

# Knowledge, Attitude, and Practice of Adult Pneumococcal Vaccination in India: A Prospective, Cross-sectional, Questionnaire-based Survey of Pediatricians



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## ABSTRACT

**Background:** The proportion of the elderly population in India is expected to double by the year 2050. Number of deaths because of lower respiratory tract infections (LRI) caused by *Streptococcus pneumoniae* are substantial in adults aged >70 years. Pneumococcal diseases are vaccine-preventable diseases (VPDs). Vaccination is safe, effective, and economical protection against infections. However, adult vaccination in India is uncommon. One way to increase it would be to educate the adults accompanying their family to vaccination visits, and improve the adult vaccination rates.

**Objective:** In this cross-sectional study, we intend to assess the knowledge, attitude, and practice (KAP) of pediatricians to understand the barriers to pneumococcal vaccination in adults in India.

**Materials and methods:** The study was a descriptive, cross-sectional, questionnaire-based survey in which 650 pediatricians were invited to participate. The survey consisted of structured questions sent to the participants in Microsoft Form through emails. The responses were collected, analyzed, and compared for final interpretations using SPSS software.

**Results:** Of the total 500 pediatricians who consented to study participation, one-third (39.6%) of pediatricians would recommend pneumococcal vaccination to adults >60 years accompanying the children, and 33.2% of the pediatricians reported that they vaccinate adults only when presented with a prescription or advised by the adult's treating physician. Most pediatricians (72.1%) reported that among their patients they would give the highest priority for pneumococcal vaccination in adolescents with chronic lung and heart diseases, and 70.4% of the pediatricians reported that only about one in five families (5–20%) consulting with them are aware of adult vaccination other than the COVID-19 vaccine. Pediatricians (80%) gave the highest priority to "low awareness regarding pneumococcal disease in adults," while only 30.4% of the pediatricians had taken the pneumococcal vaccination.

**Conclusion:** The study objectively identifies barriers to pneumococcal vaccination in adults in India from the pediatrician point of view. There is a lack of awareness among pediatricians about adult vaccination recommendations. National guidelines among pediatricians for adult vaccination, including data on vaccine safety, efficacy, and disease burden, would help pediatricians in counseling adults for vaccination. Per the pediatricians, patient-level barriers to vaccinations are poor awareness and understanding of both adult pneumococcal disease and vaccination, along with affordability.

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## INTRODUCTION

The world's population is aging at an unprecedented rate. One in six people worldwide will be 65 years of age or older by 2050.<sup>1</sup> The proportion of the elderly population in India is anticipated to increase from 8% in 2015 to 19% by 2050, keeping with the global trend.<sup>2,3</sup> In developing countries like India, infectious diseases contribute to significant morbidity, disability and mortality.<sup>4</sup> Vaccine-preventable diseases (VPDs) cause significant health, economic and social impacts in older adults, yet vaccines are underutilized in the adult population around the world.<sup>5</sup> Vaccines are one of the most cost-effective health interventions, with numerous social and economic benefits.<sup>6</sup>

As well as in young children, pneumococcal disease is a VPD that in India, as elsewhere in the world, causes significant adult morbidity and mortality, particularly among those aged >50 years and in younger adults who have chronic diseases.<sup>7</sup> The number of deaths due to lower respiratory tract infections (LRI) among adults aged >70 years increased from 7,46,700 to 10,80,958 from the year 2000 to 2016.<sup>8</sup> Among the etiologies of LRI, *Streptococcus pneumoniae* is a leading cause of LRI morbidity and mortality globally, contributing to more deaths compared to all other infectious etiologies combined in 2016.<sup>8,9</sup>

In India, vaccination is a term that is usually associated with children. As per a recent survey, >80% of the adult population is

unaware of adult vaccinations.<sup>10</sup> "Life-course immunization" has been adopted in many countries, as adult vaccination is an important contributor to healthy living. However, adult vaccination coverage in India is currently negligible, due to a lack of national guidelines and of a perceived need.<sup>11</sup> The importance of adult vaccination and its impact on the health of children are often overlooked. Pediatricians, along with adult health care providers, can serve an important role by educating parents, guardians and adult contacts of children on the importance of receiving the recommended adult vaccinations and the role of vaccines in preventing the spread of disease to the pediatric population.<sup>12</sup> One way to increase suboptimal vaccination in adults in India could be to educate the adults who accompany the children during vaccination visits to subsequently improve adult vaccination rates.

