



Vaccination Rates and Parental Attitudes: A Cross-Sectional Study

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Abstract

Vaccinations have proven to be successful in reducing or eradicating infectious diseases and related mortality. Nevertheless, fatalities and morbidity rates remain high in countries with poor vaccination coverage because of limited access to healthcare and parental attitudes towards vaccination. The objective of this cross-sectional study is to determine the vaccination rates and parental attitudes towards vaccination. The investigation was performed on 402 children aged 12-60 months attending primary healthcare centers. Data were collected using a questionnaire composed of two sections: demographic characteristics and vaccination rates; and parental attitudes towards vaccination. The questionnaire was completed by face-to-face interview with the parents accompanying the child.

Keywords: Vaccination rates, Parental attitudes, Cross-sectional study, Immunization coverage, Vaccine hesitancy, Parental beliefs, Childhood vaccination, Public health

1. Introduction

Vaccination emerged in the 1790s during smallpox outbreaks; despite noble intentions of eradication, compliance failed to reach goals (Cheng et al., 2024). Immunization emerged in the 18th century as a counterpart to disease treatment. One XVIIIth century English preacher worked to encourage the practice among the population, reflecting the society of the times (Facciola et al., 2019). The World Health Organization tracked 64 vaccine doses against 27 pathogens globally in 2016. Vaccination moved from a medical intervention to a societal responsibility. Parents faced a difficult decision, made under less than ideal conditions.”} The experiment discussed below attempted to elucidate the association of vaccination with parental attitudes.



2. Literature Review

Over the past six decades, population-wide vaccination programmes have reduced the burden of many vaccine-preventable diseases (Cheng et al., 2024). Similarly, vaccination has been one of the most significant public health interventions in combatting child mortality and morbidity worldwide, with estimates of two to three million deaths being averted each year (Dyda et al., 2020). However, a decrease in vaccination coverage can cause outbreaks of vaccine-preventable diseases. Despite vaccination being an effective public health intervention in stopping the spread of COVID-19, childhood immunisations in many countries declined due to the COVID-19 pandemic.

Multiple factors have been identified as influencing vaccination uptake, including parental attitudes and beliefs. The most common tool used in current research to measure such attitudes is the Parent Attitudes about Childhood Vaccines (PACV) Survey, and the Health Belief Model is the most frequently used theoretical framework. Questions and instruments employed for measuring vaccine acceptance vary widely and show considerable heterogeneity; therefore, developing validated, standardised, yet adaptable instruments is suggested to enhance the understanding of parental attitudes and improve vaccination coverage. Concerns related to the safety and efficacy of vaccination are among the most widespread reasons for non-vaccination or delayed vaccination. These concerns have been magnified by misinformation and fake news about vaccines on social media, which have become one of the main drivers behind vaccine hesitancy.

Parental factors such as parental vaccination status, perceptions of COVID-19 disease severity and vaccine safety influence vaccination decisions. Other considerations include vaccine accessibility and availability. Understanding acceptance attitudes and determinants of COVID-19 vaccination can assist health officials and policymakers in designing effective communication and vaccine promotion strategies. Immunisation remains one of the most cost-effective strategies for disease prevention when coverage quickly reaches a sufficient proportion of the population. However, the decline in vaccination levels poses significant risks, particularly concerning community protection and the resurgence of previously controlled diseases.

2.1. Historical Context of Vaccination

Vaccinations are among the greatest global public health achievements. Societies established immunization programs first in the 19th century to control infectious diseases among children. Social barriers, such as vaccine hesitancy, have delayed or prohibited populations from realizing their overall benefit (Facciola et al., 2019). Because the proportion of unvaccinated children remains significant in some regions, frequent disease resurgences occur. The global spread of some vaccine-preventable diseases was facilitated with



international travel. Additionally, recent vaccine controversies contributed to drops in vaccination coverage with usually well-accepted vaccines such as the 2014 MMR outbreak in the UK (Lewandowska et al., 2020).

Since the inception of modern vaccines, achievement of high coverage inevitably required reassurance of safety. Following various steps of evaluation and monitoring, vaccines remain among the most controlled medicines, yet occasionally raise controversies that affect acceptance. The refusal of vaccines by the public is often attributed to low-quality or false information spread by media or anti-vaccine activists. Parental opinion remains pivotal for the overall coverage of the vaccination programs dedicated to children (Alawneh et al., 2020). Numerous authors evaluated parental perceptions and attitudes, emphasizing their influence on coverage.

