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Abstract

***Background & objectives*:** Vaccination coverage in India is far from complete despite the commitment to universal coverage. In this study, we examine the role of health infrastructure in expanding immunization coverage in rural India. Our approach differs from prior work in that we include detailed measures of village health infrastructure that account for the wide variations in health care capabilities across facilities.

***Methods*:** The analysis sample consists of 43,416 children aged 2-35 months residing in rural India from the National Family Health Survey conducted in 1993 and 1998 respectively. We estimate separate multinomial logit regression models for polio and non-polio vaccines that estimate the probability that a child will receive "no cover," "some cover" or "full age-appropriate cover." The key measure of health infrastructure is a hierarchical variable that assigns each child to categories (no facility; dispensary or clinic; sub center; primary health care center (PHC); hospital) based on the best health facility available in the child's village.

***Results*:** In 1993, roughly 45 percent of children in rural India had no immunization coverage for polio and non-polio vaccines and 43 percent of children lived in villages with no health facility. The estimates from the regressions show that availability of health infrastructure in the village significantly improved vaccination coverage for non-polio vaccines. The estimates also show that larger and better-equipped facilities such as PHCs or hospitals have a bigger effect on vaccine coverage. The association between the best health facility available in the village and polio vaccine coverage was small and statistically insignificant. One notable exception is that having a PHC or hospital within 2 or 5 km significantly increased the likelihood of full-cover for polio vaccine.

***Interpretation & conlcusion*:** Overall, our findings suggest that rural health infrastructure, especially hospitals and PHCs, played an important role in expanding vaccine coverage for non-polio vaccine preventable diseases. Juxtaposing this result with the fact that a significant proportion of children reside in villages with no health facility suggests that increased availability of health infrastructure is an important tool for expanding immunization coverage in rural India.

Introduction

Roughly 3 million children die each year of vaccine preventable diseases (VPDs) with a disproportionate number of these children residing in developing countries[1]. Recent estimates suggest that approximately 34 million children are not completely immunized with almost 98 percent of them residing in developing countries[2]. Vaccination coverage in India is also far from complete despite the longstanding commitment to universal coverage. While gains in coverage proved to be rapid throughout the 1980s, taking off from below 20 percent coverage to about 60 percent coverage for some VPDs, subsequent gains have been limited[3]. In an effort to further boost vaccination coverage the government of India initiated the Pulse Polio Initiative (PPI) Campaign in 1995. This campaign broke from the past by proactively engaging the public, through both media awareness campaigns as well as setting up additional infrastructure for dispensing polio vaccines. However, the success of PPI has been limited. Although, PPI significantly increased first-dose polio immunization coverage, there were limited gains in complete coverage for polio vaccines[4]. Moreover, coverage of non-polio vaccines seemed to be unaffected by the PPI campaign. This limited success of the PPI campaign in expanding full-coverage for VPDs has renewed the search for other effective strategies to achieve universal immunization in India.

In this study, we examine the role of health infrastructure in expanding immunization coverage in rural India. Community health infrastructure has been shown to be an important correlate of health outcomes in other developing countries[5-8]. Two recent studies have examined the role of health infrastructure on the utilization of maternal health care using national data[9,10] while others have examined the relationship

between health infrastructure and child and maternal health at the state level[11]. These studies have mixed findings. For example, one study used multivariate regressions to control for individual and household characteristics and found that distance to a health facility did not predict health services utilization. Another used a similar analytic strategy, but different data, and the results indicated that presence of a health facility in the village significantly increased the likelihood of maternity care utilization.

We build on this prior research in three important ways. First, we characterize the availability of rural health infrastructure in more detail compared to prior studies, which typically examined whether or not *any* health facility was present within a certain distance. This is important as health facilities vary significantly in terms of their staffing and health care capabilities, thus are likely to have different effects on immunization coverage. For example, primary health care centers are manned by a medical officer and are supported by 14 paramedical and other staff. By contrast, a sub center (the lowest level of public health infrastructure) is typically a single room facility manned by an Auxiliary Nurse Midwife (ANM). In addition, facilities often tend to co-locate in the same areas due to accessibility, thus making it difficult to examine the independent effect of each facility. To capture this significant heterogeneity in health facilities and to address the co-location of facilities we construct a hierarchical measure of availability that captures the highest level of health facility available in the village. By constructing a hierarchical measure, we are able to examine whether it matters if the best available health facility in the village is a hospital or a less equipped, smaller facility. Second, we also examine whether the availability of health personnel such as village health guide and trained birth attendants affects immunization coverage. Finally, in addition to the usual household and individual covariates we include village level variables and indicator

variables for each state in our regression models (state fixed effects) to control for variations across areas in unobserved factors, such as policy environment and governance that are correlated with health infrastructure as well as immunization coverage. Given that states differ markedly in terms of development and health related measures, it is important to adequately control for these differences.

