

Perceptions of childhood vaccination practices among beneficiaries and healthcare service providers in slums under the national immunization program of India: a qualitative study

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Abstract

Purpose – A qualitative study can help in understanding the unpolluted perspectives of key stakeholders involved in the vaccination practices and can explore vital factors that could influence vaccination-related behaviors and their utilization. This study aims to document the perceptions of caretakers, community members and healthcare service providers related to childhood vaccination practices in slums under the national immunization program (NIP) of India.

Design/methodology/approach – This was a qualitative community-based cross-sectional study. Focus group discussions with caretakers, community members and healthcare service providers were used to build a holistic, detailed description and analysis of the factors associated with childhood vaccination practices within its real-world context.

Findings – Lack of awareness, fear of adverse events following immunization, inappropriate timing of vaccination sessions, loss of daily earnings, migration, lack of good behavior of health staffs, shortage of logistics and vaccines, limited resources and infrastructures and high expectations of beneficiaries were some of the vital barriers impacting vaccination practices in slums.

Research limitations/implications – Though this study provides significant good information on the indicators that can be considered to improve the vaccination practices in any slum settings, it has also a limitations too due to its setting. Therefore, one needs to be cautious while generalizing these results to other settings like rural. In addition, Though we believe that these strategies could be useful in any setting, it is also important to tailor these observations them as per the need of the society and the population. Also, this is a self-reported qualitative study and therefore the perspectives reported in this study need to be taken with caution. Further, low vaccination, poor awareness, compromised healthcare services, high expectations could be considered as a stigma/fear among the responders and therefore there is always a chance of underreporting.



Thus, it would be important in future to conduct a study involving a broader group of people in society and to establish factors associated with the vaccination coverage, that can help in improvement of vaccination.

Originality/value – Initiatives such as regular interactions at different levels, effective communication including reminders, behavior interventions, the continued supply of vaccines and logistics, additional resources for the vaccination program, incentives and recognition, extended sessions and people-friendly healthcare delivery system could be helpful to strengthen the routine vaccination practices in slums.

Keywords Immunization, Vaccination, Vaccine, Slum, India

Paper type Research paper

Introduction

Vaccination remains one of the most successful and cost-effective public health measures for reducing under-five deaths caused by vaccine-preventable diseases (VPDs) [1]. India, despite being one of the leading producers of vaccines, has the highest number of under-five deaths, 20% of which are related to VPDs [2, 3]. Of 27 million unvaccinated children globally, more than one-third i.e. almost 9.6 million are from India [3, 4]. Between 2005 and 2016, full vaccination coverage increased from 44% to 62% with wide variation across states, regions, districts and blocks [5]. However, it is still lower than the target level of >80% [6]. Where vaccination coverage is low, VPDs contribute to worse health outcomes. This is especially true for settings like slums where nearly 33% of the Indian urban population live in highly vulnerable conditions for disease outbreaks [3, 7].

Slum settings are always underprivileged due to poor economic status, overcrowding, lack of sanitation, unsafe drinking water and a stretched healthcare delivery system. Surveys in 5 of 8 Indian cities found infant and child mortality rates around 18 and 32 points higher for slums compared with non-slums. Also, in slums, full vaccination coverage was 2.7% to 18.3% less compared to non-slums [8]. These observations suggest that the present vaccination practices do not effectively meet people's needs, specifically those living in slums, presenting a challenge for the attainment of the goals of the national immunization program (NIP) [3].

Studies to explore the determinants of vaccination coverage in Indian slums are non-comprehensive as most of the studies are based on a quantitative approach, which has its limitations in terms of providing in-depth perspectives of various stakeholders. A qualitative approach can help in understanding the unpolluted perspectives of key stakeholders involved in the vaccination and can also analyze different factors that could influence vaccination-related behaviors and their utilization [9]. Mumbai was selected as a study site as it is among the world's most populous cities with an approximate estimated 20.5 million inhabitants. Of these, 41.3% i.e. over 9 million people live in slums. The population density of Mumbai is approximately 73,000 per square mile, which makes it one of the most densely populated cities in the world and therefore is vulnerable to various disease outbreaks too [10]. This study aims to document the perceptions of caretakers, community members and healthcare service providers related to childhood vaccination practices in slums under the NIP of India.