A Knowledge, Attitude, and Practice (KAP) survey is meant to be a representative survey of a target population; it aims to elicit what is known (knowledge), believed (attitude) and done (practiced) in the context of the topic of interest, and it can provide valuable information for resource allocation in the planning and implementation of public health programs.<sup>13,14</sup> In this cross-sectional survey, we intend to assess the KAP of pediatricians to understand the barriers to vaccination in adults in India.

## MATERIALS AND METHODS

### Study Setting

The KAP survey was conducted in India, in which practicing pediatricians with a minimum of 5 years of experience in clinical

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practice, who were vaccinating children at their hospital or institution, were invited to participate.

### Study Duration

The study was conducted from 12th December to 31st December 2022.

### Study Design

This was a descriptive and cross-sectional questionnaire-based survey.

### Sample Size and Sampling

About 650 practicing pediatricians were invited to participate. Of these, 500 pediatricians voluntarily consented to participate.

### Data Collection

The study questionnaire, containing 11 questions, was designed on web-based forms, and the link generated was shared in e-mails to consenting healthcare practitioners. All the participants were asked to fill out the questionnaire only once to avoid data duplication. The survey consisted of multiple-choice structured questions that were validated through consensus obtained from 10 pediatricians prior to the survey. The responses from the online version of the questionnaire were retrieved automatically.

### Data Analysis

Data used for the study was collected and processed on STATA software and statistically analyzed using descriptive statistics.

### Ethical Issues

Ethics Committee approval was taken from an Independent Ethics Committee, Suraksha Ethics Committee, Mumbai, India prior to the study initiation.

### Guidelines for Reporting

STROBE guideline was used for reporting.

## RESULTS

A total of 650 pediatricians were invited to participate. Of these, 500 pediatricians voluntarily consented to study participation. The overall response rate was 76.92%. Classification per the zone/location of the 500 pediatricians who consented to study participation is provided in Figure 1.

Knowledge of pediatricians for various vaccines for various age-groups was assessed, and the data are presented in Table 1. Of the 500 pediatricians, only 198 (39.6%) were aware of the pneumococcal vaccination recommendation for patients in the age-group >60 years.

Of the 500 pediatricians, 166 (33.2%) reported that they vaccinate adults "only when presented with a prescription or advised by their treating physician," although 124 (24.8%) of the pediatricians would offer vaccination to adults "at high risk for VPDs." Only 40 pediatricians (8%) out of 500 reported that they would like to offer vaccination to adults, but it is challenging to devote time and counsel adults.

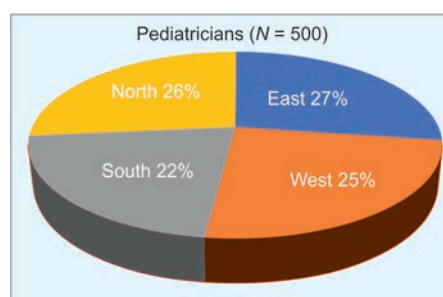


Fig. 1: Classification of the pediatricians per the zone in India

Pediatricians' vaccination practices regarding adult vaccination are presented in Figure 2.

Pediatricians were asked in which of the scenarios they would recommend pneumococcal vaccination. Of the total of 500 pediatricians, 385 (77%) agreed that they would recommend the pneumococcal vaccine in adult patients with chronic diseases, followed by 345 (69%) pediatricians who would recommend pneumococcal vaccination in immunocompromised adult patients. The data also showed that <50% [248 (49.6%)] of the pediatricians agreed that they would advise pneumococcal vaccination to older adults (age >65 years). Participating pediatricians' adult pneumococcal vaccination preferences (agreed/disagreed) are presented in Figure 3.

For adults, 51.4% of the pediatricians reported that they would advise the pneumococcal conjugate vaccine, followed by 34.8% who recommended both vaccines (pneumococcal conjugate vaccine dose followed by a dose of polysaccharide vaccine). Types of pneumococcal vaccines advised for adults by pediatricians are presented in Table 2.

