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INTEGRATED STUDY MASTER´S THESIS

A Comparative Analysis of Vaccination Plans for Children in Germany and Lithuania: Differences, Causes and Implications. Literature Review

Vaikų skiepijimo planų Vokietijoje ir Lietuvoje lyginamoji analizė: skirtumai, priežastys ir pasekmės. Literatūros apžvalga

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1.1 ABSTRACT

Childhood vaccination coverage varies considerably across European countries, shaped by differences in healthcare systems, immunisation policies, and public attitudes. Despite the availability of safe and effective vaccines, hesitancy and structural barriers continue to limit immunisation success in many settings. Within Europe, even neighbouring countries can differ substantially in how they organise, finance, and communicate vaccination programmes, differences that may have measurable consequences for public health outcomes. This narrative literature review compares childhood vaccination programmes in Germany and Lithuania, two European Union (EU) member states with distinct healthcare systems and policy approaches. It examines how structural, epidemiological, and sociocultural factors influence national immunisation schedules, parental attitudes, and vaccination coverage among children. Key areas of analysis include governance and financing structures, the role of mandatory versus voluntary immunisation policies, differences in national vaccination schedules, and the factors shaping public trust in vaccination. The review aims to identify the most relevant differences between the two countries and reflect on their implications for childhood immunisation outcomes.

1.2 SANTRAUKA

Vaikų skiepijimo aprėptis Europoje labai skiriasi, o šiuos skirtumus lemia sveikatos priežiūros sistemų ypatumai, skirtingos imunizacijos politikos ir visuomenės nuostatos. Nepaisant saugių ir veiksmingų vakcinų prieinamumo, vakcinų vengimas ir struktūrinės kliūtys daugelyje šalių vis dar riboja imunizacijos sėkmę. Europoje net ir kaimyninės valstybės gali reikšmingai skirtis tuo, kaip jos organizuoja, finansuoja ir pristato skiepijimo programas, šie skirtumai gali turėti reikšmingų pasekmių visuomenės sveikatos rodikliams.

Šioje naratyvinėje literatūros apžvalgoje lyginamos vaikų skiepijimo programos Vokietijoje ir Lietuvoje, dviejose Europos Sąjungos valstybėse narėse, pasižyminčiose skirtingomis sveikatos

priežiūros sistemomis ir politikos modeliais. Analizuojama, kaip struktūriniai, epidemiologiniai ir sociokultūriniai veiksniai daro įtaką nacionaliniams imunizacijos kalendoriams, tėvų požiūriui bei vaikų skiepijimo aprėpčiai.

Pagrindinės analizės sritys apima sveikatos priežiūros bei vakcinacijos valdymo ir finansavimo struktūras, privalomų ir savanoriškų skiepijimo politikų vaidmenį, nacionalinių skiepijimo kalendorių skirtumus bei veiksnius, lemiančius visuomenės pasitikėjimą vakcinacija. Apžvalgos tikslas – nustatyti svarbiausius šių veiksnių skirtumus tarp dviejų šalių (Lietuvos ir Vokietijos) ir aptarti jų reikšmę vaikų imunizacijos rezultatams.

1.3 ABBREVIATIONS

WHO	World Health Organization
ECDC	European Centre for Disaese Prevention and Control
RKI	Robert Koch Institute
EU	European Union
COVID -19.	Corona Virus Disease 2019
SHI	Statutory Health Insurance
PHI	Private Health Insurance
CHIF	Compulsory Health Insurance Fund
G-BA	Gemeinsamer Bundesausschuss (Federal Joint Committee)
SGB V	Sozialgesetzbuch V (Social Code Book V)
STIKO	Standing Committee on Vaccination
NVSC	National Centre for Public Health (Lithuania)
MMR	Measles, Mumps, Rubella
HPV	Human Papillomavirus
BZgA	Bundeszentrale für gesundheitliche Aufklärung
BCG	Bacillus Calmette-Guérin
HepB	Hepatitis B
DTaP	Diphtheria, Tetanus, acellular Pertussis
IPV	Inactivated Polio Vaccine
MenB	Meningococcal serogroup B
Men W	Meningococcal serogroup W
MenY	Meningococcal serogroup Y
MenC	Meningococcal serogroup C

2 INTRODUCTION

2.1 RELEVANCE AND NOVELTY

Vaccination on a global scale plays a crucial role in safeguarding public health by bolstering the immune system against harmful microorganisms, thereby significantly enhancing healthcare worldwide. The eradication of once widespread diseases has been made possible through extensive vaccination efforts. (1) Despite its undeniable benefits, vaccination has been a subject of debate, leading to varying societal opinions. Vaccine hesitancy, resistance and refusal pose challenges in achieving high immunisation rates.(2)

Factors contributing to these attitudes include social determinants of health, accessibility and convenience of vaccines, health literacy, clarity of information, risk-benefit assessments, notions of collective versus individual responsibilities, trust in healthcare authorities, and personal cultural beliefs. (3)

The outbreak of the Corona Virus Disease 2019 (COVID-19) pandemic in 2019 brought vaccination to the forefront of public discourse globally. (4) While essential for public health, mandatory vaccination measures have sparked debates around individual freedoms. Despite the challenges posed by such mandates, they have proven effective in increasing vaccination rates. (5)
Therefore, different countries have adopted varying strategies in response to the pandemic, not only in managing the disease but also in implementing preventive measures against other pathogens.

Discrepancies are evident not only in the handling of specific diseases but also in vaccination protocols. Even within Europe, there is a lack of uniformity in immunisation programs. With variations in the target age groups, dosage, timing, and combination of vaccines administered. Moreover, the mandatory or voluntary nature of childhood vaccinations differs among countries, often influenced by historical, social or political factors. (6)

2.2 HYPOTHESIS

It is hypothesised that differences in vaccination governance structures, immunisation schedules, and public trust between Germany and Lithuania contribute to the observed variations in childhood vaccination coverage.

2.3 AIM AND OBJECTIVES

The aim of this literature review is to conduct a comparative analysis of childhood vaccination policies and schedules in Germany and Lithuania, examining the structural, epidemiological, and sociocultural factors that shape national immunisation programmes and their outcomes.

The first objective of this thesis is to identify the key structural and systemic differences in vaccination governance and financing between Germany and Lithuania. This includes an exploration of the general background of vaccines as well as an overview of the healthcare systems in both countries. Special attention will be given to the organisational and financial frameworks underlying these systems, with a focus on key differences. In this context, the analysis will consider factors such as funding mechanisms, and the degree to which childhood immunisation is promoted as voluntary or mandatory.

The second objective is to evaluate the implications of the identified structural, policy-related, and attitudinal differences for vaccination coverage and public health outcomes in both countries.

The third and final objective is to compare the national childhood vaccination schedules of both countries and to evaluate the reasons underlying the observed differences in vaccine timing, dosage, and inclusion. This includes a detailed examination of the vaccines included in each programme and the recommended timing of their administration. In addition, it is to reflect critically on the reviewed literature including potential limitations of the study.

3 METHODOLOGY

This master's thesis employs a narrative literature review as its primary methodological approach. A narrative literature review is particularly suitable for exploring broad and complex topics such as national vaccination schedules and immunisation policies. It allows for a comprehensive synthesis of diverse sources and perspectives.

Unlike systematic reviews, which typically focus on strict inclusion criteria and quantitative meta-analyses, narrative reviews provide the flexibility to critically assess and interpret a wide variety of materials, including policy documents, government reports and scientific articles. This methodological choice enables an in-depth examination of the vaccination strategies employed by two EU member states, Germany and Lithuania and facilitates the identification of patterns, differences, and underlying factors influencing their respective immunisation programs. Furthermore, the method supports a thematic synthesis of findings, allowing for critical discussion of both the similarities and divergences observed between the two countries.

3.1 DATABASE AND SEARCH KEYWORDS

The literature search was conducted systematically across multiple academic and institutional databases to ensure comprehensive coverage The primary sources consulted include PubMed, ScienceDirect, SpringerLink, and Google Scholar for scientific articles, as well as official websites and databases from international and national public health organizations such as the World Health Organization (WHO), the European Centre for Disease Prevention and Control (ECDC), the Robert Koch Institute (RKI), and the Lithuanian Ministry of Health. These platforms provide access to a wide range of publications, including epidemiological studies, vaccination guidelines, policy reports, and legislative documents relevant to immunisation schedules.

The search process took place over a 12-month period, from March 2025 to March 2026, and utilised a structured set of keywords and phrases relevant to the research topic. Terms such as "childhood vaccination," "immunisation schedule," "vaccination policy," "mandatory vaccination," "Germany," and "Lithuania," were combined using Boolean operators to refine the search and maximise relevant hits. The search strategy was repeatedly refined as preliminary results were reviewed, allowing for the inclusion of additional relevant terms such as "STIKO" and "healthcare delivery systems" to capture literature specific to the organisational context of vaccination programs in the two countries.

