One third of pneumonia (113/334) and one quarter of diarrhoea (102/408) < 0.01). At endline, activists were considered an acceptable and attractive source for To conduct implementation research in integrated community case management

Trained Accredited Social Health Activists can treat uncomplicated childhood illnesses, such as pneumonia, malaria and diarrhoea in the community (4). In resource-poor settings, ICCM can improve health outcomes by increasing access to health care in remote areas, providing faster clinical management closer to home after onset of signs and symptoms, and rapid referral of complicated cases. ICCM typically involves training of CHWs on the use of simple

Key notes
- Implementation research was carried to assess feasibility and acceptability of the integrated community case management (ICCM) strategy in India.
- Forty-nine Accredited Social Health Activists (community health workers) were trained and promoted as providers for treating uncomplicated childhood pneumonia, diarrhoea and fever in children aged 2–59 months.
- Care-seeking from activists increased significantly, indicating ICCM through accredited social health activists feasible and acceptable by the community.

INTRODUCTION
Millennium Development Goal 4 prioritised reduction in child mortality to two-thirds of the rate between 1990 and 2015 (1,2). Most countries are far from achieving this target, and around 5.9 million children died before their fifth birthday in 2015(2–4). Pneumonia, diarrhoea and fever together accounted for around 50% of these deaths (5). Integrated community case management (ICCM) is a strategy to reduce child mortality using community health workers (CHWs) for the treatment of uncomplicated childhood illnesses, such as pneumonia, malaria and diarrhoea in the community (4). In resource-poor settings, ICCM can improve health outcomes by increasing access to health care in remote areas, providing faster clinical management closer to home after onset of signs and symptoms, and rapid referral of complicated cases. ICCM typically involves training of CHWs on the use of simple
diagnostic tools, such as respiratory rate counters for pneumonia and rapid diagnostic tests (RDTs) for malaria, to identify uncomplicated illnesses and treatment with oral antibiotics, artemisinin-based combination therapy or oral rehydration therapy and zinc (4,6,7). The World Health Organization (WHO) officially recommended the ICCM strategy as early as 2004, and many countries with high child mortality adopted it as a policy. However, its implementation has been delayed, especially with respect to diarrhea and pneumonia (6,8–10).

India has a national policy for treating children aged 2–59 months with illnesses such as diarrhea, pneumonia and fever by CHWs, but it has not been implemented in Haryana. The CHWs in India are accredited social health activists (ASHAs) who have an average eight years of schooling and around six weeks of training in modules that include assessment, classification and treatment of common childhood illnesses. Until now, ASHAs have only been used by government as community mobilisers and have not been promoted as treatment providers in the community (11).

Data from similar settings have shown that CHWs are able to treat sick children effectively in the community, but the duration and nature of training of the CHWs used were variable (12–16). There is inadequate evidence on the feasibility and community acceptability of using ASHAs for delivering ICCM services at the programme level in India (17).

This study reports implementation research conducted to test feasibility and acceptability of delivering ICCM services through ASHAs in a few subcentres of Palwal district in Haryana. Other objectives were to assess the changes in care-seeking from other sources of care in the public, private and informal sector as a result of ASHAs providing care according to ICCM.

The findings from this study would guide planning of a larger clinical trial to demonstrate equivalence of an approach in which ICCM is delivered by ASHA workers. These together would contribute to policymaking.

**METHODS**

**Study design**

This was a one-sample study with three measurement points and no independent comparison group. The study was conducted in six subcentres of two primary health centres (PHCs) – Rasoolpur and Kalsada – in Palwal district, Haryana (18). Each subcentre has a population of 5000 to 6000 and five or six ASHAs. A total of 49 ASHAs were trained as treatment providers.

**Data collection and Outcome measurement**

Qualitative assessments - focus group discussions (FGDs) and in-depth interviews (IDIs) - were conducted with mothers of young children, grandmothers and ASHAs prior to the start of the study and after the last survey. Qualitative assessments of mothers and grandmothers were carried out to ascertain community treatment-seeking practices for ill children, their perceptions about ASHAs as treatment providers and the barriers to be overcome if ASHAs were promoted as treatment providers. FGDs and IDIs were also carried out with ASHAs to document their experiences in their new role as treatment providers until saturation was reached. In this approach, a total of 4 FGDs with 37 participants (19 mothers/caregivers: 2 FGDs with 9–10 participants in each; 18 ASHAs: 2 FGDs with 8–10 participants in each) and 43 IDIs (32 with mothers/caregivers and 11 with ASHAs) were conducted. Attempts were made to include participants from different age, caste, education level and varying years of experience (for ASHAs) in order to get an equitable distribution of sample. Community leaders and other influential leaders who were likely to give diverse views were preferred for the FGDs. IDIs were not conducted with the participants included in FGDs. An experienced moderator conducted all sessions using a semi-structured guide in the presence of at least one note taker. All FGDs and IDIs were audio-recorded.