Methods

Study site

This study was conducted in the slum areas of Mumbai city and Mumbai suburban districts of Maharashtra state, India. The slum was defined according to the census of India as “*a residential area where dwellings are unfit for human habitation by reason of dilapidation, overcrowding, faulty arrangements and design of such buildings, narrowness or faulty arrangement of streets, lack of ventilation, light, or sanitation facilities or any combination of these factors which are detrimental to the health and safety of the inhabitants*” [11].

Maharashtra state had established health posts in slum areas for delivering its healthcare services. Health post was defined as “*set up in the community to deliver preventive and*

promotive health care services and is expected to cover a population group that has 40% of its constituents living in slum/slum-like localities" [12]. Each of these health posts consisted of 4–5 health workers. A multistage cluster sampling method was used for identifying and better representation of all these health posts in both of the districts, considered as study clusters. Fifty-five slum health posts (Mumbai city:13; Mumbai suburban: 42) out of a total of 205 health posts distributed in both districts (Mumbai city: 52; Mumbai suburban: 143) were randomly selected as clusters using the “probability proportional to size (PPS) technique [13]. We use these clusters ($n = 55$) for our qualitative data collection through focus group discussion (FGD).

Study design

A qualitative study allows us to build a holistic, detailed description and analysis of the factors associated with the childhood vaccination practices within its real-world context [14, 15]. Therefore, a qualitative study was undertaken in a community-based cross-sectional setting. The authors present the qualitative observations from the FGDs. An FGD is a widely used technique for collecting qualitative data that allows the researchers to solicit both the stakeholders’ experiences, knowledge and unbiased opinions or perceptions in a real-time context. It provides better access to participants who are not outspoken and would normally hesitate to take part in an individual interview. FGDs are used in studies that are aimed to explore health-related subjects in a particular social, cultural, economic, ecological and political context [16].

Study samples

Purposive sampling was done from the 55 clusters mentioned above. For caretakers and community, the inclusion criteria were: (1) resident of the study area having children aged 12–23 months, (2) aged ≥ 18 years who remained with the child for most of the days or took the child for at least one immunization session, (3) consented and willing to participate in the study. Those healthcare service providers in the study area who had at least participated or supervised an immunization session in the area and confirmed their willingness to participate in the study were included.

These stakeholders who were involved at various levels of the vaccination practices in slums were interviewed using FGDs ($n = 40$) as given below (Table 1).

Beneficiary

- (1) Caretakers: 15 FGDs were conducted with caretakers of the child such as mother, father, or others.
- (2) Community: 15 FGDs were conducted with community leaders, Accredited Social Health Activist (ASHA), Anganwadi Worker (AWW, type of a community worker who helps auxiliary nurse midwife-ANM) and NGO people working in the field.

Healthcare service provider

- (1) Institutional: 10 FGDs were conducted with vaccinators and health supervisors.

Data collection and analysis

This study used predefined guidelines to document our observations during the FGDs. These guidelines covered key areas to get participants’ views on healthcare services, the status of current services, awareness, their experiences with the services and service providers, major

Table 1.
Focus group
participant details

Category	Level	Target population (n)	Gender (n)	Age (yrs) (n)	Highest level of education (n)	No. of FGDs	No. of participants in each FGD	Total participants
Beneficiaries	Caretakers	Mother (72) father (18) Caretakers (60)	Male (39) Female (111)	18-30 (40) 31-45 (71) 46 and above (39)	No education (24) Below high school (60) High school (53) Graduate (12)	15	10	150
		Community	Male (22) Female (128)	18-30 (32) 31-45 (58) 46 and above (60)	Post graduate (1) No education (29) Below high school (45) High school (55) Graduate (18)	15	10	150
Healthcare service provider	Institutional	Health staff (39) Session facilitator (21) Supervisor (10)	Male (27) Female (43)	18-30 (14) 31-45 (31) 46 and above (25)	Post graduate (3) No education (00) Below high school (04) High school (34) Graduate (30) Post graduate (2)	10	7	70

Note(s): ASHA: Accredited Social Health Activist; AWW: Aganwadi Worker (type of a community worker); care takers of child include uncle, aunt, grandmothers

challenges and opportunities, expectations, behaviors of staff, the reason for vaccination or non-vaccination etc. As a validation, authors took guidance on qualitative concepts and guidelines from the subject experts. In addition, FGD guidelines were tested in the field with six FGD sessions before its actual implementation. All final FGDs were transcribed verbatim and translated from local languages into English. The transcribed data were reviewed, and key themes were identified. To organize the data, this study also used a comparison table to compare views of groups of different stakeholders. The analysis involved in this study included organizing data, breaking them into more manageable categories, developing codes and searching for possible patterns for a comparative perspective using ATLAS.ti software, version 7 [17].