3.2 INCLUSION AND EXCLUSION RITERIA

To ensure the relevance and quality of the included literature, specific inclusion and exclusion criteria were applied. Studies and documents published between 2000 and 2026 were considered to ensure that the analysis reflected contemporary vaccination policies and recent epidemiological data. This temporal boundary was chosen to capture significant policy developments and shifts in vaccination practices. Particularly, in light of recent public health challenges such as vaccine hesitancy and the impact of the COVID-19 pandemic on immunisation attitudes and programmes. Literature specifically focusing on childhood vaccination schedules or comparative vaccination policies within the context of the EU was prioritised. Publications addressing adult vaccinations, travel-related immunisations, or unrelated health topics were excluded unless they provided critical background information on policy evolution.

In terms of language, the review included publications written in English and German, reflecting the linguistic accessibility and relevance for the German context. Lithuanian-language publications were also considered, especially official documents and reports from Lithuanian health authorities, when translated or accompanied by English abstracts to ensure accurate interpretation. This multilingual

approach allowed the inclusion of important national sources that might otherwise be overlooked in English-only reviews.

Furthermore, the review incorporated a range of document types, including peer-reviewed journal articles, official government reports, vaccination guidelines, policy briefs, and legislative texts. This diversity was crucial for obtaining a holistic understanding of the topic, as vaccination schedules and policies are shaped by scientific evidence, political decisions, and administrative frameworks. Literature, such as reports from the WHO and ECDC, were particularly valuable for providing standardised data.

Following the application of the inclusion and exclusion criteria, a total of 75 sources were included in this review. These comprise peer-reviewed journal articles, official government reports, vaccination guidelines, and epidemiological data publications. Where full-text access was not available, sources were excluded from analysis.

3.3 BACKGROUND INFORMATION

What is a vaccine? According to Article 2 of the Law on Medicines of the Republic of Lithuania, vaccines are defined as “medicines containing antigens and assisting a human or an animal organism to produce defensive and protective substances” (7)

From an immunological perspective, a vaccine consists of an antigen, which may be a component of the pathogen, such as specific proteins or a weakened or inactivated form of the entire pathogen. Once administered, the immune system recognizes the antigen as foreign and begins to develop specific antibodies. These antibodies remain in the body and enable a faster and more effective immune response in the event of future exposure to the same pathogen. (8)

Vaccines are considered one of the most effective preventive measures in modern medicine.(9) Their primary goal is to protect individuals from infectious diseases. When a high enough vaccination coverage is reached, it may become possible to eliminate or even eradicate certain pathogens entirely. (10)

To achieve this, public health systems aim for herd immunity. This occurs when a sufficiently large proportion of the population is immunized, thereby reducing the number of susceptible individuals. As a result, disease transmission is significantly limited, and outbreaks tend to be smaller and less severe.

A well-documented example of successful eradication is the case of poliomyelitis. In Germany, the first oral polio vaccine was introduced in 1960. Within just one year, the incidence of polio declined drastically, leading to the near-eradication of the virus in the country. (11)

Moreover, vaccination carries an important societal benefit. By becoming immunized, individuals not only protect themselves but also reduce the risk of transmitting the disease to others, particularly those who cannot be vaccinated for medical reasons. (8)
In general, across different countries and governmental structures, vaccinations can be either mandatory or recommended. With the Denotation `` mandatory vaccine ´´it states that every child is obligated to get vaccinated against a certain pathogen. (12)

4 RESULTS

4.1 HEALTH CARE SYSTEMS

4.1.1 THE LITHUANIAN HEALTH CARE SYSTEM

Since regaining independence from the Soviet Union in 1990, Lithuania has implemented comprehensive healthcare reforms that fundamentally transformed the structure, financing, and delivery of healthcare services. (13)
Under Soviet rule, the healthcare system followed the centrally planned Semashko model, characterised by strict state control and an emphasis on quantitative expansion rather than quality or efficiency of care. (13)
In 1991, a national health policy framework was introduced to decentralise the system and strengthen primary healthcare. Many tasks were transfered to counties and communities. In addition, a mandatory health insurance was introduced. Under Lithuanian law, participation in the compulsory health insurance scheme is mandatory for all residents with permanent status, as well as for non-permanent residents who are legally employed. Contributions are income-based, typically amounting to 6–9% of taxable income, and opting out is not permitted. (13)

Since 2000 a recentralisation occured by a stronger control of the Ministry of Health and the National Health Insurance Fund. As the WHO Health System Review for Lithuania describes, "overall responsibility for general supervision of the entire health system is held by the Ministry of Health. It is strongly involved in drafting legal acts and issuing regulation for the sector. It also runs health-care facilities and public health institutions and has the overall responsibility for health system performance" (13).

4.1.2 THE GERMAN HEALTH CARE SYSTEM

The healthcare system is based on a set of core principles that shape both its organisation and day-to-day functioning. One defining feature is the dual insurance structure: residents are insured either through statutory health insurance (SHI) or private health insurance (PHI). (14) As a result, healthcare financing in Germany is largely centralised through the health insurance system. In contrast, the organisation and delivery of healthcare services are primarily decentralised, with responsibility resting at the level of the federal states and local districts. (14) Public health activities are coordinated nationally by the RKI, while implementation remains regional. This division of responsibilities creates a decentralised healthcare system in which national coordination is combined with strong regional autonomy. (14)

4.2 FINANCING OF VACCINATIONS

4.2.1 VACCINATION FINANCING IN LITHUANIA

The Health Insurance Fund is authorized to allocate financial resources from the Compulsory Health Insurance Fund (CHIF) to cover the costs of specific vaccinations for both children and adults, with the primary objective of preventing the spread of communicable diseases. The CHIF is a government-established entity responsible for ensuring the provision and financing of healthcare services within the Republic of Lithuania. (15)

In accordance with national health policy, all 14 vaccinations recommended for children are provided free of charge. (15)

4.2.2 VACCINATION FINANCING IN GERMANY

The financial responsibility for vaccinations is distributed among various entities, with SHI playing the most significant role. The scope and conditions under which SHI covers vaccination costs are determined by the ´´Gemeinsamer Bundesausschuss´´ (G-BA, Federal Joint Committee) and are legally anchored in Section 20i (1) of the German Social Code Book V (SGB V). This legal provision establishes the entitlement of insured individuals to receive vaccinations. (16)

The selection of vaccines covered by SHI is primarily based on the recommendations of the ´´Ständige Impfkommission´´ (STIKO, Standing Committee on Vaccination) at the RKI. (17)

4.3 VACCINATION GOVERNANCE

4.3.1 GOVERNANCE STRUCTURES IN LITHUNAIA

The implementation and oversight of the national vaccination strategy involve several state institutions, with overall coordination vested in the Ministry of Health of the Republic of Lithuania. The National Centre for Public Health (NVSC) is responsible for the operational implementation and monitoring of vaccination activities (18), while the State Health Insurance Fund administers and finances the associated healthcare services. (19)

The Hygiene Institute contributes to the programme through research, health monitoring, and epidemiological analysis. Various healthcare facilities across the country are actively engaged in the local delivery and surveillance of immunisation services.

Furthermore, the State Medicines Control Agency supports the programme through regulatory oversight and quality assurance. (20)

In summary, the Ministry of Health assumes the central coordinating role, while a network of specialised institutions ensures implementation, monitoring, and evaluation. This organisational structure enables a highly centralised and structured approach to immunisation policy in Lithuania. While policy decisions are made centrally, the actual delivery of vaccinations is carried out by local healthcare facilities and public health centres. (21)

4.3.2 GOVERNANCE STRUCTURES IN GERMANY

Vaccination governance is characterised by a decentralised and expert-driven structure. (22) While the federal government provides the legal framework, scientific decision-making, financing, and implementation are distributed across several self-governing institutions. (22)

Within this system, the STIKO plays a central advisory role by developing evidence-based vaccination recommendations. (23) STIKO is composed of 19 active members, including experts in pediatrics, infectious diseases, and related fields. (24)

Since 2001, the RKI has published the scientific evidence underlying vaccination recommendations issued by the STIKO. In 2011, a Standard Operating Procedure was introduced to enhance transparency and standardise the assessment of evidence supporting these recommendations. At the beginning of each working cycle, topics are prioritised based on criteria such as disease burden, public relevance, expected benefits and risks, and the available resources of the STIKO Secretariat. For high-priority topics, dedicated working groups are established to develop draft recommendations. This structured and transparent approach ensures scientific rigor and supports the systematic development and revision of evidence-based vaccination recommendations. (25) Before appointing

potential members to the STIKO, a thorough assessment is conducted to determine whether any conflicts of interest may exist. Potential conflicts may include, for example, the ownership of patents related to vaccines or the preparation of expert reports for vaccine manufacturers. (25)

