

# Attitudes and Practices of Auxiliary Nurse Midwives and Accredited Social Health Activists in Uttar Pradesh and Bihar Regarding Polio Immunization in India

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## Summary

Although India was removed from the list of polio endemic countries in January 2012, maintaining the focus on polio vaccination is critically important to prevent reintroduction of the virus. In 2009–2010, we conducted a study to assess the attitudes and practices of frontline health workers in India regarding polio immunization in Uttar Pradesh and Bihar. More than 95% of auxiliary nurse midwives (ANMs) and accredited social health activists (ASHAs) agreed that polio supplementary immunization campaigns helped in increasing acceptance of all vaccines. The majority of ANMs (60–70%) and ASHAs (56–71%) believed that polio immunization activities benefitted or greatly benefitted other activities they were carrying out. Less than 5% of ANMs and ASHAs felt they were very likely to face resistance when promoting or administering polio vaccine. This study provides information that may be useful for programs in other countries for polio eradication and in India for measles elimination.

**Key words:** auxiliary nurse midwives, accredited social health activists, immunization, India, polio.

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## Introduction

In May 2012, the World Health Assembly approved a resolution for polio eradication to be treated as a 'programmatically emergency for global public health', which will launch an emergency plan for driving the disease out of its final three strongholds: Nigeria, Afghanistan and Pakistan [1]. In January 2012, India was removed from the list of countries with indigenous transmission of wild poliovirus (WPV) [2]. Certain states in India, particularly Uttar Pradesh (UP) and Bihar, had been major poliovirus reservoirs [2]. Nearly 32% of the total population of India resides in UP and Bihar, but until recently, ~98% of polio cases were occurring in these

two states [3]. Even though India has achieved interruption of WPV transmission, the threat of re-importation from neighboring Pakistan is ever present. These states also have some of the lowest routine immunization rates in the country, as evaluated by coverage surveys. Despite improvements in routine immunization in Bihar during recent years, only 61.6% children in the age-group of 12–23 months had received three doses of oral polio vaccine (OPV) through routine immunization in 2009–2010, up from 53.1% in 2007–2008 [4]. Routine immunization coverage has been even lower in UP, with only 53.9% children in the age-group of 12–23 months having received three doses of polio vaccine through routine immunization in 2009–2010, up from 40.4% in 2007–2008 [4].

In India, the public sector is the major provider of immunization activities. Auxiliary nurse midwives (ANMs) and accredited social health activists (ASHAs) play key roles in delivery of immunization services. In the rural health system, the ANMs are the key field-level workers who interact directly with the community and have been the central focus of all the reproductive and child health programs. ASHAs work at the interface between the community and the public health system, mobilizing community members to obtain health services.

A study in UP demonstrated that polio vaccination booth coverage was 8–12% higher in areas with community mobilizers. Other studies found that community mobilizers can increase families' positive attitudes and behaviors toward OPV [5, 6]. Another study in UP found that mobilizers pointed to a 20% increase in their intention to vaccinate their children against polio among families who reported interaction with the mobilizers [7]. Social mobilization raised community perceptions of polio risk for an unvaccinated child [8]. Interpersonal communication and social mobilization activities were found to increase acceptance of OPV from resistant families [9].

As ANMs and ASHAs have frequent interactions with community members and owing to the influence they can have on families, the perceptions and practices of these frontline health workers regarding polio vaccination and eradication are important. This study assessed the attitudes and practices of ANMs and ASHAs regarding polio vaccination, polio eradication and the effects of supplementary polio immunization activities (SIAs) on other activities. These data may provide important lessons for future efforts in India, such as measles elimination, and in other countries working to eradicate polio.

### Methods

ANMs and ASHAs were selected from primary health centers (PHCs) in Bihar and UP. All participants were adults with a minimum age of 18 years.

Surveys were done in-person between June 2009 and June 2010.