Of the 500 pediatricians, 369 (73.8%) would advise pneumococcal vaccination for

Table 2: Pediatricians advise to adults for the type of pneumococcal vaccine

Pneumococcal vaccines	Pediatricians (N = 500)
Only pneumococcal conjugate vaccine	51.4%
Both—conjugate followed by polysaccharide vaccine	34.8%
Only pneumococcal polysaccharide vaccine	7.4%
None of the above	6.4%

Table 1: Summary of pediatricians' responses to the question "which of the below vaccines are recommended for each age-group?"

Vaccines	Pediatricians (N = 500)			
	Pediatric	Unimmunized adults		Special circumstance* only (all ages)
		19–59 years	>60 years	
Influenza	84.8%	73.6%	42.3%	28.4%
Tetanus	98%	90.2%	52.8%	31%
Pneumococcal	95.2%	62.2%	39.6%	20%
Hepatitis B	97.4%	75%	37.2%	12.2%
Hepatitis A	92.4%	58.6%	28.8%	14.4%
COVID-19	84.4%	97.8%	65.4%	16.4%
Tdap	87.4%	41.2%	22.2%	25.4%
Measles	99.6%	7.8%	4.6%	4%
Rotavirus	98.4%	9.2%	5.4%	5.6%
Human papillomavirus virus	80.8%	42.4%	9.6%	19.4%

Note: The above results represent the number of participants who have chosen the particular option for the vaccine

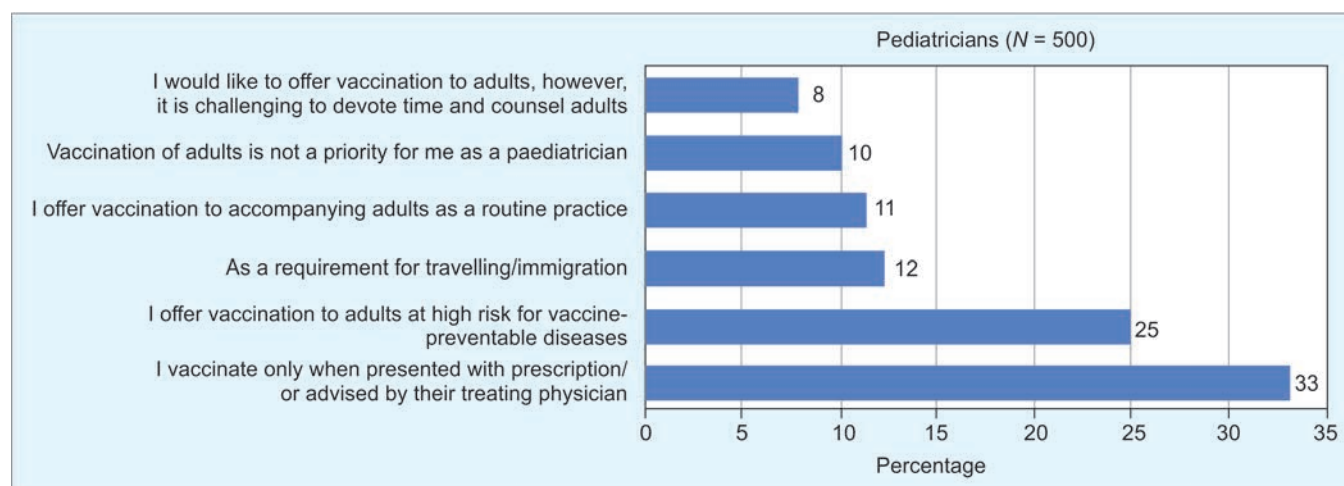


Fig. 2: Adult vaccination practice by pediatricians (multiple responses)