Ethical issue

The study was approved by the Institutional Ethics Committee (IEC) of the author's institute (EC-NIMS-ICMR-New Delhi, 2 February 2017).

Results

A total of 370 participants were included in this study. We identified themes based on the perspectives shared by beneficiaries and service providers in FGD, the two vital pillars of any healthcare delivery system (Table 1).

Beneficiary's perspectives

The beneficiaries described their experiences with vaccination practices, including their belief and decision-making processes. These interactions helped in identifying themes which are described below:

Public healthcare delivery system a preferred choice. The caretakers and the community members were aware of private clinics as well as public healthcare centers in the area. They preferred to visit public healthcare centers, as services were available at no cost.

One of the respondents answered, "*We always visit a public health center as it is near and free of cost. The only problem is, it does not have flexible times and does not work on a 24X7 basis.*"

Poor awareness of vaccination a major reason for its poor compliance. A greater portion of people did not have any idea about VPDs. To a limited extent, they were aware of the benefits of vaccination (e.g. polio drops for polio, Bacillus Calmette–Guérin (BCG) vaccines for tuberculosis, Tetanus Toxoid (TT) vaccines for tetanus and measles vaccine for measles disease). They were aware of the place, day and time of vaccination sessions in their area. They were informed about special campaigns on vaccination such as the "National Pulse Polio Program" and "Mission Indradhanush (in English 'Mission Rainbow')" by the Government of India (GOI). The majority of caretakers mentioned TV, radio and newspaper as their main sources of vaccine-related information and awareness. Healthcare workers were also considered as a vital source and considered cleanliness, healthy food and safe drinking water as preventive measures for any kind of disease including VPDs.

One of the respondents replied, "*It would be great if health staff visit on a regular basis to educate on VPDs and vaccines.*"

A mother informed, "*We all are busy in our work, if we could get reminders through phone calls or personal visits one day prior to our kids' vaccination then we will make it.*"

Vaccination is everybody's responsibility and the public health delivery system has a vital role. Most caretakers felt that vaccination practices are an integral part of the healthcare delivery system and agreed that it is everybody's duty to make it successful. The majority of them visited the nearest health centers for their kids' vaccination. However, a few of them visited

private clinics due to better quality of services, the flexibility of timing, availability of additional vaccines, professional behavior and vaccination done by the doctors. They felt that health staff should be polite, respectful and treat you well, maintain cleanliness, provide drinking water and deliver complete information related to vaccination (diseases, benefits, side effects, next schedule, etc.).

A participant stated, *“Government is doing a lot of things to improve our health including vaccination. Now, it’s time to leave our casual approaches and support our government.”*

Concerns or fears – an endless anxiety of every parent. People did not vaccinate their children as they were not aware of the great benefits of vaccination. If their children were vaccinated, they were not aware of the types of vaccines and their benefits. This resulted in poor motivation for the next doses. The followings were reasons mentioned by most respondents.

- (1) They forgot, as there were no reminders, or they were unaware of the next schedule or session site
- (2) Fear of side effects
- (3) Vaccination timing did not suit
- (4) Other domestic priorities
- (5) Loss of daily income
- (6) Bad experience and inappropriate behavior of health staff
- (7) No incentive or motivation for vaccinating kids
- (8) Long waiting time
- (9) A feeling of insecurity among those who were from different states
- (10) Sometimes non-availability of vaccines resulted in multiple visits.

One of the women stated, *“We want to vaccinate our kids, but we fear as some people said that post-vaccination, their kids had fever and pain. Sometimes, we forget the date of the next dose.”*

Community voices are important to improve the vaccination services. Followings were suggestions to improve the vaccination services:

- (1) Flexibility: Extended sessions – vaccination in evening or night and on weekend
- (2) Vaccination at door like the pulse polio program
- (3) Reminders: SMS, personal visits, or community announcements
- (4) Incentives and recognition for completing vaccination
- (5) Awareness on vaccination using appropriate media (e.g. television, radio, newspaper)
- (6) Parent-friendly healthcare delivery system.

