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Letter to the Editor

Designing an inclusive immunization schedule for children and adults in India

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Immunization plays a pivotal role in upholding public health by effectively preventing the transmission and spread of infectious diseases. By stimulating the body's immune system to recognize and respond to specific pathogens, vaccines effectively equip individuals with the necessary defenses to combat a wide range of diseases. Through the administration of vaccines according to a well-structured immunization schedule, individuals can develop immunity against various infectious agents, thereby reducing their susceptibility to infection and preventing the onward transmission of diseases within communities.[1] Vaccines have been developed and refined over decades of scientific research and have proven to be highly effective in reducing the burden of infectious diseases worldwide. Diseases that were once widespread, causing significant morbidity and mortality, have been significantly curtailed or even eradicated through successful vaccination campaigns. Examples include smallpox, which was eradicated globally in 1980, and polio, which has seen a remarkable decline in cases due to widespread immunization efforts.[2]

Immunization schedules are meticulously designed to ensure optimal protection at different stages of life. India's national immunization program has made significant strides in reducing the burden of vaccine-preventable diseases. Nevertheless, there is a pressing need to optimize and expand the existing immunization schedule to ensure robust protection across all age cohorts. Presently, the schedule predominantly concentrates on immunizations for infants and children, with relatively limited attention given to adolescents and adults.[3] By extending the immunization schedule to encompass individuals up to the age of 26, India can make substantial progress in mitigating the incidence of vaccine-preventable diseases throughout the population. This expansion will enhance the overall effectiveness of the immunization program and contribute to a healthier nation.

A crucial factor in designing an inclusive immunization schedule is considering the immunological maturity of individuals at different ages. Early infancy is a critical period when newborns possess limited immune protection, making them vulnerable to various infections. Immunizations administered during this period, such as Hepatitis B, BCG, and oral polio vaccines, are crucial in providing early defense against diseases. However, as children grow older, their immune systems evolve, necessitating adjustments to the immunization schedule to sustain optimal protection. Furthermore, adolescents and adults, who may be at increased risk of exposure due to lifestyle factors, occupational hazards, or travel, should also be included in the immunization program to ensure comprehensive immunity.[4]

Expanding the immunization schedule to cover individuals up to the age of 26 aligns with the concept of 'lifelong immunization' and has several benefits. First, it enhances individual protection by extending the duration of immunity against diseases that may have waning immunity over time. Second, it helps in reducing disease transmission by creating a larger population with immunity, leading to herd immunity. Lastly, it supports the prevention of outbreaks and the potential reintroduction of diseases that were once under control.[5]

In light of the unique healthcare challenges faced by India, such as a vast population, diverse geographic regions, and varied socioeconomic backgrounds, an inclusive immunization schedule is imperative. It would serve as a comprehensive framework for healthcare professionals and policymakers, guiding the administration of vaccines across different age groups. In addition, it would facilitate standardized and accessible immunization services, ensuring equitable coverage across urban and rural areas.

The establishment of a comprehensive and inclusive immunization schedule for India, encompassing all age groups from newborns to young adults up to the age of 26, holds immense potential in combating vaccine-preventable diseases. By expanding the existing national immunization program and tailoring it to the specific healthcare needs of India's population, the country can significantly enhance public health outcomes and contribute to a healthier future for all its citizens. This article aims to propose such a schedule, incorporating the recommended vaccines tailored to different age groups while addressing the unique healthcare requirements of India's diverse population (Table 1).[6,7]

Table 1. Proposed immunization schedule for children and adults in India.

