



## Original article

# From theory to practice: Association between community health workers' home visit and neonatal morbidity in a rural area of North India

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## ABSTRACT

**Background:** Averting the hospital admissions for morbidity by timely providing home-based care or referral in case of neonatal illness is important outcome of home visits by Accredited social health activists (ASHA) in India.

**Objective:** To determine the association between number of home visits by ASHA and identification of neonatal morbidity in 28 days of life in a north Indian Village.

**Methods:** It was a cross sectional survey including live births between August 2020 and January 2021 from a village in North India as study population. Taking estimated live births of the area the minimum study sample included was 120 to be covered in 2 months duration.

**Results:** Among the 121 infants included in study the informants reported that 95% ASHA visited the home during neonatal period with 56.5% visits 4–6 times to single neonate. Any type of illness during neonatal period was reported by 21.5% informants. 69.2% (18/26) were visited by ASHA during the illness of neonate. 61.1% were referred by ASHA to nearest primary health center (11/18). 15.3% (4/26) underwent hospitalization for their illness and were cured. ASHA visiting a neonate 7–10 times in a month had 68% higher chances of identifying the signs of illness in the neonate (Adj OR (95% CI): 1.68 (0.12–23.26)).

**Conclusion:** The community-based care by ASHA does reduce the risk of mortality however community has the right to choose the type of health facility and care for their newborns.

## 1. Introduction

Infant mortality rate (IMR) in India was 32 per 1000 live births in 2018 and that of Haryana was 30 per 1000 live births.<sup>1</sup> In the last ten years, IMR has witnessed a decline of about 35% in rural areas and about 32% in urban areas.<sup>1</sup> Around 70% of infant deaths occur in first 28 days of life (neonatal period). Three-quarters of all neonatal deaths occur during the first week of life, 25–45% in the first 24 h.<sup>2</sup> Neonatal mortality has reduced much less than post-neonatal deaths, thereby increasing the contribution of neonatal deaths from 41% of under-5 deaths in 1990 to 56% in 2012. It has been estimated that preventable neonatal deaths can be decreased by at least 50% through implementation and scale-up of educational interventions that include neonatal resuscitation and other essential elements of basic newborn care.<sup>3</sup> Given its demographic and cultural diversity, India does face numerous challenges with significant rural-urban, poor-rich, gender, socio-economic, and regional differences.

The India Newborn Action Plan (INAP) was developed in response to the Global Every New born Action Plan (ENAP) and launched at the World Health Assembly in June 2014. It outlines a targeted strategy for accelerating the reduction of preventable newborn deaths and stillbirths in the country.<sup>3</sup> It has been demonstrated that community-level home-based postnatal care, including simple interventions such as thermal care and exclusive breastfeeding, can significantly improve newborn survival. Evidence also suggests that linked community and facility-based care, as well as referrals between various levels of the healthcare system can improve newborn survival.<sup>4</sup>

Community-based interventions to prevent neonatal deaths broadly consist of two approaches: delivery of packages through home visits, and community mobilization.<sup>4</sup> Government of India through National rural health mission in 2005 introduced the cadre of accredited social health activists (ASHA). ASHA is a community health worker who is the first level of worker in village, a resident of village and preferably from the marginalized community.<sup>5</sup> One of the functions of ASHA is imparting

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home based new born care (HBNC). HBNC was introduced in 2011 with an objective to improve newborn survival. ASHA has to visit six times to mother and newborn after an institutional delivery and seven times after home delivery. Prompt identification of sepsis/illness through signs and symptoms and timely referral to appropriate center is one of her duties.<sup>6</sup>

In December 2019 more than 100 infants died in an intensive unit of a hospital in Rajasthan, majority of which were neonates. It was also reported that most of the sick newborns were referred from peripheral centers. These institutional deaths were within 48 h of admission which indicates that failure of Pre-Hospital Primary health care.<sup>7</sup> This pre hospital care at village level is to be provided by community health workers; one of which is ASHA through activities listed above. The first step in prevention of mortality is to prevent emergence of causative morbidity and its complications. The situation in Rajasthan intrigued us to evaluate the interventions at our local level in Haryana. Hence, it was hypothesized that home visits by ASHA have a role in identification of preventable morbidity, hospitalization due to morbidity and mortality among neonates of Village Pali, Faridabad, Haryana. This study was undertaken to determine the association between number of home visits by ASHA and identification of neonatal morbidity in 28 days of life in Village Pali, Faridabad.