Materials and Methods

We use data from the 1993 and 1998 waves of the National Family Health Survey (NFHS). The NFHS surveyed a representative sample of households in India's 26 major states. The sample consists of ever-married women in the 13-49 age group. Structured interviews were conducted with the women and the household in which they resided. Data on immunization were collected in each wave through the mother questionnaire for children in the age group of 2-35 months. In addition, for women residing in rural areas information was also collected on the availability of village infrastructure through a village questionnaire. Our analysis sample consists of 43,416 children sampled from rural primary sampling units, including 22,473 children in wave 1 and 20,943 children in wave 2. By matching the mother level data files with the village level data files we have information on each child's immunization status, their personal attributes, their maternal and household attributes, and the village infrastructure that they have access to. (More detailed information on the survey is available at http://www.nfhsindia.org).

Immunization

Mothers were asked about the immunizations received by each of her eligible children, and where possible, this information was verified by cross-checking against the child's vaccination card. Specifically, the survey asked whether the child had received

BCG, DPT (all doses), Polio (all doses) and Measles vaccinations. Our definition of immunization distinguishes across vaccine types to identify immunization coverage rates for two categories of VPDs – Polio and Non-Polio. This categorization is useful since the two waves of NFHS straddled the PPI.

In each of the NFHS waves we categorize a child as having either "no coverage," "some coverage" or "full age appropriate coverage" using Government of India's Recommended Immunization Schedule (Table 1). Thus, for example, a child who is 3 months old, and has BCG, DPT1 and 2, and Polio1 vaccines would be classified as having "fully age appropriate coverage" under the Non-Polio vaccine category, but would only be classified as having "some cover" for the Polio vaccine. Since many diseases require multiple doses to provide full coverage across a range of strains of the disease (e.g. polio) we use this three fold classification of immunization status to distinguish across the levels of coverage that a child has against the two categories of VPDs we study. While prior studies have used a similar three fold classification (no coverage, partial coverage, full coverage), they restrict their sample to children 12-25 months[4,9]. Our characterization of immunization coverage differs from past studies by defining immunization cover on the basis of its appropriateness at every age of the infant. This approach has two advantages. First, it allows us to include all children less than 35 months in our analysis. Second, it allows us to distinguish children who receive age appropriate coverage from children who are immunized at an older (or younger) age and therefore are exposed to the risk VPDs for a longer duration of time (or are physiologically not ready for vaccination).

Rural Health Infrastructure

The NFHS collected village level information in each wave regarding the presence of rural health infrastructure relevant for immunizations. The primary health care infrastructure in rural India consists primarily of public health facilities, with some private provision. The public health care infrastructure consists of a three-tier system comprised of sub-centers (SC), primary health centers (PHC), and community health centers (CHC), that vary markedly in their staffing and health care capabilities. SCs are typically single room facilities manned by an Auxiliary Nurse Midwife (ANM) and provide basic health services, such as child delivery kits. The average rural population served by SCs is about 4,500 individuals or about four villages. The next level of facility is the PHC, which is manned by a medical officer supported by 14 paramedical and other staff. It acts as a referral unit for six SCs and has 4-6 beds for patients. The highest level of facility is a CHC, which is manned by four medical specialists i.e. Surgeon, Medicine, Gynecologist and Pediatrician, supported by 21 paramedical and other staff. It has 30 in-door beds with one operation theater, x-ray, labor room and laboratory facilities. It serves as a referral center for four PHCs.

In addition to public health infrastructure, rural areas are some times also served by private health facilities including private hospitals, clinics or family planning/health centers run by non-governmental organizations (NGO). Villages may also have pharmacies or medical shops, and visits from mobile health units (MHU). Besides physical infrastructure, villages may also have health personnel such as village health guides (VHG), trained birth attendants (TBA), and Anganwadi workers who provide advice, information and basic health services for pregnant women, mothers and young children. The presence of informal workers in the village, their ability to build one-to-

one relationship with the women in villages may give them an advantage over formal health care delivery system in rural India.

