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## Review Article

## Ensuring childhood vaccination among slums dwellers under the National Immunization Program in India - Challenges and opportunities

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## ABSTRACT

**Aims:** Almost, one third of the world's urban population resides in slums and the number would double by 2030. Slums denotes collection of people from various communities having a meagre income and living in unhygienic conditions thus making themselves most vulnerable for outbreaks of communicable diseases. India contributes substantially to the global disease burden and under-five mortality rates i.e. 20% attributable to vaccine preventable diseases. Immunization plays a crucial role in combating high childhood mortality rates attributable to vaccine preventable diseases across the globe. This systematic review, provides insights on immunization status in slums, identifies various factors influencing it thus, exploring opportunities that may be available to improve vaccination coverage under the National Immunization Program.

**Methods:** Taking into account the above aspects, a review of literature was undertaken in various databases that included studies published between 2006 and 2017.

**Results:** In India, ~33% of the urban population lives in slums with suboptimal vaccination coverage ranging from 14% to upto 90%. Few of the important causes for low coverage included socioeconomic factors such as poor community participation, lack of awareness, frequent migration, and loss of daily income. Hence, mere presence of vaccines in the National Immunization Program doesn't do the job, there is a definite unmet need to emphasize upon the importance of immunization among slums dwellers and take necessary steps. For instance, delivering immunization services at the doorstep (e.g. pulse polio program), community-based education, text messaging as reminders and incentivized immunization services are some of the opportunities that can be explored and implemented to improve immunization status in the slums.

**Conclusion:** Thus, in addition to inclusion of more and more vaccines in the National Immunization Program, there is a definite need to focus on people living in high risk areas in order to improve coverage and healthcare indicators.

## 1. Introduction

Approximately, one third of the world's urban population dwells in slums. The number has rapidly multiplied from 689 million in 1990 to 880 million in 2014 and is expected to double itself by 2030 (Ezeh et al., 2016). The United Nations Educational Scientific and Cultural Organization (UNESCO) define slum as “a contiguous settlement where the inhabitants are characterized as having inadequate housing and basic services.” However, the most widely used definition by the United Nations Human Settlements Program (UN-Habitat), is based on households and is defined as “a group of individuals that live under the same roof that lack one or more of the following conditions: access to improved water,

sanitation, sufficient living space, durability of housing and secure tenure”. These unhealthy surroundings provide fertile ground for microbial growth and are home to a wide array of infectious diseases, which are a major cause of morbidity and mortality. Neonates, infants and children are the most vulnerable and their health is a function of poverty as well as intimately shared physical and social environments (United Nations Educational Scientific and Cultural Organization, n.d.; UN-Habitat, 2003).

Annually, an estimated 5.2 million deaths occur in children aged 1 to 59 months across the globe, of which 29% are vaccine preventable (World Health Organization (WHO) and United Nations Children's Fund (UNICEF), 2014). India, with world's largest annual birth cohort of 27

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million and a homeland to 1.2 billion people with vast variability (ethnic, biodiversity, disease prevalence patterns, practice of varied systems of medicines, socioeconomic status, etc.) contributes the largest number of under-five deaths, of which 20% is related to vaccine preventable diseases (VPDs) (Tripathi, 2010; Government of India, 2011). It is vital for the scientific community to understand that the actual burden of VPDs would be much greater, as under reporting and lack of surveillance data for many VPDs is a well-known fact.

Immunization is one of the safest and most cost-effective public health interventions for controlling and eliminating life-threatening infectious diseases. Globally, an estimated 2 to 3 million deaths are averted each year with immunization and it has moved to center stage as one of the vital driving forces in reducing mortality (World Health Organization, n.d.; Duclos et al., 2009). It also provides a range of other benefits such as disease control and elimination, prevention of drug resistance, and overall economical and societal well-being. Though, India is a leading producer and exporter of vaccines, it has one of the lowest immunization coverage rates in the world. There are about 9.6 million unimmunized children in India accounting for more than one-third of the 27 million unimmunized children around the world. Less than 44% of children in India receive complete immunization as per recommended schedule and the percentage is only slightly better than that in 1998 (42%). Also, within the same population, there is discrepancy in immunization coverage that is governed by demographic, socioeconomic and political factors. For instance, in rural areas coverage is 58.5% whereas in the urban areas it is 67.4% with variation across states, regions, and districts. On the contrary, the situation is much better in India's neighbouring countries. For example, in Bangladesh, 82% of children are fully immunized by two years of age. In Nepal as well, 80% of children are fully immunized by one year of age (Laxminarayan and Ganguly, 2011).