To promote transparency and public trust, members are required to submit self-disclosure statements detailing any potential conflicts of interest. These declarations are published on the official STIKO website. Members are individually responsible for ensuring that their declarations remain accurate and up to date. The RKI regularly reviews these disclosures and may determine, based on the nature of a conflict, whether a member should be included or excluded from participating in discussions on specific topics. (25)

4.4 VACCINATION GOALS

4.4.1 NATIONAL IMMUNISATION TARGETS IN LITHUANIA

The following information is based on the National Immunoprophylaxis Programme 2019–2023 of the Republic of Lithuania, issued by the Lithuanian Ministry of Health, which defines the national framework for vaccination policy and immunisation objectives. (26)

The programme aims to sustainably control, eliminate, and, where possible, eradicate vaccine-preventable diseases, in alignment with the public health goals of the WHO and the ECDC. To ensure population-level immunity, vaccination coverage targets are set at a minimum of 90% for routine childhood immunisations and 95% for measles and rubella. Further objectives include reducing the disease burden associated with major vaccine-preventable infections, maintaining Lithuania's polio-free status, and achieving the national elimination of measles and rubella. The programme also emphasises the need for continuous adaptation of the national vaccination schedule in response to changing epidemiological conditions, including the introduction of new vaccines and efforts to improve vaccination uptake among adult populations. (26)

4.4.2 NATIONAL IMMUNISATION TARGETS IN GERMANY

According to the National Vaccination Plan, specific vaccination coverage targets have been defined in line with international public health objectives. (27)

In accordance with the WHO goals, a minimum coverage rate of 95% is targeted for both the first and second doses of the measles, mumps, and rubella (MMR) vaccine.
For pertussis, the vaccination plan aims to achieve a coverage rate of 95% for the second dose by the second year of life. In addition, vaccination coverage for booster doses against diphtheria, tetanus,

pertussis (DTaP), and poliomyelitis among school-aged children is intended to exceed 90%. For Hepatitis B (HepB), the WHO recommends achieving vaccination coverage rates of at least 95% among children and adolescents.

4.5 VACCINE IMPLEMENTATION- MANDATORY OR VOLUNTARILY?

4.5.1 IMMUNISATION POLICY IN LITHUANIA

During the Soviet era, mandatory vaccinations and compulsory medical interventions were widely implemented. At that time, the concept of informed consent, as understood in modern medical ethics, did not exist, and patients were not granted the autonomy to make decisions regarding their own healthcare. (28)

In contemporary Lithuania, there are no mandatory vaccinations. (29)

However, on January 20, 2022, a draft law proposing compulsory vaccination for healthcare workers was brought before the Seimas (the Lithuanian Parliament). The proposal was ultimately rejected. This legislative initiative sparked significant public debate, with many perceiving it as a potential reintroduction of authoritarian practices reminiscent of the Soviet period. (30)

4.5.2 IMMUNISATION POLICY IN GERMANY

An international increase in measles cases during 2014–2015, coupled with a significant decline in vaccination coverage, prompted many EU member states to revise their national vaccination strategies. (12)

In Germany, a mandatory measles vaccination policy was introduced in March 2020. (31) According to the law, the mandate applies to children entering kindergarten or school, as well as those cared for by childcare staff. In addition, individuals born after 1970 who work in healthcare settings, educational institutions, or community facilities, including teachers, educators, and medical personnel are also subject to the requirement. (31)

The primary aim of this regulation is to protect children in educational settings from measles infection. Proof of immunity must be provided either through an official vaccination certificate, the child's medical examination booklet, or a physician's certificate confirming prior infection.

Failure to comply with the vaccination requirement constitutes an administrative offense and can result in monetary fines. This applies not only to parents who do not ensure their child's vaccination, but also to managers of childcare facilities who admit unvaccinated children.

As a consequence, unvaccinated children and employees may be excluded from attending educational or childcare institutions. (31)

Five years after its introduction, the RKI drew a mixed conclusion regarding the effectiveness of the measles mandate. On the positive side, vaccination coverage among children did increase. The proportion of twice-vaccinated 24-month-old children rose from 70% in 2019 to 77% in 2023, and among six-year-olds from 89% to 92%.
However, the WHO target of 95% has not yet been achieved, and measles cases have been rising again since 2023 following a pandemic-related decline. Implementation was further complicated by the COVID-19 pandemic, which caused significant delays. Overall, the mandate is regarded as a partial success: it has raised awareness and improved coverage, but has not yet achieved the intended level of herd immunity. (32)

Within this framework, a longitudinal study examining parental perception and reaction to the measles mandate was conducted, surveying affected parents across six time points over eighteen months, from August 2020 to January 2022. The findings revealed that the COVID-19 pandemic substantially overshadowed public awareness of the measles mandate, with insufficient communication reaching parents during this period. As a result, many parents displayed considerable knowledge gaps regarding the practical implications of the mandate, including uncertainty about who was affected, from what point it applied, and what sanctions could follow in cases of non-compliance. These knowledge gaps were particularly pronounced among parents with lower levels of education or income, raising concerns about potential inequities in how the mandate affected different population groups. Reflecting these implementation challenges, approximately one third of parents had not yet been required to provide proof of vaccination as of January 2022. Despite this, the overall parental response was predominantly cooperative, with around 60% of parents expressing a positive attitude toward the measles mandate. (32)

However, a notable minority of 10 to 12% of parents displayed persistent anger, referred to in the literature as reactance, throughout the entire study period, with no sign of this attitude diminishing over time. This resistance was particularly pronounced among individuals with low levels of institutional trust. Importantly, the study identified an unintended consequence: the greater the anger a parent felt toward the measles mandate, the more likely they were to skip other voluntary vaccinations for their children, a finding described by the RKI as a warning signal for public health. (32)

In terms of overall conclusions, workshop participants agreed that measles elimination ultimately cannot be achieved through national policy alone but requires international cooperation, rendering the mandate a necessary but insufficient tool in isolation. Among the practical improvements proposed were enhanced digitalisation within health authorities to improve the tracking of missing

vaccination certificates, as well as stricter measures against physicians issuing false exemption certificates. (32)

4.6 ATTITUDES TOWARD VACCINATION

4.6.1 PUBLIC ATTITUDES IN LITHUANIA

Public perceptions of vaccination play a crucial role in shaping vaccine uptake, with hesitancy often driven by concerns about safety, effectiveness, and trust in health-related institutions. (33)

A literature review of survey-based studies indicates a comparatively high level of mistrust toward vaccinations in Lithuania, affecting both specific vaccines, such as influenza, and vaccination in general. Perceived importance of vaccination is among the lowest within the EU, ranking 23rd out of 28 member states. (34) While outright opposition is limited, widespread concerns about potential health effects persist. (35)

Further evidence is provided by a nationally representative study conducted during the COVID-19 pandemic, which demonstrated a strong association between institutional trust and vaccination intentions. Although a majority of respondents expressed willingness to be vaccinated, mistrust in governmental institutions was identified as a key driver of vaccine hesitancy. Negative attitudes were more prevalent among women and individuals believing in conspiracy beliefs, whereas higher felt disease burden and fear of infection were associated with increased vaccination intent. (35)

A 2024 study from Vilnius University specifically examining parental attitudes toward childhood vaccination found that vaccine hesitancy was associated with not having been vaccinated oneself in childhood, suggesting a generational dimension to vaccine refusal. Notably, there was no societal consensus on whether childhood vaccination should be made compulsory in Lithuania, with responses almost evenly divided on this question. (36)

A more recent study published in 2025 examined vaccine hesitancy in Lithuania and Latvia in the aftermath of the COVID-19 pandemic. The findings suggest that attitudes toward vaccination in Lithuania are shaped primarily by the level of trust in public health authorities, rather than by conventional sociodemographic factors such as age, education, or income. Notably, nearly half of Lithuanian respondents were classified as vaccine refusers, a proportion that represents a marked increase compared to earlier surveys. The authors conclude that strengthening institutional trust is a key requirement for improving vaccination acceptance in the Lithuanian population. (37)

These patterns of institutional mistrust may partly be understood in the context of Lithuania's post-Soviet legacy, in which centrally imposed medical interventions historically left little room for individual autonomy and informed consent, a factor that continues to shape public perceptions of state-led health initiatives today. (28)

4.6.2 PUBLIC ATTITUDES IN GERMANY

The data presented in this section are derived from a population-based study conducted in Germany in 2022. In total, 5,000 individuals aged between 16 and 85 years were surveyed regarding their attitudes toward vaccination. The aim of the study was to assess general vaccination attitudes as well as to identify potential barriers to vaccine uptake. (38) One particular focus of the study was placed on parents of children aged 0 to 13 years and their attitudes towards childhood vaccinations. The results indicate that 54% of the surveyed parents fully support vaccinating their children. Compared to 2016, when 62% of parents expressed full support, this represents a noticeable decline. However, an additional 29% of parents reported being rather supportive of childhood vaccinations. Mixed attitudes, combining both supportive and opposing views, were observed in 15% of parents, while only 2% reported a clearly rejecting stance towards vaccinating their children.(38)