First, ANMs and ASHAs were recruited for preparatory focus groups. The focus groups were held separately for ANMs and ASHAs. The survey instruments developed from the focus groups were piloted before administration. After the focus groups and pilot testing of the survey, ANMs and ASHAs were surveyed in-person, and the survey took ~30 minutes to complete. In drawing this sample, blocks were selected from contiguous districts of Bihar and UP that had at least one confirmed case of WPV infection between January 2006 and June 2009. From 969 eligible blocks in these states, 236 blocks were randomly selected. The primary sampling unit was the block. In most of India, including Bihar and UP, a block is a sub-section of a district that has at least one PHC covering 30 000 or more people [10]. Once blocks were selected, different sampling frames were established to select 800 healthcare workers of each type (ANMs and ASHAs). For the ANMs, the PHCs within the selected blocks were enumerated to provide a list from which individuals were randomly sampled; for the ASHAs, the villages within the selected blocks were enumerated to provide a list from which individuals were randomly sampled.

Emory University's Institutional Review Board and Maulana Azad Medical College Institutional Ethics Committee determined that this study met the definition of quality improvement rather than research and therefore did not need review. Verbal consent was obtained before data collection.

The survey instrument was designed to assess attitudes, barriers and practices associated with Universal Immunization Program (UIP) vaccines, non-UIP vaccines and polio eradication efforts. Both surveys used a 5-point Likert scale ranging from 1 to 5. Survey items were guided by the Health Belief Model [11]. The Health Belief Model is considered to be the most appropriate for use with one-time behaviors, such as vaccination, where perceived threat and illness avoidance are the most salient issues. The survey form was translated from English into Hindi and then back-translated to ensure conceptual and linguistic equivalence. Surveys were administered in Hindi by trained personnel. Questions addressed attitudes on perceived threat of disease (perceived susceptibility) 'Polio would likely be a serious disease in an unvaccinated child under 5 years?', perceived expectations of vaccination (perceived vaccine safety and perceived barriers) 'How likely are side-effects with the polio vaccine?' and 'How likely are you to face resistance when trying to promote/administer the following vaccines?', attitudes about polio eradication and what ANMs and ASHAs would devote their time to if they did not have to conduct SIAs. The goal of SIAs is to interrupt circulation of a disease by immunizing every child within a certain age range, regardless of previous immunization status.

The idea is to capture children who are either not immunized, or only partially protected, and to boost immunity in those who have been immunized. This way, every child in the most susceptible age-group is protected against the specific infection at the same time—instantly depriving the pathogen of the fertile seedbed on which its survival depends [12]. SIAs are carried out when there is high potential for an outbreak, such as with measles, or for polio eradication efforts.

Data management and analysis was conducted using SAS version 9.2. Due to the high level of skewness in some response categories, responses to Likert scale questions were dichotomized into two categories: (i) very likely/important or likely/important versus (ii) neither likely/important, unlikely/not important, or very unlikely/very unimportant. Descriptive analyses were performed to assess distributions of variables assessing vaccine-related attitudes, beliefs and barriers. Chi-square analyses were conducted to assess differences in responses between ANMs and ASHAs using Bonferroni's adjustment of  $p=0.003$  for ANMs and  $p=0.004$  for ASHAs for significance.

**Results**

Overall, 720 of 773 ANMs (93%) and 722 of 773 ASHAs (93%) completed the survey. In Bihar, 139 of 159 ANMs (87%) and 141 of 159 ASHAs (89%) completed the survey. In UP, 581 of 614 ANMs (95%) and 581 of 614 ASHAs (95%) selected completed the survey.

ANMs and ASHAs in both UP and Bihar responded that polio immunization is essential for a child's health (97.1 and 98.6%, respectively), and 98% of them supported polio SIAs. Despite support for polio SIAs, 27.8% of ANMs and 40.1% of ASHAs stated that polio SIAs interfered with their responsibilities related to routine vaccination. Importantly, >95% of ANMs and ASHAs felt polio SIAs helped in increasing acceptance of other vaccines. The great majority of ANMs felt polio campaigns helped in increasing acceptance of all vaccines, although the proportion was higher in UP than Bihar (97.4 vs. 87.8%) ( $p < 0.001$ ). In UP, 25.3% of ANMs and 34.4% of ASHAs believed that breastfeeding was better than vaccination for protecting children against polio; in Bihar, this perception was significantly higher at 48.2% for ANMs ( $p < 0.0001$ ) and 55.6% for ASHAs ( $p < 0.0001$ ). A significantly higher number of ANMs (15.8%) and ASHAs (18.3%) in Bihar reported that side effects were likely from polio vaccine compared with ANMs (5.2%,  $p < 0.0001$ ) and ASHAs (3.3%,  $p < 0.0001$ ) in UP (Table 1).