We use this information to construct our measures of rural health infrastructure for each village in our sample. First, we construct a categorical variable that captures the hierarchy of primary health infrastructure, where dispensary or clinic is the smallest facility followed by SC, PHC and hospital. Specifically, we assign each village to one of five mutually exclusive categories that capture the highest level of public or private health facility available in the village – (1) no health facility present, (2) best facility is a dispensary or clinic, (3) best facility is a SC, (4) best facility is a PHC, and (5) best facility is a hospital. We are not able to distinguish between private and public hospitals due to the nature of the survey questions. As mentioned earlier, the survey also asked about visit from a MHU. However, since MHUs visits were relatively less common in our data we include a separate indicator for whether a MHU visited the village.

Second, we construct indicator variables for other types of health facilities and personnel present in the village that do not provide immunizations to children but may educate households about the benefits of immunization and may help identify nearby facilities where vaccines may be received. These include – (1) whether there was a pharmacy or medical shop present in the village, (2) whether a VHG was present in the village, (3) whether a TBA was present in the village, (4) whether an *Anganwadi* was present in the village.

Finally, even though many households may not have a health facility in their village, it is possible that a facility is available in a neighboring village. Therefore, we also construct alternative measures of infrastructure availability that capture the highest level of facility available within 2 and 5 kms from the village.

Analysis Approach

For each category of immunizations (Polio vaccines and Non-Polio vaccines), we estimate a multinomial logit regression model, which estimates the conditional probability that a child with a specific set of characteristics (at the child, household and village levels) is likely to receive "no cover," "some cover" or "full age-appropriate cover." The key explanatory variables of interest in our models are the village health infrastructure and health personnel variables described earlier.

Since placement of health facilities and personnel is likely to be influenced by other population and village characteristics that may also be correlated with a child's likelihood of being immunized, controlling for these factors is important in order to assess the independent impact of health infrastructure on immunization coverage. The NFHS survey data allow us to include a rich set of covariates, at various levels, that relate to a child's likelihood of being immunized – child-level (age, sex, birth order), mother-level (age, education, cohabiting, work status, and if working for a salary), husband-level (age and occupation), household-level (religion, tribal status, household size, wealth index[12]). In addition, we also include a number of village-level variables that are likely to influence the placement of health facilities (access to roads, distance to a major town, availability of post office, schools, and electricity).

We also include dummy variables for each state in our models to control for time invariant unobserved differences across states that are related to immunization coverage. We also include a dummy variable for wave, which controls for any general time trend in immunization coverage (e.g. improved efficiency in providing health care). We estimate our models using Stata for Windows, Version 8 (Stata Corp, College Station, TX). All estimates are weighted to adjust for the multistage sampling design. Robust standard

errors are estimated to adjust for clustering at the village level. The variables in our analysis had extremely low rates of missing data, on average the variables had a less than 1 percent missing rate, with the maximum missing rate for any one variable being 3 percent.

Results

Polio and Non-Polio Vaccine Coverage

Table 2 shows the distribution of age-appropriate immunization coverage for polio and non-polio vaccines in each wave. The data show that in 1993, a significant proportion of children in rural India did not have any vaccination coverage. Between 1993 and 1998 there was a significant decline in the proportion of children with no coverage for both polio and non-polio vaccines. However, the decline in no-coverage was much more pronounced for polio vaccines (21 percentage points) compared to non-polio vaccines (12 percentage points). The reduction in no-coverage for polio vaccines translated into a roughly equal increase in partial and full coverage. In contrast, the decline in no-coverage for non-polio vaccines increased full coverage almost twice as much as partial coverage.

Availability of Rural Health Infrastructure and Health Personnel

Table 3 shows the distribution of rural health infrastructure in each wave of the NFHS. The data show three salient trends. First they highlight the limited availability of health infrastructure in rural India in the early 1990's. For example, in 1993 as many as 43 percent of children lived in villages with no health facility and roughly half did not have a PHC or hospital within a 5 km radius. Second, the data show substantial improvement in the availability of health infrastructure across the two waves that mimic

the trend of higher immunization coverage. Third, the data suggest that the improvement in health infrastructure was concentrated in areas that already had a health facility. For example, across all our hierarchical measures of health infrastructure the proportion with no health facility remained relatively stable while the proportion with PHC or hospital increased significantly across the two waves. Finally, as expected, the best available facility in the village improved as we examine availability within larger distances. Most notably, there was a significant drop in the percentage of children who had no dispensary/clinic, SC, PHC or hospital in their village (only 28 percent within 2 km, and just under 9 percent within 5 km), and a significant increase in the percentage of children living in villages where the best health facility was a hospital.