Vaccines	Age			
	Birth to 15 months	**16 months to 6 years**	**7–18 years**	**19–26 years**
Haemophilus influenzae type B vaccine	Given at 2, 4, and 6 months of age	One dose between this age group	Not recommended	Not recommended
Hepatitis A vaccine	12 months	Up to 23 months	Not recommended	All adults who have not been vaccinated before, two doses, 6 months apart.
Hepatitis A and hepatitis B vaccine	At birth, 1–2 months, 6–18 months	Not recommended	Not recommended	If not vaccinated as a child need to consult the doctor and further proceed.
Hepatitis B vaccine	Two doses 6 months apart	If not given prior two doses 6 months apart	Not recommended	All adults who have not been vaccinated before, three doses, over a 6-month period.
Human papillomavirus vaccine	Not recommended	Not recommended	11 or 12 years to 26 years two doses are recommended for people who get the first dose before age 15.	All women who have not been vaccinated before, and men who are at high risk for Human Papilloma Virus (HPV) infection. The HPV vaccine is given as a series of three doses, over a 6-month period.
Influenza vaccine (inactivated)	Not recommended	One dose annually	One dose annually	All adults, especially those who are at high risk for complications from influenza, such as older adults, people with chronic health conditions, and pregnant women. Flu vaccine should be given every year seasonal.
Influenza vaccine (live, attenuated)	6 months–8 years	6 months–8 years	Up to 8 years two doses every flu season, after one dose in flu season	Not recommended for pregnant women, people with certain chronic health conditions or people who are in close contact with people who are at high risk for complications from the flu advised up to 49 years of age.
Influenza vaccine (recombinant)	Not recommended	Not recommended	Not recommended	Advised for age group 65 years and above.

(Continued)

Table 1. (Continued)

Vaccines	Age			
	Birth to 15 months	**16 months to 6 years**	**7–18 years**	**19–26 years**
Measles, mumps, and rubella vaccine	1 dose at 9–12 months	2nd dose at 16–24 months. (measles vaccine can be given till 5 years of age)	One dose if not given prior	Single dose for all adults who were not vaccinated as children or who do not know their vaccination status.
Meningococcal serogroups A, C, W, Y vaccine	Not recommended	Not recommended	One dose	Single dose for all adults who are at high risk for meningococcal disease (college students, military personnel, and people who travel to areas where meningococcal disease is common).
Meningococcal serogroup B vaccine	Not recommended	Not recommended	One dose at any time	Single dose for adults at high risk.
Pneumococcal 15-valent conjugate vaccine	Two doses, 6–8 weeks apart for children younger than 2 years.	One dose for the high-risk group.	One dose for high-risk groups includes children with chronic kidney disease, cochlear implants, or asplenia.	Those who have not been vaccinated against pneumococcal disease should get one dose of PCV15.
Pneumococcal 20-valent conjugate vaccine	Not recommended	Not recommended	One dose	Adults who are at high risk for serious pneumococcal infections, such as those with chronic health conditions or who are older than 65 years.
Pneumococcal 23-valent polysaccharide vaccine	Not recommended	One dose at 2 years	Not recommended	Not recommended
Tetanus and diphtheria toxoids	1, 2, and 3 doses at 2, 4, and 6 months	18 months and 4–6 years 4th and 5th doses, respectively.	One dose if not given prior	The booster dose is given every 10 years from the last vaccination.
Tetanus and diphtheria toxoids and acellular pertussis vaccine	Not recommended	Not recommended	1 dose at 11–12 years, booster dose every 10 years.	Booster dose every 10 years
Varicella vaccine	First dose at 12–15 months.	4–6 years second dose	Not recommended	All adults who have not had chickenpox or who have not been vaccinated against chickenpox.
Zoster vaccine, recombinant	Not recommended	Not recommended	Not recommended	All adults aged 50 and older. Two doses, 2–6 months apart.
COVID-19 vaccine	Birth to 5 years. Two doses of the Pfizer-BioNTech COVID-19 vaccine, at least 8 weeks apart.	Birth to 5 years. Two doses of the Pfizer-BioNTech COVID-19 vaccine, at least 8 weeks apart.	For all children even if they got the disease in the past. Age group of 15–18 years. Covaxin only.	All adults above 18 years of age. Covishield and Covaxin.

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Not applicable.

Author contributions
Farah Niazi: Conceptualization; Writing – original draft.

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