Reports of facing resistance when trying to promote or administer polio vaccine were uncommon. Only 13.6% of ANMs and 13.4% of ASHAs

TABLE 1  
Knowledge of and support for polio immunization

Knowledge and Support	ANM		ASHA		p-value	Total (%) (N=722)
	UP (%) (n=581)	Bihar (%) (n=139)	UP (%) (n=581)	Bihar (%) (n=141)		
Polio vaccines are essential for a child's health	99.1	95.0	99.0	97.2	0.10	98.6
Breastfeeding is better than vaccination for protecting children against polio	25.3	48.2	34.4	55.6	<0.0001	38.6
I support polio SIAs	97.3	98.6	99.0	97.2	0.1027	98.6
Polio SIAs interfere with my job responsibilities related to routine vaccines	30.0	18.7	40.8	37.3	0.4498	40.1
Polio SIAs help in increasing acceptance of all vaccines	97.4	87.8	96.4	93.7	0.1446	95.9
How likely are side effects with the polio vaccine	5.2	15.8	3.3 <sup>a</sup>	18.3 <sup>b</sup>	<0.0001	6.1
Polio would likely be a serious disease in an unvaccinated child under 5 years	98.3	95.0	98.2	93.7	0.0009	97.1

<sup>a</sup>Out of 545.

<sup>b</sup>Out of 126.

Bold values are significant at  $p < 0.05$

TABLE 2  
ANMs and ASHAs who report facing resistance when trying to promote or administer vaccines

Vaccine	Percent ANMs likely/very likely N = 720	Percent ASHAs likely/very likely N = 722
BCG	18.2	22.9
Polio	13.6	13.4
DPT	41.9	36.8
Measles	7.4	15.2

reported that they were very likely or likely to face resistance against polio vaccine. This is compared with diphtheria, pertussis, and tetanus (DPT) vaccine, which had the highest reported resistance from both ANMs (41.9%) and ASHAs (36.8%) (Table 2). ANMs reported facing the least resistance with measles vaccine (7.4%), whereas ASHAs reported facing the least resistance with polio vaccine (13.4%) (Table 2).

More than 96% of ANMs and ASHAs believed that polio SIAs benefitted their locality a great deal and that it was likely or very likely that polio would be eliminated from India. The majority of ANMs (69.8% in UP and 60.4% in Bihar) and ASHAs (68.8% in UP and 56.7% in Bihar) believed that polio immunization activities either benefitted or greatly benefitted their other activities.

The largest percentage of ANMs in both UP and Bihar reported that insufficient vaccine supply was an important barrier to promoting or administering vaccines. In UP, ANMs reported non-availability of vaccines and lack of awareness of time and place of vaccination as important barriers. ANMs in Bihar felt that insufficient personnel and parents' belief that children were fully vaccinated through receiving OPV during mass campaigns were important barriers. The largest percentage of ASHAs in both UP and Bihar reported that lack of awareness of time and place of vaccination was an important barrier. ASHAs in UP reported that insufficient vaccine supply and non-availability of vaccine were also important barriers, whereas in Bihar, insufficient personnel and insufficient vaccine supply were identified as barriers (Table 3).

More than 50% of ANMs and ASHAs reported spending equal time on polio vaccination and routine immunization. More ANMs and ASHAs in UP reported that they spent equal time on polio SIAs and routine immunizations, whereas in Bihar, both groups reported spending more time on polio SIAs than on routine vaccination (Fig. 1).

The top two activities that ANMs and ASHAs would devote more time to if they did not have to do polio SIAs were antenatal care and routine

immunization. There was more interest among the ANMs in Bihar than in UP in making Anganwadi visits (14.4 vs. 1.9%), conducting ASHAs' record and payment activities (14.4 vs. 4.3%), attending monthly PHC meetings (25.9 vs. 5.3%) and conducting area surveys (19.4 vs. 4.6%). ASHAs in UP had lower interest compared with their counterparts in Bihar in some activities, including Anganwadi visits (7.6 vs. 29.3%), area surveys (12.1 vs. 30.7%), leprosy work (3.3 vs. 17.4%), tuberculosis program activities (3.6 vs. 25.7%) and HIV counseling (3.6 vs. 25.7%) (Table 4).