A participant said, *“Sometimes, it’s a whole day’s business. We lose our daily income and get nothing. Timing and day should be flexible or we should be paid for the vaccination. The government should take care of these things.”*

Another participant said, *“Good health including vaccination is everybody’s duty. We have to be more proactive and the government staff has to be more empathic.”*

Service provider’s perspectives

We identified the following key areas through the FGDs with the service providers:

VPD is a serious public health issue with poor awareness. All agreed that VPDs are serious. Awareness among the slum community is less except for some diseases like polio, measles and tetanus due to ongoing vaccination rounds under “Mission Indradhanush”. Awareness usually increases at the time of epidemics or outbreaks due to associated fears.

Vaccination is one of the key strategies to prevent VPDs. They considered vaccination as one of the effective ways to prevent VPDs which kills not only children but is also responsible for economic losses.

One of the healthcare workers said, “*Vaccination is like a miracle for the 21st century and I have seen it working. See the use of oral polio vaccine and reduction in the wild polio cases.*”

Ongoing efforts have supported the improvement of community awareness on vaccination but there is a long way to go. They were informed that over the past few years, awareness has improved due to various initiatives by the government and frequent awareness campaigns through – TV, radio, newspaper, etc. However, people still have not understood the value of vaccination fully. Thus, regular communication at different levels is warranted.

One of the participants said, “*The awareness level related to overall health increased. However, for vaccination, it is still suboptimal, and we have to do something extraordinary to improve it.*”

The healthcare delivery system faces multidimensional challenges related to vaccination coverage. Slums are highly susceptible to disease outbreaks due to overcrowding, poor sanitation, inadequate safe drinking water, lack of social networking, low socioeconomic status and political will and less attention by the administration when compared to any other settings. The healthcare delivery system faced the following challenges.

- (1) Supply-side: Shortage of vaccines (e.g. injectable polio vaccines, IPV), inadequate manpower, limited resources and infrastructures.
- (2) Demand-side: High expectations of beneficiaries, low awareness level, frequent movement of people, parents have other priorities such as daily earnings and sometimes only 1 or 2 beneficiaries that present a tough situation to open multi-dose vials (e.g. BCG / measles).

One of the healthcare service providers narrated “*You cannot compare slums with any other settings. These settings are like hell. Thus, we need extraordinary planning and implementation to improve the mindset of the people and the healthcare delivery system in the slums.*”

Service providers provided experience-based solutions to improve the vaccination services in slums:

- (1) Supply-side:
 - An adequate supply of vaccines
 - Optimization of resources
 - Incentive and motivation for service providers
 - Flexible timings and community-based planning & implementation
 - Regular communication and awareness
 - Parent and worker-friendly work environment.
- (2) Demand-side:
 - Active community participation to improve awareness and overall vaccination coverage
 - Trust and cooperate with the healthcare delivery system.

One of the service providers stated that *“Improving the health of the people is not only our responsibility. People have to understand this and all stakeholders have to come together to work.”*

This study also compared the perspectives of beneficiaries and healthcare service providers for communication channels for vaccination awareness. Table 2, health workers, media, reminders and community announcements were considered to be the most relevant ways of obtaining information.

We found the following as key facilitators to improve the vaccination coverage in the slums: regular interactions at different levels, effective communication including reminders, continued supply of vaccines, extended sessions, incentives and additional resources for the vaccination program and people-friendly healthcare delivery system. Table 3 provides competitive perspectives of beneficiaries and healthcare service providers on preferred strategies to improve vaccination coverage.

Discussion

A large part of the Indian population resides in slums with inadequate vaccination coverage due to many known and unknown reasons. This subjects them to a high risk of VPDs that have the worst health outcomes for vulnerable settings like slums [3]. Understanding of unpolluted perspectives of caretakers, community members and healthcare service providers is essential to analyze different factors that influence vaccination-related behaviors that are essential to shaping the vaccination practices [9]. This study explored the perceptions of childhood vaccination practices among caretakers, community members and healthcare service providers in slums under the NIP of India through FGDs.

