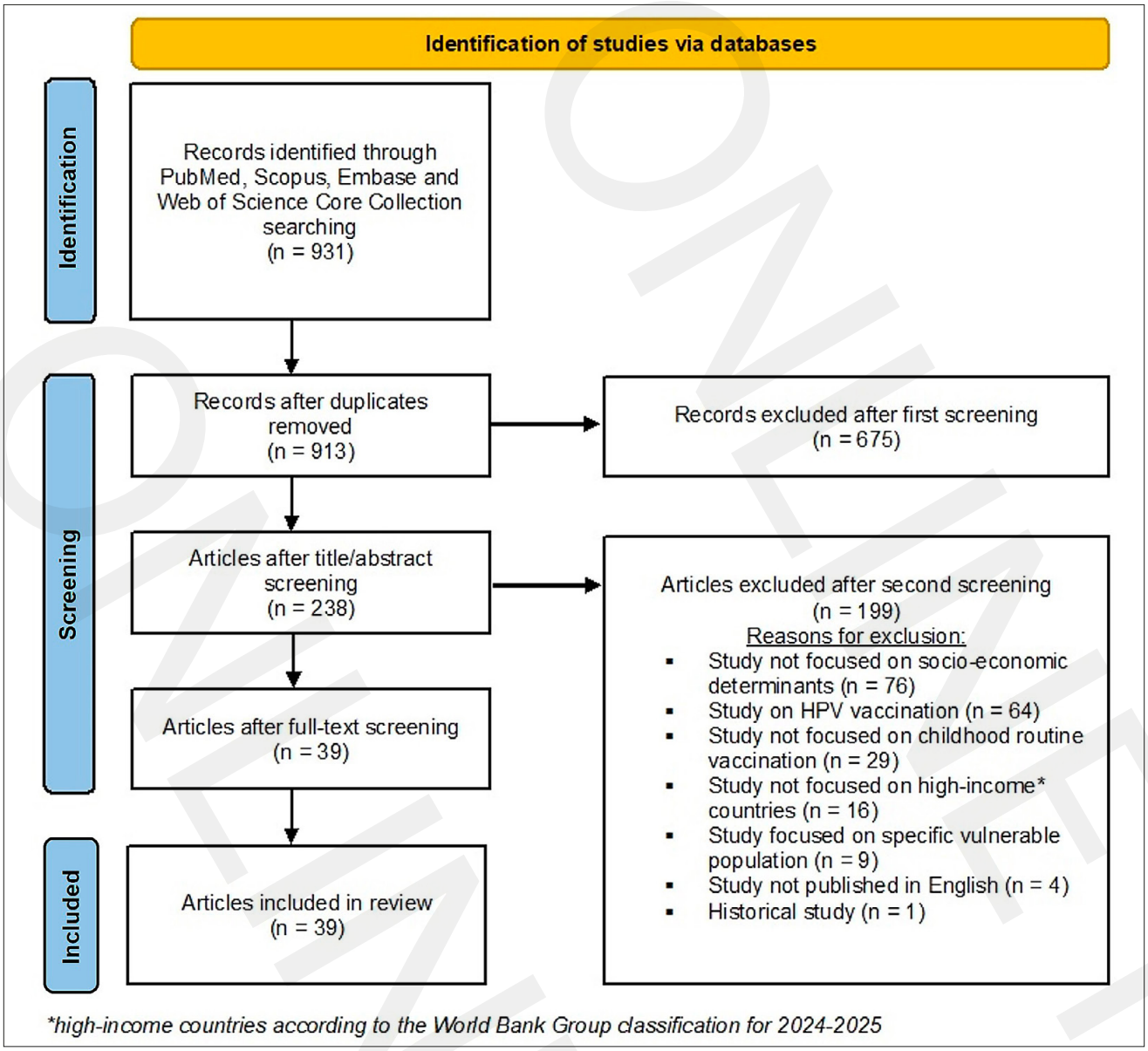

Figure 1. Flow diagram for literature search and study selection

Single parenthood/mother's marital status. Children from single-parent families were more likely to experience partial immunization in the UK [33], delayed [42] or non-vaccination in Canada [49]. Canadian and Italian studies found that mother's marital status (unmarried) was negatively associated with vaccine uptake [37, 47].