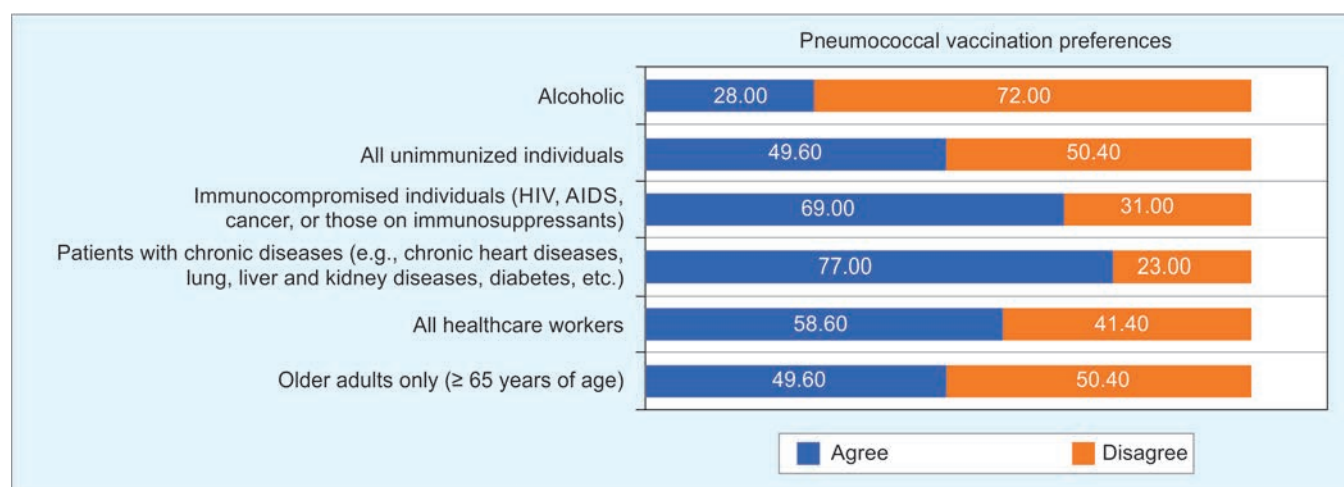


Fig. 3: Summary of pediatricians' responses (agree or disagree) to "which of the following scenarios are pneumococcal vaccination recommended in adults (aged  $> 19$  yrs)?"

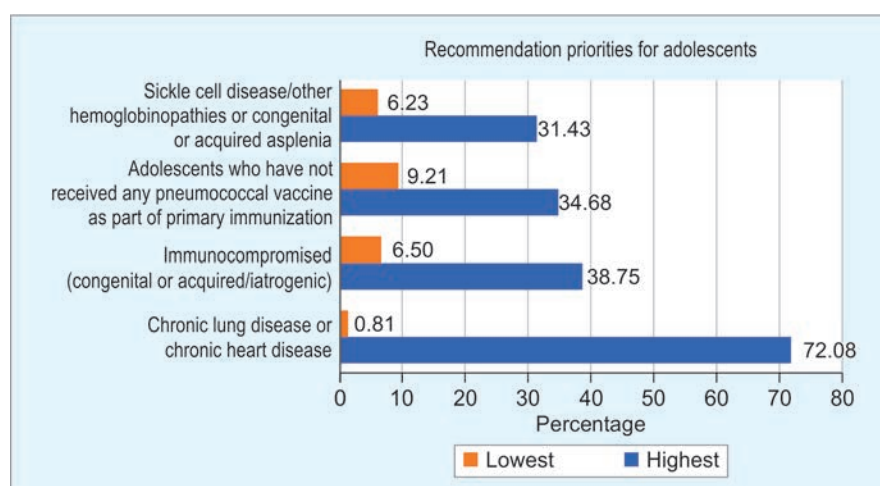


Fig. 4: Summary of the pediatricians' responses to the question "which of the following scenario would you recommend pneumococcal vaccination to adolescent patients?"

adolescents. These 369 pediatricians were asked in which scenarios they would advise pneumococcal vaccination for adolescents

and were further asked to grade the response on a scale of 1–5, with 1 being the highest and 5 being the lowest. The lowest and highest

responses are presented in Figure 4. Of these, three-quarters (72.1%) of pediatricians reported that they would give the highest