A more detailed analysis of attitudes towards specific vaccines revealed high levels of acceptance for most routine childhood immunisations. Almost all parents stated that they would vaccinate their children under all circumstances against Tetanus (98%), Poliomyelitis (97%), Measles (95%), Rubella (94%), Mumps (92%), and Diphtheria (91%). High acceptance rates were also reported for Varicella (84%), Pertussis (84%), and Meningococcal vaccines (83%). Approximately three quarters of parents considered vaccination against Hepatitis B (74%) and Pneumococcal disease (72%) to be absolutely necessary for their child. Around two thirds regarded immunisation against Rotavirus (69%) and Human papillomavirus (HPV) (63%) as essential. In contrast, only 35% of parents perceived vaccination against Haemophilus influenzae type b (Hib) as necessary, while the Influenza vaccine was considered essential by just 23% of respondents. (38)

Beyond parental attitudes, physician perspectives on vaccination policy have also been studied in Germany. A study conducted in March 2021 aimed to assess physicians' attitudes in Germany toward the mandatory measles vaccination. (39) Utilizing a mixed-method approach combining online and paper-based surveys, the study included responses from 2,229 physicians, comprising gynecologists, internists, general practitioners, and pediatricians. Overall, 86% of participants supported the implementation of a measles vaccine mandate. However, only 80% of pediatricians were in favor of the mandate, and just 59.3% believed that it would lead to an increase in vaccination rates among

children. In contrast, 87.1% of physicians from other specialties supported the mandate, with 78.3% anticipating an improvement in vaccination coverage as a result. In conclusion, the study found that physicians in Germany generally expressed strong support for the mandatory measles vaccination policy. (39)

4.7 REASON NOT TO VACCINATE

4.7.1 BARRIERS TO VACCINATION IN LITHUANIA

According to the Immunization Status Report No. 7 – Health (Annual) (Lithuanian*:* Imuniteto būklės ataskaita Nr. 7 – sveikata (metinė)), published by the National Public Health Centre under the Ministry of Health, Kaunas Department, the following section ananlyses the underlying reasons why children do not receive recommended vaccinations. (40) It should be noted that this data originates from the Kaunas district and may not fully represent national patterns across Lithuania.

The report identifies five main categories of reasons: (1) parental refusal, (2) medically approved contraindications to vaccination, (3) children living abroad but receiving vaccinations in Lithuania, (4) failure to attend vaccination appointments without providing a reason, and (5) other reasons.

Across most vaccines, parental refusal represents the predominant cause of non-vaccination. The second most frequently reported category is classified as “other reasons.” Failure to attend scheduled vaccination appointments without justification is the third most common reason. (40)

Specifically, parental refusal accounts for 64.9% of missed vaccinations for HepB, 33.7% for Rotavirus, 37.7% for Meningococcal vaccines, and 42.3% for Pneumococcal vaccines. For booster vaccinations against HepB, non-attendance at vaccination appointments emerges as the leading barrier, particularly among school-aged children. With regard to the HPV vaccine, parental refusal accounts for 18.4% of missed vaccinations among 11-year-old children, rising to 24.3% among 12-year-olds. While these figures are comparatively lower than those observed for other vaccines such as HepB, the large proportion of missed vaccinations falling into the "other reasons" category suggests that organisational barriers or limited awareness of the HPV vaccine among parents of this age group may play a more prominent role than active refusal.

Taken together, these findings indicate that parental refusal is the dominant factor contributing to incomplete vaccination coverage. This refusal is largely unrelated to medically justified contraindications, suggesting that non-medical factors, potentially including organizational or logistical challenges, may play a significant role. (40) A further study published in 2024 by

researchers at Vilnius University examined parental attitudes towards childhood vaccination in Lithuania. (36)

Among vaccine-hesitant parents, concern about side effects emerged as the most frequently cited reason for non-compliance, reported by 43.4% of respondents. Beyond attitudinal barriers, the study also identified structural factors contributing to incomplete vaccination: insufficient information provided by medical staff was highlighted as a notable barrier to vaccine uptake, suggesting that the quality of patient-provider communication plays an important role in parental decision-making. (36)

4.7.2 BARRIERS TO VACCINATION IN GERMANY

The following section draws on data from the 2022 representative survey on infection prevention conducted by the Federal Centre for Health Education (Bundeszentrale für gesundheitliche Aufklärung, BZgA), published in 2024 as part of a repeated cross-sectional study series running since 2016. The survey included 5,000 respondents aged 16 to 85 years across Germany, with a specific sub-sample of 1,046 parents of children aged 0 to 13 years providing data on childhood vaccination attitudes and barriers. (38)

Regarding vaccination barriers, the beforementioned study examined nine potential reasons for delaying or refusing childhood vaccinations. The most frequently reported barrier, cited by 46% of parents, was that the child was ill at the time the vaccination was scheduled.

Fear of side effects was reported by 15% of parents as a reason for delaying or refusing vaccination. However, concerns about severe outcomes remained limited: only 5% expected side effects requiring medical treatment and only 3% feared permanent damage. More prevalent was the expectation of mild, short-lived reactions, which rose from 56% in 2016 to 76% in 2022, suggesting that parents are not becoming more fearful of serious harm, but are increasingly perceiving minor side effects as an potentially discouraging aspect of vaccination. (38)

Another 14% refrained from vaccinating their child because they considered the vaccination unnecessary. An equal proportion cited concerns about permanent physical damage or feared that the vaccine would pose an excessive physical burden for the child. (38)

Furthermore, 12% of parents stated that their physician had advised against vaccination. Practical reasons were also reported: 6% of parents indicated that they had missed a vaccination because they forgot about it in the course of everyday life, while 5% reported time constraints or organisational

difficulties that prevented them from visiting a physician. In 3% of cases, a midwife had advised against vaccination. (38)

In terms of information levels, one third of the surveyed parents (32%) reported feeling very well informed about childhood vaccinations, while 58% felt rather well informed. In contrast, 10% of parents stated that they felt poorly informed (9%) or not informed at all (1%) about vaccinations in childhood. (38)

4.8 VACCINATION RATES

Both datasets reflect immunisation coverage for the year 2024, though the respective national reports were published at different points in 2025, with the Lithuanian report issued in March and the German data appearing in December of the same year.

4.8.1 VACCINATION COVERAGE IN LITHUANIA

Based on data from the 2024 immunization report issued by the Lithuanian National Public Health Centre published in March 2025, the following section analyses vaccination coverage rates in Lithuania. It gives information about the vacccination rates in Lithuania by giving Age and - dosage specific vaccinatioon quota for children and youngsters. (41) It should be noted that, given the nature of annual reporting cycles, these represent the most recently available figures at the time of writing.

In Lithuania in 2024, vaccination coverage for early childhood immunizations was generally high. Coverage for the BCG vaccine exceeded 93.18%, and 92.35% of children completed the basic DTaP/IPV/Hib immunization series. These figures vary significantly depending on the age at which coverage is measured. While only 74.33% of children under one year of age had received the first dose within the recommended timeframe, this figure rose to 92.35% when measured at one year of age, suggesting that a notable proportion of children receive their vaccinations with a delay rather than missing them altogether. A similar pattern is observable for the third dose, where coverage under one year of age stood at only 43.42%, yet reached 88.82% by the end of the first year of life. (41)

However, a decline in coverage was observed for later doses and booster vaccinations. A similar pattern was evident for the HepB vaccine: while approximately 93.51% of children received the first dose, completion of the series dropped substantially, among infants under one year of age, with only 43.89% having received the third dose within this timeframe. When measured at one year of age,

however, coverage for the third dose recovered to 86.80%, again reflecting the pattern of delayed rather than missed vaccination. (41)

In contrast, Pneumococcal vaccination showed a different trend. Coverage decreased from 73.42% for the first dose to 58.06% for the second dose, but subsequently increased with age, reaching between 81.47% (age: 1-year) and 87.31% (age: two-years) for the third dose. (41)

Regarding MenB vaccination, a comparable pattern emerges. Among infants under one year of age, coverage for the first dose reached 64.87%, while uptake of the second dose within the same age group fell to 49.68%. By one year of age, third-dose coverage had risen to 76.74%, climbing further to 84.29% among two-year-olds. This progression mirrors the trend observed across other vaccines in the Lithuanian schedule. Lower completion rates in the first year of life are followed by a notable recovery as children grow older once again pointing to delayed rather than absent vaccination as the primary driver of incomplete coverage. (41)

