

REVIEW ARTICLE

Routine Childhood Immunization: Its health, developmental, economic and social benefits

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ABSTRACT

Introduction: Immunization plays a pivotal role in public health. It is one of the most cost-effective inventions that have helped bring down a significant amount of burden of diseases among under-five children, some of which are now on the verge of extinction. **Objective:** To assess the diverse benefits of routine childhood immunization. **Methodology:** A literature review was conducted using electronic database to understand the broader benefits of immunization. **Results:** Studies have shown that routine childhood immunization have been able to reduce the incidence of influenza and other targeted diseases (diphtheria, Haemophilus influenzae type b, measles, mumps, polio, and rubella) by 17% and 100% respectively. **Conclusion:** Vaccines are known to have protective and positive health benefit which extends beyond infancy and childhood. It is therefore one of the best strategies in public health to reduce morbidity and mortality and enable child survival.

KEYWORDS

Immunization, Vaccine, Under-Five Children

INTRODUCTION

Immunization has a significant role in public health because of which millions of lives have been saved globally. It is one of the foundations of primary health care which helps avert morbidity and mortality due to vaccine preventable life-threatening diseases (1, 2). It also prevents a large number of families from falling below poverty line, especially in low and middle income countries, due to out of pocket expenditure on treatment of vaccine preventable disease (3). Therefore, the health, developmental, economic and social benefits

of immunization extend way beyond infancy and childhood (1).

The benefits of immunization programme have not been distributed equally. Children belonging to marginalised population, low socioeconomic status and those living in conflict torn and hard to reach areas are still deprived of basic immunization services (1). There are about 13 million “zero dose” children and about 20 million children fail to receive full course of basic vaccines (1). Globally, the immunization coverage was 86% in the pre-pandemic era which gradually started to lose

ground during the Covid-19 pandemic, with immunization coverage dropping down to 81% in 2021, lowest recorded since 2008 (3).

The world's population is expected to reach 10 billion by 2025 and with the rise in population comes the challenges of availability of manpower, funding, persistent supply of vaccines, effective IEC activities and combating the alarming rise in misinformation regarding vaccines (4, 5). This calls for a strong political commitment to not only promote but provide both vaccines and immunization services and manpower to meet the goal and targets of Immunization Agenda 2030 (IA2030)(6).

For this, the World Health Assembly with its supporting partner and countries have endorsed a strategy called the Immunization Agenda 2030 (IA2030) with a vision to develop a world where people of all ages, everywhere benefit from vaccines and live longer and healthier lives, without undergoing financial hardships (6). It aims to reach 50 million lives over the next decade, to maintain the grounds gained in the field of immunization and also to gain back the grounds lost during the Covid-19 pandemic (6). The objective of this study is to assess the diverse benefits of routine childhood immunization.

MATERIAL & METHODS

Methodology: This review article was conducted to study the diverse benefits of routine childhood immunization by studying the data available on the websites of World Health Organization, UNICEF and the scientific data available on the subjects of immunization, vaccination and its diverse benefits. Also, electronic databases such as Pubmed, Scopus and Google Scholar were searched for.

RESULTS

Health benefits of childhood immunization

The vaccines given to children are immunological substances which stimulate the body's natural defence system to fight against diseases (7). The vaccines provided under National Immunization Schedule protects children against 12 vaccine preventable diseases such as poliomyelitis, diphtheria, whooping cough, tetanus, tuberculosis, hepatitis B, meningitis, pneumonia,

Haemophilus influenza type B infection, rotavirus, Japanese encephalitis, measles and rubella (8).

A child who has been vaccinated is less likely to pass infectious diseases and also help protect other people in the community who are not able to get vaccinated such as babies, children, cancer patients or people with weak immune system (9). By vaccinating children and preventing vaccine preventable diseases, there is reduction in psychological and social burden of illness and also helps the in channelizing the resources in fighting against other diseases (9). Routine childhood immunization has been able to reduce the incidence of all the targeted diseases, leading to decline in incidence ranging from 17% (influenza) to 100% (diphtheria, Haemophilus influenzae type b, measles, mumps, polio, and rubella) (10).

Developmental benefits of childhood immunization

Routine childhood vaccination plays a vital role in protecting the children from vaccine preventable diseases (11). Infection in the early stages of life may adversely affect the health of a child which could result in poor growth, stunting, disabilities and decreased cognitive capacity and have a long term effect, affecting the health during adult life (12). Routine immunization helps reduce the burden due to vaccine preventable diseases making them have good health and lead productive and economically stable lives as an adult, breaking the vicious cycle of poverty, low income and poor health (12, 13, 14,15).

A longitudinal study conducted by Nandi A et al among 2000 children each in India, Ethiopia and Vietnam showed that when measles vaccine is given at the age of 6-18 months of life, children develop 0.1–0.2 higher anthropometric Z score, a score of 1.7–4.5 percentage points higher on standardized cognition tests and additional schooling grades of 0.2–0.3 at ages 7–8 and 11–12 years have been observed (16). The association between National Immunization Programme of India and height-for-age and weight-for-age z-scores among children of 0–4 years has been found to be 0.3–0.5 higher as compared to other children (17). Childhood vaccination has been

associated with 7.4% higher rate of enrolment among school children (18, 19).