**Table 3:** Patient level barrier prioritized as perceived by pediatricians

Patient level barriers	Rated by the participating pediatricians N = 500 (%)		
	High-level	Mid-level	Low-level
Low awareness regarding pneumococcal disease in adults	350 (70%)	130 (26%)	20 (4%)
Low awareness of the need for adult vaccination	245 (49%)	196 (39.2%)	56 (11.2%)
Patient vaccine hesitancy	233 (46.6%)	177 (35.4%)	90 (18%)
Affordability	103 (20.6%)	181 (36.2%)	216 (43.2%)
Not mandated/incentivized	100 (20%)	240 (48%)	202 (40.4%)
Unsure of where to go for vaccination/lack of adult vaccination centers (infrastructure)	5 (2.2%)	73 (14.6%)	416 (83.2%)

**Table 4:** Pediatricians' responses to "what data would you need to offer vaccination to adults proactively in your clinic?" (more than one response as applicable)

Required data	Pediatricians (N = 500)
Data on vaccine efficacy and safety	74.2%
Data on disease burden	67.4%
Vaccine recommendation guidelines	66%
Others (easy availability and low cost of vaccine)	0.4%

priority for pneumococcal vaccination in adolescents with chronic lung and heart diseases. The responses are summarized.

Pediatricians were asked what percentage of families consulting with them were aware of adult vaccination (other than the COVID-19 vaccine). According to the majority (92%) of the pediatricians, fewer than 20% of families consulting with them were aware of adult vaccination.

Participating pediatricians were asked to prioritize patient-level barriers to pneumococcal vaccination on a scale of 1–5, with 1 being the highest and 5 being the lowest. For better understanding, the responses were combined into three categories: "high" (1 and 2), "medium" (3), and "low" (4 and 5). According to the pediatricians, patient-level barriers were as follows: most (70%) gave the highest priority to "low awareness regarding pneumococcal disease in adults," followed by 49% reporting "low awareness of the need for adult vaccination" as the patient-level barriers to pneumococcal vaccination in adults. In contrast, 416 (83.20%) of the pediatricians felt that the lack of a vaccination infrastructure is a low-level barrier (Table 3).

Of the surveyed pediatricians, 70.2% reported that "National guideline on adult immunization" could improve vaccine uptake, followed by "Proactive discussion by pediatrician for adults at risk of VPDs" (61.2%) and "strong recommendation/prescription of vaccination from treating physician" (56.4%).

Participating pediatricians reported that they would need the following data (Table 4) to offer vaccination proactively to adults in their clinics.

A total of 152 (30.4%) of the pediatricians reported that they have taken the pneumococcal vaccine, and 241 (48.2%) reported that their families are vaccinated with the pneumococcal vaccine. Meanwhile, 107 (21.4%) pediatricians and their families have not received pneumococcal vaccination.

## DISCUSSION

### Vaccine Hesitance and the Role of Healthcare Professionals in Vaccination

The World Health Organization (WHO) defined vaccine hesitancy as the context- and vaccine-specific "delay in acceptance or refusal of vaccines despite availability and quality of vaccine service" in 2014 and declared it a top global health threat in 2019.<sup>15</sup> Healthcare professionals are a key population in the study of vaccine trust and behavior, as their recommendations influence patient acceptance. Moreover, their personal vaccination behavior affects communicable disease prevention and control in healthcare settings.<sup>16</sup>

### Role Pediatricians in Vaccination in India

In India, pediatricians introduce vaccination to the child, as well as to the family, on the day of the child's birth. Among all the medical specialties, pediatricians have been the primary vaccinators for decades. There is a high acceptance of the pediatrician's recommendations by the family. Hence, pediatricians could play a pivotal role in educating and vaccinating the adults who

accompany the children on vaccination and improve adult vaccination rates in India. In view of this, we conducted a KAP survey to understand the barriers to adult pneumococcal vaccination from pediatricians' perspectives.

### Indian Pediatricians' Knowledge of Adult Vaccination

Pneumococcal vaccination for older adults and individuals at higher risk has been recommended by multiple Indian medical associations, such as the Association of Physicians India, Geriatric Society of India, and Indian Chest Society.<sup>17–19</sup> However, according to the survey, only 49.6% of the pediatricians agreed that pneumococcal vaccination is recommended for older adults. Only 39.6 and 31% of the pediatricians were aware that pneumococcal vaccination is recommended in adults >60 years and in special circumstances for all ages, respectively. The majority of participating pediatricians' priorities for pneumococcal adolescent vaccination were in line with the recommendations of the Indian Academy of Pediatrics.<sup>20</sup> However, a lack of information pertaining to the recommendations for adult pneumococcal vaccination was observed in the study. This may also indicate a lack of understanding by pediatricians of the benefit of pneumococcal vaccination in older adults.

