



Reports on Global Health Research

K Suresh Rep Glob Health Res: RGHR-101.

Commentary

DOI: 10.29011/RGHR-101.100001

Challenges of Urban Immunization in India

K. Suresh*

Freelance Public (Child) Health Consultant, Bengaluru, India

*Corresponding author: Suresh Kishan Rao, Retd. Program Officer- Health, UNICEF, India Country Office, New Delhi, Bengaluru-India. Tel: +919810631222; Email: ksuresh.20@gmail.com

Citation: K Suresh (2018) Challenges of Urban Immunization in India. Rep Glob Health Res: RGHR-101. DOI: 10.29011/

RGHR-101.100001

Received Date: 14 August, 2018; Accepted Date: 23 August, 2018; Published Date: 31 August, 2018

What is Ailing Urban Immunization in India?

Immunization is one of the key inventions of the last century and the biggest success of modern medicine. On April 26 2017, Prime Minister Narendra Modi chairing one of his regular progress review sessions asked Union Ministry of Health & family Welfare not to wait for 2020 to achieve the goal of 90% immunization but make it happen by 2018[2]. The calling is large as every year, 8.9 million children remain at risk due to incomplete or no vaccination [2].

A record of 123 million infants were immunized globally in 2017 with at least one dose of the diphtheria-tetanus-pertussis (DTP) vaccine [1]. Over all 90% infants received at least one dose of diphtheria-tetanus-pertussis over the world. An additional 4.6 million infants were vaccinated globally in 2017 with three doses of the DTP vaccine compared to 2010 [1]. Despite these successes, almost 20 million infants did not receive the benefits of full immunization in 2017. In addition, a growing share is from middleincome countries, where inequity and marginalization, particularly among the urban poor, prevent many from getting immunized [1].

National Family Health Survey (NFHS-4) 2015-16 has revealed that nationwide only 62.6% of children were fully immunized by their first birth day. While 64.8% of rural children were fully immunized, the proportion of fully immunized children in urban was significantly less at 59.8% proving the fact that inequity and marginalization particularly among the urban poor prevented nearly 40% from getting fully immunized [3]. Government data shows that the proportion of children and mothers who are missed, has not dropped drastically (27% to 21%) despite the gains of the four phases of 'Mission Indradhanush' The percentage of children missed due to "operational gaps," attributed to the faltering of the mission itself, has also remained consistent at 10% and 11% [2].

In India, ~33% of the urban population lives in slums with suboptimal vaccination coverage ranging from 14% up to 90%. Few of the important causes for low coverage included i) Operational limitations such as inadequate infrastructure including human resource for outreach services growing urban poor inhabi-

tations of construction labour and unorganized small industries, majority of whom may not even be recognized by the municipal authorities, are devoid of regular services. ii) 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 and urgency to take necessary steps. For instance, delivering immunization services where the urban poor and disadvantaged people live on regular basis, community system strengthening and community mobilization through Non-governmental Organizations (NGOs) and local Community-based Organizations (CBOs), 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.

Thirty-three years after launch of universal Immunization Program in 1985 and with reference to the marching order from the Honourable Prime Minister to achieve 90% coverage by 2018, the situation calls for urgent action in urban India countrywide and especially for urban poor in India. This paper analyses the status of urban Immunization, the challenges and solutions and need for stronger commitment from national, State and local health authorities not just in words but by allocating requisite resources.

Introduction

Traditionally- major thrust of immunization is reduction of infant and child mortality. However, Hepatitis B vaccine is administered in infancy to give lifelong protection against liver cancer and other complications and HPV vaccine given to adolescents before they have sexual contact, as most cases of cervical cancers are associated with human papillomavirus (HPV) and various strains of HPV spread through sexually transmitted infections. While the basic immunization schedule includes vaccination against Tuberculosis (BCG), Diphtheria, Pertussis, Tetanus (DPT), Polio {Oral Polio Vaccine (OPV) & Injectable Polio Vaccine (IPV)}, Hepatitis B virus (Hep. B), Haemophilus Influenza B (Hib), Viral Diarrhoea

(Oral Rotavirus vaccine) in combinations. 167 countries included a second dose of measles vaccine in RI schedule. 162 countries now use rubella vaccines and global coverage increased from 35 % in 2010 to 52 % in 2017. The human papillomavirus (HPV) vaccine was introduced in 80 countries to help protect women against cervical cancer. Additional vaccines like new formulations of meningitis and polio vaccines are being included into the national schedules [1].