Other social determinants. Gender inequality at the national level was predictive of childhood immunization coverage. Higher gender inequality was significantly associated with increased zero-dose DTP prevalence and lower DTP3 coverage. A study from Italy showed that the social network composition also played a role, with the presence of anti-vaccine individuals linked to reduced uptake [19]. In Canada, children who were not attending daycare were more likely to experience delays in vaccination [42].

SOCIO-ECONOMIC DETERMINANTS

Receiving welfare/social assistance/child benefits. A higher number of households receiving welfare benefits was correlated with higher MCV vaccination coverage in Japan [36], and with the higher chance of sufficient MCV vaccination coverage in Poland [14]. In the UK, lower MCV coverage was associated with eligibility for free school meals [23]. Families receiving means-tested benefits, particularly within Pakistani communities, had increased risk of partial immunization [33].

Socio-economic status. In 4 studies (from Israel, The Netherlands and the USA) socio-economic status (SES) was associated with vaccine uptake [22, 39, 46, 48]. Lower SES was associated with reduced vaccine uptake or vaccination delays in two studies [22, 48]. In one study from Israel, the higher SES level of the municipality where health facility was located was associated with lower OPV vaccination uptake [39]. In a study from The Netherlands, high SES had significantly lower early MMR uptake, compared with very high SES [46].