Table 2.
Perspectives of beneficiaries and healthcare service providers on preferences for source of vaccination-related information

Preferred source of information	Beneficiaries	Healthcare service providers
Health workers	++	++
Community members	-	+
Home visits/outreach	++	+
Media (radio, television, newspaper)	++	++
Text message reminders, phone calls	++	++
Community announcement	++	++

Note(s): Key, ++ Considered as most relevant by the most respondents; + Considered as relevant by the most respondents; - Considered as non-relevant by the most respondents

Table 3.
Perspectives of beneficiaries and healthcare service providers on preferred strategies to improve the vaccination coverage

Preferred strategies	Beneficiaries	Healthcare service providers
Vaccination-related education and awareness	++	++
Reminder or recall	++	++
Vaccination at home	++	-
Incentives and recognition to parents, mobilizer and service providers	++	++
Multiple interventions during the vaccination services	+	+
Alternative timings and vaccination during holiday and weekend	++	++
Parents friend healthcare system	++	++

Note(s): Key, ++ Considered as most relevant by the most respondents; + Considered as relevant by the most respondents; - Considered as non-relevant by the most respondents

India's Universal Immunization Program (UIP) (95% through the public sector) is one of the largest public health programs in the world in terms of quantity of vaccine, the number of recipients, sessions, geographical spread, people and equipment involved to reach 26 million newborns and 30 million pregnant women to distribute 390 million vaccine doses through 9 million sessions by 2.5 million health workers and 55,000 cold chain staff using 27,000 functional cold chain points and 76,000 cold chain equipment annually [18]. This shows the government's commitment and beneficiaries' trust in vaccination practices in India. Our study observed a similar perception where people had trust in the public health delivery system for vaccination services. However, they expected healthcare service providers to be polite, supportive and friendly. Besides, long waiting times and poor service arrangements such as drinking water, toilets, cleanliness and educational materials at the vaccination site were other factors that concerned them. This study observed that a focus on modification of behavior and attitude of healthcare service providers is warranted to win the trust of beneficiaries as documented by other studies [19, 20].

Further, the awareness regarding VPDs, the value of vaccination and adverse events following immunization (AEFI) was still lacking in slums. Thus, there is an urgent need to address this through regular and effective communication with all potential stakeholders as lack of awareness can influence decisions negatively resulting in no vaccination or dropouts. Many studies demonstrated that effective vaccination communication with caretakers is critical to overcome barriers for vaccination, tackle vaccine hesitancy, improve confidence and coverage [3, 9, 20–23]. Healthcare service providers should be able to provide information to beneficiaries and communities through commonly agreed communication strategies. Beneficiaries and healthcare service providers believed health workers, media (TV, radio, newspaper), phone calls and community announcements as the most relevant strategies to generate vaccination awareness. Almost similar observations were found in a Nigerian study [23]. It was noticed that caretakers do not vaccinate their children as they forget or were not aware of the next dose or session site, feared any side effects, unsuitable session timing, an inappropriate attitude of the health staff, loss of daily earnings and no incentives or motivations for vaccinating. These observations are similar to those documented by other studies [9, 24–27].

In addition, healthcare service providers faced various challenges such as poor settings, high expectations of beneficiaries, inadequate resources, weak administrative and political supports. Further, the slum population has priority for daily earnings resulting in poor utilization of overall health services including vaccination. To improve the vaccination coverage, initiatives such as reminders, incentives, outreach sessions and extended session timing were well documented through many studies [13, 28–39]. Similarly, in our study, beneficiaries and healthcare service providers suggested reminders; incentives and recognition to parents, mobilizer and service providers; vaccination-related education and awareness; alternative timings or vaccination during holidays and weekends; and parents and service providers' friendly healthcare system as most preferred strategies to improve the vaccination coverage in slums.

Though this study provides significant information on the indicators that can be considered to improve the vaccination practices in any slum setting, it has limitations too. Therefore, one needs to be cautious while generalizing these results to other settings like rural. In addition, it is also important to tailor these observations as per the need of the society and the population. Also, this is a self-reported qualitative study and therefore the perspectives reported in this study need to be taken with caution. Further, low vaccination, poor awareness, compromised healthcare services, high expectations could be considered as a stigma/fear among the responders and therefore there is always a chance of underreporting. Thus, it would be important in the future to conduct a study involving a broader group of people to establish factors associated with vaccination coverage.