## 2. Methods and materials

A Cross sectional analytical study was carried out in village Pali, Faridabad (rural field practice area of Department of Community Medicine). The study was conducted in the months of March–April 2021 (two months) after approval from institutional ethics committee.

Live births between August 2020 and January 2021 in village Pali (area under sub center Pali) were the study population. Birth rate of Village Pali, Faridabad, Haryana was 24 per 1000 mid-year population for the year 2018-19 as per the census of local primary health center. The population of village Pali was 10,100 for year 2019. Hence taking an estimate of 2 live births per 1000 population per month, it is expected that in six months duration there will be around 120 live births in study area. After accounting for exclusion criteria (64% of estimated neonatal deaths, NMR: 23 per 1000 LB) a minimum of 120 live births in study area was our sample size. Newborn deaths due to birth asphyxia, congenital abnormalities, intra partum complications and preterm birth complications were excluded from the study. However, none of these scenarios were encountered during data collection.

A semi structured questionnaire was designed. The outcome variables are i) episodes of symptoms and signs of Acute respiratory illness (ARI), diarrhea and sepsis within 28 days of life, ii) number of days of hospitalization or referral to tertiary care center/NICU for ARI, diarrhea and sepsis, if any, and iv) ASHA identified signs and symptoms of ARI, diarrhea and sepsis. The Independent variables are i) ASHA visiting the house of newborn and mother, ii) number of visits by ASHA during neonatal period, iii) duration of visit. Socio demographic characteristics, socio economic status of the study population and birth history were also recorded.

Data was collected through interview technique by the investigator in the local language (Hindi) from the informant (mother of newborn or grandmother if mother was not available). The list of houses of all newborns from the period of August to January 2020 in the study area was obtained from sub center. A house-to-house survey was conducted for the interview. The principal investigator of the study along with the medical social worker conducted the data collection procedure. After narrating the objective of the study and taking consent from the informant the questions regarding the illness of newborn in 28 days of life and regarding ASHA visit were filled. A household where no informant was available or was closed during the visit was visited once more on next day. In case the house was closed in two subsequent visits it was excluded from the study.

The data collected was entered in Microsoft excel 2007 software and was analyzed using Epi info version 7 software (CDC). Data presented as

proportions for categorical variables and mean/median for continuous variables. Proportions were compared across groups using chi square test of significance and continuous variables were compared between groups using student 't' test. Binary logistic regression was applied to identify whether number of visits by ASHA as an independent predictor. P value less than 0.05 is considered as statistically significant.

## 3. Results

A total of 121 live births between August 2020 and January 2021 were included in the analysis. Male infants constituted 52.1% (63/121) of the study population. 31.4% of infants' mothers were illiterate and 19% mothers have completed education till 12th standard. 24% of infants' father had completed 12th standard education and 19.8% have completed high school (10th standard). Majority of the mothers were homemakers (96.7%). Majority of infants' fathers were skilled workers (59.5%) and 19.8% were unskilled workers. 43.8% of the study population belonged to upper middle-class socio-economic status according to BG Prasad scale. All the study population were a product of term delivery. Mean birth weight was 2.90 kg (SD: 0.45). As per the informant less than one fourth (21.5%) of the neonates suffered one or more signs and symptoms in first 28 days of life. Majority of these were among males and those whose mothers were unskilled worker (Table 1).

As per the informant (mother or grandmother of infants), 95% of study population were visited at least once by ASHA during the first 28 days of life. ASHA visited 77.7% of study population just after delivery of the baby or discharge from the hospital. 37% of the neonates who were visited by ASHA at home just after delivery had at least one of episode of illness as compared to 17% of those not visited (p:0.03). The median number of visits by ASHA to a neonate's house was 4 times (IQR:

**Table 1**  
Socio demographic profile of study population.

	Any sign or symptom reported by neonate's mother/guardian			P value
	Present	Absent	Total	
	26 (21.5)	95 (78.5)	121 (100)	
<b>Gender</b>				
Male	16 (25.4)	47 (74.6)	63 (52.1)	0.38
Female	10 (17.2)	48 (82.8)	58 (47.9)	
<b>Mother's education</b>				
Illiterate	3 (7.9)	35 (92.1)	38 (31.4)	0.10
Primary school complete	1 (12.5)	7 (87.5)	8 (6.6)	
Secondary school complete	3 (20.0)	12 (80.0)	15 (12.4)	
High school complete	6 (27.3)	16 (72.7)	22 (18.2)	
Intermediate complete	7 (30.4)	16 (69.6)	23 (19.0)	
Graduate and post graduate	6 (40.0)	9 (60.0)	15 (12.4)	
<b>Father's education</b>				
Illiterate	2 (10.5)	17 (89.5)	19 (15.7)	0.74
Primary school complete	2 (14.3)	12 (85.7)	14 (11.6)	
Secondary school complete	4 (22.2)	14 (77.8)	18 (14.9)	
High school complete	6 (25.0)	18 (75.0)	24 (19.8)	
Intermediate complete	7 (24.1)	22 (75.9)	29 (24.0)	
Graduate and post graduate	5 (29.4)	12 (70.6)	17 (14.0)	
<b>Mother's occupation</b>				
Homemaker	23 (19.7)	94 (80.3)	117 (96.7)	0.03
Unskilled worker	3 (75.0)	1 (25.0)	4 (2.5)	
<b>Father's occupation</b>				
Unemployed/student	1 (16.7)	5 (83.3)	6 (5.0)	0.87
Unskilled worker	4 (16.7)	20 (83.3)	24 (19.8)	
Skilled worker	16 (22.2)	56 (77.8)	72 (59.5)	
Semi professional	5 (26.3)	14 (73.7)	19 (15.7)	
<b>Socio economic status (BG Prasad Scale)</b>				
Upper class	7 (26.9)	19 (73.1)	26 (21.5)	0.79
Upper middle class	12 (22.6)	41 (77.4)	53 (43.8)	
Middle class	6 (19.4)	25 (80.6)	31 (25.6)	
Lower middle class	1 (11.1)	8 (88.9)	9 (7.4)	
Lower class	0	2 (100)	2 (1.7)	
<b>Birth weight</b>				
Mean (SD)	2.87 (0.54)	2.91 (0.42)	2.90 (0.45)	0.71

2 times). Majority of illness was reported among those with least category (1–3) of visits (29.5%) and least time spent on each visit (<5 min) by ASHA (25%) (Table 2).

Out of all neonates who suffered any type of illness (26) during first 28 days of life, 69.2% (18/26) were visited by ASHA during the illness (Fig. 1).

Two neonates out of eight who were never visited by ASHA, one suffered from diarrhea with fever and the other had signs of Jaundice. Overall, 10 neonates suffered diarrhea (including other symptoms also), eight suffered with symptoms of ARI (including other symptoms also), and six present with signs of Jaundice (including other symptoms also). Out of all the neonates (with any signs and symptoms) visited by ASHA majority had Diarrhea, fever and ARI (22.2% each) (Table 3).

Among the neonates in whom ASHA identified sign and symptoms of any illness 61.1% were referred by her to nearest primary health center (11/18). However only 54.5% (6/11) of those referred to PHC actually sought consultation from PHC and 18.2% underwent hospitalization at private health facility (2/11). Rest sought treatment either from faith healer or local chemist. 37.5% (3/8) of neonates who were not visited by ASHA during any illness went to private health facility for care of which 66.7% (2/3) were hospitalized (Fig. 2). Majority of hospitalizations (50%) were among neonates with combination of signs and symptoms of Diarrhea, ARI, Jaundice, Fever.

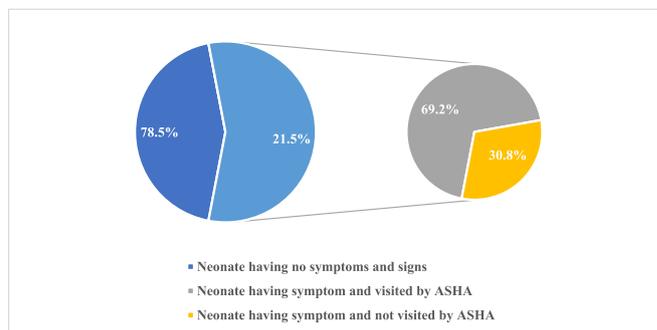
The data was subjected to binary logistic regression analysis with neonates with morbidity identified by ASHA as dependent variable. None of the variables emerged as an independent predictor. Literate mother had around 4.67 times higher odds of her neonate being identified of their morbidity by ASHA (Adj OR (95% CI): 4.67 (0.66–32.92)) as compared to illiterate mother. ASHA visiting a neonate 7–10 times in a month had 68% higher chances of identifying the signs of illness in the neonate (Adj OR (95% CI): 1.68 (0.12–23.26)) (Table 4).