India Commits for 90% Immunization by 2018

On April 26 2017, Prime Minister Narendra Modi chaired one of his regular 'PRAGATI review sessions' with bureaucrats from different ministries and chief secretaries from the states. On health, he addressed 'Mission Indradhanush', the universal immunisation programme and the 'Swachh Bharat Mission'. In his address, the prime minister asked the Union health ministry to buck up. He advised them not to wait till 2020 to achieve the goal of 90% immunisation, but to make it happen two years earlier - by 2018. The calling is large - every year, half a million children die in India due to vaccine preventable diseases and another 8.9 million remain at risk due to incomplete or absent vaccination [1].

History of Vaccine availability -India

Reviewing the history of availability of vaccines in India reveals that Small Pox Lymph Vaccine first given in Mumbai on 14 June 1802, followed by first Cholera Vaccine trial conducted in Agra in 1893. In 1897 Dr. Haffkine developed the first Plague Vaccine in India produced in today's Haffkine Institute since 1925 till plague eradication and in 1907 first neural vaccine against Rabies in Pasteur Institute of India (PII) Coonoor, Tamil Nadu (TN) was produced. Then came the advent of 1920-40 DPT/DT/TT vaccines were available followed by 1948 BCG Vaccine pilot in Guindy in 1948 and by 1951 liquid Bacillus Calmette-Guerin (BCG) was made available making way for mass campaign in 1951.

1965 witnessed a great development in Freeze Dried Small Pox vaccine after nearly 163 years of its first introduction in India. Then followed the availability of Freeze dried BCG vaccine and OPV in 1967. From 1970 indigenous OPV produced from imported Bulk. In 1980- Indigenous Measles Vaccine was produced by Serum Institute of India (SII) Pune. It was SII again in2013, followed by Shanta Biotech (in 2014) and Biological Evans (BE in 2016) produced Indigenous Pentavalent vaccine. Indigenous Oral Rotavirus (Bharat Biotech) Vaccine Produced in 2014 [3].

History of Immunization Program in India

The chronology of introduction / dropping of vaccines in Indian National Immunization program were: DPT, DT, Typhoid & TT early 1970's. Oral Polio Vaccine in early 1980's, Measles Introduced in 1985, Typhoid vaccine dropped in 1987-88 due to multiple complaints of reactions to the then available Typhoid/para-

typhoid vaccine affecting the uptake of other vaccines. In 1999 Mumps, Measles and Rubella (MMR) was introduced in Delhi, by now offered in Goa, Puducherry, Sikkim also. In 2002 Hepatitis B was introduced in 3 States that was expanded countrywide by 2011. In view of outbreaks of Japanese encephalitis in UP and Bihar in 2006, Japanese Encephalitis (JE) was added to the schedule to cover all the 112 endemic districts by - 2010. Second dose of measles introduced in 2010, followed by Hib in Pentavalent in TN/ Kerala in 2011 and country wide by 2014. 2015 saw introduction IPV in 6 states after achieving polio eradication and expanded to cover rest of the country by 2016. Oral Rotavirus Vaccine was introduced in 2017.

Urban India as launch pad in Vaccination Programs

Most of the vaccines were tried in urban areas first in India before they were expanded to cover the entire country. First of all, in 1897 the small pox vaccination was offered through 'dispensaries' in urban areas, which also acted as a store for Old Lymph Vaccine (OLV). From February 1949, five India Tuberculosis Control (ITC) teams demonstrated BCG vaccination in various urban centres, starting a small scale pilot in Madanapalle, TN. In 1994 measles vaccine introduction trials were conducted in Delhi, Bidar-Karnataka and Devas in Madhya Pradesh. Pulse polio strategy was also tried in Delhi for the first time in 1994-95 before country-wide campaign was launched in 1995-96.