## Discussion

In January 2012, India was removed from the list of endemic countries. The World Health Assembly has declared polio eradication a global public health emergency, with the aim to stop polio transmission in the three remaining endemic countries. With the present threat of importation of polio from Pakistan and Afghanistan, aggressive polio eradication efforts in India must continue to maintain a polio-free status, especially in UP and Bihar.

ANMs and ASHAs are key groups of health workers in rural India. They are responsible not only for polio immunization activities, but also for many activities pertaining to maternal and child health, including routine immunization. They remain in close contact with families. Hence, their knowledge, attitudes and practices directly affect performance of many important health programs.

According to a 2005 survey of community health workers that included ANMs and other female health workers across eight Indian states covering 40 districts, only 12% of health workers knew the immunization schedule for children [13]. Our findings show that both groups of health workers in UP and Bihar believe that polio vaccines are safe and effective and that ongoing polio SIAs are important. The results demonstrate that health workers recognize the risk of polio in an unvaccinated child and indicate a very high level of support for polio-related activities among these workers in UP and Bihar. Similar to findings from a survey conducted by the INCLIN Trust in two districts of western UP in 2006, a significant proportion of health workers in both states felt that the time they spent during repeated polio rounds could be used for performance of other community programs, including routine immunization [14]. However, in our study, a much higher proportion of ANMs and ASHAs in both states reported that polio SIAs helped in increasing the acceptance of all UIP vaccines. This finding suggests that even though ANMs and ASHAs feel polio SIAs interfere with other job responsibilities, they also believe that these campaigns are vital to a child's health and help increase acceptance of routine immunizations.

TABLE 3  
Important barriers to promoting/administering vaccines

Barriers	ANMs (N = 720)		ASHAs (N = 722)	
	UP (%) (n = 581)	Bihar (%) (n = 139)	UP (%) (n = 581)	Bihar (%) (n = 142)
Parents' lack of awareness of the importance of vaccines	13.4	15.1	20.1	29.6
Parents' lack of faith in effectiveness of vaccines	16.2	17.3	22.7	28.2
Parents' fears of side effects, such as fever	13.4	13.7	21.2	23.9
Parents belief that children are fully vaccinated through receiving OPV during mass campaigns	15.0	20.1 <sup>a</sup>	25.0	26.1
Superstition	10.2	12.2	15.5	21.8
Parents' cultural beliefs	14.6	15.1	22.7	26.8
Parents' religious beliefs	16.4	16.5	24.1	24.6
Lack of time and priority	16.0	17.3	23.1	23.9
Lack of awareness of time and place of vaccination	25.8 <sup>a</sup>	18.0	36.1 <sup>b</sup>	37.3 <sup>b</sup>
Belief that immunization providers will come door-to-door for all vaccines, not just polio vaccine	13.8	15.8	24.8	30.3
Non-availability of vaccine	26.5 <sup>c</sup>	19.4	33.0 <sup>a</sup>	28.9
Refusal to complete series if side effects observed following receipt of preceding dose in a series	18.1	13.7	24.8	16.9
Illiteracy	9.5	8.6	16.4	18.3
Lack of faith in government facilities	19.3	17.3	26.3	26.8
Lack of infrastructure	24.1	15.8	30.5	28.2
Lack of transportation	20.7	18.7	28.1	27.5
Insufficient personnel	23.8	20.9 <sup>c</sup>	32.1	33.1 <sup>c</sup>
Insufficient vaccine supply	30.1 <sup>b</sup>	25.2 <sup>b</sup>	36.0 <sup>c</sup>	32.4 <sup>a</sup>
Resistance from other family members, such as mother-in-law	15.3	15.1	24.1	23.2

<sup>a</sup>Ranked third.

<sup>b</sup>Ranked first.

<sup>c</sup>Ranked second.