#### 4. Discussion

The current analysis was conducted on 121 neonates born between August 2020 and December 2021 to identify the correlation between ASHA (community health worker of India) visits at home and morbidity in their neonatal period. Majority of literature till date have tried to assess the advice given by ASHA workers to the mother of new born. Current study has tried to assess the outcome of these visits and advices in form of HBNC and referrals of sick new born. The informants reported that 26.4% of neonates had one or more symptoms of illnesses during first month of life. None of the mothers and neonates affected from Covid 19 were included in the study as this was not part of the protocol.

**Table 2**  
Visit of ASHA to the infants' house during first 28 days of life.

	Any sign or symptom reported by neonate's mother or guardian			P value
	Present	Absent	Total	
<b>ASHA visit once in 28 days</b>				
No	2 (33.3)	4 (66.7)	6 (5.0)	0.61
Yes	24 (20.9)	91 (79.1)	115 (95.0)	
<b>Visit of ASHA to neonate's house just after delivery</b>				
Yes	10 (37.0)	17 (63.0)	27 (22.3)	0.03
No	16 (17.0)	78 (83.0)	94 (77.7)	
<b>Number of visits</b>				
1–3	13 (29.5)	31 (70.5)	44 (38.3)	0.30
4–6	10 (15.4)	55 (84.6)	65 (56.5)	
7–10	1 (16.7)	5 (83.3)	6 (5.2)	
<b>Time spent by ASHA per visit (minutes)</b>				
<5	2 (25.0)	6 (75.0)	8 (7.2)	0.97
5–15	18 (21.2)	67 (78.8)	85 (76.6)	
>15	4 (22.2)	14 (77.8)	18 (16.2)	
<b>Identification of any sign and symptoms in neonate during ASHA's visit</b>				
No	6 (6.2)	91 (93.8)	97 (84.3)	<0.001
Yes	18 (100)	0	18 (15.7)	



**Fig. 1.** Neonates with illness and visited by ASHA.

**Table 3**  
Illness wise distribution of sign and symptoms identified by ASHA during her visit to neonate's house.

Symptoms and signs		Identification of sign and symptoms by ASHA		
		Yes N (%)	No N (%)	Total N (%)
<b>ARI</b>	ARI alone	4 (22.2)	2 (25.0)	6 (23.1)
	Diarrhea alone	4 (22.2)	3 (37.5)	7 (26.9)
<b>Diarrhea</b>	Diarrhea alone	4 (22.2)	1 (12.5)	5 (19.2)
	Fever alone	4 (22.2)	1 (12.5)	5 (19.2)
<b>Fever</b>	Fever alone	4 (22.2)	1 (12.5)	5 (19.2)
	Jaundice alone	2 (11.1)	1 (12.5)	3 (11.5)
<b>Jaundice</b>	Jaundice alone	2 (11.1)	1 (12.5)	3 (11.5)
	Combination	0	1 (12.5)	1 (3.8)
<b>Combination</b>	ARI and Diarrhea	0	1 (12.5)	1 (3.8)
	Diarrhea and Jaundice	1 (5.6)	0	1 (3.8)
	ARI, Diarrhea and Jaundice	1 (5.6)	0	1 (3.8)
	Fever and Jaundice	1 (5.6)	0	1 (3.8)
<b>Pustules</b>		1 (5.6)	0	1 (3.8)
<b>Total</b>		18 (100)	8 (100)	26 (100)

#### 4.1. Sociodemographic profile of neonates

The majority of neonates included in the study belonged to upper middle- and middle-class socioeconomic status according to BG Prasad Socioeconomic status scale. The informant in all cases was the mother of neonate. 68.6% mothers of the neonates were literate and this was lower as compared to the district female literacy of 74.2%.<sup>8</sup> This could be due to the study area being rural and the district has a major portion of urban area. Institutional birth was reported in majority of cases. This was higher compared to the district Faridabad report of NFHS-IV where institutional births were reported to be 77%.<sup>8</sup>

#### 4.2. Visit by ASHA worker

Majority of informants of neonates reported visits by ASHA to their home in the first month of life. The India New Born Action plan, 2014 to achieve target of single digit neonatal mortality rate by 2030 has set targets of 95% home visit by ASHA for HBNC by 2025.<sup>3</sup> The current study reports that the study area is consistent with the national targets with 95% ASHA visits for HBNC in neonatal period.<sup>3</sup> The importance of a first day home visit in reducing mortality by 67% was highlighted in a meta-analysis.<sup>9</sup> In the current study 77.7% of neonates were visited by ASHA on the first day of birth. Only a third of the newborns in a study by Sinha et al., were visited on first day of birth by ASHA worker in rural blocks of Mewat district of Haryana.<sup>10</sup> The district factsheet of Faridabad in the NFHS-IV survey reported 16.4% visit to a newborn within 2 days of birth by any health care worker.<sup>8</sup> The current study area is