Table 1. Studies included in the review

Ref. no.	Authors	Year	Country/ area	Study title	Study design	Aim
13.	Gellert FR, et al.	2025	United States, Canada	Bridging the gap: A mixed-methods analysis of Canadian and U.S. immunization programs for enhancing racial equity in childhood vaccinations	mix-methods	to compare racial disparities in childhood immunization between Canada and the United States over the past decade to identify resilient, cross-context interventions that promote racial equity and strengthen public health practices
14.	Nowicka PM, et al.	2025	Poland	Socio-economic determinants of the second-dose measles vaccination coverage in Poland	ecological	to assess the relationship between socio-economic factors and sufficient coverage (≥95%) with the second dose of vaccination against measles at the poviat level in Poland from 2014 – 2018
15.	Scronias D,et al.	2025	France	Persistence of major socio-economic inequalities in childhood measles-mumps-rubella vaccination coverage and timeliness under vaccination mandates, France, 2015 to 2024	retrospective cohort	to evaluate whether the 2018 expansion of France's childhood vaccination mandates improved the timeliness of MMR vaccine administration and reduced socio-economic inequalities in vaccination coverage among children
16.	Jary H, et al.	2025	United Kingdom, England	Sociodemographic inequalities in the epidemiology and vaccine uptake within a large outbreak of measles in Birmingham, England, 2023 to 2024	retrospective descriptive	to investigate sociodemographic disparities in measles epidemiology and vaccine uptake during a large outbreak in Birmingham, United Kingdom
17.	Anzà D, et al.	2025	Italy	Determinants of Rotavirus Vaccine Acceptance in an Area of Southern Italy with Low Vaccination Coverage: A Case-Control Study by the Health Belief Model Questionnaire	survey-based case-control	to identify key determinants influencing parental acceptance of the rotavirus vaccine (RVV) in a region of Southern Italy (Palermo, Sicily) with historically low vaccination coverage
18.	Mercogliano M, et al.	2024	Italy	An ecological analysis of socio-economic determinants associated with paediatric vaccination coverage in the Campania Region: A population-based study, years 2003-2017	ecological	to assess the association between socio-economic factors and paediatric vaccination coverage at the municipal level
19.	La Fauci G, et al.	2024	Italy	Rates and determinants of Rotavirus vaccine uptake among children in Italy: a cross-sectional study within the 2022 OBVIOUS* project	cross-sectional survey-based	to assess national rotavirus vaccine uptake among Italian children and identify sociodemographic and behavioral factors influencing parental decisions
20.	Jacques M, et al.	2023	France	Determinants of incomplete vaccination in children at age two in France: results from the nationwide ELFE birth cohort	observational cohort study	to identify factors associated with incomplete vaccination in two-year-old children in France, in order to inform targeted public health interventions.
21.	Arzilli G, et al.	2023	Italy	Assessing vaccine hesitancy and health literacy using a new Italian vaccine confidence index and a modified Italian medical term recognition test: A cross-sectional survey on Italian parents	cross-sectional survey-based	to evaluate vaccine hesitancy and health literacy among Italian parents using two newly developed tools: the Vaccine Confidence Index and a modified Italian Medical Term Recognition Test
22.	Michels SY, et al.	2023	United States	Failure to Complete Multidose Vaccine Series in Early Childhood	cross-sectional survey-based	to identify demographic and socioeconomic factors associated with initiating but not completing multidose vaccine series among children aged 19–35 months
23.	Perry M, et al.	2023	United Kingdom, Wales	Determinants of Equity in Coverage of Measles-Containing Vaccines in Wales, UK, during the Elimination Era	ecological	to identify demographic and socioeconomic factors associated with inequities in measles-containing vaccine coverage in Wales
24.	Ilesanmi MM, et al.	2022	Canada	Trends, barriers and enablers to measles immunisation coverage in Saskatchewan, Canada: A mixed methods study	mix-methods	to assess measles immunization trends and explore barriers/enablers from healthcare providers' perspectives
25.	Shen AK, et al.	2022	United States	Trends in Vaccine Refusal and Acceptance Using Electronic Health Records from a Large Pediatric Hospital Network, 2013-2020: Strategies for Change	cohort	to characterize trends in vaccine refusal and acceptance across pediatric practices and identify associated demographic and systemic factors
26.	Varbanova V, et al.	2022	Europe	Determinants of basic childhood vaccination coverage in European and OECD countries	ecological	to identify national-level determinants of DTP3 and MCV1 coverage across 61 countries from 1990–2019
27.	Vidal Fuertes C, et al.	2022	World	The Association between Childhood Immunization and Gender Inequality: A Multi-Country Ecological Analysis of Zero-Dose DTP Prevalence and DTP3 Immunization Coverage	ecological	to assess the relationship between gender inequality and childhood immunization coverage globally
28.	Tandy CB, et al.	2022	United States	Geographic disparities and predictors of vaccination exemptions in Florida: a retrospective study	ecological	to identify geographic disparities and sociodemographic predictors of vaccination exemptions in Florida
29.	Tal O, et al.	2021	Israel	Parents' attitudes toward children's vaccination as a marker of trust in health systems	cross-sectional survey-based	to assess how trust in health system stakeholders influences parental adherence to childhood vaccination
30.	Marek L., et al.	2021	New Zealand	Spatial-temporal patterns of childhood immunization in New Zealand (2006-2017): An improving pattern but not for all?	retrospective observational	to identify geographic and temporal trends in immunization coverage
31.	Marek L.; et al.	2020	New Zealand	Investigating spatial variation and change (2006–2017) in childhood immunisation coverage in New Zealand	retrospective observational	to assess socioeconomic and demographic factors influencing immunization coverage