Conclusion

There is nothing more unfortunate than a precious life dying due to VPDs. Vaccination is everybody's responsibility and therefore we suggest that each one of us has a role to play by taking simple initiatives such as having regular interactions at different levels and effective communication including reminders. Policymakers can ensure a continued supply of vaccines, incentivize and provide additional resources for vaccination programs to enable healthcare service providers to have extended sessions. Most importantly, a people-friendly healthcare delivery system could be helpful to strengthen the routine vaccination practices. Our combined efforts will certainly help to translate safe and effective vaccines into vaccination, as vaccines do not save lives but quality vaccination on time does.

Conflict of Interest: None

References

1. Duclos P, Okwo-Bele JM, Gacic-Dobo M, Cherian T. Global immunization: status, progress, challenges and future. *BMC Int Health Hum Rights*. 2009; 9(Suppl 1): S2. doi: [10.1186/1472-698x-9-s1-s2](https://doi.org/10.1186/1472-698x-9-s1-s2).
2. Tripathi B. How India is aiming for full immunization. [updated 2015 April 16; cited 2020 June 13]. Available at: <https://www.weforum.org/agenda/2015/04/how-india-is-aiming-for-full-immunisation/>.
3. Singh S, Sahu D, Agrawal A, Vashi MD. Ensuring childhood vaccination among slums dwellers under the National Immunization Program in India - challenges and opportunities. *Prev Med*. 2018; 112: 54-60. doi: [10.1016/j.ypmed.2018.04.002](https://doi.org/10.1016/j.ypmed.2018.04.002).
4. Laxminarayan R, Ganguly NK. India's vaccine deficit: why more than half of Indian children are not fully immunized, and what can—and should—be done. *Health Aff (Millwood)*. 2011; 30(6): 1096-103. doi: [10.1377/hlthaff.2011.0405](https://doi.org/10.1377/hlthaff.2011.0405).
5. International Institute for Population Sciences [IIPS]; Macro International. National Family Health Survey (NFHS-4), 2015-16: India. Mumbai: IIPS; 2016. [cited 2020 June 13]. Available at: <http://rchiips.org/nfhs/>.
6. India, Ministry of Health and Family Welfare [MoHFW]. Multi-year strategic plan 2013-17 Universal Immunization Program. New Delhi: Government of India; 2013.
7. Crocker-Buque T, Mindra G, Duncan R, Mounier-Jack S. Immunization, urbanization and slums - a systematic review of factors and interventions. *BMC Public Health*. 2017; 17(1): 556. doi: [10.1186/s12889-017-4473-7](https://doi.org/10.1186/s12889-017-4473-7).
8. International Institute for Population Sciences [IIPS]; Macro International. National Family Health Survey (NFHS-3) 2005-06: India. Mumbai: IIPS; 2009.
9. Singh S, Sahu D, Agrawal A, Vashi MD. Barriers and opportunities for improving childhood immunization coverage in slums: a qualitative study. *Prev Med Rep*. 2019; 14: 100858. doi: [10.1016/j.pmedr.2019.100858](https://doi.org/10.1016/j.pmedr.2019.100858).
10. World Population Report (WPR): Mumbai population 2020. [cited 2020 September 29]. Available at: <https://worldpopulationreview.com/world-cities/mumbai-population>.
11. India, Office of the Registrar General and Census Commissioner. Primary census abstract for slum. [updated 2011; cited 2020 June 13]. Available at: <https://www.censusindia.gov.in/2011-Documents/Slum-26-09-13.pdf>.
12. Dilip TR, Duggal R. Unmet need for public health-care services in Mumbai, India. *Asia Pac Popul J*. 2004; 19(2): 27-40.
13. Singh S, Sahu D, Agrawal A, Jeyaseelan L, Nadaraj A, Vashi MD. Coverage, quality, and correlates of childhood immunization in slums under national immunization program of India: a cross-sectional study. *Heliyon*. 2019; 5(9): e02403. doi: [10.1016/j.heliyon.2019.e02403](https://doi.org/10.1016/j.heliyon.2019.e02403).
14. Baxter P, Jack S. Qualitative case study methodology: study design and implementation for novice researchers. *Qual Rep*. 2008; 13(4): 544-59. doi: [10.46743/2160-3715/2008.1573](https://doi.org/10.46743/2160-3715/2008.1573).