Coverage with the first MMR dose was relatively low, reaching only 61.42% among one-year-old children, but increased to 86.17% in two-year-olds. Uptake of the second dose again varied by age: 65.88% of six-year-olds had received the second MMR vaccination, compared with 84.57% of seven-year-olds and 87.22% of eight-year-olds. (41)

HPV vaccination coverage remained suboptimal across both age groups assessed. For the first dose, coverage reached 59.27% among 11-year-old children and 70.73% among 12-year-olds. A more striking pattern emerged for the second dose: among 11-year-olds, only 25.97% had completed it, rising to 59.68% in 12-year-olds. This interpretation is supported by the markedly higher second-dose coverage among 12-year-olds. (41)

Rotavirus vaccination coverage follows a similar pattern. Among infants under one year of age, 71.29% received the first dose, while uptake of the second dose within the same age group dropped to 56.48%. Coverage then recovered to 77.09% for the third dose, measured among children at one year of age. As seen with other vaccines, this configuration of a mid-series decline followed by a subsequent increase likely reflects scheduling delays rather than a fundamental reluctance to complete the series. (41)

4.8.2 VACCINATION COVERAGE IN GERMANY

The following analysis of vaccination coverage in Germany is based primarily on data published in the Epidemiologisches Bulletin 50/2025 by the RKI, which provides the most recently available nationwide figures on immunisation uptake across all age groups and vaccine types. (42)

MMR coverage in Germany is roughly comparable to Lithuania for the first dose, at approximately 87%. Coverage for the second dose is around 78% among 24-month-old children, rising to 92% by 72 months. School entry examination data, reported under the unfavourable scenario in which all children without vaccination documentation are counted as unvaccinated, indicate a rate of 92% among four to seven-year-olds, approaching but not yet consistently reaching the WHO target of 95%. (42)

Regarding DTP and Polio vaccination, coverage in Germany was high for the initial doses: by 15 months of age, 96% of children had received the first DTaP dose and 93% the second. However, completion of the full series by 24 months of age dropped considerably, with only 76% of children fully vaccinated against DTP and 75% against Poliomyelitis within this timeframe. As observed with other vaccines, many of these missed doses were subsequently caught up at a later stage, by four to seven years of age, completion rates had recovered to 90% for both DTaP and Poliomyelitis based on the same school entry examination data, reflecting the familiar pattern of delayed rather than absent vaccination (42)

For HepB, 74% of children aged 24 months had completed the full vaccination series. Unlike the Lithuanian data, the RKI does not report Hepatitis B coverage broken down by individual dose, making a direct dose-by-dose comparison between the two countries difficult. Nevertheless, the overall completion rate at 24 months is broadly comparable to the pattern observed for other combination vaccines in Germany, suggesting a similar dynamic of delayed series completion. School entry examination data further indicate a recovery to 87% among four to seven-year-olds, confirming the familiar pattern of delayed rather than absent vaccination. (42)

Rotavirus vaccination coverage among infants at 32 weeks of age reached 69%, according to the Epidemiologisches Bulletin 50/2025. Notably, this figure has remained largely unchanged since 2020, suggesting a plateau in uptake that has persisted despite the continued recommendation of the vaccine. In contrast to other childhood vaccinations in Germany, where delayed completion rather than outright refusal appears to be the primary driver of incomplete coverage, the stagnation in Rotavirus uptake over several years may point to more persistent barriers, whether organisational, informational, or related to parental awareness of the vaccine's availability. (42)

Varicella vaccination coverage followed a pattern consistent with other two-dose vaccines in Germany. The first dose, was received by 82% of children, while uptake of the second dose at 24 months declined to 75%. This drop of approximately seven percentage points between doses mirrors

the broader trend observed across the German immunisation schedule, where second doses and series completions are consistently achieved later than recommended, or, in some cases, not completed at all. By four to seven years of age, second-dose coverage recovered to 84%, again consistent with the broader delay pattern observed across the German immunisation schedule. (42)

Pneumococcal vaccination coverage reached 73% among children at 24 months of age in 2024. As with several other vaccines in the German schedule, coverage improved considerably by school entry age: data from school entry examinations indicate that 83% of four to seven-year-olds had received complete pneumococcal vaccination. This recovery over time reflects the same pattern of delayed series completion observed in Lithuania, where children who missed their vaccination at the recommended age received it later, which improved overall coverage rates over time. (42)

HPV vaccination coverage in Germany remained comparatively low, with notable differences between sexes. Among boys, only 36% had completed the full vaccination series. While coverage among girls was somewhat higher at 55%, though still well below the national target. A particularly striking feature of HPV vaccination in Germany is the substantial regional variation: depending on the district, coverage among 15-year-old girls ranged from as low as 27% to as high as 81%. This degree of regional disparity suggests that access, local healthcare structures, and provider recommendations play a considerable role in shaping HPV vaccine uptake, factors that go beyond individual parental decision-making alone. (42)

Meningococcal vaccination coverage reached 73% among children at 24 months of age. School entry data indicate a recovery to 83% among four to seven-year-olds, suggesting delayed rather than absent vaccination. (42)

As Germany discontinued BCG vaccination in 1998, no comparable coverage data exists for this vaccine.

4.9 VACCINATION SCHEDULE

Based the ´´Vaccine Scheduler 2025´´ by the European Centre For Disease Prevention And Control (43) the following will give an overview about the the national recommended and carried out vaccinations for children and adults in Lithaunia. It reports details about recommended vaccines, age groups, and dosage schedules.

For Germany the Vaccination schedule of 2026 by the RKI acts as a guideline for the following analysis. (44)

This paragraph provides an overview of the entire childhood vaccination schedule in both Lithuania and Germany. For a complete overview of the German vaccination schedule, see Annex, Figure 1. (44). For a complete overview of the Lithuanian vaccination schedule, see Annex, Figure 2. (43)

4.9.1 HEPATITIS B

In Lithuania, the HepB vaccine is administered in three doses: at birth, at four weeks, and again at six months of age. (43) This approach aligns with WHO recommendations for higher-risk settings, where early protection is considered essential. Across Europe, national strategies vary clearly, while some countries, including Lithuania, prefer universal newborn vaccination, others rely primarily on maternal screening to identify infants at elevated risk. (45)

A key argument in favour of the birth dose is the disproportionate risk faced by newborns. Infants infected at birth have an 80–90% probability of developing chronic HepB infection, compared to only around 5% in adults. (46)

In Germany, HepB vaccination is also given in three doses, though the timing differs substantially from the Lithuanian schedule. Infants receive their doses at two months, four months, and between eleven and fourteen months of age. (44) This later start reflects Germany's comparatively lower epidemiological risk profile and its well-established system of maternal screening, which allows for targeted protection of high-risk newborns. (47) An additional practical consideration is that Germany integrates the HepB vaccine into a hexavalent combination vaccine, administered alongside five other routine childhood vaccines. This approach reduces the total number of medical appointments required and offers a meaningful organisational advantage for families and healthcare providers alike. (47)

4.9.2 COMBINED INFANT VACCINATION

In early infancy (at 2, 4, and 6 months), six vaccines are routinely administered together. These include protection against: Rotavirus, Diphtheria, Tetanus, Pertussis, Poliomyelitis and Hib. In Germany additionally Pneumococcal vaccination is administered stimutaneously.

4.9.2.1 ROTAVIRUS

In Lithuania, the Rotavirus vaccine is administered in three doses, given at two, four, and six months of age, simultaneously with other routine childhood vaccinations. (43) This synchronisation may

help reduce the number of separate medical appointments required, potentially supporting parental compliance and overall vaccine uptake.

In Germany, Rotavirus vaccination begins earlier, between the sixth and eighth week of life, in line with WHO guidance recommending the earliest possible administration. (48) Depending on the specific vaccine product used, either two or three doses are given, with a minimum interval of four weeks between each dose. (44)

The difference between the two countries in this regard is therefore not primarily driven by epidemiological considerations, but rather reflects divergent organisational approaches to scheduling. Lithuania prioritises alignment with existing appointment structures, while Germany follows the WHO-recommended earliest possible start. Both strategies aim to achieve timely and complete Rotavirus immunisation, but through different logistical frameworks.