Ref. no.	Authors	Year	Country/ area	Study title	Study design	Aim
32.	Bertoncello C, et al.	2020	Italy	Socioeconomic Determinants in Vaccine Hesitancy and Vaccine Refusal in Italy	cross-sectional survey-based	to explore socioeconomic inequalities in vaccine hesitancy and refusal
33.	Santorelli G, et al.	2020	United Kingdom	Factors associated with the uptake of the UK routine childhood immunization schedule in a bi-ethnic population	longitudinal cohort	to assess vaccine uptake and associated factors in White British and Pakistani children
34.	Morrison M, et al.	2020	United States	Conscientious vaccination exemptions in kindergarten to eighth-grade children across Texas schools from 2012 to 2018: A regression analysis	retrospective observational	to examine geographic trends and predictors of nonmedical vaccine exemptions
35.	Carpiano RM, et al	2019	Canada	Socioeconomic status differences in parental immunization attitudes and child immunization in Canada: Findings from the 2013 Childhood National Immunization Coverage Survey (CNICS)	cross-sectional survey-based	to explore the influence of socio-economic status (SES) on vaccine attitudes and coverage
36.	Sugishita Y, et al.	2019	Japan	Determinants of Vaccination Coverage for the Second Dose of Measles-Rubella Vaccine in Tokyo, Japan	ecological	to identify municipal-level factors associated with MR2 coverage
37.	Rafferty E, et al.	2019	Canada	Measurement of coverage, compliance and determinants of uptake in a publicly funded rotavirus vaccination programme: a retrospective cohort study	retrospective cohort	to assess rotavirus vaccine coverage, schedule compliance, and determinants of uptake following the introduction of a publicly funded programme
38.	Haider EA, et al.	2019	United Kingdom, Scotland	Identifying inequalities in childhood immunisation uptake and timeliness in southeast Scotland, 2008-2018: A retrospective cohort study	retrospective cohort	to examine the relationship between deprivation, vaccine uptake, and timeliness for four routine childhood vaccine
39.	Tur-Sinai A, et al.	2019	Israel	Vaccination uptake and income inequalities within a mass vaccination campaign	ecological	to assess OPV uptake and its association with socioeconomic status and income inequality during a national campaign
40.	Oster NV, et al.	2019	United States	Sociodemographic, clinical and birth hospitalization characteristics and infant Hepatitis B vaccination in Washington State	retrospective cohort	to identify sociodemographic and clinical factors associated with timely HepB vaccination during birth hospitalization
41.	Toffolutti V, et al.	2019	Italy	Austerity, measles and mandatory vaccination: cross-regional analysis of vaccination in Italy 2000-14	ecological	to assess the impact of public health expenditure cuts on MMR vaccination coverage
42.	Kiely M, et al.	2018	Canada	Impact of vaccine delays at the 2, 4, 6 and 12 month visits on incomplete vaccination status by 24 months of age in Quebec, Canada	cross-sectional survey-based	to quantify the impact of vaccine delays at 2, 4, 6, and 12 months on incomplete vaccination status by 24 months
43.	Suppli CH, et al.	2018	Denmark	Sociodemographic predictors are associated with compliance to a vaccination-reminder in 9692 girls age 14, Denmark 2014-2015	cohort	to identify sociodemographic predictors of compliance with vaccination reminders for MMR and HPV
44.	Lu PJ, et al.	2018	United States	Association of Health Insurance Status and Vaccination Coverage among Adolescents 13-17 Years of Age	cross-sectional survey-based	to assess vaccination coverage disparities by insurance status among adolescents
45.	Danchin MH, et al.	2018	Australia	Vaccine decision-making begins in pregnancy: Correlation between vaccine concerns, intentions and maternal vaccination with subsequent childhood vaccine uptake	prospective cohort	to assess how maternal vaccine concerns, intentions, and uptake during pregnancy correlate with subsequent childhood vaccine uptake
46.	Nic Lochlainn LM, et al.	2017	Netherlands	A novel measles outbreak control strategy in the Netherlands in 2013-2014 using a national electronic immunization register: A study of early MMR uptake and its determinants	retrospective cohort	to evaluate uptake and determinants of early MMR vaccination during a targeted outbreak intervention
47.	Anello P, et al.	2017	Italy	Socioeconomic factors influencing childhood vaccination in two northern Italian regions	retrospective cohort	to identify sociodemographic factors associated with non-vaccination and trends over time
48.	Stein-Zamir C, et al.	2017	Israel	Age-appropriate versus up-to-date coverage of routine childhood vaccinations among young children in Israel	retrospective cohort	to compare age-appropriate and up-to-date vaccination coverage and identify factors associated with delays
49.	Gilbert NL, et al.	2017	Canada	Determinants of non-vaccination and incomplete vaccination in Canadian toddlers	cross-sectional survey-based	to identify sociodemographic factors associated with total non-vaccination, measles non-vaccination, and incomplete pertussis vaccination
50.	Hill HA, et al.	2016	United States	Vaccination Coverage Among Children Aged 19-35 Months - United States, 2015	cross-sectional survey-based	to assess national and subgroup vaccination coverage and disparities
51.	Bernstein S, et al.	2016	United States	State-Level Voting Patterns and Adolescent Vaccination Coverage in the United States, 2014	ecological	to examine whether state-level political affiliation is associated with adolescent vaccination coverage for HPV, Tdap, and meningococcal vaccination