Realities of DATA for URBAN Immunization in India

Municipal Administration attaches low priority to health data in general and immunization in particular. Most of vaccine preventable diseases (VPD) surveillance data is generated from paediatrics hospitals in cities and towns. Desegregation according to the normal residence of these cases is rarely done and matched with vaccination coverage. Authenticity of the Resident status of the events reported rarely identified. The epidemiological analysis of communities reporting such cases in urban areas is hardly done for documenting full picture of the outbreaks. Most cities rely upon Registration of births & deaths and Census data and disease surveillance data from health facilities. Registration is good but rarely complete. Town /City Specific Desegregated data by wards (lowest unit) and urban poor for many health determinants in India is lacking. Reported immunization data is the collation of services provided in facilities for the children brought. Most cities lack capacity for collecting or collating and analysing immunization data too due mainly to priority given and poor human resource (HR).

Current Immunization Coverage Status

Routine Immunization data from the Ministry of Health & Family Welfare gives reported data by districts and states integrat-

ed for rural and urban. The data is generally believed to be over reported due to multiple reasons, most importantly as inferred by periodical immunization coverage surveys over the last 2 decades. There is also inordinate delay in putting the data on public domain, for example, the information available now on National Health Mission (NHM) portal is for the year 2016-17. The data from IndraDhanush has been complicating the reported coverage data in last 5-6 years as its numerator is mixed age coverage information by each round.

World Health Organization (WHO) and United Nations Children Fund (UNICEF) globally estimate the immunization coverage by countries considering the reported data and recent coverage evaluations. The estimates of routine Immunization for 2017 puts the Indian antigen-wise coverage data for BCG at 91%, DPT3-88%, OPV3-88%, Hep.B3-88%, MCV1-88%, MCV2-77%, Rotavirus-13% [11]. These estimates also are not comparable to the coverage evaluation data for the corresponding period.

Immunization Coverage Data by Surveys

There had been attempts to collect city specific urban poor immunization status by standard (random cluster surveys) coverage evaluation surveys from 1995-96 for three years from UNI-CEF India [5]. After a gap of 8 years UNICEF, India country Office renewed the effort for the MOH&FW, Govt. of India again in 2005. In the last 13 years four important sources of Immunization are CES by UNICEF India in 2005 [6], 2006 [7] & 2009 [8] and National Family Health Surveys (NFHS 1-4) between 1992-93 and 2015-16 [9]. The trend of Urban Rural coverage based on these reports is indicated in the Table 1.

The overall trend of country's urban immunization coverage indicates a steady decline from 2006 (NFHS3) onwards, compared to the coverage in rural India that has improved a bit since in the same period.

The percentage of children age 12-23 months who have received all basic vaccinations increased from 43.5 % in 2005-06 to 62% in 2015-16. Between 2005-06 and 2015-16, this percentage increased more in rural areas (from 39% to 61%) than in urban areas (from 58% to 64%). This may be attributed to GOI's campaign approach called Indradhanush that was better planned and implemented in rural sectors of the country. The proportion of children who received no vaccinations remained low in both surveys (5-6%).

	Table-1	Historical	Perspectives	of
IMMUN	NOITASIN	COVERAGE	IN INDIA (Sense	Sarveys- 1993-2015)
	THE SPECIAL PROPERTY.	O month	TOTAL	

Source /Year	Urban	Rural	TOTAL	Remarks
2015-16 (NFHS -4) resid to	63.9	61.3	62.0	
2009 (UNICEF) NOV 2009-Jan10	67.4	58.5	61.0	
2006 (UNICEF) Jan-April 2007	74.3	58.4	62.4	
2005-06 (NFHS3)	57.6	38.6	43.5	
2005 (UNICEF) Dec-04 to 05	67.8	47.4	54.5	
1998-99 (NFHS 2)	NA	NA	42	
1992-93 (NFHS1)	41.5	23.4	27.5	

Table 1: Historical Perspectives of IMMUNIZATION COVERAGE IN INDIA.