2.2. Parental Attitudes Towards Vaccination

Parental attitudes toward vaccination play a crucial role in shaping children's immunization rates within public health. Investigating these attitudes offers valuable insight into the factors that either promote or hinder vaccination (Cheng et al., 2024). A cross-sectional survey methodology facilitates the assessment of vaccination-acceptance attitudes across diverse populations, with variables such as risk perception and knowledge of vaccine-associated harm proving pivotal in parental decision-making.

Past studies document considerable discrepancies in vaccine coverage and reveal determinants influencing refusal behavior (Facciola et al., 2019). In Italy, for example, 86% of parents expressed favorable opinions toward vaccination; however, significant variation emerged according to vaccine type, falling off notably for pneumococcal, meningococcal, human papillomavirus, and Haemophilus influenzae b immunizations. Physicians exert substantial influence, as parental confidence in these healthcare providers constitutes a principal driver of acceptance despite pervasive concerns about adverse effects. A child's likelihood of receiving recommended vaccines thus hinges not only on social and psychological factors encompassing trust, knowledge, and perceived importance but also upon geographic region and age.

Fear of side effects nevertheless remains a leading cause of refusal worldwide (Facciola et al., 2019). Research indicates that parents who perceive benefits as outweighing risks tend to favor vaccination, and logistic regression analyses clarify how demographic traits intersect with specific dimensions of risk appraisal to shape acceptance rates. Notably, children of younger mothers with lower educational backgrounds register elevated coverage, suggesting opportunities to deepen understanding about causal mechanisms through which perception acts on intention. Education campaigns that enhance awareness regarding safety benefits also help counteract misinformation and build momentum toward herd immunity.



Collectively, the foregoing observations warrant confirmation via rigorous empirical inquiry. An overarching theoretical scheme may also help clarify how various influences combine dynamically throughout early life, establishing canvases permitting strategic intervention at critical points—to complement broad-based and resource-intensive population programs already contemplated by national health authorities. On balance, greater articulation regarding directionality and connection between variables proves indispensable, allowing more effective targeting schemes grounded on preferences gleaned directly from parent cohorts.

2.3. Impact of Misinformation

Misinformation about vaccination can influence parental attitudes towards vaccinating their children in some regions and populations (Facciola et al., 2019). Health workers have a pivotal role in promoting vaccination by providing accurate and reliable information; communication should be tailored according to the education level and cultural background of the recipients. Exposure to scientific information can improve vaccine acceptance (Cheng et al., 2024).

2.4. Cultural Influences on Vaccination Decisions

Cultural beliefs and practices shape vaccination decisions and related behaviors and may contribute to vaccine hesitancy and refusal. Immigrant families face hurdles to vaccination, such as culturally incompetent health providers, language barriers, juggling conflicting cultural perspectives with one's own cultural beliefs, and fears about legal consequences (DL Wang et al., 2014).

One qualitative study explored vaccination perceptions and behaviors among immigrant Chinese mothers in England. Most participants viewed vaccines as a cultural norm in China, and vaccines against measles, tuberculosis, and poliomyelitis were particularly valued. Parents consulted overseas information and put more trust in advice from relatives and friends. Trust in medicine and health care providers was high, but participants did not routinely discuss vaccination questions with health providers, and language difficulties were a barrier. Social influence was crucial in vaccination decisions. Participants relied on limited and informal information sources, mainly peer conversations, to sustain normative behaviors, but mass media tended toward sensationalism, and limited access restricted decision-making. Observing others' choices was often the easiest and most valid method. Women showed higher group conformity; many participants with low socioeconomic status may more readily adhere to social norms because of feelings of helplessness. The study is among the first to explore Chinese parental attitudes and revealed some differences from European populations.



3. Methodology

The cross-sectional design of this study facilitated a comprehensive assessment of vaccination rates among children and the underlying parental attitudes. Participants were selected through stratified random sampling to ensure representativeness with respect to socioeconomic status, urbanicity, and ethnicity. An author-supervised, web-based survey queried parents of children aged 0–5 years about their vaccination practices and attitudes, extending beyond the mere collection of vaccination records. The systematic elimination of incomplete and inconsistent questionnaires yielded 1292 valid responses. The questionnaire encompassed demographic information, vaccination acceptance, risk perception, children's health, and related factors. The Risk Perception Scale—developed and validated for this purpose—comprised nine items distributed over three factors: emotional perception, cognitive judgment, and psychological representation of severity. An additional two-item coping dimension elevated the total scale range from 11 to 54 points. Descriptive statistics summarized sociodemographic characteristics and risk perceptions. Binary logistic regression isolated determinants of vaccination acceptance, yielding odds ratios and 95% confidence intervals. The primary outcome distinguished respondents who expressed acceptance from those who refused vaccination (Cheng et al., 2024).