15. Bingham A, Drake JK, LaMontagne DS. Sociocultural issues in the introduction of human papillomavirus vaccine in low-resource settings. *Arch Pediatr Adolesc Med.* 2009; 163(5): 455-61. doi: [10.1001/archpediatrics.2009.50](https://doi.org/10.1001/archpediatrics.2009.50).
16. Swiss Tropical and Public Health Institute [Swiss TPH]. Key area of activity (KAA-10) 'society, culture and health': how to ... conduct a focus group discussion (FGD). [cited 2020 June 13]. Available at: https://www.swisstph.ch/fileadmin/user_upload/Swiss_TPH/Topics/Society_and_Health/Focus_Group_Discussion_Manual_van_Eeuwijk_Angehrn_Swiss_TPH_2017.pdf.
17. Friese S. ATLAS.ti 7: user guide and reference. [cited 2020 June 13]. Available at: https://atlasti.com/wp-content/uploads/2014/05/atlasti_v7_manual_201312.pdf?q=/uploads/media/atlasti_v7_manual_201312.pdf.
18. India, Ministry of Health and Family Welfare [MoHFW]. Comprehensive multi-year plan (cMYP) 2018-22 Universal immunization programme. [cited 2020 June 13]. Available at: https://nhm.gov.in/New_Updates_2018/NHM_Components/Immunization/Guidelines_for_immunization/cMYP_2018-22_final_pdf.
19. Negussie A, Kassahun W, Asseged S, Hagan AK. Factors associated with incomplete childhood immunization in Arbegona district, southern Ethiopia: a case-control study. *BMC Public Health.* 2016; 16: 27. doi: [10.1186/s12889-015-2678-1](https://doi.org/10.1186/s12889-015-2678-1).
20. Abdurraheem IS, Onajole AT, Jimoh AAG, Oladipo AR. Reasons for incomplete vaccination and factors for missed opportunities among rural Nigerian children. *J Public Health Epidemiol.* 2011; 3(4): 194-203.
21. Bofarraj MAM. Knowledge, attitude and practices of mothers regarding immunization of infants and preschool children at Al-Beida City, Libya 2008. *Egypt J Pediatr Allergy Immunol.* 2011; 9(1): 29-34.
22. Babirye JN, Rutebemberwa E, Kiguli J, Wamani H, Nuwaha F, Engebretsen IM. More support for mothers: a qualitative study on factors affecting immunisation behaviour in Kampala, Uganda. *BMC Public Health.* 2011; 11: 723. doi: [10.1186/1471-2458-11-723](https://doi.org/10.1186/1471-2458-11-723).
23. Oku A, Oyo-Ita A, Glenton C, Fretheim A, Ames H, Muloliwa A, *et al.* Perceptions and experiences of childhood vaccination communication strategies among caregivers and health workers in Nigeria: a qualitative study. *PLoS One.* 2017; 12(11): e0186733. doi: [10.1371/journal.pone.0186733](https://doi.org/10.1371/journal.pone.0186733).
24. Tagbo BN, Eke CB, Omotowo BI, Onwuasigwe CN, Onyeka EB, Mildred UO. Vaccination coverage and its determinants in children aged 11 - 23 months in an urban district of Nigeria. *World J Vaccines.* 2014; 4(4): 175-83. doi: [10.4236/wjv.2014.44020](https://doi.org/10.4236/wjv.2014.44020).
25. Maina LC, Karanja S, Kombich J. Immunization coverage and its determinants among children aged 12-23 months in a peri-urban area of Kenya. *Pan Afr Med J.* 2013; 14: 3. doi: [10.11604/pamj.2013.14.3.2181](https://doi.org/10.11604/pamj.2013.14.3.2181).
26. Rahman L, Biswas H, Hossain T, Khan AM, Khan IA. Study on reasons of dropout of immunization in children in selected slum area of Dhaka city, Bangladesh. *South East Asia J. Public Health.* 2012; 2(1): 64-7.
27. Zewdie A, Letebo M, Mekonnen T. Reasons for defaulting from childhood immunization program: a qualitative study from Hadiya zone, Southern Ethiopia. *BMC Public Health.* 2016; 16(1): 1240. doi: [10.1186/s12889-016-3904-1](https://doi.org/10.1186/s12889-016-3904-1).
28. Harvey H, Reissland N, Mason J. Parental reminder, recall and educational interventions to improve early childhood immunisation uptake: a systematic review and meta-analysis. *Vaccine.* 2015; 33(25): 2862-80. doi: [10.1016/j.vaccine.2015.04.085](https://doi.org/10.1016/j.vaccine.2015.04.085).
29. Uddin MJ, Larson CP, Oliveras E, Khan AI, Quaiyum MA, Saha NC. Child immunization coverage in urban slums of Bangladesh: impact of an intervention package. *Health Policy Plan.* 2010; 25(1): 50-60. doi: [10.1093/heapol/czp041](https://doi.org/10.1093/heapol/czp041).
30. Uddin MJ, Shamsuzzaman M, Horng L, Labrique A, Vasudevan L, Zeller K, *et al.* Use of mobile phones for improving vaccination coverage among children living in rural hard-to-reach areas and urban streets of Bangladesh. *Vaccine.* 2016; 34(2): 276-83. doi: [10.1016/j.vaccine.2015.11.024](https://doi.org/10.1016/j.vaccine.2015.11.024).