4.9.2.2 DIPHTERIA, TETANUS AND aPERTUSSIS

In Lithuania, regarding the DTaP vaccination, in addition to the three initial doses, further immunisations are recommended at 18 months, 6–7 years, and 15–16 years of age, followed by boosters every 5–10 years. (43)

In Germany, DTaP is given at 2, 4, and 11–14 months of age. Booster vaccinations are recommended at 5–6 years, 9–16 years, and every 10 years thereafter. Pertussis receives an additional booster specifically at age 17. (44)

These differences in booster scheduling reflect a broader pattern observed across Europe, where pertussis schedules vary considerably, shaped by a combination of historical tradition, national health system organisation, and evolving epidemiological evidence, rather than a single uniform approach. (49) Germany's additional pertussis-specific booster at age 17 in particular responds to the well-documented phenomenon of waning immunity: disease incidence has been increasing in adolescents and adults in recent years, largely attributable to declining protection after natural infection or vaccination, with susceptible adolescents posing a transmission risk to unvaccinated infants who are too young to be vaccinated themselves. (50)

4.9.2.3 POLIOMYELITIS

In Lithuania, the Poliomyelitis vaccine follows the same early schedule as DTaP with doses administered at 2, 4, and 6 months of age, and booster doses at 18 months and 6–7 years. (43)

In Germany, Poliomyelitis vaccination is likewise administered simultaneously with the DTaP vaccine as part of the hexavalent combination vaccine, with doses at 2, 4, and 11–14 months, and a booster at 9–16 years. (44)

The schedules of both countries are thus broadly comparable, with both recommending an adolescent booster, though Germany extends the booster window to 9–16 years while Lithuania completes its Poliomyelitis schedule at six to seven years of age. Despite this minor variation, the underlying rationale for continued polio vaccination in both countries is the same. Although the WHO declared the European Region polio-free in 2002, the disease has not been eradicated globally. (51)
Importations of poliovirus into Europe are unavoidable as long as global eradication has not been achieved,. (53) Between September and December 2024, vaccine-derived poliovirus type 2 was detected in wastewater systems across several European countries, including Germany underscoring that maintaining high vaccination coverage remains essential even in polio-free regions.. (42)

4.9.2.4 HAEMOPHILUS INFLUENZAE TYPE B

In Lithuania, the Hib vaccine is administered in four doses at 2, 4, 6 and 18 months of age, following a 3+1 schedule that prioritises early completion of the primary series. (43)

In Germany, the first two doses are administered at the same age as in Lithuania, at 2 and 4 months of age. However, the third dose is given considerably later, at 11–14 months. This difference in timing reflects Germany's use of the hexavalent combination vaccine, which integrates Hib protection alongside five other routine childhood vaccinations, DTaP, poliomyelitis, and HepB, within a single injection. (54) As part of this 2+1 schedule introduced by STIKO in 2020, the third dose is administered at 11–14 months as a booster rather than as a third primary dose. (54) This organisational approach reduces the total number of injections required and aligns the Hib booster with the broader hexavalent vaccination appointment, offering a practical advantage for both families and healthcare providers, a consideration already noted in the context of Germany's HepB schedule. (44)

4.9.2.5 PNEUMOCOCCAL

In Lithuania, the Pneumococcal vaccination uses a 2+1 schedule with doses administered at 2, 4, and 12–15 months of age. (55)

The third dose at 12–15 months therefore functions as a booster rather than a primary dose, administered after a longer interval to maximise immunological response. (43)

In Germany, Pneumococcal vaccination is administered simultaneously with the other combined infant vaccinations as part of the same appointment structure, with doses at 2, 4, and 11 months. (44) As with the Hib vaccine, this timing reflects Germany's 2+1 hexavalent schedule introduced by STIKO in 2020, where the booster is given slightly earlier than in Lithuania.

Both countries thus follow the same 2+1 principle, two early primary doses followed by a booster in the second year of life. This approach is in line with WHO guidance which recommends that pneumococcal conjugate vaccines can be effectively administered as two primary doses followed by a booster, with the timing of the booster dose being a key consideration depending on when disease incidence peaks in a given country. (56) The minor difference in booster timing between the two countries, 11 months in Germany versus 12–15 months in Lithuania, therefore reflects organisational scheduling differences rather than fundamentally divergent scientific positions, a pattern consistent with what has been observed for other vaccines in both national schedules.

4.9.3 MENINGOCOCCAL B

In Lithuania**,** vaccination against MenB is part of the routine childhood immunisation programme and is administered in three doses**,** given at 3 months, 5 months, and a booster dose between 12 and 15 months of age**.** (43)

In Germany**,** the MenB vaccine is also administered as a three-dose series**,** with doses given at 2 months, 4 months, and a booster at 12 months of age**.** (44) As for the rotavirus vaccination both countries folow different stragedies. This earlier start may reflect the general principle of providing protection as early as possible during the period of highest vulnerability. MenB is responsible fo 38% of all Meningococcal diseases in Germany. (57)

4.9.4 MENINGOCOCCAL C

In addition, in Germany for all young people at the age from twelve to fourteen Meningococcal ACWY vaccinations are recommended. Recent surveillance data show that MenW and MenY together represented 41%, and MenC 8% of recorded cases. (57)

This shifting epidemiological landscape, with MenC declining and MenW/Y rising provides the rationale for Germany's adolescent MenACWY recommendation, which targets this broader spectrum of serogroups. (57)

The absence of a MenC vaccination recommendation in Lithuania's routine childhood immunisation programme can be understood in light of the country's specific epidemiological profile. Studies of invasive meningococcal isolates collected in Lithuania between 2009 and 2019 revealed that 90.5% belonged to serogroup B, with MenC accounting for only 7.5% of cases. This strong predominance of serogroup B provides a clear epidemiological rationale for Lithuania's decision to focus its national immunisation programme exclusively on MenB, rather than introducing a broader serogroup coverage. (58)

4.9.5 MEASLES, MUMPS AND RUBELLA

In Lithuania, the combined MMR vaccine is administered in two doses: the first at 15 months and the second at six to seven years of age. (43). In settings where herd immunity is less firmly established, children face a higher risk of exposure to circulating pathogens, making early individual protection particularly important. Administering the first dose at 15 months thus offers children a degree of immunity during a period of particular vulnerability, in line with the immunological rationale for early MMR vaccination. (59, 60)

In Germany, the same three antigens are delivered as a single combined vaccine, but the timing differs considerably. The first dose is recommended between 11 and 14 months of age, followed by a second dose between 15 and 23 months, with a minimum interval of four weeks between the two doses. (44) This means that German children complete their MMR series significantly earlier than their Lithuanian counterparts.

Germany's more accelerated two-dose schedule, completing the MMR series within the first two years of life, reflects in part the influence of the measles vaccination mandate introduced in 2020, which created a practical deadline for series completion prior to kindergarten entry. With stronger population-level herd immunity and lower transmission risk, (31)

4.9.6 HUMAN PAPILLOMA VIRUS

In Lithuania, both girls and boys receive the HPV vaccination by two doses starting at 11-years and the second one being administered 6 months later. (43)

In Germany, it is administered for both girls and boys later at the age of 9-14 years with an additionally dose, 5 months after the first one. However, if administered before 5 months after the first one or after the age of 15, 3 doses are recommended. (44)

Despite the difference in starting age, both countries share the same underlying principle, vaccination should be completed before potential HPV exposure, ideally prior to sexual debut. (61) The immunological rationale for earlier vaccination is well established, vaccine effectiveness is consistently higher in younger adolescents, supporting the recommendation to initiate the series as early as possible. (61) The public health importance of timely HPV vaccination is further underlined by population-level data demonstrating a significant decrease in cervical cancer incidence among young females following vaccine introduction. (62) Lithuania's slightly earlier start at age 11 may therefore offer a practical advantage, as more time is available to complete the series within the recommended age window.

4.9.7 TUBERCULOSIS

A vaccine against Tuberculosis has existed for several decades. It consists of a live attenuated preparation containing weakened strains of Mycobacterium bovis, known as Bacillus CalmetteGuérin (BCG). While the vaccine offers significant protection for infants and young children, particularly against severe manifestations such as tuberculous meningitis, it provides limited efficacy against pulmonary tuberculosis, the most prevalent form of the disease. Furthermore, the protection conferred by the BCG vaccine is not considered to be lifelong. (63)

The inclusion of the BCG vaccine in national immunization schedules typically depends on a country's epidemiological context. According to the WHO, the vaccine is not generally recommended in countries where the annual risk of infection is lower than 0.1% of the population. (64)

The Situation in Lithuania: In comparison to other EU member states, Lithuania reports one of the highest tuberculosis incidence rates, ranking third in terms of cases per 100,000 inhabitants. It also holds the second-highest tuberculosis-related mortality rate within the European Union. A recent study entitled "Tuberculosis and Sudden Death in Lithuania" (July 2023) revealed a substantial number of undiagnosed tuberculosis cases, many of which were discovered only through autopsy in postpartum individuals. The authors suggest a strong correlation between the high national tuberculosis burden and various socioeconomic Determinants (65).