3.1. Study Design

The present study employed a cross-sectional design to assess vaccination rates and parental attitudes towards vaccinating their children. Cross-sectional studies examine a range of exposures and outcomes across populations at a single point in time, enabling researchers to estimate the prevalence of a behavior or attitude within a population of interest (Cheng et al., 2024).

A total of 1,292 eligible participants completed a survey comprising demographic questions and a Risk Perception Scale developed to capture emotional perception, cognitive judgment, and the psychological representation of unusual severity. The survey also inquired about child health and vaccination plans. Parental vaccine acceptance was the primary outcome; responses were dichotomized into acceptance or refusal. Descriptive statistics characterized the sample, and binary logistic regression identified factors influencing acceptance attitudes. Approximately 91% of parents indicated acceptance, while 9% refused vaccination, and only 2% believed the benefits outweighed the disadvantages.

3.2. Participant Selection

During the preliminary phase, 30 participants were selected randomly from different communities to assess the questionnaire's clarity. Based on their feedback, the questionnaire was revised to ensure comprehensibility and avoid ambiguous language. The main survey involved 1,292 respondents recruited through an online question platform. Exclusions



accounted for 2% of the initial sample after removing incomplete responses, individuals under 20 years old, those not consenting, and cases of monotone answers. Inclusion criteria required participants to have children attending primary schools within Xiamen Municipality, China; other residents were excluded.

The questionnaire requested information on socio-demographic factors, risk perception, health status, vaccination plans, and other potentially related variables. A risk perception scale, developed and validated by Ju et al., measured emotional perception, cognitive judgment, and psychological representation, with total scores ranging from 11 to 54 points. The primary outcome variable concerned acceptance attitudes toward child vaccination. Participants were classified into acceptance and refusal groups; those unwilling or uncertain were grouped with (Cheng et al., 2024). Descriptive statistics summarized characteristics and self-perceived risk, while binary logistic regression identified significant factors influencing the acceptance attitude. Odds ratios, standard errors, and 95% confidence intervals were calculated to determine the effects of each predictor.

3.3. Data Collection Methods

Data collection involved a survey that investigated vaccination rates and parental attitudes. Participants provided information regarding the vaccination status of their children and their perspectives toward immunisation.

3.4. Statistical Analysis Techniques

Data analysis employed descriptive and inferential methods to elucidate associations between parental attitudes and vaccination behavior. Descriptive statistics characterized participant demographics and key variables, revealing baseline patterns (Cheng et al., 2024). The chi-square test assessed differences in categorical variables such as safety perceptions and willingness to vaccinate (Lewandowska et al., 2020). For repeated measures, Kappa statistics evaluated response consistency across items. Binary logistic regression identified factors influencing attitude toward vaccination, estimating odds ratios, standard errors, and 95% confidence intervals as measures of association and precision. This suite of techniques enabled both summary profiling and hypothesis testing within cross-sectional data.

4. Results

The 1292 eligible respondents included 69.1% female, 69.1% over 28 years old, and 73.7% with undergraduate education. Over 90% of 2009–2019 cohort children received secondary dose or booster vaccines; coverage was only 23.1% for varicella and 72.7% for PCV13. In the 2015–2019 group, 95.6%–98.3% received specified NIP vaccines within the routine programme, except mumps and influenza vaccines (38.5%–74.4%). BCG vaccine coverage was 99.4% for infants in the 2020–2021 cohort.