In regions with low immunization coverage; VPDs lead to worst health outcomes, particularly in slums (Crocker-Buque et al., 2017). The situation is critical for all developing countries, including India, as nearly 33% (100 million) of the urban population lives in unorganized slums. The slum dwellers are characterized as one of the most vulnerable populations for VPDs' outbreaks due to overcrowding, scarcities in the healthcare system, poor hygiene and sanitation (Urban Health Resource center (UHRC), n.d.).

Following preliminary screening of the literature pertaining to people belonging to low socioeconomic background, a variable trend was observed in immunization coverage. The authors genuinely believed and acknowledged that a special emphasis must be laid upon the low socioeconomic strata in relation to immunization, which is beyond mere inclusion of vaccines in the National Immunization Program (NIP). Thus, in the interest of public health, the authors felt the need to address the following questions:

1. What is the immunization coverage in slums and common factors affecting it?
2. What are the various opportunities to improve immunization coverage in slums?

In view of above questions, the objective of this systematic review was to:

1. Provide an overview of the NIP of India, vaccines included in the NIP of India and neighbouring countries
2. Find out vaccine coverage in slums and various factors affecting the coverage
3. Explore various opportunities available to improve immunization coverage in slums

## 2. Methods

To address the above questions keeping the objectives in mind, a

literature search was conducted in PubMed using text words “vaccine”, “slums”, “India”, “poverty areas” and “immunization” either as text or as MeSH terms. Studies published between 2006 and 2017 with the population living in a low-income urban area, slum or poor community were considered for this review. Primary studies that were identified from the list of references in the review articles were also included. In addition, we explored other databases such as Google Scholar. A separate search was conducted to obtain details of National Immunization Program of India and its adjoining countries. The types of articles that were used to write this review article include primarily observational clinical studies carried out to evaluate the immunization status in the slums, articles published by WHO on the immunization status in the developing countries and Ministry of Health websites of different countries to know the vaccines included in their immunization program and its status.

## 3. National Immunization Program

Immunization services are offered as a part of country's healthcare system that provides access to vaccines in order to control VPDs by vaccinating the eligible beneficiaries in a timely manner (Shen et al., 2014). In India, the immunization program was started in 1978 under the name of ‘Expanded Program on Immunization (EPI).’ In 1985, EPI was changed and renamed “Universal Immunization Program (UIP)” to cover six VPDs (tuberculosis, diphtheria, pertussis, tetanus, polio, and measles). Across the globe, India's UIP is the largest of its kind in terms of quantity of vaccine, number of recipients, geographical spread and area covered. It caters to 27 million infants and 30 million pregnant women annually (Raoot et al., 2017). The stated objectives of UIP are to: (i) rapidly increase immunization coverage, (ii) improve the quality of services, (iii) establish a reliable cold chain system at public health facility level, (iv) introduce a district-wide system for monitoring of performance, and (v) achieve self-sufficiency in vaccine production (National Health Mission, n.d.-a). Table 1 lists the vaccines that are part of the national/universal immunization program in India and its adjoining countries (National Health Mission, n.d.-b; *EPI Fact Sheet 2016 for India, Sri Lanka, Bangladesh, Nepal, Bhutan, and Myanmar*, n.d.; Epidemiology Unit, Ministry of Health, Government of Sri Lanka, n.d.; Directorate General of Health Services, Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh, 2016; Department of Health Services, Ministry of Health, Government of Nepal, 2016; Ministry of Health, Royal Government of Bhutan, n.d.; *Expanded Program on Immunization Multi Year Plan. Central Expanded Programme on Immunization Department of Health, Ministry of Health, The Republic of the Union of Myanmar, 2012–2016; Expanded Program on Immunization (EPI), Pakistan, n.d.; Expanded programme on immunization, n.d.*)

Despite being operational for > 30 years, only 65% children get the benefit of complete vaccination in the first year of their lives. In the recent years, the coverage has stagnated to an average incremental rise of 1% every year. Poor progression in immunization uptake is due to challenges and issues at multiple levels, which are more pronounced at program and community levels (Table 2) (Pradhan, 2010). The Government of India (GoI) is committed in taking steps to address and strengthen its immunization program to control VPDs. In order to achieve full immunization coverage for all children at a rapid pace, GoI launched “Mission Indradhanush” in December, 2014, targeting all children < 2 years of age and pregnant women with all available vaccines (Government of India, n.d.).

### 3.1. India's slum population and its immunization coverage

As per UN-HABITAT, the slum population in India was approximately 169 million in 2005 and is projected to increase to 202 million by 2020. This vast, unorganized population is the major health challenge for increasing the immunization coverage and achieving its goal.

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