Knowledge, Attitudes, and Practices of Private Sector Immunization Service Providers in Gujarat, India

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José E. Hagan¹ b, Narayan Gaonkar c, Vikas Doshi d, Anas Patni e, Shailee Vyas e, Vihang Mazumdar d, J K Kosambiya e, Satish Gupta f, Margaret Watkins a

a) Global Immunization Division, Centers for Disease Control and Prevention, Atlanta, USA
b) Epidemic Intelligence Service, Centers for Disease Control and Prevention, Atlanta, USA
c) United Nations Children’s Fund, Gujarat, India
d) Department of Preventive and Social Medicine, Medical College Baroda, Baroda, India
e) Department of Preventive and Social Medicine, Government Medical College, Surat, India
f) United Nations Children’s Fund, Delhi, India

Corresponding author: Jose Hagan: jehagan@cdc.gov. Tel: +1 404 718 6361. Fax: +1 404 471 8414

Author emails:

Jose Hagan jehagan@cdc.gov
Narayan Gaonkar ngaonkar@unicef.org
Vikas Doshi vikasgdoshi@gmail.com
Anas Patni dr.anas1985@gmail.com
Shailee Vyas shaileenvyas@gmail.com
Vihang Mazumdar vihang.mazumdar@gmail.com
J K Kosambiya jkkosambiya@gmail.com
Satish Gupta sgupta@unicef.org
Margaret Watkins maw8@cdc.gov
Abstract

Background: India is responsible for 30% of the annual global cohort of unvaccinated children worldwide. Private practitioners provide an estimated 21% of vaccinations in urban centers of India, and are important partners in achieving high vaccination coverage.

Methods: We used an in-person questionnaire and on-site observation to assess knowledge, attitudes, and practices of private immunization service providers regarding delivery of immunization services in the urban settings of Surat and Baroda, in Gujarat, India. We constructed a comprehensive sampling frame of all private physician providers of immunization services in Surat and Baroda cities, by consulting vaccine distributors, local branches of physician associations, and published lists of private medical practitioners. All providers were contacted and asked to participate in the study if they provided immunization services. Data were collected using an in-person structured questionnaire and directly observing practices; one provider in each practice setting was interviewed.

Results: The response rate was 82% (121/147) in Surat, and 91% (137/151) in Baroda. Of 258 participants 195 (76%) were pediatricians, and 63 (24%) were general practitioners. Practices that were potential missed opportunities for vaccination (MOV) included not strictly following vaccination schedules if there were concerns about ability to pay (45% of practitioners), and not administering more than two injections in the same visit (60%). Only 22% of respondents used a vaccination register to record vaccine doses, and 31% reported vaccine doses administered to the government. Of 237 randomly selected vaccine vials, 18% had expired vaccine vial monitors.

Conclusions: Quality of immunization services in Gujarat can be strengthened by providing training and support to private immunization service providers to reduce MOVs and improve quality and safety; other more context specific strategies that should be evaluated may involve giving feedback to providers on quality of services delivered and working through professional societies to adopt standards of practice.

Keywords: Health Knowledge, Attitudes, Practice; Public-Private Sector Partnerships; Private Sector; Vaccination;
Background

India leads the world in number of childhood deaths [1], is responsible for 30% of the annual global cohort of unvaccinated children [2], and accounts for 47% of global measles mortality [3]. In 2015, through routine immunization programs, only 82% of India’s children received three doses of oral polio vaccine (OPV3) [4]; during 2014, estimated state-level percentage of children aged 9—11 months who had been fully vaccinated (i.e., having received bacille Calmette–Guérin [BCG], three doses of diphtheria-pertussis-tetanus vaccine [DPT3], three doses of OPV3, and one dose of measles-containing virus [MCV1]), ranged from 27% to 89% [5]. While strategies for measles elimination and polio eradication have focused on improving vaccination coverage and access to services in the public sector, the private health care sector, comprising a wide range of for-profit and not-for-profit practices, also plays a large and important role in India. In 2013, expenditures in the private sector accounted for 68% of total health expenditures country-wide [6], and an estimated 21% of routine childhood vaccinations in urban areas of India are provided in the private sector [7].