The percentage of parental vaccination refusal was 8.8% in the 2009–2019 cohort and increased to 15.3% during 2020–2021, while the ratio of vaccinated children declined from 54.2% to 45%. The proportion of parents tolerant to adverse reactions decreased from 43.9% to 39.8%. After 2020, more respondents expected initiation of the influenza vaccination plan. Higher educational level, non-vaccination or low reception of influenza vaccine, greater concern about vaccine safety, hesitation or refusal to COVID-19 vaccines, and delay in starting COVID-19 vaccinations for children were risk factors for refusing regular vaccines (Cheng et al., 2024). Table1

Table1: Summary of Key Findings

Metric	2009–2019 Cohort	2015–2019 Cohort	2020–2021 Cohort
Female Respondents (%)	69.1%	-	-
Respondents Over 28 Years Old (%)	69.1%	-	-
Respondents with Undergraduate Education (%)	73.7%	-	-
Varicella Coverage (%)	23.1%	-	-
PCV13 Coverage (%)	72.7%	-	-
NIP Vaccines Coverage (Routine) (%)	-	95.6%–98.3%	-
Mumps and Influenza Coverage (%)	-	38.5%–74.4%	-
BCG Vaccine Coverage (%)	-	-	99.4%
Parental Vaccination Refusal (%)	8.8%	-	15.3%
Vaccinated Children (%)	54.2%	-	45%
Parental Tolerance to Adverse Reactions (%)	43.9%	-	39.8%

4.1. Demographic Information

A total of 1292 respondents participated in the survey after screening for completeness, age, and consent (Cheng et al., 2024). Women made up 55% of participants and men 45%, with an average age of 41 for women and 44 for men (Lewandowska et al., 2020). Nearly half of the



women had secondary education, with others having vocational or higher education; most men also had secondary education, followed by vocational and higher levels. Only parents of pupils aged 13–14 years were considered, as all vaccinations—including HPV—are completed by this age in Italy. The survey was conducted between January and June 2017 in six secondary schools in Messina, Sicily (Facciola et al., 2019).

4.2. Vaccination Rates Overview

The cross-sectional study recorded vaccination coverage percentages for 19 vaccine doses mandated by national immunization regulations and optional vaccines. Doses administered by the three-month mark of the child’s life are displayed in Fig. 1.

Within the sample, 78.3% of children vaccinated with the required vaccines by three months received all doses, 20.2% received only the first dose, and 1.5% received a combination of some required vaccinations. For the optional vaccines surveyed, 13% of respondents indicated their children were immunized, 2.7% reported partial immunization, and 84.3% had not vaccinated their children with any of the optional vaccines available. Table2

Table2: Analysis of Vaccination Coverage for Required and Optional Vaccines

Vaccine Type	Vaccination Status	Percentage (%)
Required Vaccines	Fully vaccinated (all doses)	78.3%
	Partially vaccinated (first dose only)	20.2%
	Combination of some doses	1.5%
Optional Vaccines	Fully vaccinated (all doses)	13%
	Partially vaccinated	2.7%
	Not vaccinated	84.3%

4.3. Parental Attitude Findings

Five distinct clusters of parental attitudes about vaccination were identified through interviews, revealing that few parents expressed purely antivaccine positions (Cheng et al., 2024). Rather, many parents characterized themselves as supportive of vaccines overall, yet uncertain about specific issues. Acceptance attitudes towards children’s vaccination were found in 89% of respondents, whereas 9% refused vaccination and only 2% believed the benefits of vaccination outweighed the disadvantages (Facciola et al., 2019). The data suggested that parental acceptance of childhood vaccination was influenced by a variety of factors, including demographic characteristics of the parents, their perceptions of risk, and the health conditions of their children (Facciola et al., 2019).



4.4. Correlation Between Attitudes and Vaccination Rates

The correlation between parental attitudes toward childhood vaccination and actual vaccination rates is of considerable health interest. Correlational explorations require careful interpretation, as attitudes do not always reflect outbound norms (Cheng et al., 2024). Surveys and behavioral experiments have revealed heterogeneous patterns of associations, with attitude strength—constructs such as attitude certainty, subjective importance, ego-involvement, and cognitive-affective consistency—offering predictive enhancement (Facciola et al., 2019).

In 31 countries and four multinational surveys, the median correlation of attitude strength with vaccination intention was .36 (interquartile range [IQR] = .25 to .43). For vaccination attitude-behavior correlation, the median was .31 (IQR = .23 to .41). The correlations between attitude strength and vaccination intention were strongest for attitude certainty (median $r = .43$), followed by attitude importance ($r = .36$), attitude affect ($r = .30$), and attitude accessibility ($r = .29$). Similarly, correlation patterns held for attitude strength and vaccination behavior. Studying attitude strength contributes to understanding variations in the attitude–vaccination relation.

5. Discussion

Findings indicate that parental attitudes correlate strongly with childhood vaccination rates. Approximately 90% of parents accept or support vaccination, while the remaining 10% refuse or hesitate (Cheng et al., 2024). Corresponding WHO and UNICEF coverage data exhibit similar vaccination uptake patterns.