Table 2. Determinants of vaccine uptake identified according to study design

Category	Determinant	Study design						Sum
		Ecological	Cohort	Survey-based	Mixed-methods	Retrospective observational	Descriptive	
Social	Parental education	**4** [18, 23, 27, 28]	**2** [43, 47]	**8** [17, 21, 29, 32, 35, 42, 44, 49]				14
	Ethnicity[a]	**3** [23, 28, 36]	**5** [33, 40, 46, 47, 48]	**1** [49]	**1** [13]	**2** [31, 34]	**1** [16]	13
	Household size[b]	**1** [23]	**4** [20, 33, 37, 48]	**2** [22, 42]				7
	Single parenthood[c]		**3** [33, 37, 47]	**2** [42, 49]				5
	Gender[d]	**1** [27]		**1** [19]				2
	Social circle[e]			**1** [19]				1
	Daycare attendance			**1** [42]				1
Socio-economic	Welfare[f]	**3** [14, 23, 36]	**1** [33]					4
	Socio-economic status (SES)	**1** [39]	**2** [46, 48]	**1** [22]				4
Economic	Household income	**3** [18, 28, 39]	**2** [15, 37]	**2** [35, 49]				7
	Deprivation	**2** [18, 23]	**1** [38]		**1** [24]	**1** [31]		5
	Gross Domestic Product per capita	**1** [26]						1
	Unemployment rate	**1** [18]						1
	Poverty status			**1** [50]				1
	Perceived economic hardship			**1** [32]				1
Healthcare-related/ economic	Insurance		**3** [15, 25, 40]	**3** [22, 44, 50]				6
	Health expenditure	**1** [41]						1
Healthcare-related	Interaction with healthcare provider[g]	**1** [36]	**2** [20, 25]	**2** [17, 29]				5
	Trust in health authorities			**2** [21, 29]				2
	Access to healthcare			**1** [44]	**1** [13]			2
	Adherence to health recommendations		**1** [20]	**1** [29]				2
	Medical treatment approach[h]		**1** [20]	**1** [29]				2
	Gestational age at birth		**1** [37]	**1** [42]				2
	Density of healthcare workers[i]	**2** [26, 28]						2
	Access to vaccine information			**1** [17]				1
	Delayed first dose of a vaccine		**1** [48]					1
	Number of medical consultations in primary healthcare	**1** [14]						1
	Length of the hospital stay		**1** [40]					1
	Under-five mortality	**1** [26]						1
Environmental	Geographical location[j]	**3** [18, 26, 28]	**4** [20, 25, 37, 43]	**4** [17, 19, 22, 50]	**1** [24]	**2** [30, 34]		14
Individual	Political views	**1** [51]	**1** [46]					2
	Age		**1** [37]	**1** [29]				2
	Diet			**1** [29]				1
	Parity		**1** [45]					1
	Religious affiliation		**1** [46]					1
	Season of birth		**1** [48]					1

a ethnicity, race, citizenship, mother's birthplace, child's birthplace
b household size, birth order
c single parenthood, mother's marital status
d parental gender, gender inequality
e having friends/relatives opposed to vaccination
f families receiving welfare, social assistance, state subsidies, child benefits
g receiving recommendation/notification/visit from healthcare provider
h using alternative/conservative medicines
i density of primary care providers, nurses and midwives (per 1,000 people), physicians (per 1,000 people)
j geographical location, region, city, area, health facility location, geographical mobility

ECONOMIC DETERMINANTS

Household income. Higher household income was positively associated with improved vaccine uptake in Italy and France [15, 18], while in the USA, high median income at the community level was paradoxically associated with an increased risk of total vaccination exemptions [28]. In Israel, maternal clinic areas characterized by greater income inequality showed significantly lower vaccination uptake [39]. Similarly, in Canada, income interacted with residential location: children in lower-income rural areas had decreased odds of rotavius vaccination, whereas income had no apparent effect in urban settings [37]. Moreover, lower household income was associated with increased gaps in immunization [49]. Parents in middle-income group were more likely to express strong concerns regarding MCV vaccine side-effects, while parents from the lowest income groups had higher safety concerns regarding DTP vaccine [35].