The few studies that have explored the role of the private sector in immunization service delivery in low- and middle-income countries have generally found less knowledge of recommended immunization services and lower quality of service delivery among private sector providers when compared to their public sector counterparts [8]. Globally the pooled prevalence of missed opportunities for vaccination (MOV) for children, in which a person eligible for vaccination, and with no valid contraindication, visits a health service facility and does not receive all of the recommended vaccines, is estimated at 32% among low- and middle-income countries [9]. Little is known, however, about the specific behaviors and practices among private sector providers that could be targeted to decrease this high prevalence. In studies conducted in India, private sector providers had less concern about polio, greater likelihood to depart from recommended vaccine schedules, and lower sense of personal responsibility for providing vaccinations, than did providers in the public sector [10–12]. However, these studies were limited to members of the Indian Academy of Pediatrics (IAP) in Bihar and Uttar Pradesh, and were limited to attitudes rather than actual practices.
Because of limitations of previous studies and the lack of on-site observational assessment of immunization practices, many questions remain about actual immunization practices in the private sector setting in India, and the role that practice changes can play in improving vaccination coverage. To address this knowledge gap, we conducted a study among private providers who offered child vaccination in two urban settings in Gujarat State, India. Gujarat is a state in Western India, which, like many population centers in India, is urbanizing rapidly (currently 43% urban) and has experienced rapid economic growth that is outpacing growth of social and development metrics. In urban Gujarat state, private immunization providers deliver a large percentage (24%) of immunization services, similar to other urban areas of India [7]. The second and third most populous cities in Gujarat State were selected for this study, Surat (pop. 4,591,246), and Baroda (pop. 1,822,221).

The objectives of our study were to assess: a) the knowledge, attitudes, and practices of private providers regarding administration of polio, measles and other vaccines, including vaccination schedules, cold chain storage of vaccines, recording vaccine doses administered, and vaccine management; b) acute flaccid paralysis (AFP) and measles case reporting; and c) the feasibility of potential public-private partnership strategies to improve access to immunizations in urban populations.

Methods

Survey design

We conducted a systematic assessment of urban private medical providers who offer childhood immunizations in Surat and Baroda municipal corporations in Gujarat State, India. A comprehensive sampling frame of private immunization providers was created by obtaining a list of vaccine purchasers from the major vaccine distributors in these two cities, accounting for approximately 90% of the combined market. This list was supplemented with membership lists of the Surat and Baroda Branches of both the Indian Academy of Pediatrics and the General Practitioner Association, and other published directories of pediatricians (defined as practitioners with an MBBS degree, plus a diploma in pediatrics, or MD in pediatrics) and general practitioners (MBBS degrees without
further specialization) from the region. Finally, snowball sampling was used to identify additional providers that were not captured through the previous methods [13].

All identified practitioners were contacted by telephone to determine whether they provide immunization services to children in a practice located within the city limits. All practitioners were offered the opportunity to participate in the study if they provided immunization services in any non-governmental setting, including both for-profit and not-for-profit practices, such as charity or faith-based organizations. In the case of provider groups that share common immunization practices and supplies, a provider who was familiar with the common practices among the group was selected for interview. Practitioners were not required to offer a specific minimum set of vaccines to be eligible to participate; however, practitioners were excluded from the study if they did not provide vaccines to children as part of the routine childhood immunization schedule.

Representatives of IAP, Indian Medical Association, and the Gujarat Department of Health and Family Welfare were consulted during study design and pilot testing of the questionnaire, which was performed among pediatricians in Ahmedabad city to avoid exposing potential study participants in Surat and Baroda to the questionnaire.

**Measures**

Each assessment included administration of an in-person structured questionnaire, which captured information on knowledge, attitudes and practices related to vaccination schedules, potential MOV, record-keeping of vaccine doses administered, injection safety, vaccine management and storage, and reporting of vaccination coverage, adverse events following immunization (AEFI), and notifiable diseases. In addition, we directly observed practices for vaccine management and storage, and safety of vaccine administration. Vaccine refrigerators were examined for the presence of thermometers and temperature logs and non-vaccines, including food, and other medications. One vaccine vial was randomly selected from each refrigerator and the vaccine vial monitor (VVMs) was examined.
We also assessed practitioner’s willingness to enter into partnerships with the government to deliver subsidized vaccine and improve vaccine dose administration reporting. Practitioners were asked to rate the acceptability of three example partnership models: “Allow the government to use my facility to administer free vaccines to the public”, “Receive some free vaccines from the government in exchange for me reporting the number of doses given, and I could not charge any fee”, and “Receive some free vaccines from the government in exchange for me reporting the number of doses given, and I could charge a fee”.