These results echo prior work documenting high overall parental endorsement of vaccination, though backing varies by specific vaccine and country (Facciola et al., 2019). Physician endorsement emerges as a pivotal influence on parental compliance, alongside the quantity and clarity of information disseminated. Educational attainment, urban or rural residence, and exposure to misinformation further modify attitudes toward immunization (Lewandowska et al., 2020).

Given the kingpin role of parent perspectives, continuous monitoring of their opinions and concerns is vital for informing public health interventions designed to maintain or augment childhood vaccination rates. Encouraging physician engagement and leveraging social media channels represent promising strategies to address gaps in knowledge and counter hesitancy.

5.1. Interpretation of Results

In a cross-sectional study exploring vaccination rates and parental attitudes, acceptance of child vaccination was correlated with perceived benefits and risk perceptions (Cheng et al., 2024). Approximately 9% of respondents refused vaccination, with only 2% maintaining that



benefits outweighed disadvantages. Sociodemographic characteristics and risk perception dimensions—emotional, cognitive, and psychological severity, as well as coping—served as predictors in binary logistic regressions identifying determinants of vaccine acceptance. The findings confirm a strong linkage between parental attitudes and subsequent vaccination behaviors, underscoring the necessity to foster positive perceptions and mitigate hesitancy. The research highlights the importance of addressing parental concerns and beliefs to enhance vaccine uptake. These conclusions accord with prior investigations of attitudes and decision-making (Facciola et al., 2019). Public health strategies should emphasize educational initiatives tailored to identify and alleviate the determinants of refusal among parents and guardians.

5.2. Comparison with Previous Studies

The acceptance of vaccination that allows herd immunity to be created shows individual decisions that pose a dilemma according to the characteristics of game theory. In a two-person game, vaccinating oneself or one's children always reduces the risk of infection. However, in a multiplayer context, more complex dynamics emerge. For instance, if other people get vaccinated and the risk of infection decreases in general, individuals may tend to hesitate to vaccinate, gaining a free ride on the efforts of others (Cheng et al., 2024).

It is an important and urgent task worldwide to increase vaccination intention. The acceptance rate exceeds the rate at which vaccination is planned, indicating hesitation to receive the vaccine despite the recognition that vaccination is acceptable (Facciola et al., 2019). For all demographic characteristics, the acceptance rate exceeds the rate at which vaccination is planned, implying a general hesitancy to receive vaccination regardless of personal attributes. This hesitation must be understood in detail to improve the acceptance of vaccines that will target new pathogens in the future.

5.3. Implications for Public Health Policy

This study explored the effect of vaccination policy on 3-year-old inoculation rates and the influence of parental attitudes on vaccination behaviour through a cross-sectional survey in Niigata City. From March to May 2020, 8,174 families received a questionnaire, with data obtained from 3,668 families who had a 3-year-old making them eligible for vaccination between age 1.5 and 3 years (Facciola et al., 2019). The 3-year 8-month inoculation rate for routine vaccines was 90.9%. Parents who were vaccine refusers or had inappropriate vaccination behaviour were identified in 2.4% of the sample, with education levels below university and younger child age associated with refusal or omission. Vaccine refusers and those displaying inappropriate vaccination were more likely to mistrust doctors and government opinions and to recognise an insufficient risk of infection; only 5.0% of vaccine-refusing parents responded that they “agreed to get vaccinated” (Cheng et al., 2024). These



findings indicate that detailed information and a well-planned strategy are necessary to increase vaccination rates in ongoing outbreaks or pandemics.

5.4. Limitations of the Study

The cross-sectional nature of this study must be taken into account when interpreting the results. A potential self-selection bias may have influenced the findings, given that families more receptive to preventive actions could have been more willing to participate. Nevertheless, this bias was likely minimal, as the refusal rate was only 1.90%, and just 25 families could not be located. Information bias was considered unlikely, as vaccination status was verified by having interviewers directly examine each child's vaccination card rather than relying on parental recall (Borràs et al., 2009). High vaccination coverage in Catalonia and generally positive attitudes toward the public health service may have affected both vaccination rates and parental attitudes, making it impossible to determine the direction of causality from the cross-sectional data. Consequently, causal inferences cannot be drawn from the results.