The state specific urban immunization coverage situation used in this paper is based on NFHS-4 data [10]. The overall sample size required for NFHS-4 were guided by several considerations, paramount among which was the need to produce indicators at the district, state/union territory (UT), and national levels, as well as separate estimates for urban and rural areas in the 157 districts that have 30-70 percent of the population living in urban areas as per the 2011 census, with a reasonable level of precision. In addition, the NFHS-4 sample was designed to be able to produce separate estimates for slum and non-slum areas in eight cities (Chennai, Delhi, Hyderabad, Indore, Kolkata, Meerut, Mumbai, and Nagpur), that set of data is yet to be published.

According to NFHS-4 report, over all coverage in Urban India was 63.9% as compared to 61.3% in rural India (Table 1). The proportion of fully immunized children increased from 57.6% to 63.9% in Urban India over a period of nearly one decade. The proportion of unimmunized children remained almost constant between 5-6%. (Figure 1).

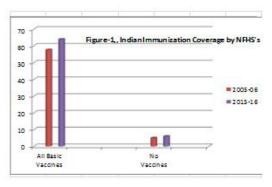


Figure 1: Indian Immunization Coverage by NFHS's.

There are 21 States/UTs which seen above the All India (62%) percentage of Children of 12-23 months' age have been fully immunized (BCG, measles, and 3 doses each of polio and DPT). These States/UTs are Puducherry, Punjab, Goa, Lakshadweep, West Bengal, Sikkim, Kerala, Chandigarh, Odisha, Chhattisgarh, Jammu & Kashmir, Andaman and Nicobar Islands, Tamil Nadu, Himachal Pradesh, Telangana, Delhi, Daman and Diu, Manipur, Andhra Pradesh, Karnataka and Haryana. There are 15 States/UTs which seen below the all India (62%) percentage of Children of 12-23 months' age have been fully immunized namely Nagaland, Arunachal Pradesh, Dadra and Nagar Haveli, Assam, Gujarat, Mizoram, Uttar Pradesh, Madhya Pradesh, Tripura, Rajasthan, Maharashtra, Uttarakhand, Meghalaya, Bihar and Jharkhand [10].

Seventy (70) % of children aged 12-23 months whose mothers have 12 or more years of schooling have received all basic vaccinations, 52% of the children whose mothers had no schooling and 60% of children whose mother had Primary education. Immunization coverage among wealth quintiles indicated that while children of parents with lowest quintiles had coverage of 53% as compared to 70% among children of highest quintiles. Second, third and fourth quintile children had coverage of 61, 64 and 67% respectively.

An analysis of the full immunization coverage (Table 2, next page) by states desegregated by residence in NFHS-4 for 2015-16 as compared with that in NFHS3 in 2005-06 and contribution of Private sector in respective years is done to infer the outcomes by states. It indicated that while countrywide total full immuniza-

tion coverage improved in the recent year by almost 30%. The urban India immunization coverage was marginally higher (2.6%) at 63.9% as compared to Rural India (61.3%). While majority of states showed improvement in immunization coverage during 2015-16 over 2005-06, but a few states like Haryana, Himachal Pradesh, Maharashtra, Tamil Nadu and Uttarakhand recorded deterioration in NFHS-4 compared to NFHS3. The states of Andhra Pradesh, Haryana, Karnataka and West Bengal were unique in recording significantly lower coverage in urban area as compared to rural area. On the contrary the states of Assam, Chhattisgarh, J&K, Jharkhand, MP, Manipur, Meghalaya, Nagaland, Rajasthan, Tamil Nadu and Tripura had significantly higher proportion of fully vaccinated children in urban areas. Some other states like Bihar, Delhi, UP etc. the coverage by residence (urban vs. rural) did not show much difference.

Another interesting point to see is the contribution of private sector in full immunization has decreased by 31% over this decade period from 10.5% to 7.2%. The contribution of private sector as source of immunization has improved only in Goa, Manipur, Mizoram, Nagaland and Sikkim in the last one decade, whereas the same has deteriorated in all other states. Across all the states the contribution of private sector as source of immunization is much higher in urban areas as compared to rural India. This follows the pattern of private sector, as private services are lacking in villages and population depends upon public sector solely at least for immunization. There is a large scope to mobilize private sources in urban India.