Deprivation. Across five studies (from Italy, UK, Canada and New Zealand) deprivation has been shown to exert a negative impact on childhood vaccination coverage [18, 23, 24, 31, 38]. In Italy, area-level deprivation correlated with lower coverage, especially for MCV and OPV vaccines [18]. In the UK, association between deprivation, uptake, and timeliness was found: delay was pronounced for 40% of the most deprived population [38].

Other economic determinants. In European countries, higher gross domestic product *per capita* was positively associated with increased DTP and MCV vaccination coverage [26], while elevated unemployment rates were negatively associated with DTP coverage [18]. In the USA, poverty status was associated with reduced vaccination [50]. Additionally, rising levels of perceived economic hardship were associated with increase vaccine hesitancy in Italy [32].

HEALTHCARE-RELATED AND HEALTHCARE-RELATED / ECONOMIC DETERMINANTS

Insurance. In France, children from households eligible for State-subsidized health insurance had delayed and incomplete MCV vaccination [15]. In the USA, eligibility for the Vaccines for Children programme corresponded with higher vaccine refusal odds [25], in contrast, public insurance was positively associated with timely hepatitis B vaccination [40], though the vaccine coverage was lower for most vaccines among uninsured children and those insured by Medicaid, compared with those having private health insurance [44, 50]. Lack of insurance was strongly associated with failure to complete vaccination series [22]. Reductions in public health expenditure were associated with a decrease in MCV coverage in Italy [41].

Interaction with healthcare provider. Provider engagement improved coverage through repeated vaccine invitations [25], reminder letters [36], and postnatal follow-up. Higher incomplete vaccination rate was associated with the child's medical follow-up by a general practitioner, compared to a follow-up by a paediatrician in France [20]. Compliance with other child screening examinations was associated with the higher acceptance of the national vaccination programme in Israel [29].

Other healthcare-related determinants. Trust in health authorities positively correlated with vaccine confidence in two studies [21, 29]. Institutional distrust and poor access to healthcare were mentioned as barriers undermining vaccine equity in confidence in the USA [13]. Low reliance on alternative medicine was associated with greater adherence to the national vaccination programme in Israel [29], whereas social media use was linked to lower vaccine confidence in Italy [21]. In areas with greater number of medical consultations, the chance of sufficient vaccination coverage was higher in Poland [14], while in the USA high density of primary care providers was a predictor of high risk of total vaccination exemptions [28].

Preterm birth increased odds of delayed or incomplete vaccination [37, 42], while high under-five mortality correlated with reduced DTP and MCV coverage [26]. Additionally, findings from the USA indicated that shorter durations of postnatal hospitalization were inversely associated with timely administration of the first dose of the HBV [40]. Delayed initiation of the vaccination against diphtheria, tetanus, acellular pertussis, polio and Haemophilus influenzae type b (DTaP-IPV-Hib) series was positively correlated with overall vaccination delays, as reported in a study conducted in Israel [48].

ENVIRONMENTAL DETERMINANTS

Geographical location. Factors related to geographical location (urban/rural area, health facility location, geographical mobility) and their association with vaccination coverage were mentioned in 14 studies. Urban settings were associated with higher vaccination coverage in four studies [17–19, 26]. However, some urban areas with concentrated deprivation exhibited poorer outcomes than rural counterparts with active local health services [18].

Although spatial clustering revealed that suburban outskirts in New Zealand exhibited higher immunization coverage compared to urban areas [30], living in rural or isolated area was linked to lower vaccine uptake in three studies [20, 37, 50]. A study focused on Florida, USA, showed that populations living in a rural area showed lower risks of non-medical exemptions [28], while a study conducted in Pennsylvania, USA, showed that the location of the suburban clinic was associated with higher refusal odds [25]. In a study conducted in Texas, USA, schools with the top 10 highest reported conscientious vaccination exemption percentages were located in three of the four most populous metropolitan areas in this state [34]. In Denmark, girls only lacking the MCV-vaccination, were less likely to be vaccinated when living in non-capital regions [43].