The reported likelihood of encountering resistance to administration of polio vaccines was not significantly different among both types of health workers in both states. Resistance to polio was substantially lower than reported with other vaccines. Resistance varied by vaccine type, but the survey did not assess what type of resistance is faced. This is an important area for future study so that educational interventions for the public can be guided by the degree of resistance. Further research is needed to distinguish whether the resistance is coming from parents, community members or other health workers. In a qualitative community-based study done in two districts of UP to gain insights into the phenomenon of social resistance and rumors about polio campaigns, researchers concluded that resistance was confined to marginalized sections of society and was sporadic and transient in nature [15]. Our results suggest that the issue of resistance to OPV in UP may not be an important problem. This may be attributable to the fact that the families have had interactions with ANMs and ASHAs, which have been shown to decrease resistance [9]. ANMs and ASHAs must be sure to communicate why polio vaccination mass campaigns are happening and what the side effects of vaccination could be to avoid increasing any resistance [16].

In an effort to assess barriers to routine immunization, the National Polio Surveillance Project collaborated with a number of stakeholder organizations in 2004 to conduct a comprehensive evaluation of India's national UIP [17]. This review focused on six states selected to represent conditions of poor performance (Bihar, Jharkhand, Madhya Pradesh, Orissa, Rajasthan and UP). The results of this assessment suggest that the basic infrastructure was in place to deliver vaccines to every child, but that the system was not reaching its potential due to geographic, financial and human resource constraints. Although health workers try hard to serve their population, they are not given the support and training they need. Our study supports some of these findings. Some of the top barriers to vaccination given by ANMs and ASHAs are non-availability of vaccine, insufficient personnel and insufficient vaccine supply. ANMs and ASHAs also report lack of awareness of time and place of vaccination as an important barrier. This lack of community awareness may be overcome by increased magnitude and frequency of mass awareness campaigns.

Despite ANMs and ASHAs reporting that the commitment to polio SIAs interferes with their job responsibilities related to routine immunization, ANMs and ASHAs continue to show strong support