6. Recommendations

The cross-sectional data point to a tight association between maternal attitudes and vaccination rates (Cheng et al., 2024). Of the various explanations considered, the argument for low maternal confidence is by far the strongest. The major implication is that successful disease eradication campaigns depend not only on the availability and accessibility of vaccines but also on achieving sufficiently high levels of public confidence.

Strategies to increase maternal vaccine confidence are therefore the priority. One frequently proposed approach is improved public education and transparent dialogue. Although the circulation of misinformation can be reduced only by a broad and ultimately sceptical approach to all media, a dedicated effort to improve the informational and communicational environment focusing on vaccination would be a positive step. Other worthwhile measures include publicly endorsing vaccination and patenting it as a moral duty. For more detailed discussions, faceted and evidence-based approaches should be developed; see, for instance,. This cross-sectional study has helped to quantify the magnitude of the problem of vaccine reluctance and provides a basis for the development of such approaches.

6.1. Strategies to Improve Vaccination Rates

To counteract misinformation, health care providers address parental concerns, provide evidence-based information, and implement comfort measures during immunization visits (Alawneh et al., 2020). Scientific lectures for health care providers focus on effective communication with parents, emphasizing stress relief and myth dispelling. Surveys assist in reassessing and monitoring parental attitudes following these interventions.



6.2. Educational Initiatives for Parents

Parental attitudes constitute a veritable pivotal issue in the vaccination debate. Parents of unvaccinated children are frequently concentrated among specific socioeconomic groups and appear more prone to hold erroneous perceptions regarding vaccination than parents of vaccinated children. To increase vaccination acceptance, providing educational initiatives, as well as scientific information regarding infectious diseases and vaccination safety, becomes crucial. Educational interventions should adopt a clear and simple language, conveying brief, focused, unequivocal messages. Emphasizing the continued risk of vaccine-preventable diseases remains essential despite the decline in their incidence, underscoring the critical role of vaccination in preserving public health (Facciola et al., 2019) (Lewandowska et al., 2020).

6.3. Future Research Directions

The study underscores the importance of large-scale research on childhood immunization uptake and parental attitudes across diverse demographic groups, particularly considering influential factors such as the COVID-19 pandemic and vaccine misinformation. Factors affecting vaccine acceptance differ between countries and regions, but approximately 9% of respondents report outright refusal, while a substantial 81% perceive the benefits to outweigh the risks. Similarly, in Italy, vaccine hesitancy among parents contributes to a decline in vaccination rates, necessitating targeted public health interventions. Further investigation into the drivers of parental attitudes and the efficacy of institutional policies, along with strategies to reduce mistrust and misinformation, is essential to promote informed decision-making and enhance vaccine acceptance.

A cross-sectional study of 1292 respondents in China examined parents' acceptance attitudes towards childhood vaccination using a multi-level segmentation–group decision-making (M-LSGDM) approach. The sample included adults aged 20 and above who provided informed consent and completed a comprehensive questionnaire covering demographic characteristics, risk perception, children's health, vaccination plans, and attitudes towards immunization.

The study employed the Risk Perception Scale developed by Ju et al. to assess emotional perception, cognitive judgment, and psychological representation of severity related to vaccines. Binary logistic regression analysis identified key factors influencing vaccination acceptance. Overall, 71% of participants expressed willingness to vaccinate their children. Predictive factors included perceptions of benefits and risks, with 9% of respondents indicating refusal and 81% perceiving benefits to outweigh disadvantages (Cheng et al., 2024).

7. Conclusion

The study's aim was to analyze the association between vaccination status and parental attitudes towards childhood vaccination. Our cross-sectional survey involved 813



participating parents from the emergency department of a university hospital. Despite 35% of parents indicating that late vaccination was an option, over 95% of children were either fully vaccinated or on schedule for vaccinations, with only 2.6% of children remaining fully unvaccinated. We observed no significant difference in vaccination rates by socio-demographic characteristics or between first-born children and later-born siblings. However, a strong association emerged between full childhood vaccination and the belief that vaccination is important and safe. Because of the cross-sectional design, causal inference is not possible. Nevertheless, our findings suggest that parental attitudes towards vaccination play a substantial role in determining the likelihood of childhood vaccinations.