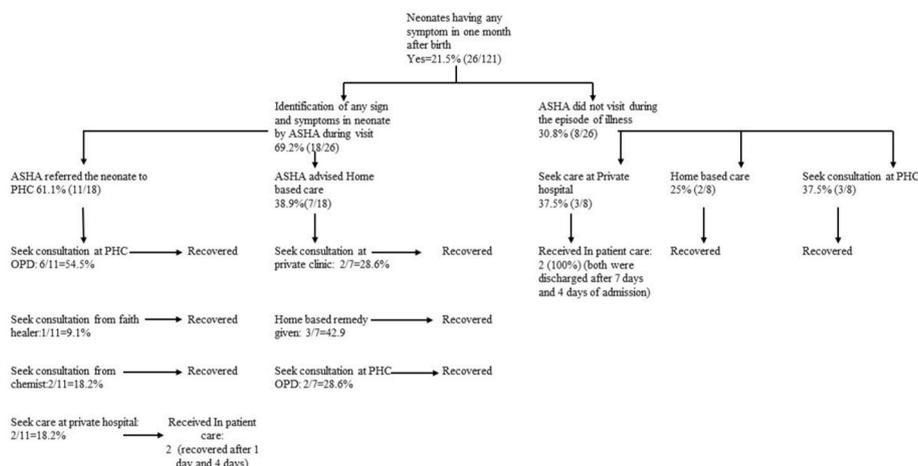


Fig. 2. Flowchart showing outcome of identification and referral of neonates with illness.

Table 4

Binary logistic regression analysis identifying predictors of ASHA identifying morbidity during neonatal period.

	df	Identification of morbidity by ASHA during neonatal period Adj OR (95% CI)	P value
<b>Gender of neonate (Male)</b>	1	2.26 (0.74–6.88)	0.15
<b>Time spent with ASHA</b>			
>15	2	1	0.97
<5	1	1.34 (0.13–14.23)	0.81
5–15	1	1.36 (0.10–19.34)	0.82
<b>Birth weight</b>	1	1.00 (0.99–1.00)	0.54
<b>Number of visits by ASHA in a month</b>			
1–3	2		0.91
4–6	1	0.86 (0.26–2.82)	0.81
7–10	1	1.40 (0.11–18.43)	0.80
<b>Mother's education (Literate)</b>	1	5.69 (0.84–38.64)	0.08
<b>Father's education (Illiterate)</b>	1	1.70 (0.20–14.35)	0.63
<b>Socio-economic status</b>			
Lower middle and lower class	3		0.99
Upper class	1	0.90 (0.24–3.30)	0.87
Upper middle class	1	0.94 (0.20–4.45)	0.94
Middle class	1	0.98 (0.07–13.75)	0.99

performing better as compared to district average and nearby districts which is reflected in terms of lower infant mortality rate of the study area as compared to state average.

#### 4.3. Frequency of visits by ASHA

Around half of the neonates were visited 4–6 times in first month of life and around three fourth of them spent 5–15 min with one neonate. To provide HBNC under National Health mission ASHA makes 6–7 visits neonates and their mothers in 42 days of life.<sup>3</sup> The visits by ASHA to the study participants was nearing to the norms. The fifth round of ASHA evaluation was conducted in Tripura in the year 2017-18 by Ministry of Health and Family Welfare, GOI. It reported that only 32% of ASHA visited six times to the neonate.<sup>11</sup> Another study by Panda et al., on ASHA workers profile of Odisha reported that around 84% of workers visited <100 households per month and around 60% spent >4 h a day on field.<sup>12</sup> In a comparative study by Yonjon et al., in HBNC intervention districts of Rajasthan; 46% women received four HBNC home visits by ASHA, whereas in control districts, 12% women received the same.<sup>13</sup> Lower number of visits of ASHA was reported by neonates' informants

who had at least one sign or symptom of morbidity, however higher number of visits by ASHA showed a positive association with identification of morbidity when other factors were taken into account. Subsequent visits by ASHAs are important for early recognition of feeding problems and treatable infections followed by prompt referrals to reduce morbidity and mortality in new born. This was demonstrated by Sinha et al., from Mewat district with increasing number of unsafe practices by mother as the number of visits by ASHA decreased.<sup>10</sup> Spending more time with a neonate and his/her mother is a sign of detailed advice given and more time to observe for danger signs by ASHA. However, there is no guideline on time to be spent as it is a subjective concept and ASHA are also expected to address other health issues in the family. Moreover, current analysis did not reveal any significant association with time spent by ASHA with the neonate and mother.