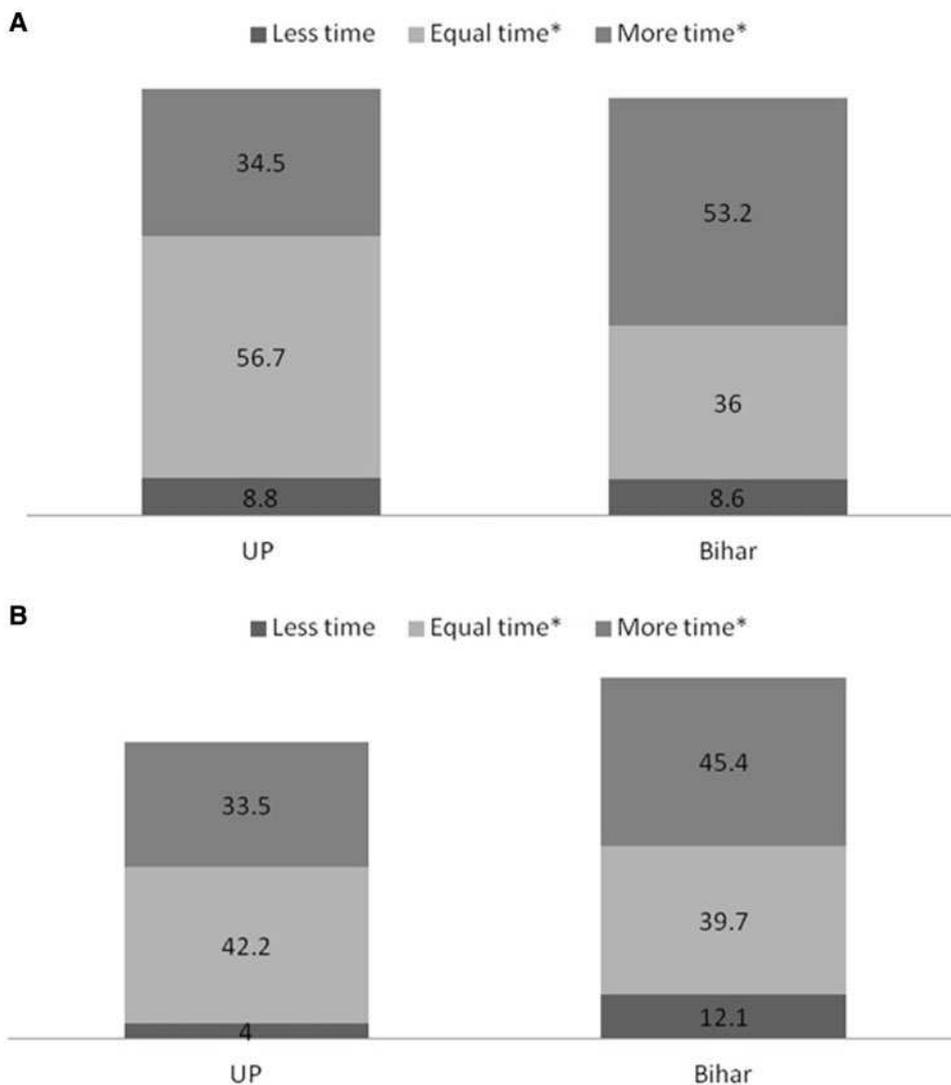


FIG. 1. Time spent in polio vaccination compared with routine vaccination. (A) ANMs, (B) ASHAs. Comparisons between UP and Bihar  $*p < 0.0001$ .

for immunization, reporting that spending more time on routine immunization would be a high priority if they did not have to conduct polio SIAs. One encouraging finding was the level of support of these health workers for ongoing eradication efforts, including frequent SIAs. This is in contrast to observations of an earlier study conducted in 2009 where providers expressed reservations regarding the high frequency of OPV rounds and also questioned the scientific rationale for frequent rounds [15]. Future research into how ANMs and ASHAs can be supported, such as redistribution of workload, better planning or increasing the workforce, is important to improving routine immunization efforts.

Reassuringly, provision of antenatal care and routine immunization services were listed as a high priority by both groups of health workers, which bodes well for achieving Millennium Development Goals 4 and 5, as these two states contribute substantially to both maternal mortality and under-5 mortality in India [18].

There is a potential for social desirability bias because the surveys were done in-person. As the study was focused in UP and Bihar, the results may not be generalizable to the rest of India. The data on amount of time spent on activities should be interpreted with caution because of variation in time devoted to polio immunization during supplementary

TABLE 4

Activities ANMs and ASHAs reported they would spend more time on if they did not have to conduct polio SIAs

Other Activities	ANM		ASHA	
	UP (%) (n = 581)	Bihar (%) (n = 139)	UP (%) (n = 580)	Bihar (%) (n = 140)
Antenatal care	66.4 <sup>a</sup>	60.9 <sup>b</sup>	79.3 <sup>a</sup>	61.3 <sup>c</sup>
Conduct delivery	64.2 <sup>b</sup>	62.6 <sup>c</sup>	N/A	N/A
Routine immunization	64.6 <sup>c</sup>	70.5 <sup>a</sup>	76.0 <sup>c</sup>	66.4 <sup>a</sup>
Birth and death registration and verification	46.0	28.8	50.8 <sup>b</sup>	32.9
Family planning	29.1	38.8	N/A	N/A
Home visitations	15.0	22.3	48.8	55.5 <sup>b</sup>
Anganwadi visits	1.9	14.4	7.6	29.3
ASHA worker record and payment	4.3	14.4	N/A	N/A
Monthly PHC meetings	5.3	25.9	N/A	N/A
Area survey	4.6	19.4	12.1	30.7
Leprosy	N/A	N/A	3.3	17.4
SMS (sakhshar mahila samuh) bimonthly meeting in every village	N/A	N/A	15.3	26.4
DOTS (TB)	N/A	N/A	3.6	25.7
HIV/AIDS counseling/treatment	N/A	N/A	3.6	25.7

<sup>a</sup>Ranked first.<sup>b</sup>Ranked third.<sup>c</sup>Ranked second.

immunization campaigns in comparison with intervening periods.

The findings of this study provide important and encouraging information on the support and commitment of community health workers for polio eradication in these two states that may be applicable to other countries facing importation of WPVs and potentially for future efforts in India, like planning end-game vaccination strategies and measles elimination. Complacency must be avoided, as there is a looming threat of importation from neighboring countries. Careful planning for the roles and responsibilities of ANMs and ASHAs will be important for further improving routine immunization and sustaining polio eradication.

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