Country/State	NFHS-4			NFHS3	Private as source of Immunization			
	Urban	Rural	Total	Total	Urban	Rural	Total	NFHS3
India	63.9	61.3	62	43.5	16.7	3.4	7.2	10.5
Andhra Pradesh	60.4#	67.2	65.3		16.6	5.1	8.4	
Andaman & Nicobar	61.8#	82.5	73.2		0	0	0	
Arunachal Pradesh	44.2	36.4	38.2	28.4	8.7	4.5	5.5	3.2
Assam	70.9	44.4	47.1	31.4	21.8^	3.3	5.3	7.3
Bihar	59.7	61.9	61.7	32.8	11.4	3.2	3.9	9.8
Chandigarh	77.2	NA	79.5		7.7		6.9	
Chhattisgarh	84.9	74.3	76.4	48.7	12.4	1.4	3.6	4.6
NCT Delhi	66.2		66.4	63.2	7.5		7.4	22.1
Goa	87.7	90.1	88.4	78.6	27.3^	13.6	22.8*	15.5
Gujarat	50.4	50.4	50.4	45.2	21.8^	5.6	12.6	15.1

					,			
Haryana	57#	65.1	62.2*	65.3	8.6	3.1	5.1	6.5
Himachal Pradesh	64.8	69.9	69.5*	74.2	5.3	1.7	1.9	2.2
Jammu & Kashmir	81.6	72.9	75.1	66.7	6.1	0.8	2.1	7.3
Jharkhand	67	60.7	61.9	34.2	18.5^	1.6	4.6	11.1
Karnataka	59.8#	64.8	62.6	55	21.3^	3.9	11.4	19.7
Kerala	82.2	82	82.1	75.3	27.4^	18.3	22.4	30.7
Madhya Pradesh	63	50.2	53.6	40.3	10.8	1	3.7	6.7
Maharashtra	55.8	56.7	56.3*	58.8	21.3^	7.6	13.6	18.2
Manipur	74.3	61.7	65.8	46.8	7	5.6	6.1*	3.3
Meghalaya	81.4	58.5	61.5	32.9	18.9 [^]	2.5	4.9	8.9
Mizoram	49.8	51.3	50.5	46.5	13.1	0.6	7.2*	5.7
Nagaland	41.6	33.4	35.7	21	15.4	4.5	7.8*	6.1
Odisha	75	79.2	78.6	51.8	6.2	0.1	1.0	2.5
Punjab	88.7	89.3	89.1	60.1	19.6^	5.7	11.0	14.5
Puducherry	93.9	91.3	91.3		13.8	2.5	10.3	
Rajasthan	60.9	53.1	54.8	26.5	11.1	2.4	4.4	4.1
Sikkim	81.4	83.7	83	69.6	8.1	4.9	5.9*	0.4
Tamil Nadu	73.3	66.8	69.7*	80.9	21.3^	8.1	14	25
Telangana	67.8	68.3	68.1		28^	4	16.1	
Tripura	64.2	51.2	54.5	49.7	7.4	0	2	1.7
Uttar Pradesh	53.6	50.4	51.1	23	14.5	2.5	5.1	5.4
Uttarakhand	56.5	58.2	57.7*	60	10.3	4.6	6.3	12.4
West Bengal	77.7#	87.1	84.4	64.3	9.6	8.3	3.2	7.2
		#= Lower	· Urban Immunia	zation = Highe	er Urban Immuni	zation		

#= Lower Urban Immunization, -- = Higher Urban Immunization, ^= Significant Private source, & *= Improved private source in 2015-16

Table 2: Full Immunization Coverage by Residence- NFHS-4 &NFHS-3 and Private sector contribution.