Given this critical public health context, Lithuania continues to recommend BCG vaccination for newborns as part of its national immunization program. Historical data reflect high vaccination coverage, with a rate of 99.4% in 2003 and 97.3% in 2007. (66)

The Situation in Germany: In contrast, Germany discontinued its general recommendation for BCG vaccination in 1998, based on guidance from the STIKO. (67) This decision was primarily influenced by the low incidence of tuberculosis in the country and concerns over the vaccine's potential side effects. These include rare but serious complications, which were deemed to outweigh the benefits

in a low-risk population. The position of the German Central Committee for the Control of Tuberculosis reflects this stance. (63) At present, there is no BCG vaccine authorized or routinely administered in Germany. (63)

WHO clearly recommends the implementation of this vaccine opnly in countreis having high epidemiological risk. This being the situation in Lithuania but not in Germany. (68)

4.9.8 VARICELLA

The WHO recommends routine childhood immunisation against varicella in countries where the disease represents a relatively important public health and socioeconomic burden and where high and sustained vaccination coverage of at least 80% can be achieved. (69)

Germany introduced universal varicella vaccination for children in 2004, initially with a single dose, and expanded to a two-dose schedule in 2009. The first dose is recommended between 11 and 14 months of age, and the second dose between 15 and 23 months, with a minimum interval of four weeks between doses. (44) At the time of this guidance, Germany was described as the country with the most experience of varicella vaccination in Europe. (69)

In contrast to Germany, Lithuania does not include varicella vaccination in its universal childhood immunisation programme. (43) According to the ECDC guidance, Lithuania recommends varicella vaccination only for susceptible healthcare workers and specific risk groups, rather than for the general child population. This places Lithuania among the majority of EU member states that, at the time of this guidance, had not adopted universal childhood varicella vaccination at national level, only six EU countries had done so. (69)

The absence of a universal varicella vaccination programme in Lithuania reflects a broader pattern observed across eastern and southern European countries, where seroprevalence data suggest that antibodies to Varicella tend to be acquired at a slightly later age than in northern and western Europe. This difference has been partially attributed to variations in the use of day-care and pre-school facilities and differing social contact patterns among young children. (69)

4.9.9 RESPIRATORY SYNCYTIAL VIRUS

In Germany, RSV protection is provided through Nirsevimab, a monoclonal antibody rather than a traditional vaccine. Infants born between April and September should receive Nirsevimab in autumn,

prior to the start of their first RSV season. Newborns of any gestational age who are born during the RSV season, which typically runs from October to March, should receive Nirsevimab as soon as possible after birth, ideally at discharge from the maternity unit or at the first postnatal check-up between day three and ten of life. (44) It should be noted that Nirsevimab is not a conventional vaccine but a monoclonal antibody that provides passive immunisation against RSV, and is therefore not included in the standard vaccination schedule in the traditional sense. (70,71)

Regarding RSV immunisation, the two countries differ considerably in their approach. As of the 2025/26 season, Germany has implemented a fully funded universal mAbs programme for all infants during their first RSV season, including a catch-up programme for infants born outside the RSV season. Lithuania, by contrast, has restricted its funded mAbs programme to infants at increased risk of severe RSV disease, and has not implemented a universal programme. No maternal RSV vaccination programme is funded in either country. (72)

The reasons behind Lithuania's decision to restrict RSV immunisation to high-risk infants rather than implementing a universal programme are not explicitly stated in available sources. However, the ECDC identifies cost-effectiveness, epidemiological context, and national public health priorities as key factors influencing such decisions at country level. (72)

4.9.10 COVID- 19

Regarding COVID-19 vaccination, both Germany and Lithuania have moved away from universal childhood immunisation recommendations.

In Germany, the STIKO does not recommend routine COVID-19 immunisation for healthy children and adolescents, as the risk of severe illness in this group is considered low. Vaccination is however recommended for children aged six months to 17 years with relevant underlying conditions, as well as an annual autumn booster for this risk group. (73)

In Lithuania, a comparable approach has been adopted. According to the ECDC Vaccine Scheduler, COVID-19 vaccination is recommended for persons aged 65 years and older as well as for individuals with underlying conditions from the age of six months onwards. As in Germany, no universal COVID-19 vaccination recommendation exists for healthy children. (43)

Despite differences in their overall governance structures and vaccination policy approaches, both countries have thus arrived at broadly similar positions regarding COVID-19 immunisation in children, prioritising targeted protection for vulnerable groups over universal childhood vaccination.

5 SUMMARY OF RESULTS

Both Germany and Lithuania operate healthcare systems based on statutory health insurance, with recommended childhood vaccinations provided free of charge in both countries. A key structural difference lies in the degree of centralisation: Lithuania relies on a state-coordinated, centralised model, whereas Germany is characterised by decentralised, corporatist self-governance involving a range of autonomous actors at national and regional levels. These structural differences are further reflected in contrasting approaches to vaccination governance, mandatory vaccination policy, and conflict of interest management.

The regulatory approaches to vaccination differ notably. Germany applies a partial legal mandate for measles, supported by administrative and financial sanctions, whereas Lithuania relies entirely on voluntary participation. Five years after its introduction, the measles mandate is regarded as a partial success, coverage increased, but the WHO target of 95% remains unmet. Epidemiological differences also shape national schedules. This is most evident in Lithuania's continued recommendation of BCG vaccination, reflecting its higher tuberculosis burden, and in Germany's inclusion of universal varicella vaccination, which is absent from the Lithuanian schedule. Further schedule differences include Germany's universal RSV prophylaxis programme for all infants, which Lithuania restricts to high-risk groups, and Germany's adolescent MenACWY recommendation, driven by a shifting epidemiological landscape towards MenW and MenY serogroups, whereas Lithuania focuses exclusively on MenB, which accounts for over 90% of invasive meningococcal disease in the country.

Regarding public attitudes, vaccination is generally accepted in both countries and strong ideological opposition remains limited. However, the underlying drivers of incomplete vaccination differ markedly. In Germany, missed vaccinations are more commonly attributable to situational barriers such as child illness at the time of the appointment, whereas in Lithuania intentional parental refusal plays a more prominent role. More cautious attitudes in Lithuania may partly reflect the country's post-Soviet legacy, which continues to shape public perceptions of state involvement in healthcare and contributes to comparatively higher levels of institutional mistrust.

Across both countries, the data reveal a consistent pattern of delayed rather than absent vaccination: children ultimately receive most recommended vaccines, but later than scheduled. This is most clearly illustrated by MMR second-dose coverage. Germany achieves 92% by age six, while Lithuania, which schedules the second dose later, at six to seven years, reaches 87% by age eight. While Germany typically reaches adequate coverage 1–2 years behind the recommended age, Lithuania follows the same trajectory, though at a later age group still, partly reflecting its later recommended vaccination schedule. In some areas, however, Lithuania's earlier and more universal administration approach results in comparatively higher early coverage, most notably for HepB, where universal birth-dose vaccination produces higher completion rates than Germany's risk-based approach. Organisational barriers and scheduling delays thus appear to be a more prevalent driver of incomplete coverage than outright refusal. The exception in both countries is HPV, where persistently low rates point to structural barriers that cannot be resolved through timing alone.

6 CONCLUSION

Returning to the hypothesis formulated at the outset of this thesis, the findings presented here provide partial confirmation. While Germany has implemented a legal measles vaccination mandate and benefits from higher institutional trust, which would theoretically support better vaccination coverage, the actual coverage rates across most vaccines were broadly comparable in 2024. This suggests that Germany's structural advantages are counterbalanced by practical and organisational barriers that affect both countries. Therefore, improving vaccination coverage requires not only stronger governance and public trust, but also targeted measures to reduce scheduling delays and missed appointments.

Neither the centralised Lithuanian model nor the decentralised German system demonstrates a clear overall advantage in terms of vaccination coverage. Rather, each system presents distinct strengths and weaknesses that shape immunisation outcomes in different ways. This suggests that high vaccination coverage cannot be achieved through governance structure alone, but requires additional interventions to address the specific barriers prevalent in each country.

With regard to the first objective, the analysis identified fundamental differences in vaccination governance and financing between the two countries, with Lithuania relying on a centralised, state-coordinated model and Germany on a decentralised, expert-driven system, differences that are further reflected in their contrasting approaches to mandatory vaccination and conflict of interest management.

Concerning the second objective, public attitudes toward vaccination were found to differ markedly between the two countries, with institutional mistrust playing a greater role in Lithuania and situational barriers being more prevalent in Germany. These attitudinal and structural differences help explain the observed gap in vaccination timing, though both countries ultimately achieve comparable final coverage rates. Policy efforts should therefore address both dimensions: reducing administrative delays while continuing to engage with hesitancy through trust-building measures. The shared exception is HPV, where structural barriers, rather than timing or attitudes alone, require targeted interventions in both countries.

In relation to the third and final objective, the comparison of national childhood vaccination schedules revealed that observed differences in vaccine timing, dosage, and inclusion are primarily driven by epidemiological and organisational factors rather than fundamentally divergent scientific positions.