Data on care-seeking practices, treatment provided by ASHAs, and community perceptions and acceptability of ASHAs as treatment providers were ascertained through three cross-sectional household surveys conducted in the study population at baseline, and three and eight months later. During the cross-sectional surveys, all households in the study area (10974 at baseline, 11771 at midline and 12016 at endline) were visited and detailed information through a two-week recall was obtained from households where there was a child aged 2–59 months.

For the data collected through the household surveys, pneumonia was defined as mother reporting presence of cough along with either fast breathing or difficult breathing or stridor (khar khar or khad khad) or chest indrawing or pneumonia (pasliyon ka chalna) in the last 14 days. Diarrhoea and Fever were defined as presence of the illness in the last 14 days as reported by mother.

Further, each child assessed by ASHA was concurrently seen by an ASHA supervisor to validate assessment and classification carried out by ASHAs. Data were also collected from supervision of ASHAs including assessment findings of ASHAs and their supervisors.

Pneumonia identified during ASHA’s assessments was defined as presence of fast breathing or lower chest indrawing. Diarrhoea was identified when the child reported had loose stools or stools at frequency higher than regular. Fever was defined as measured axillary temperature higher than 99.5°F.

**Training of ASHAs**

Trainers from a tertiary hospital in Delhi, assisted by the study team, conducted training sessions for the 49 ASHAs at a tertiary hospital in Delhi and at the district hospital in Palwal. The ASHAs were trained in the ICCM module prepared by WHO (19). The participant manual, chart booklet and sick child recording forms were translated into the local language and pretested for understanding with ASHAs before use.

The training included respiratory rate counting for diagnosing pneumonia, RDT for diagnosis of malaria, identification of danger signs for referral, and treatment of
diarrhoea, fever and fast breathing pneumonia for children aged 2–59 months. Each training group consisted of a maximum of 10 ASHAs with the trainer: trainee ratio of 1:3. The clinical sessions were held in a tertiary hospital in Delhi and the district hospital in Palwal. After training, the ASHAs were evaluated for their technical and clinical skills and scored on a scale of 0–30. All those who scored less than 20 were retrained. Post-training, ASHAs were provided with a medicine kit containing amoxicillin tablets, RDT for malaria diagnosis, dispersible zinc tablets, oral rehydration solution (ORS) packets, paracetamol and chloroquine tablets. These supplies were replenished periodically by the study supervisors. Following the initial training of ASHAs, a two-day refresher course was organised before starting implementation.

### Demand generation activities
Information, education and communication activities were implemented to create awareness about the ASHAs’ new role as treatment providers and to generate demand for ICCM services. The materials developed included posters with pictures and simple messages in the local language, audio announcements, pamphlets and stickers. Posters were installed in high visibility public places such as government buildings, marketplaces and venues where village meetings are usually held (chaupals). Nameplates mentioning the ASHA’s name and phone number were pasted outside each ASHA’s home. Audio announcements were made periodically through loudspeakers across the study areas informing the community that ASHAs have been trained for treatment of illness and that medicines for diarrhoea, pneumonia and fever were available from them. These methods were chosen as they are currently used by the government to promote new programmes.

### Treatment of children by ASHAs
Accredited social health activists treated children aged 2–59 months with fast breathing pneumonia, diarrhoea and fever. Children with complications or danger signs were referred to the district hospital. These danger signs included cough for 14 days or more, diarrhoea for 14 days or more, blood in stools, fever for seven days or more, convulsions, not able to drink or eat anything, vomiting everything, unusually sleepy or unconscious, severely malnourished as identified through measurement of mid-upper arm circumference (MUAC) and swelling of both feet (19). ASHAs filled a recording form for every sick child. The form contained the child’s details as age, sex, assessment, weight, temperature recorded, respiratory rate, lower chest indrawing (LCI), MUAC and treatment given. Oral amoxicillin was provided for fast breathing pneumonia, ORS and zinc for diarrhoea, paracetamol tablets for non-malaria fever and chloroquine for malaria.