The availability of other village health infrastructure was also relatively scarce in wave 1. Fewer than one in three children lived in villages that had a pharmacy or medical shop. Visits by a MHU were even less common. In contrast, the availability of health personnel in the village was relatively more common. As many as one in two children lived in villages that had a TBA, 45 percent lived in villages with a VHG, and 46 percent lived in villages that had an Anganwadi worker.

Regression Results

In our regression analyses, we estimated a series of multinomial logit models for non-polio and polio vaccine coverage that sequentially added sets of covariates. We estimated three specifications – (1) only the health infrastructure and personnel variables and a wave indicator were included as covariates, (2) added individual and household covariates to the model in (1), and (3) added village covariates and state fixed effects to the model in (2). For the sake of brevity, we only present results from specification (3)

that included the full set of covariates. Estimates from specifications (1) and (2) showed large and significant associations between health infrastructure and personnel variables and non-polio vaccine coverage, although the associations became smaller as additional sets of covariates were added. The results for polio vaccine coverage had a similar pattern however the effect sizes were relatively smaller compared to non-polio results. These results are available from the authors upon request.

Panels A to C in Table 4 report estimates from specification (3) of the effect of village health infrastructure and personnel on non-polio vaccination coverage for the three hierarchical measures of health infrastructure. The estimates in all three panels of Table 4 show that availability of a dispensary/clinic, SC, PHC or hospital in the village significantly reduces no-coverage for non-polio vaccines. The estimates also show that that larger and better equipped facilities such as PHCs or hospitals have a larger effect on non-polio vaccine coverage compared to dispensaries or SCs. For example, children living in villages where the best available health facility is a hospital are 4 percentage points less likely to have no-cover for non-polio vaccines compared to children that have no health facility in their village. This decrease translates into an almost equal increase in some-cover and full-cover. By contrast, children living in villages where the best available health facility is a dispensary or clinic are 3 percentage points less likely to have no-cover for non-polio vaccines and this decrease translates mostly into an increase in some-cover.

The results across Panels A, B and C also show that more restrictive measures of the lack of health infrastructure have a stronger effect on vaccination coverage. For example, children who resided in villages with no health facility within 2 km were 4.8 percentage points more likely to have no-cover compared to children where the best

facility within 2 km radius was a hospital. By contrast, children who resided in villages with no health facility within 5 km were 7.1 percentage points more likely to have no-cover compared to children where the best facility was a hospital.

Finally, the results for other health infrastructure and health personnel variables show that these factors have little or no influence on immunization coverage. The availability of MHU or of health personnel such as VHGs and TBAs was not associated with significant changes in non-polio vaccine coverage. However, the availability of a pharmacy or medical shop in the village was associated with an increase in some-cover, although the effect was smaller than that of hospitals and PHCs. The presence of an Anganwadi worker in the village was also weakly associated with a decrease in no-cover for non-polio VPDs.

Table 5 presents the corresponding results for polio vaccination coverage. In contrast to the results for non-polio coverage, the association between the best health facility available in the village and polio vaccine coverage was small and statistically insignificant. One notable exception is that having a PHC or hospital within 2 or 5 km significantly increased the likelihood of full-cover for polio vaccine. In contrast to what we found for non-polio coverage, MHU visits in the village were associated with a significant decline in no-cover for polio, with an equal increase in some-cover and full-cover. Moreover, availability of a pharmacy or Anganwadi worker in the village was not associated with increase in coverage for polio vaccines. Presence of a TBA in the village, while not associated with changes in non-polio coverage, reduced the likelihood of some-cover.

Discussion

In this paper, we examined the role of rural health infrastructure and village health personnel in expanding immunization coverage for VPDs. Our approach differed from prior work in this area in that we included detailed measures of village health infrastructure and personnel that accounted for the wide variations in health care capabilities across facilities and personnel. Our measures also allowed us to examine the role of proximity of health infrastructure for immunization coverage.