### Indian Pediatricians' Attitude and Practice toward Adult Vaccination

A total of 33.2% of the participating pediatricians reported that they vaccinate



adults only when the adult has been advised vaccination by their treating physician, while 24.8% of the pediatricians offer vaccination to adults at elevated risk for VPDs. Pediatricians and family physicians are major advocates of childhood immunization, both in their offices and in public policy settings.<sup>21</sup> However, a similar attitude is not seen for adult immunization, as observed in this study.

An overwhelming majority (92%) of pediatricians reported that <20% of families consulting with them were aware of adult vaccination, other than the COVID-19 vaccine, underlining the exceptionally low awareness about adult vaccination in India.

As per the participating pediatrician, the highest patient-level barrier to pneumococcal vaccination in India is "low awareness of pneumococcal disease in India." This finding concurs with an observation reported by a study conducted in Türkiye, which found that the attitude and behavior of individuals are influenced by their knowledge of health; the survey found that 64.6% of the adult population had problematic or inadequate health literacy.<sup>22</sup> The second most cited barrier in our study was "affordability." This is relevant in a setting where the patient pays out-of-pocket for vaccination. This was similar to the finding by Neufeind et al., which reported cost coverage problems to be frequent system-related barriers.<sup>23</sup>

Most of the pediatricians reported that "National guideline on adult immunization," followed by "proactive discussion by pediatrician for adults at risk of VPDs," and "strong recommendation/prescription of vaccination from treating physician," could improve adult vaccination in India. A literature review by Dash et al. observed that in India there are various adult vaccination recommendations, but no nationally adopted guidelines, and no systematic programs are in place to recommend, promote, or fund any of these schedules.<sup>11</sup> The lack of a national commitment to improve adult vaccination has resulted in adult immunization being neglected.<sup>11</sup>

Only 31% of the participating pediatricians and 48% of the participants' families were vaccinated with pneumococcal vaccines. Most of the participants reported that to offer vaccination proactively to adults, they would require data on vaccine efficacy and safety, disease burden, and vaccine recommendation guidelines. This finding highlights the need to educate healthcare professionals about adult

vaccination. Dash et al. also recommended that the awareness of the benefits of adult vaccination should be promoted among healthcare professionals, along with the distribution of new adult immunization guidelines.<sup>11</sup>

The survey reported that, according to the participating pediatricians, the national guideline on adult immunization, proactive discussion by pediatricians for adults at risk of VPDs, and strong recommendation/prescription of vaccination from treating physicians could help improve adult vaccination by pediatricians.

### Limitations

There are a few limitations to the present study. The small sample size and the possibility of an imbalanced dataset, such as the economic status of the patients/families seen by the pediatricians, are inherent limitations that might not provide a true reflection. While pediatricians from across all zones and different practice types were included in the survey, the absence of complete geographical representation might not provide a projection of the whole of India.

### CONCLUSION

The study objectively identifies barriers to pneumococcal vaccination in adults in India from pediatricians' point of view. There is a lack of awareness among pediatricians about adult vaccination recommendations. National guidelines for adult vaccination, which provide data on vaccine safety and efficacy, and disease burden, would help pediatricians in counseling adults for vaccination. According to the pediatricians, patient-level barriers to vaccinations are poor awareness and understanding of pneumococcal disease and vaccination, along with affordability.

### KEY MESSAGE

Pneumococcal vaccination rates in adults in India are extremely low. It is important to understand and identify the barriers to pneumococcal vaccination in adults in India from each pediatrician's perspective, even though they are considered the primary vaccinators for children. The survey has helped to understand the KAP patterns of pediatricians for adult pneumococcal vaccination. These insights may aid in developing recommendations for improving adult pneumococcal vaccination by pediatricians in India.

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### CONFLICT OF INTEREST

Santosh Taur and Sripriya Sathyanarayanan are the employee of Pfizer Limited.

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