### Supervision
The work of five ASHAs was overseen by a supervisor. Whenever an ASHA was contacted by the family for an ill child, she made a call to the respective supervisor, assessed the child in his/her presence and then provided treatment. In case the supervisor was unable to reach the ASHA within an hour, the assessment findings and treatment were discussed over the phone. This supervision was carried out to ensure that ASHAs were able to assess and classify correctly, as prior to the study the ASHA’s role was limited to referring all ill children to health facilities. A physician visited each ASHA monthly to reassess her skills and retrain if necessary.

### Data analysis
All FGDs and IDIs were expanded and transcribed. The transcriptions were reviewed for emerging themes, and summary reports were prepared. The resulting qualitative data were analysed using thematic principles (20), by which themes were identified and summarised for presentation. The quantitative data collected through cross-sectional surveys were used to analyse cases of pneumonia, diarrhoea and fever who sought care from ASHA and other sources at baseline compared with those at midline and endpoint. Quantitative data were analysed using STATA, version 12 (Stata Corporation, College Station, TX, USA). Categorical data were presented as proportions; Pearson’s chi-square was used to test for significance. The Kappa statistic was calculated to assess inter-rater agreement. Sensitivity and specificity with their 95% confidence intervals (CIs) were calculated for ASHAs’ assessments and classification of children with fast breathing compared to their supervisor’s assessment.

### Approvals
The research was approved by the ethics review committees of the Society for Applied Studies and WHO, Geneva. The study was carried out under the collaborative programme of implementation research between National Health Mission, Department of Health and Family Welfare, State Government of Haryana and the Society for Applied Studies. State approvals for the study were also given. Written informed consent was obtained from respondents of the cross-sectional surveys.

### RESULTS

#### Treatment by ASHAs post implementation of the programme
Subsequent to the initial training, eight (16.3%) of the 49 ASHAs needed re-training.

Quality checks by the study physicians during the 10 months of implementation revealed that 98% of the ASHAs filled the recording forms as per instructions, asked about all symptoms, examined chest indrawing in the correct position, counted respiratory rate correctly and made the correct decision postassessment. Almost all (97%) ASHAs gave appropriate treatment, and 96% of them counselled the mother on follow-up visits and when to return.

Study supervision data showed that during the 10-month period of programme implementation from January to October 2016, 5957 sick children were taken for care to
ASHAs. Of these, 1722 (28.9%) had fast breathing pneumonia (confirmed after ASHA's and supervisor's assessment), 2329 (40.3%) diarrhoea and 3529 (59.2%) fever. ASHAs referred 217 children. Of the 5740 (96.4%) cases treated by ASHAs at home, 1633 (28.4%) had fast breathing, 2371 (41.3%) had diarrhoea, and 3465 (60.4%) fever; 1684 (29.3%) were advised home care for other illnesses such as cough, cold, weak child (MUAC-yellow zone), vomiting, not feeling well or abdominal pain.

Cases of diarrhoea were given zinc and ORS, and those with fast breathing pneumonia were given a five-day course of oral amoxicillin (antibiotic). Of the 3465 cases diagnosed with fever, RDT was carried out for 3151 (96.9%); 314 were not tested as the family refused.

Only 3.6% (217/5927) of the cases seen by ASHAs were referred to district hospital. Of those referred, over three quarters (170/217) went to the hospital. Of these, only nine were assessed by the district hospital as needing admission; the remaining 161 were prescribed a different antibiotic and sent home. Those who did not go to the hospital (47/217) sought treatment from private practitioners who were usually not medically qualified.

A little over half of the cases of fast breathing were also assessed independently by supervisors. The agreement between the ASHAs and supervisors for respiratory rate measurements (±2 counts) was 98.5%. The inter-observer agreement was high (Kappa statistic 0.88) (Table 1). Of the 46 cases of LCI assessed by ASHAs in the presence of supervisors, there was concurrence in 45 cases (98.6%).

### Findings of qualitative assessments

The age of the mother/caregivers of young children with whom FGDs and IDIs were conducted ranged from 18 to 42 years. The median years of schooling were five (interquartile range 3–12).