Our results suggest that there are key differences in the types of health infrastructure that are important for expansions in coverage for Polio and Non-Polio vaccinations. First, even though both Polio and Non-Polio immunization cover expanded, these expansions were sourced from different service delivery mechanisms. While the expansion in non-Polio coverage is attributable to changes in the rural health infrastructure, such as the availability and proximity of hospitals, PHCs, and SCs, the rapid gains seen in Polio coverage appear to be less influenced by such changes. In fact, the unique and extremely intensive service delivery for polio vaccines centered around two days in the year (National Immunization Days) appears to have reduced the reliance on rural health infrastructure for polio vaccinations. This finding is supported by data on place of immunization collected in wave 2 of NFHS -- 72 percent of mothers reported visiting pulse polio locations to immunize their child against polio, whereas about three-quarters of all mothers reported using the rural health infrastructure to vaccinate their child against non-polio VPDs.

While reliance on village health infrastructure for polio vaccines was significantly reduced due to the PPI, the availability of PHCs and hospitals did in fact increase the likelihood of full age appropriate coverage for polio vaccines. Given that PPI had limited

success with increasing full-cover for polio, our findings may suggest an important avenue for expanding full-cover for polio.

The results from this study also highlight the importance of accounting for the heterogeneity of health infrastructure for estimating the effects of health infrastructure on immunization. We consistently find that larger and better equipped facilities such as PHCs and hospitals have a much bigger impact on immunization coverage compared to dispensaries and sub centers. Overall, our findings suggest that village health infrastructure, especially hospitals and PHCs, played an important role in expanding vaccine coverage for non-polio VPDs. Juxtaposing this result with the fact that many children in rural India reside in villages with no health infrastructure suggests that increased availability of health infrastructure is an important tool for expanding immunization coverage in rural India.

Table 1: Recommended Immunization Schedule

Age (weeks)	Vaccine (months)	BCG	DPT	Polio	Measles	Age Appropriate Coverage for all India
Birth	0	X		X*		BCG
6 weeks	1.5		X	X		BCG + DPT1 + Polio1
10 weeks	2.5		X	X		BCG + DPT1-2 + Polio1-2
14 weeks	3.5		X	X		BCG + DPT1-3 + Polio1-3
36 weeks	9.0				X	BCG + DPT1-3 + Polio1-3 + Measles

Source: Universal Immunization Program Division, Department of Family Welfare, Min. of Health & Family Welfare http://cbhidghs.nic.in/hii2003/12.01.htm

Table 2: Age Appropriate Coverage for Polio and Non-PolioVaccination, By Wave

	NFHS I (1993)	NFHS II (1998)
Polio Age Appropriate Coverage		
No Cover	47.3%	26.0%
Some Cover	13.8%	25.7%
Full Cover	38.9%	48.3%
Total		
Non-Polio Age Appropriate Coverage		
No Cover	45.3%	34.0%
Some Cover	27.4%	31.5%
Full Cover	27.4%	34.5%

Notes: Estimates are based on weighted data

Table 3: Availability of Health Infrastructure in the Child's Village, By Wave

	NFHS I (1993)	NFHS II (1998)
Best Health Facility in the Village		
None	42.9%	46.6%
Dispensary or Clinic	20.7%	10.0%
Sub-Center	20.2%	21.9%
Primary Health Center	5.1%	6.5%
Hospital	11.2%	14.9%
Best Health Facility Within 2 km of the Village		
None	28.1%	29.5%
Dispensary or Clinic	21.8%	9.1%
Sub-Center	24.3%	28.2%
Primary Health Center	7.3%	11.0%
Hospital	18.5%	22.2%
Best Health Facility Within 5 km of the Village		
None	8.8%	9.7%
Dispensary or Clinic	18.9%	4.8%
Sub-Center	21.8%	26.1%
Primary Health Center	11.8%	18.7%
Hospital	38.8%	40.7%
Mobile Health Unit in the Village	16.2%	11.3%
Pharmacy or Medical Shop in the Village	26.9%	23.9%
Health Personnel in the Village		
Village Health Guide	45.0%	33.2%
Trained Birth Attendant	50.1%	57.8%
Anganwadi worker	46.2%	62.1%

Notes: Estimates are based on weighted data.