31. Domek GJ, Contreras-Roldan IL, O'Leary ST, Bull S, Furniss A, Kempe A, *et al.* SMS text message reminders to improve infant vaccination coverage in Guatemala: a pilot randomized controlled trial. *Vaccine*. 2016; 34(21): 2437-43. doi: [10.1016/j.vaccine.2016.03.065](https://doi.org/10.1016/j.vaccine.2016.03.065).
32. Kazi AM, Murtaza A, Khoja S, Zaidi AK, Ali SA. Monitoring polio supplementary immunization activities using an automated short text messaging system in Karachi, Pakistan. *Bull World Health Organ*. 2014; 92(3): 220-5. doi: [10.2471/blt.13.122564](https://doi.org/10.2471/blt.13.122564).
33. Igarashi K, Sasaki S, Fujino Y, Tanabe N, Muleya CM, Tambatamba B, *et al.* The impact of an immunization programme administered through the Growth Monitoring Programme Plus as an alternative way of implementing Integrated Management of Childhood Illnesses in urban-slum areas of Lusaka, Zambia. *Trans R Soc Trop Med Hyg*. 2010; 104(9): 577-82. doi: [10.1016/j.trstmh.2010.05.008](https://doi.org/10.1016/j.trstmh.2010.05.008).
34. Sasaki S, Igarashi K, Fujino Y, Comber AJ, Brunson C, Muleya CM, *et al.* The impact of community-based outreach immunisation services on immunisation coverage with GIS network accessibility analysis in peri-urban areas, Zambia. *J Epidemiol Community Health*. 2011; 65(12): 1171-8. doi: [10.1136/jech.2009.104190](https://doi.org/10.1136/jech.2009.104190).
35. Athar Ansari M, Khan Z. Routine immunization coverage in underserved children of Aligarh (India): an effort with UNICEF. *J. Child Health Care*. 2010; 14(2): 142-50. doi: [10.1177/1367493509355615](https://doi.org/10.1177/1367493509355615).
36. Shei A, Costa F, Reis MG, Ko AI. The impact of Brazil's Bolsa Familia conditional cash transfer program on children's health care utilization and health outcomes. *BMC Int Health Hum Rights*. 2014; 14: 10. doi: [10.1186/1472-698x-14-10](https://doi.org/10.1186/1472-698x-14-10).
37. Chandir S, Khan AJ, Hussain H, Usman HR, Khowaja S, Halsey NA, *et al.* Effect of food coupon incentives on timely completion of DTP immunization series in children from a low-income area in Karachi, Pakistan: a longitudinal intervention study. *Vaccine*. 2010; 28(19): 3473-8. doi: [10.1016/j.vaccine.2010.02.061](https://doi.org/10.1016/j.vaccine.2010.02.061).
38. Giles EL, Robalino S, McColl E, Sniehotta FF, Adams J. The effectiveness of financial incentives for health behaviour change: systematic review and meta-analysis. *PLoS One*. 2014; 9(3): e90347. doi: [10.1371/journal.pone.0090347](https://doi.org/10.1371/journal.pone.0090347).
39. Owais A, Hanif B, Siddiqui AR, Agha A, Zaidi AK. Does improving maternal knowledge of vaccines impact infant immunization rates? A community-based randomized-controlled trial in Karachi, Pakistan. *BMC Public Health*. 2011; 11: 239. doi: [10.1186/1471-2458-11-239](https://doi.org/10.1186/1471-2458-11-239).

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