The median (IQR) of years of education for ASHAs with whom FGDs and IDIs were conducted was 11(10,12). They had a mean work (SD) experience of 6 (2) years.

### Mothers’ awareness about illnesses

The respondents perceived pneumonia (chaati dhasana, pasli chalna), diarrhoea (dast) and fever (bukhaar) as the major causes of illness in children. The families chose home remedies as the first choice of treatment for these illnesses. Home remedies for pneumonia included massaging the chest with warm oil, applying Vicks (mentholated topical ointment) or balm, or using hot fomentation. Sugar-salt solution, lentil (dal) water, rice-legume gruel (khichri) and black tea were given as home remedies for diarrhoea. For fever, a cloth soaked in cold water was put on the child’s head and the child massaged with oil. Seeking care outside home was almost universal when the home remedies did not work or if the illness became ‘serious’.

Mothers perceived pneumonia as ‘serious’ if there was LCI (dhasi hui chaati/pasliyon ka chalna/chati emein gode padna), or the child needed to make an effort while breathing. Diarrhoea was considered serious if the child became listless, felt weak, was unable to stand and move, and vomited whatever was eaten. Fever was considered serious if the child reduced intake of food and fluids.

Accredited social health activist was the most common first choice of care-seeking outside home. Families sought care from a private doctor or government hospital when the child did not get any relief from ASHA’s medicines.

If the child does not get relief from ASHA’s medicine then I go to private doctor. CAREGIVER_FGD_02/RESPONDENT_08

When the ASHAs were asked about the awareness of common illnesses among mothers/caregivers, they said that people have now started recognising illnesses better. Few ASHAs mentioned that mothers had now started looking at the child’s abdomen for presence of fast breathing or chest indrawing when their children developed cough.

### Awareness and perception of mothers/caregivers about ASHAs as treatment provider

Before the study, mothers were aware of ASHAs as workers who weighed their children, took them for immunisation, before the study, mothers were aware of ASHAs as workers who weighed their children, took them for immunisation, took pregnant women for antenatal check-ups, and called an ambulance at the time of childbirth. ANMs were recognised as doctors (doctorni) or workers who immunised children (teekewali bahanji). Now, the respondents had noticed a change in the ASHAs of their area and were aware that she provides treatment for children and refers children who are ‘too sick’.

Children get cured by ASHA’s medicine. CAREGIVER_FGD_02/RESPONDENT_05

Mothers were of the opinion that ASHAs were better suited than ANMs to provide treatment to ill children at home as they lived in the same village and are available around the clock. This may have been possible because ASHAs were trained as a part of the study and were provided with good quality medicines to treat children. Another advantage of ASHAs as treatment providers was that expenditure on transportation to hospital and on medicines would be reduced. The respondents stated that some people in the community may not seek treatment from ASHAs as they do not trust them. They also said that ASHAs would be better

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**Table 1: Assessment and classification of children with fast breathing brought by mothers to ASHAs in comparison with independent assessment by supervisors**

| Supervisor’s assessment | Fast breathing | Total |
|-------------------------|---------------|-------|
|                         | +             | –     |       |
| ASHA’s assessment        |               |       |       |
| Fast breathing           | 804           | 85    | 889   |
|                         | 12            | 756   | 768   |
| Total                   | 816           | 841   | 1657  |

Kappa statistic: 0.88.
Sensitivity = 98.5% (95% CI: 97.4–99.2).
Specificity = 89.9% (95% CI: 87.7–91.8).
accepted if they were promoted by the government as health workers who provide good quality care close to homes.

I like ASHA because she does her work very nicely. When I went to her home with my sick child, she left her house work to assess my child. CAREGIVER_IDI_15

Nearly all ASHAs felt that their recognition by the community has increased since the time they started treating children. Half of them said that people also knew them by their name now and a few ASHAs were now being addressed as ‘doctorni’ (lady doctor). They also felt that the community trusted them as treatment providers as they see children even from far areas and the families listen to their advice.

People give their children full 5 day course of amoxicillin on our advice. ASHA_FGD_01/RESPONDENT_05

Perception of ASHA about themselves as treatment providers
All ASHAs had treated sick children suffering from pneumonia, diarrhoea and fever. This made them feel good as they could do something more than calling the children and pregnant women for immunisation. Now that they give medicines to sick children, they believed that they could treat children now. Seeing children improving with their treatment gave them a lot of confidence and satisfaction. Few of them felt that they have become like ‘doctors’. Some children who did not improve with the medicines given by doctors had also visited the ASHAs, took the medicines and got improved.