Table 4: Marginal Effects of Rural Health Infrastructure on Non-Polio Vaccine Coverage

	Panel A: Non-Polio Vaccine Coverage Response to Availability **in Village**			**Panel B:** Non-Polio Vaccine Coverage Response to Availability **Within 2km**			**Panel C:** Non-Polio Vaccine Coverage Response to Availability **Within 5km**		
	No Cover	Some Cover	Full AAC	No Cover	Some Cover	Full AAC	No Cover	Some Cover	Full AAC
Best Health Facility (reference=none)									
Dispensary or Clinic	-3.0%*	2.6%**	0.4%	-3.7%**	1.5%	2.3%*	-6.6%***	3.1%*	3.5%*
Sub-Center	-3.2%**	1.4%	1.8%	-4.0%***	1.6%	2.4%**	-6.1%***	2.5%*	3.6%**
Primary Health Center	-4.7%**	3.9%**	0.9%	-5.8%***	1.8%	4.0%**	-7.0%***	2.7%	4.3%**
Hospital	-4.0%**	2.2%	1.8%	-4.8%***	1.1%	3.6%***	-7.1%***	2.5%*	4.6%***
Other Health Infrastructure in the Village[†]									
Mobile Health Unit Visit	0.2%	0.2%	-0.4%	0.1%	0.2%	-0.2%	-0.1%	0.3%	-0.2%
Pharmacy or Medical Shop	-0.6%	2.2%**	-1.6%	-0.7%	2.5%***	-1.8%*	-1.0%	2.5%***	-1.5%
Health Personnel in the Village[†]									
Village Health Guide	1.4%	-0.7%	-0.7%	1.4%	-0.6%	-0.8%	1.4%	-0.6%	-0.8%
Trained Birth Attendant	0.1%	-0.9%	0.7%	0.1%	-0.8%	0.6%	-0.2%	-0.6%	0.8%
Anganwadi Worker	-1.8%*	0.8%	1.0%	-1.9%**	0.9%	1.1%	-2.0%**	0.9%	1.1%

Notes: *Significant at 10%, **Significant at 5%, ***Significant at 1%. Estimates shown in the table reflect changes in the percentage of children receiving "No Cover", "Some Cover", and "Full Cover" in response to changes in availability of health infrastructure and personnel. All estimates come from weighted multinomial logit models that include individual, household and village level variables as well as state and wave fixed effects.[†] Information on distances for the "other health infrastructure" and "health personnel" variables was not collected in wave 2. Therefore, estimates for these variables in panels B and C capture the effect of availability in the village.

Table 5: Marginal Effects of Rural Health Infrastructure on Polio Vaccine Coverage

	Panel A: Polio Vaccine Coverage Response to Availability **in Village**			**Panel B:** Polio Vaccine Coverage Response to Availability **Within 2 km**			**Panel C:** Polio Vaccine Coverage Response to Availability **Within 5 km**		
	No Cover	Some Cover	Full AAC	No Cover	Some Cover	Full AAC	No Cover	Some Cover	Full AAC
Best Health Facility (reference=none)									
Dispensary or Clinic	-0.9%	1.6%*	-0.8%	-1.5%	-0.8%	2.2%	-2.4%	0.6%	1.8%
Sub-Center	-0.4%	0.5%	0.0%	-0.9%	-1.0%	1.8%	-0.6%	-1.5%	2.1%
Primary Health Center	-2.2%	1.5%	0.7%	-3.7%*	-0.9%	4.6%**	-3.3%*	-2.4%**	5.7%***
Hospital	-1.3%	-0.1%	1.5%	-2.5%*	-1.9%**	4.3%***	-3.4%**	-1.0%	4.4%***
Other Health Infrastructure in the Village†									
Mobile Health Unit Visit	3.2%**	-1.7%**	-1.5%	3.0%*	-1.6%*	-1.4%	2.9%*	-1.5%*	-1.4%
Pharmacy or Medical Shop	-1.3%	0.6%	0.7%	-1.2%	0.8%	0.4%	-1.3%	0.7%	0.6%
Health Personnel in the Village†									
Village Health Guide	-0.7%	0.2%	0.5%	-0.7%	0.3%	0.3%	-0.7%	0.3%	0.4%
Trained Birth Attendant	0.7%	-1.7%***	0.9%	0.8%	-1.5%**	0.7%	0.5%	-1.5%**	1.0%
Anganwadi Worker	-1.3%	0.6%	0.7%	-1.4%	0.7%	0.7%	-1.4%	0.5%	0.8%

Notes: *Significant at 10%, **Significant at 5%, ***Significant at 1%. Estimates shown in the table reflect changes in the percentage of children receiving "No Cover", "Some Cover", and "Full Cover" in response to changes in availability of health infrastructure and personnel. All estimates come from weighted multinomial logit models that include individual, household and village level variables as well as state and wave fixed effects.† Information on distances for the "other health infrastructure" and "health personnel" variables was not collected in wave 2. Therefore, estimates for these variables in panels B and C capture the effect of availability in the village.

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