_Data collection and analysis_

The assessments were conducted by trained interviewers composed of faculty members and residents from the Department of Preventive and Social Medicine at Surat and Baroda Medical colleges. Data were collected on paper case report forms, double entered and managed using REDCap electronic data capture tools [14]. R statistical programming language v.3.2.3 [15] was used for descriptive analyses using chi-square or Fisher’s exact tests, as appropriate. P-value cut-offs for statistical significance were determined after adjusting for false discovery rate due to multiple comparisons [16].

_Results_

Overall provider response rate was 87% (258/298), 82% (121/147) in Surat, and 91% (137/151) in Baroda. Characteristics of physicians and their practices are described in Table 1. Pediatricians comprised the majority of providers (195, 76%), and the remaining 63 (24%) were general practitioners. A wide range of vaccines were offered by private sector providers (Table 2), including vaccines not available in India’s Universal Immunization Program (UIP) schedule. In general, private providers closely followed the IAP-recommended vaccination schedule, rather than the UIP schedule (the IAP schedule includes inactivated polio, pneumococcal conjugate, rotavirus, varicella, hepatitis A, typhoid, human papillomavirus, and measles-mumps-rubella vaccines).

We assessed vaccination practices of practitioners to identify potential MOV (Table 3). Most practitioners (60%) were unwilling to administer three vaccines in the same visit. Of those, 77% reported they did not administer three concurrent injections because of their own judgement, rather than parental concerns (21%) or other
motivations. In addition, 45% of practitioners stated that they would vary the vaccination schedule “sometimes or often” for financial reasons, e.g., concerns about caregiver’s ability to pay for multiple vaccines at the same time.

Recordkeeping and reporting practices were suboptimal (Table 3). Twenty-two percent of practitioners reported using a register to record vaccination doses. In addition, 51% responded they would not vaccinate if the parents did not bring the child’s vaccination card. A majority (69%) of practitioners stated they do not report vaccine doses administered to the government. Practitioners commonly responded that they would not report cases that met surveillance definitions for notifiable diseases including measles (88%) and polio (36%). The most common reason given for not reporting was not being aware of any reporting requirement.

We directly observed several practices suggesting weakness in vaccine safety and cold-chain quality (Table 3). In almost all practices (92%), vaccines were stored in domestic refrigerators. Expired (stage 3—4) VVMs were noted in 18% of observed refrigerators. We observed notable outlier practices with respect to stock management; some providers did not maintain refrigerators for vaccine storage, and kept vaccine vials in unrefrigerated thermal boxes (7%), or obtained vaccine vials directly from a nearby pharmacy as needed on a patient-by-patient basis (<1%).

Overall, there was an equal degree of acceptability and unacceptability of the three example public-private partnership models (Figure 1). However, there was variation in the acceptability of these partnership models between the two cities and between practitioners of different levels of training. The highest level of overall acceptance for any type of model was 44% for Model 3 (allow government to use the facility), particularly among providers with an MBBS alone (59%).

Discussion

This study fills crucial knowledge gaps related to immunization practices in the private sector in India. In comparison to prior studies [10–12], we conducted an on-site assessment of knowledge, attitudes and practices rather than a telephone survey, and the scope of included providers was not limited to pediatrician members of
the India Academy of Pediatrics. The response rate for this study (87%) was also higher than in prior studies (range 47-51% among pediatricians) [10–12]. We aimed to maximize the completeness of the sample of providers who vaccinate by obtaining the actual lists of vaccine purchasers from vaccine distributors in the two cities. We were therefore able to capture information from multiple categories of physician immunization providers in Gujarat irrespective of membership in professional organizations.

Our study among private providers in Gujarat found a high prevalence of practices that lead to MOV, such as multiple injection hesitancy. Several studies have demonstrated that concern about multiple injections among providers is associated with vaccination delay and incomplete vaccinations [18–21]. Although providers in our study reported some reluctance from parents towards multiple vaccinations, providers often overestimate this parental concern [22]. In addition, since most providers in our study reported their own reluctance to administer multiple vaccinations at the same visit, multiple injection hesitancy among practitioners might be a key source of MOV that can be addressed in India.