I gave a child medicine for pneumonia and fever. The child had 101°F fever. Next morning when I went to re-check, the child had got relief. I felt nice that my work was benefitting poor people. ASHA_IDI_16

Experience of mothers regarding treatment provided by ASHAs
The mothers said that ASHAs assessed their ill children in detail whenever they sought care from them. The mothers who had an experience of seeking treatment from ASHAs were willing to do the same again in the future if their children fell ill. Treatment through ASHAs was liked because it was available near home, medicines were given for free and families had seen their children recover with ASHA’s treatment.

Some mothers remembered that earlier private doctor used to give injections for all illnesses but now they could avoid the injections as the child gets improved with the oral medicine.

Awareness about IEC activities and feedback to promote ASHAs as treatment providers
The mothers had heard the announcements, seen the posters and found the messages to be understandable. Half the mothers said that they came to know about ASHA through announcement which gave the message that ASHA provides treatment and refers the children with danger signs. Many of them could recognise ASHA’s home because of the nameplate on her door. When asked about ways to increase community awareness about ASHA as a treatment provider, the mothers said that it can be done if people whose children had benefitted tell others. Another suggestion was that ASHAs should do more door-to-door visits to inform people.

I know ASHA's house, there a sticker on her door with her phone number. CAREGIVER_FGD01/RESPONDENT_03

I came to know through announcements that ASHA has been trained to treat children now. CAREGIVER_IDI_07

The ASHAs concurred that all people in their areas had heard the announcements and seen the posters. Some ASHAs had also informed the people in their village while pasting the stickers at their home, during polio camps, while conducting their scheduled home based postnatal visits, and during the bi-annual survey. ASHAs unanimously agreed that the announcement was the best way of spreading information and the nameplates outside ASHA’s home were also helpful. The stickers were removed and torn by the children after some time and hence they felt that these were not beneficial. They suggested that the posters placed in common community areas should be placed at a greater height to prevent tearing by children.

Other observations
Accredited social health activists expressed concern about their inability to treat infants less than two months, children suffering from only cough, vomiting or pustules brought to them for treatment. They felt this led to dissatisfaction in the community and hurt their credibility. None of the mothers had found any barriers in seeking treatment from ASHA.

Unmet challenges included refusal by some mothers to get malaria RDT blood test done and lack of compliance to follow-up visits for sick children. ASHAs also desired improvement in packaging of medicines with dosage mentioned to help mothers who forgot the dosage prescribed.

Findings from cross-sectional surveys
The number of houses (total number of children aged 2–59 months in households surveyed) interviewed was 10 951 (6848) at baseline, 11 763 (6900) at midline, and 12 009 (6871) at endline. Less than 0.2% of households surveyed could not be interviewed either due to refusal or because the family was not available at home (Table 2).

At baseline 3023 (44%) of the children had an episode of illness in the previous two weeks; this proportion was 38% and 40% at the midline and endline surveys respectively. The proportion of children hospitalised in the previous three months was between 4% and 6% in the three surveys. The two-week prevalence of pneumonia was 4.9% at...
Table 2: Prevalence of pneumonia, diarrhoea and fever in the preceding two weeks and care-seeking outside home

| Characteristics | Baseline n (%) Sep–Nov 2015 | Midline n (%) Apr–May 2016 | Endline n (%) Sep–Oct 2016 |
|-----------------|-----------------------------|---------------------------|---------------------------|
| Total nonvacant households surveyed | 10 974                      | 11 771                    | 12 016                    |
| Total households interviewed | 10 951 (99.8)               | 11 763 (99.9)             | 12 009 (99.9)             |
| Households surveyed but not interviewed due to refusal or family outstation | 23 (0.2)                    | 8 (0.1)                   | 7 (0.1)                   |
| No. of children aged 2–59 months in the households surveyed | 6848                        | 6900                      | 6871                      |
| No. of children with pneumonia | 333 (4.9)                   | 209 (3.0)                 | 341 (5.0)                 |
| No. of children with pneumonia whose mothers sought care outside home | 304 (91.3)                  | 195 (93.3)                | 334 (97.9)                |
| No. of children with diarrhoea | 538 (7.8)                   | 1148 (16.6)               | 459 (6.7)                 |
| No. of children with diarrhoea whose mothers sought care outside home | 460 (85.5)                  | 1029 (90.6)               | 408 (88.9)                |
| No. of children with fever without any other illness | 1226 (17.9)                 | 699 (10.1)                | 1468 (21.3)               |
| No. of children with fever whose mothers sought care outside home | 1163 (94.9)                 | 641 (91.7)                | 1383 (94.2)               |