The study conducted by Joe et al (20) show that children who had received all the vaccines by the age of 12 months performed better in math test (OR: 1.87, 95% CI: 1.48, 2.35), had better writing (OR: 1.77, 95% CI: 1.44, 2.18) and reading skill (OR: 1.60, 95% CI: 1.23, 2.09) as compared to children who were unvaccinated or partially vaccinated. A study on long term benefits of childhood vaccinations among adults was conducted by Nandi et al (20) and the study suggest that adults born on or after Universal Immunization Programme in India attained 0.18–0.29 more grades of schooling as compared to those born before UIP. An increase in 4-6% in men's wages and 5-8% in women's wages has been associated with gains in school attainment and extra years of schooling in India (21). Also, women who were vaccinated as per UIP were found to be physically stronger as compared to those who were not vaccinated (20).

Economic benefits of childhood immunization

Childhood vaccination is one of the most cost-effectiveness interventions which have helped reduce under-five mortality due to vaccines preventable diseases (22). Vaccinating a child against diseases helps cut down economic cost such as, the fees of the physician, expenditure on medicine and hospitalisation, travel cost and wages lost (23). This significantly impacts the lives of the people especially those living in developing country like India, where the total out of pocket expenditure in health is 47.1% (2019-20) (24, 25) whereas, the cost of getting a child fully vaccinated is as low as \$18 USD (5). The aim of the National Immunization Programme is to provide free of cost vaccines to a birth cohort of 27 million children, annually (26).

In India, the estimated cost of providing basic vaccines and all the vaccine which are included in the National Immunization Schedule was \$784.91 million US\$ and 1.73 billion US\$ respectively (27). However, the estimated cost (including cost of vaccines, manpower and other expenses) to achieve per fully immunized child, varied widely from one district to another and was found to be ranging

from \$12.43 to \$55.36 US\$, and the cost at the national level to vaccinate 90% of the children with EPI vaccines was estimated to be \$784.91 million US\$ (27). The current public spending in RCH Flexible Pool is Rs. 6,273 crore (\$757.59 million US\$) (8), which is approximately \$27.32 million US\$ lesser than estimated requirement.

According to the Global Analysis study conducted by Carter et al (10), if IA2030 targets are met, with increase in immunization coverage about 51.0 million (95% CI: 48.5 – 53.7) under-five deaths are expected to be prevented with the help of immunization between the years 2021-2030 and about an average of 5.1 million under-five deaths per year (4.9 – 5.4) can be averted annually. Also, by meeting the targets of Immunization Agenda 2030, 18.8 million (16.7-21.1) and 14 million (13.6 million-14.4 million) of total deaths due to Measles and Hepatitis B can be averted, respectively. Also, according to the study conducted by Ozawa et al on Estimated economic impact of vaccinations in 73 low- and middle-income countries, 2001–2020 (28), childhood vaccination could prevent 20 million deaths, 500 million cases of illnesses, 9 million cases of disabilities and 960 million Disability-Adjusted Life Years (DALY).

India is home to 17% of the global under-five population and accounted for 27% of global under-five deaths in 2018, substantial number of which were due to vaccine preventable diseases (29,30,31). According to the study conducted by Ozawa S et al (29), immunization could help avoid a mean loss of approximately \$5 US in treatment per year. It has also been estimated that vaccines will help keep 24 million people away from poverty by 2030 (32).

Social benefits of childhood immunization

Over the last two decades, India's extreme poverty has reduced to 21% infant mortality has been reduced to halve and about 80% of the women reach health care facility for delivery (33). However, these successes have not resulted in improved quality of life of all the women and children (33) and a large section of the society still belongs to low socio-economic status (32). Having to spend money

for treatment on vaccine preventable diseases could push families into financial instability and also, those playing the role of care taker are unable to help contribute to family income by not being able to participate in economic activities (32).

Factors like poverty, malnutrition, unsatisfactory WaSH practices, overcrowding, discrimination, underprivileged communities and urban-concentrated health care system continues to be a problem in developing country like India, making the population, especially the under-five children fall prey to preventable diseases (3). The introduction and adoption on Expanded Programme of Immunization in India in 1978 has given the children, irrespective of the social conditions, their right to good health (3).

Immunization plays a vital role in protecting the future generation. It has helped the world get rid of debilitating diseases such as polio (31). Measles, one of the prime causes of blindness, deafness and mental disability has been averted by measles vaccine (33). Also, vaccinating pregnant mothers with Td vaccine and women of reproductive age group with MMR vaccine helps protect against maternal and neonatal tetanus, diphtheria and congenital rubella, respectively (32,33). Decreasing mortality and morbidity among under-five children helps them survive adulthood and have more potential to lead healthy and productive lives (3).

CONCLUSION

Vaccines are known to have protective and positive health benefit which extends beyond infancy and childhood. It is therefore one of the best strategies in public health to reduce morbidity and mortality and enable child survival. To improve immunization coverage healthcare facilities providing immunization services needs be to easily accessible in high-risk/hard to reach areas to gain the ground that was gained during the pre-pandemic era. Intensified IEC activities need to be carried out to not only engage the community but also to accelerate the demand for vaccination to leave no child behind.

AUTHORS CONTRIBUTION

All authors have contributed equally.

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CONFLICT OF INTEREST

There are no conflicts of interest.

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