Analysing the full immunization coverage [10] in the Capital cities or other major cities of the states one sees that only six cities of Chennai (TN), South Goa (Goa), Jalandhar (Punjab), Nagpur (Maharashtra), Raipur (Chhattisgarh) and Srinagar (J&K) had achieved more than 80% coverage. Metropolitan city districts like, Mumbai (45.6), Delhi (66.2) Kolkata (66.6) and lag behind. So are other capital city districts of Hyderabad, Bengaluru, and Lucknow, Jaipur, Patna and others. One wonders why these urban districts despite possessing multiple private and public sector facilities and individual private paediatricians and nursing homes providing immunization services have poor coverage (Figure 3).

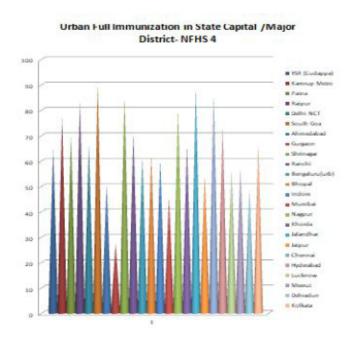


Figure 3: Urban full immunization in State capital major district-NFHS 4.

What Ails Urban Immunization?

A cursory review of the Urban India Immunization Program reveals that there is mere presence of vaccines in the National Immunization Program and plenty of sources of immunization services both in public and private sectors in most of the cities and towns. It is also proved that this only doesn't do the job. There is a definite unmet need especially among urban poor and urgency to take necessary steps.

Immunization in urban slums has been a challenge. In a systematic review involving 64 studies [13], it was inferred that different factors affect immunization coverage in different urban poor and slum contexts. Barriers in knowledge among mothers include poor awareness of immunization schedule and vaccine preventable diseases. Mothers postpone or delay vaccination due to common childhood illness. Lack of family support, negative attitude of the elderly at home, poor male participation, gender bias, apprehension of giving many vaccines at one time and adverse rumours are the commonly mentioned attitudinal barriers to immunization. Barriers to utilization of immunization services included economic constraints, long distance to health facility, and loss of daily wages while attending immunization clinic, inconvenient timings and lack of effective communication with health personnel [12-14]. In the study conducted in Slums of Bangalore (2015) only 12 (5.7%) were partially immunized of which 6(50%) abstained due to AEFI. Lack of faith, myth and contraindications contribute to 8.3% each [12].

In a study by UNICEF Patna, it has been concluded that Coverage can be rapidly improved through outreach immunization in

low socioeconomic areas if existing opportunities are carefully utilized. Immunization services need to be designed in collaboration with slum-dwelling communities, considering the local context, convenient timing and place accessible to all without discrimination of cast and creed. Interventions should also be designed and tested to increase immunization in migrants from rural areas [15].

On 5th June 2018 Dr B. Y. Sudarshan from BBMP Bangalore shared some of the key issues and concerns in Bruhat Bengaluru Municipal Corporation (BBMP) areas as [3]: No clear area Demarcation for UPHC and Health Workers, poor relocation of PHC and sub-centre as most of the old localities are in the midst of developed urban societies and their services are under-utilized, whereas new inhabitations and settlements come-up in outskirts have no facilities. Human Resource Constraints (vacancies > 30%), Non ICDS areas with no filed workers to mobilize families, Clarity of Job responsibility particularly for enumeration & tracking of the beneficiary in unrecognized Municipal Areas, poor Intra- sectoral and inter-sectoral coordination. From the community-side he summarized Resistance to Immunization by certain population, poor private sector participation & Reporting, Migratory Population, high rise apartments [3].

Way Forwards

The researches so far in India infer that delivering immunization services where the urban poor and disadvantaged people live on regular basis is of utmost importance. They also advocate for community system strengthening and community mobilization through NGOs and local community organizations. Sending text messaging as reminders and incentivized immunization services are some of the other opportunities that can be explored and implemented to improve immunization in the slums.