Pneumonia is defined as the presence of cough along with fast breathing or difficult breathing or stridor (khar khar or khad khad) or LCI or pneumonia (pasilyon ka chalna) in the previous two weeks.

Diarrhoea is defined based on the mother's report of presence of diarrhoea in the previous two weeks.

Percentage of disease prevalence is calculated on the total number of children in the survey.

Percentage of those who sought care outside home is calculated on the number of children with the illness during the survey.

Table 3: First source of care-seeking and treatment in cases of pneumonia

| Characteristics                                      | Baseline n (%) | Midline n (%) | Endline n (%) |
|------------------------------------------------------|----------------|---------------|---------------|
| No. of children with pneumonia whose mothers sought care outside home | 304            | 195           | 334           |
| First source of care-seeking outside home            |                |               |               |
| ASHA                                                 | –              | 57 (29.2)†    | 113 (33.8)†   |
| Any public sector (ANM, AWW, subcentre, PHC, district/government hospital) | 26 (8.6)       | 10 (5.1)      | 10 (3.0)*     |
| Formally qualified and nonqualified private care providers (chemist, traditional healer) | 238 (78.3)     | 101 (51.8)†   | 159 (47.6)†   |
| Institutional private care providers (hospital or nursing home) | 37 (12.2)      | 22 (11.3)     | 45 (13.5)     |
| Type of medicine prescribed by any source            |                |               |               |
| Any antibiotics (amoxicillin or cotrimoxazole or other antibiotic) | 70 (23.0)      | 73 (37.4)†    | 165 (49.4)†   |
| Amoxicillin                                          | 13 (4.3)       | 62 (31.8)†    | 136 (40.7)†   |
| Unknown oral medication (tablet or syrup or powder)  | 222 (73.0)     | 108 (55.4)†   | 162 (48.5)†   |
| Unknown injectables                                  | 136 (44.7)     | 79 (40.5)     | 116 (34.7)*   |

*Significantly different from baseline at the p < 0.05 level.
†Significantly different from baseline at the p < 0.01 level.

Baseline and 3.0% and 5.0% at the midline and endline surveys respectively. Over 90% of the children with pneumonia were taken for care outside home in the three surveys (Table 2).

The two-week prevalence of diarrhoea reported at baseline, midline and endline surveys were 7.8%, 16.6% and 6.7% respectively. The substantial increase in the prevalence during the midline survey was probably due to the summer season when this survey was conducted (Table 2). The mothers of over 85% of children with diarrhoea sought care outside home. The two-week prevalence of fever without any other illness was 18% at baseline, 10% at midline and 21% at the endline survey. Over 90% of the cases with fever sought care outside home (Table 2).

In the baseline survey the mothers of 78% of children sought treatment for pneumonia from private providers and none from ASHAs (Table 3). These trends changed, and compared to baseline one-third of cases of pneumonia were assessed by ASHAs in the midline and endline surveys. There was a 31% absolute reduction in seeking care from private providers (p < 0.01) at the endline survey. A similar trend was observed in the midline survey (Table 3). Use of inpatient care remained the same across the three surveys, indicating that seriously ill children are taken for admission to hospital.

Use of amoxicillin increased across the three surveys, and there was a significant reduction in the use of unknown oral medications at both midline and endline. Of the total, over 80% of the amoxicillin was provided by ASHAs in children assessed by them for respiratory infections (Table 3).

Close to one quarter of the mothers of children sought treatment from ASHAs for diarrhoea both at the midline and endline surveys, against none at baseline. The proportion of mothers of children at baseline who sought care from private providers was 81%, decreasing to 58% at
endline (Table 4). At baseline, ORS prescribed by any source was 13%, and this increased to 34% at endline, with 72% of the ORS prescribed by ASHAs. Prescriptions for zinc in diarrhoea increased from less than 1% at baseline to 25% at endline; over 90% of zinc was prescribed by ASHAs and consumed by children (Table 4).