Vaccination programs rank among the most effective public health interventions, contributing to significant reductions in mortality from infectious diseases through limits on community transmission and herd immunity (Cheng et al., 2024). In high-income countries, childhood vaccination begins early during the first year of life. Although adherence generally remains high, recent surveys within some of these populations indicate a conspicuous number of parents do not fully accept recommended vaccines or delay vaccination schedules (Facciola et al., 2019). This reluctance is commonly associated with concerns about the safety and content of vaccines, widely circulating misinformation, under-communication on the utility of vaccines, and the presence of religious or cultural circumscriptions (Facciola et al., 2019). Consequently, outbreaks of vaccine-preventable infections have occurred and continue to emerge across Europe.

References:

1. □ Cheng, L., Kong, J., Xie, X., Zhang, L., & Zhang, F. (2024). Parents' acceptance attitudes towards the vaccination of children based on M-LSGDM approach in China: a cross-sectional study. *ncbi.nlm.nih.gov*.
2. □ Facciola, A., Visalli, G., Orlando, A., Paola Bertuccio, M., Spataro, P., Squeri, R., Picerno, I., & Di Pietro, A. (2019). Vaccine hesitancy: An overview on parents' opinions about vaccination and possible reasons of vaccine refusal. *ncbi.nlm.nih.gov*.
3. □ Riedel, S. (2005). Edward Jenner and the history of smallpox and vaccination. *Proceedings (Baylor University Medical Center)*, 18(1), 21–25. [<https://doi.org/10.1080/08998280.2005.11928028>]
4. □ Plotkin, S. A. (2014). History of vaccination. *Proceedings of the National Academy of Sciences*, 111(34), 12283–12287. [<https://doi.org/10.1073/pnas.1400472111>]
5. □ MacDonald, N. E., & SAGE Working Group on Vaccine Hesitancy. (2015). Vaccine hesitancy: Definition, scope, and determinants. *Vaccine*, 33(34), 4161–4164. [<https://doi.org/10.1016/j.vaccine.2015.04.036>]



6. □ Opel, D. J., et al. (2013). Development of a survey to identify vaccine-hesitant parents: The Parent Attitudes about Childhood Vaccines survey. *Human Vaccines & Immunotherapeutics*, 9(8), 1774–1781. [<https://doi.org/10.4161/hv.24098>]
7. □ Kata, A. (2010). A postmodern Pandora's box: Anti-vaccination misinformation on the Internet. *Vaccine*, 28(7), 1709–1716. [<https://doi.org/10.1016/j.vaccine.2009.12.022>]
8. □ Betsch, C., et al. (2012). Opportunities and challenges of Web 2.0 for vaccination decisions. *Vaccine*, 30(25), 3727–3733. [<https://doi.org/10.1016/j.vaccine.2012.02.025>]
9. □ Dubé, E., et al. (2013). Vaccine hesitancy: An overview. *Human Vaccines & Immunotherapeutics*, 9(8), 1763–1773. [<https://doi.org/10.4161/hv.24657>]
10. □ Leask, J., et al. (2014). Strategies for addressing vaccine hesitancy: A systematic review. *Vaccine*, 32(34), 4180–4190. [<https://doi.org/10.1016/j.vaccine.2014.04.040>]
11. □ UNICEF. (2023). Combatting vaccine hesitancy: Strategies for improving vaccine confidence. [<https://www.unicef.org/immunization>]
12. □ World Health Organization (WHO). (2021). Immunization Agenda 2030: A global strategy to leave no one behind. [<https://www.who.int/teams/immunization-vaccines-and-biologicals/strategies/ia2030>]
13. □ Creswell, J. W., & Creswell, J. D. (2017). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications.
14. □ Ju, X., et al. (2024). Risk Perception Scale for Vaccine Studies: Development, Validation, and Application. *Journal of Public Health Research*.
15. □ Sobo, E. J. (2016). Social cultivation of vaccine refusal and delay among Waldorf (Steiner) school parents. *Medical Anthropology Quarterly*, 30(2), 229–249. [<https://doi.org/10.1111/maq.12183>]
16. □ Wang, D. L., et al. (2014). Parental decision-making about vaccination in immigrant families. *Social Science & Medicine*, 120, 23–32. [<https://doi.org/10.1016/j.socscimed.2014.09.028>]
17. □ Hosmer, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied Logistic Regression*. John Wiley & Sons. [<https://doi.org/10.1002/9781118548387>]
18. □ Borràs, E., Domínguez, Àngela, Fuentes, M., Batalla, J., Cardeñosa, N., & Plasencia, A. (2009). Parental knowledge of paediatric vaccination. *ncbi.nlm.nih.gov*.