The administrative actions required may include proper Area demarcation of area to PHCs (Ward wise), health functionaries ANMs and area demarcation for community level workers like Anganwadi workers (AWWs) and Accredited Social Health Activists (ASHA-urban). Filling up and maintaining requisite staff, their appropriate training and to keep them motivated with due vaccine logistics and supplies, immunization cards etc. would act as incentives. Regularizing a System to identify the beneficiary and regular outreach activities for urban poor, follow-up of drop outs will minimize partial immunization. The digital recording of beneficiary data, mandatory reporting of UIP vaccination by Pvt. Practitioners would also improve the coverage. Regular District Task Force meeting on RI and community monitoring of the immunization under the leadership of local elected representative are other measures successfully tried. In practical terms city specific actions required may include:

 Microplanning: Mapping of urban area to identify uncovered pockets (Unauthorised slums, construction work sites, brickkiln sites etc.).

- Relocating the erstwhile post-partum centres and urban health posts and their filed practice areas, to newer extensions of the city, as their utilization in most cases has gone down.
- Allocating such underserved population among available health resources like medical colleges, Nursing colleges and schools, Public Health schools, Private hospitals and NGOs for regular services and monitoring coverage.
- Improving staff position front line workers like ASHA, AWW, NGOs, national Cadet Corps (NCC), and Auxiliary Cadet Corps (ACC) cadets for mobilization activities and follow-up of drop.
- Innovative approaches to increase awareness including information on date, time and venue of immunization sites and mobile text messaging as reminders may also boost the coverage.
- Develop a system of free routine immunization services on fixed days and convenient time to slums, Migratory Population, Apartments etc. involving young practitioners and providing them all supplies.
- Inter-sectoral coordination will be the back bone of this endeavour: women and Child Development, Health and Family Welfare, Education, Municipal Administration and Urban Development Department and Departments involved in ensuring Universal Health Coverage.
- Establishing Urban Primary Health Centres (UHCs) and sub centres and other volunteers for mobilization under Urban Health Mission to sustain immunization coverage in the long run.
- Mobile vaccination teams to reach unorganized slums, construction sites should also be considered.
- Linking existing birth registration with Aadhaar / Ration card can also facilitate tracking beneficiaries.
- Active involvement of Municipal authorities and elected corporation councillors in oversight and Intra- sectoral & Inter- sectoral Coordination.

References

- World Health Organization and UNICEF 16 July 2018, Vaccines and Global Health: The Week in Review dated 21 July 2018
- India Plans to Achieve Full Immunisation by 2018 Instead of 2020, The Wire 6/10/2017.
- Urban Immunization- Now and Then, A report of Karnataka State Consultation on URBAN IMMUNIZATION, Directorate of Health & Family Welfare, Bengaluru, 5 June 2018.
- A brief history of vaccines & vaccination in India, Chandra Kant Lahariya, Indian J Med Res. 2014 Apr; 139(4): 49-511.
- The Universal Immunisation Programme in India, case study May 18, 2017, Centre for Public Impact, 18 May 2017.
- Coverage Evaluation Reports (CES) 1995-96, 96-97 & 97-98, UNICEF India, New-Delhi 110003.
- 7. Coverage Evaluation Survey, All India Report 2005 UNICEF for Government of India, Ministry of Health & Family Welfare.
- Coverage Evaluation Survey, All India Report 2006-UNICEF for Government of India, Ministry of Health & Family Welfare.
- 2009 Coverage Evaluation Survey, All India Report- UNICEF for Government of India, Ministry of Health & Family Welfare.
- 10. National Family Health Survey (NFHS-4), 2015-16, NFHS-3 2005-06.
- 11. Immunization coverage by antigen as of March 2018.
- 12. Geethu Mathew, Avita Rose Johnson, Sulekha Thimmaiah, Ratna Kumari, Aby Varghese. Barriers to childhood immunisation among women in an urban underprivileged area of Bangalore city, Karnataka, India: a qualitative study International Journal of Community Medicine and Public Health.
- Mathew G et al. International Journal of Community Med Public Health. 2016 Jun; 3 (6):1525-1530.
- Tim Crocker-Buque, Godwin Mindra, Richard Duncan, Sandra Mounier-Jack. (2017) Immunization, urbanization and slums-a systematic review of factors and interventions. BMC Public Health 17: 556.
- Pradhan N, Ryman TK, Varkey S, Ranjan A, Gupta SK, et al. (2012) Expanding and improving urban outreach immunization in Patna, India. Tropical Medicine and International Health 17: 292-299.