Only 11% of the mothers of children sought care for fever from ASHAs at the midline and endline surveys. Care for fever was mainly sought from local private providers; most were unqualified (Table 5).

**DISCUSSION**

The main findings of this implementation research indicate that ASHAs with short initial training can be retrained to assess and classify acute illnesses reliably in children aged 2–59 months. They were able to diagnose pneumonia, diarrhoea and fever correctly using the ICCM strategy, when compared to their supervisors. The deployment of ASHAs as ICCM workers improved overall care-seeking outside home and they were increasingly chosen as the first source of care for pneumonia, diarrhoea and to a lesser extent for fever. The increase in care-seeking from ASHAs was accompanied by a reduction in care-seeking from untrained, poorly standardised, informal sector care providers. The use of ASHAs for ICCM treatment helped improve overall rate of appropriate use of antibiotics for pneumonia, and Zinc and ORS for diarrhoea.

There were other associated features of using ASHAs for primary health care of childhood pneumonia, diarrhoea and fever. The increase in treatment-seeking from ASHAs close to home resulted in a reduction in sick children being taken for care at public health facilities, but there was no effect on the rate of care-seeking from inpatient facilities in the private sector. This indicates that private sector facilities continue to be preferred for treatment of some illnesses. In the current study, a smaller proportion of mothers sought care from ASHAs for children with undifferentiated fever than for diarrhoea and pneumonia. This may likely be because diarrhoea and pneumonia were emphasised during demand generation activities.

The community’s recognition for ASHAs increased and they were being perceived as treatment providers now. The mothers and caregivers had a positive experience when seeking care for their children from ASHAs; common reasons were care close to their homes and available at all times including late night and early morning, medicines free of cost, and children got cured after taking ASHA’s medicines. Caregivers were willing to seek care from ASHAs again in case their children fell ill in future. Seeing children cured by medicines provided by them strengthened the confidence of the ASHAs in their new role as treatment providers. However, ASHAs faced negativity when families had to get medicines from other sources for younger children or other illnesses that the ASHAs were not treating under ICCM.

In India, the role of CHWs (ASHAs) is limited to that of community mobilisers, creators of awareness and providers of social support (21). These preliminary findings suggest that following training in ICCM, ASHAs can play a useful role in assessment, screening and navigating timely referral. Previous studies demonstrating community case
management in Indian context did not involve the ASHAs who are community-based and institutionalised under existing Government system (22). The level of education and period of ICCM training received by CHWs in other settings is greater from that of the ASHAs used in this study (12–16,22,23).

The use of ASHAs delivering ICCM services offers several other practical advantages. The treatment provided through ASHAs is easily accessible and affordable. Experience of implementing ICCM using frontline workers in similar settings found reduction in workload at the PHCs (13,15,23) and even reduced child mortality when implemented at national level (13). In countries like India, the widespread use of informal sector care provider is a concern due to lack of proper training and dispensing medicines without label (24,25). It seems likely that as ASHAs are trained and used for primary care of common childhood illnesses, the use of informal sector providers will decrease.

Strengths of our study are that it was implemented through the existing health system, and this increases the generalisability of the study’s findings. Also the knowledge retention and clinical practices of ASHAs were constantly monitored during the study period.

There are some potential limitations of this study. Seasonal variations in disease incidence were not accounted for, and high variability in the incidence of diseases across the three surveys may have distorted the outcomes on care-seeking behaviour. Medicines used in the study were provided by the study team and not by the government.

The results of this study need to be tested on a larger scale. There is a need for a cluster randomised trial to assess any excess risk of treatment failure either due to misclassification or poor judgement when ASHAs provide ICCM treatment. Such results would pave the way for developing ASHAs for providing community-based standard treatment, at least in remote and tribal areas where getting trained human resource in primary health care is a challenge.

CONCLUSIONS
Our research provides evidence in support of ASHAs as potential treatment providers for common childhood illnesses. An important lesson learnt was the likely reduction in use of informal healthcare providers when primary health care is available close to homes. With greater evidence through controlled trials, these findings would provide an argument in favour of scaling-up ICCM in remote areas where accessibility to care is an issue and referral is not possible.

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CONFLICT OF INTEREST
None of the authors reported a conflict of interest.

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