Geographic mobility – moving across state lines – was described as being associated with higher odds of incomplete vaccination series in one study [22]. Geographic and logistical barriers negatively impacted vaccine uptake in Canada [24].

INDIVIDUAL DETERMINANTS

Political views. In The Netherlands, municipalities with a higher proportion of the conservative Reformed Political Party voters were associated with lower MCV uptake [46]. Similarly, in the USA, adolescent vaccination coverage was

higher in states with Democratic majorities compared to those with Republican majorities [51].

Age. In Israel, older age was positively associated with favourable attitudes toward the national vaccination programme and higher adherence [29]. In Canada, when compared with mothers over 40 years of age, those aged 31–35 and 36–40 had significantly lower odds of not completing the rotavirus vaccine series, while mothers 21–25 years of age and under 21 years of age, had significantly greater odds of not having their children fully vaccinated [37].

Diet. In Israel, vegetarian parents were more likely to partially vaccinate their children, whereas vegan parents demonstrated a tendency not to vaccine their children [29].

Parity status. In Australia, women pregnant with their first child exhibited greater vaccine hesitancy, compared with mothers with more children [45].

Religious affiliation. Religious objections towards vaccination were found to be associated with lower MCV uptake in The Netherlands [46].

Season of birth. Authors of a study from Israel found that vaccination delay was associated with a particular birth season – winter [48].

SUMMARY

More than half of the studies included in this review originated from three countries: USA, Italy, and Canada. The key determinants of immunization were identified as being geographic location for environmental characteristics; parental education, ethnicity, household size and single parenthood for social characteristics; household income, insurance, deprivation of economic characteristics, benefitting from social assistance and SES status from socio-economic category, and interaction with health provider among healthcare-related variables.

Childhood vaccination uptake is governed by a complex interaction of socio-economic, environmental and healthcare-related factors. Across diverse countries and contexts, parental education is associated with higher vaccine coverage, confidence, and compliance. However, shifting trends in later birth cohorts suggest rising scepticism among highly educated parents, warranting longitudinal examination. Ethnicity, race, and citizenship status influence immunization patterns, with foreign-born and minority populations often experiencing lower coverage, although notable exceptions exist across different national settings. Family structure plays a critical role: larger household, higher birth order, and single parenthood consistently predict incomplete or delayed immunization. Socio-economic disadvantage, including low income and deprivation, has a well-documented negative effect on vaccination, although some evidence points to mitigating effects of social assistance in certain countries. Counter-intuitively, some affluent communities show increased exemption rates, highlighting ideological hesitancy as a distinct phenomenon.

Institutional support, including pediatric follow-up and reminder systems, improve adherence. Trust in medical authorities, preference for conventional care, and consistent child screening support vaccine uptake. Conversely, social media use and institutional distrust undermine vaccine confidence.

Environmental factors, particularly rural residence, further exacerbate disparities. Geographic determinants reveal that urban settings often outperform rural ones, yet intra-urban deprivation and suburban exemption hotspots complicate this narrative. Maternal age, primiparity, religious or political affiliations and lifestyle choices, such as vegetarianism or veganism, have been associated with vaccine hesitancy or refusal.

Limitations of the study. All studies included in this review were published in peer-reviewed journals; however, the quality of the included studies and the quantitative strength of identified determinants were not formally assessed, as the primary objective of this review was to map the current landscape of socio-economic determinants influencing vaccination coverage in high-income countries. Consequently, the relevance of the reported determinants may be limited, if underlying evidence was compromised by methodological bias or insufficient study rigour. This review was restricted to studies published in English, which may have introduced selection or publication bias by omitting pertinent research available in other languages.

CONCLUSIONS

The review reinforces that childhood vaccination coverage reflects broader societal systems – economic security, healthcare infrastructure, socio-cultural context, and trust in institutions. The socio-economic determinants of childhood vaccination coverage are not uniform across countries. This variability highlights the need not only to unravel the intersectionality among these determinants in future studies, but also to prioritize standardized cross-national comparisons to identify structural drivers of inequity. Context-sensitive qualitative studies are needed to better understand the declining uptake, parental decision-making, and plan-targeted interventions to close immunization gaps.

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