Several limitations of this thesis should be acknowledged. A first and central limitation concerns the comparability of vaccination coverage data between the two countries. The Lithuanian and German reporting systems differ considerably in structure. Lithuania provides age- and dose-specific coverage figures, whereas German data from the RKI are more aggregated and not consistently broken down by individual dose. This makes a direct dose-by-dose comparison between the two countries difficult. A related limitation concerns the timing of data collection. Although both datasets reflect vaccination coverage for the year 2024, the Lithuanian report was published in March 2025 and the German data in December 2025, meaning that minor differences in reporting periods cannot be entirely excluded.

Furthermore, the data on reasons for non-vaccination in Lithuania originates from the Kaunas district only and may not be fully representative of national patterns across the country. This should be taken into account when interpreting the findings for Lithuania as a whole.

With regard to the attitudinal data, some Lithuanian studies cited in this thesis were conducted in the context of the COVID-19 pandemic and refer at least in part to COVID-19 vaccines rather than exclusively to routine childhood immunisations. This limits the direct comparability with the German attitudinal data, which focuses more specifically on routine childhood vaccination.

Finally, this thesis was written in English. Lithuanian-language sources were consulted where possible, but were only included when accompanied by an English translation or abstract. It cannot be excluded that relevant national literature written exclusively in Lithuanian was not captured in this review.

7 RECOMMENDATIONS

Strengthening public, and in particular parental trust in vaccination programmes emerges as one of the most important levers for improving immunisation coverage in both countries but primarily in Lithuania examined in this thesis. Translating this insight into practice requires concrete and visible action from health authorities.

A first and fundamental recommendation concerns transparency. Health authorities should actively demonstrate their commitment to evidence-based decision-making through public disclosure of conflicts of interest and clear communication about how vaccination recommendations are developed. Germany's STIKO already provides a model for this approach through its publicly accessible conflict of interest declarations and standardised recommendation processes, a practice that Lithuania could consider adopting to strengthen the credibility of its own vaccination governance.

Addressing the spread of misinformation represents a further priority, particularly in Lithuania where virtual anti-vaccination groups have been identified as an influential factor shaping public attitudes through the spread of post-truth narratives on social media platforms. (74) Germany faces a comparable challenge: Studies from Germany indicate that the use of social media and alternative information sources was significantly and negatively associated with vaccination intention. (75) Public health campaigns in both countries should therefore be designed not only to inform but to actively counter these narratives, particularly through proactive science communication on digital platforms.

Germany faces its own unresolved challenges. More consistent enforcement of existing sanctions and a clearer allocation of responsibilities between federal and regional authorities could help address the implementation gaps that the RKI evaluation identified concerning the measles covering goals.

Furthermore, HPV vaccination rates, remain well below target, with substantial regional disparities suggesting that access rather than attitudes alone may be a limiting factor. Introducing vaccination offers directly in school settings could represent a pragmatic step towards reducing these inequities.

Finally, in both countries, improving series completion rates should be treated as a priority . The data analysed in this thesis consistently show that initial vaccination uptake is considerably higher than the rate of full series completion, a pattern that points not to fundamental opposition but to preventable gaps in follow-up. Digital reminder systems, combined with proactive outreach from primary care providers, could meaningfully reduce this gap as a low-cost intervention.

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9 ANNEXES

Tabelle 1 | Impfkalender 2026 (Standardimmunisierungen mit Impfstoffen und monoklonalen Antikörpern); für Indikationsimpfungen wird auf Tabelle 2 verwiesen

A – Säuglinge und Kleinkinder <5 Jahre (0–59 Monate)

Impfung/Immunisierung	Alter in Wochen			Alter in Monaten										
	0	4	6	2	3	4	5–6	7–10	11*	12	13–14	15	16–23	24–59
	U2	U3		U4			U5		U6				U7	U7a/U8
Respiratorische Synzytial-Viren	mAk (Einmaldosis) je nach Geburtsmonat[a]													
Rotaviren		G1[b]		G2	(G3)									
Tetanus[c]				G1		G2			G3[f]					
Diphtherie[c]				G1		G2			G3[f]					
Pertussis[c]				G1		G2			G3[f]					
Hib[c] – *H. influenzae* Typ b				G1		G2			G3[f]					
Poliomyelitis[c]				G1		G2			G3[f]					
Hepatitis B[c]				G1		G2			G3[f]					
Pneumokokken[c,d]				G1		G2			G3[f]					
Meningokokken B*				G1		G2				G3[f]				
Masern, Mumps, Röteln									G1			G2		
Varizellen									G1			G2		

B – Kinder ≥ 5 Jahre, Jugendliche und Erwachsene

Impfung	Alter in Jahren									
	5–6	7–8	9–11	12–14	15–16	17	18–24	25–59	60–74	ab 75
	U9	U10	U11	J1		J2				
Tetanus	A1		A2				A[h]			
Diphtherie	A1		A2				A[h]			
Pertussis	A1		A2				A3[h]			
Poliomyelitis			A1							
Hepatitis B										
HPV – Humane Papillomviren			G1[g]/G2[g]							
Meningokokken ACWY				G1						
Masern							S[i]			
Mumps, Röteln										
Varizellen										
Pneumokokken									S[k]	
Herpes zoster									G1[l]/G2[l]	
Influenza									S (jährlich)[m]	
COVID-19							Gx[l]		S (jährlich)[m]	
Respiratorische Synzytial-Viren										S[n]

Figure 1: Vaccination schedule 2026 – Recommendations of the STIKO
Source: Robert Koch-Institut. Impfkalender 2026 – Empfehlungen der STIKO [Internet]. Berlin: RKI; 2026 [cited 2026 Feb 2].

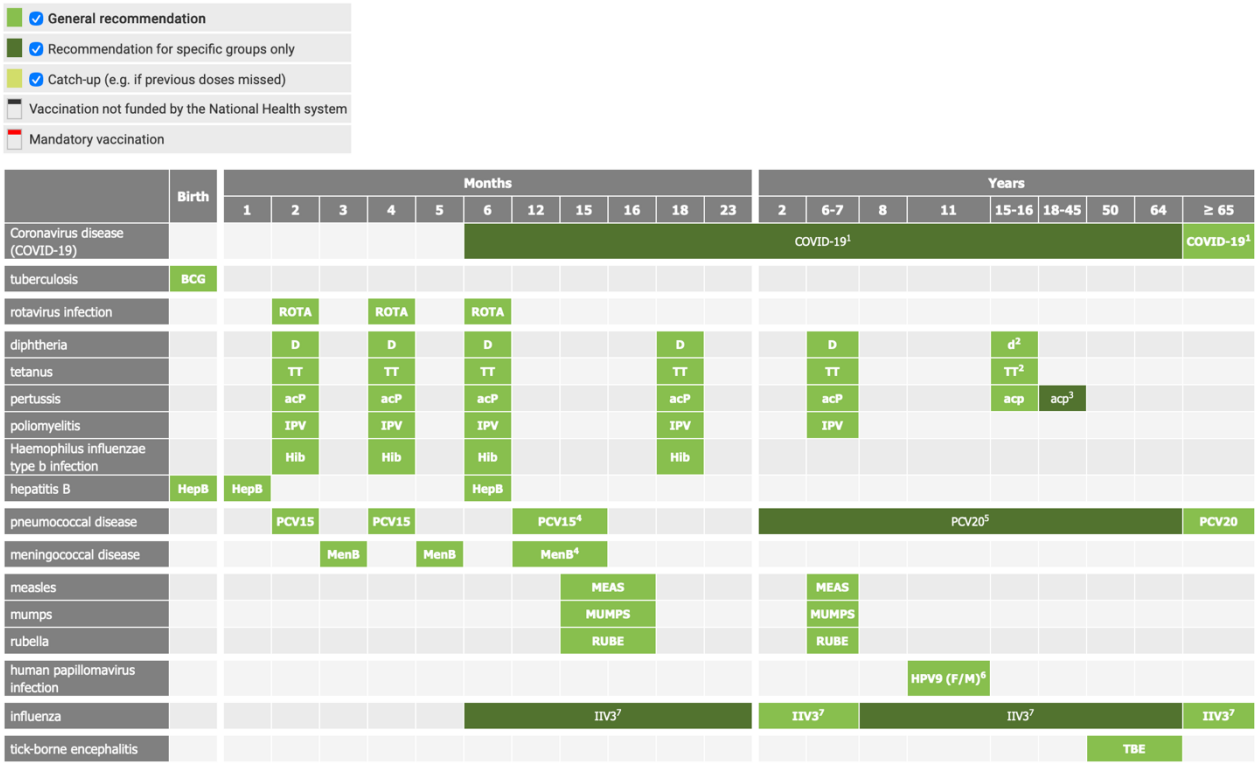

Figure 2: Vaccination schedule Lithuania 2025
Source: European Centre for Disease Prevention and Control. Lithuania – Vaccine Scheduler [Internet]. Stockholm: ECDC; [cited 2026 Feb].