Our findings suggest that MOV in the private sector could be reduced by relatively straight-forward changes in practice, such as performing opportunistic screening for vaccination status and appropriate vaccination by providers at all visits. MOV could also be reduced through the improved and increased use of office-based records and child-based vaccination registers, instead of relying solely on home-based vaccination cards; half of the providers responded that they would not vaccinate a child who presented for immunizations without their home-based vaccination card. In addition, other more context-specific strategies to improve provider practices might be needed, including working through professional societies to adopt standards of practice on multiple vaccinations and recordkeeping, for example, and giving feedback to providers through on quality of services delivered. Although only rigorously evaluated in high income countries, provider assessment and feedback interventions are powerful evidence-based strategies to improve vaccination coverage; these strategies both evaluate provider performance in delivering one or more vaccinations to a client population (assessment) and present providers with information about their performance (feedback) [23]. In addition, MOV cannot be fully addressed without a key change in the attitude of practitioners towards immunization; without a specific valid
contraindication, every child should be vaccinated with all indicated vaccines to reach and maintain high vaccination coverage [24,25].

We found a wide range of quality in cold chain and injection safety practices. Any blood borne pathogen transmission event that occurs in the private sector due to unsafe injection practices, or vaccine preventable disease outbreak among vaccinated children due to improper cold-chain storage practices, would be highly visible and threaten to undermine public trust in the UIP; therefore, training on injection safety, and cold-chain maintenance, including the appropriate use and interpretation of VVMs and temperature monitoring practices may be valuable. We did not obtain information on the cold-chain, transportation, and quality assurance systems used by vaccine distributors; future assessments focused on vaccine distributor supply and quality would also be informative.

Finally, we found a great need to clarify and communicate about existing channels for private sector providers to report vaccination doses to reliably estimate vaccination coverage; AEFI to identify and monitor vaccine safety; and notifiable vaccine-preventable diseases, to monitor the impact of vaccination. In particular, with the recent switch to bivalent oral poliovirus vaccine (bOPV) and inactivated poliovirus vaccine (IPV) introduction, ongoing sensitive AFP surveillance is needed to identify potential circulating poliovirus in India.

Although acceptability of the public-private partnership models that we investigated showed variation by city and level of training of the provider, none of the three models in either city were accepted by more than about half of providers surveyed, and no model had greater than 44% acceptability overall. Exploring the acceptability of the public-private partnership models further will likely require the use of qualitative methods (e.g., focus groups or key informant interviews) at several levels in the health system to understand barriers and identify meaningful public–private partnership models.

This study has some limitations. Our study was designed to provide a description of attitudes and practices related to immunization services among all physicians offering these services in two major cities in Gujarat state. However, these findings might not be representative of all urban settings in India, which range widely in level of
economic development and other factors such as religious and cultural norms that influence demand, access, and use of the health care system, as well as norms, attitudes, and practices among health care providers. In addition, although our study aimed to obtain a comprehensive sample of private immunization service providers, no central registration of medical practitioners is available that could be used to generate a complete sampling frame, and physician associations do not exist at a national or state level for general practice physicians or non-physician providers. Although non-physicians provide immunization services in some settings in India, we were unsuccessful in obtaining municipal membership lists of non-physician immunization providers affiliated with Ayurvedic Yoga and Naturopathy, Unani, Siddha, and Homeopathy organizations; we limited our assessment to private practitioners. A similar study of immunization practices in India’s UIP would be valuable to allow comparison of the two groups. Finally, our findings should be interpreted cautiously, given the potential for social desirability bias in the responses, or the desire of providers not to provide information that might be used to increase regulation or estimate income for the purposes of taxation.

This study provides key information that should influence development of mutually strengthening relationships between the public and private health sector, and policies related to private vaccination provider practices in Gujarat. Immunization services can be strengthened in this State by engaging the private sector to leverage the important position it plays in ensuring high vaccine coverage in the State, while reducing MOV, strengthening cold-chain and injection safety practices, improving recordkeeping and reporting practices, and exploring innovative and mutually-beneficial partnerships.

**Conflicts of Interest Statement:** The authors declare no conflicts of interest.

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Figure captions:

**Figure 1.** Acceptability of example public-private partnership models among vaccination providers, stratified by city (left panel) and by level of training (right panel). Percentages within the figure refer to respondents in overall disagreement (disagree or strongly disagree, left), neutral or undecided (center), and in overall agreement (agree or strongly agree, right).
References