#### 4.4. Illnesses during neonate period and ASHA visits

Overall, 21.5% of the studied population had signs and symptoms in neonatal period. Out of these 69.2% were identified with symptoms of illnesses during ASHA's visit. In an evaluation survey of ASHA 69% attended on a sick child in a district of Odisha (Angul).<sup>14</sup> However, 64% of ASHAs in East Godavari district of Andhra Pradesh in same survey did not attend on or refer any sick newborn in last six months.<sup>14</sup> Signs and symptoms of diarrhea and acute respiratory illnesses were reported by majority of mothers in neonatal period. ASHA in current study was reported to have visited majority of neonates with ARI and diarrhea alone or in combination with one or more illnesses. The first field trial of HBNC using a quasi-experimental design in 39 intervention and 47 control villages in rural Gadchiroli reported a significant decline in mortality in neonates (by 62%), and infants (by 46%) and perinatal mortality rate (71%) by the third year was observed.<sup>15</sup> Among the number of roles and responsibilities of ASHA one is identification and referral of sick newborns. However, in the current study around 30% of the sickness were missed from identification. This analysis is based on the information provided by the mothers or grandmothers of neonate. It may be subjected to recall bias. Another possibility could be ASHA visiting the sick neonate's house when he/she has already been identified by the parents and taken for medical care, hence not being counted.

#### 4.5. Referral of sick neonates by ASHA

In total 61% referrals were advised by ASHA among those with identified sign or symptom. Based on her experience and training she advised home based care to rest of the neonates. All referrals were advised to primary health center (PHC). Rajawat R et al., reported 28% referrals in sick neonates from rural Rajasthan by ASHA which was

lower as compared to current analysis.<sup>16</sup> Sinha et al., reported 56% of ASHA referred sick new-born from rural block of Mewat in South Haryana.<sup>10</sup> Another study on ASHA workers from Dayalpur village of Ballabgarh, Haryana reported 16 sick neonates were referred of which 14 were followed up after 2 days. Due to absence of denominator in this study proportions cannot be presented to evaluate the performance of ASHA.<sup>17</sup> In the evaluation report of ASHA more than 85% were reported to be referred to the public sector and others to private sector.<sup>14</sup>

Among those referred to government PHC, 54.5% visited the same and 18.1% sought treatment from private hospital (all hospitalized). More than half of those neonates advised Home based care were taken by the parent either to PHC or private clinic for confirmation or reassurance from a doctor. Attendants of neonates went directly to chemist shop also for medications despite of referral by ASHA to PHC. Visit to faith healers was also reported. Evidence suggests that in rural areas of country people frequently become dependent on unqualified medical practitioners because they do not have any other choices available probably due to absence of qualified doctors to treat acute illness episodes.<sup>18</sup> In India laissez-faire approach prevails in seeking health care. People by choice can approach any level of care be it private or public. It is still not strictly systematic and institutionalized.<sup>19</sup> The National health mission's HBNC approach spells out the strategy of combatting neonatal mortality through ASHA's visit and her intervention. At the end it is people's decision to follow her advice or not. Seeking care instead of home-based care is a sign of social status for some by going out and interacting people.<sup>20</sup> Neonatal period being very vulnerable one hence without taking any risks parents access the nearest and best medical care as per their own or family's belief. Another reason being parents do not want to take chance even for minor illnesses in neonates when any form of health care is accessible nearby. In the current study there were 15.4% hospitalizations of sick neonates and all approached private hospitals. In the current study utilization of government run PHC was high for outpatient department (OPD) services and private sector was favored for in patient (hospitalization) services. Public healthcare is very much affected by irregularity or absence of staff, quality of care available, etc., in the facilities. Moreover, in current setting nearby PHC was running with medicines facility but it referred all sick new born to district hospital which was at a distance of around 9 km. Distance, accessibility, quality of services and the belief of community are major drivers of seeking medical care at a public health facility or private facility or chemist or local faith healer.<sup>21</sup>

## 5. Limitations

The design of the study may have resulted in recall bias about the events and episodes of illness during the neonatal period of infant. ASHA being a resident of the same community; is socially and culturally linked to the residents. Hence many a times she is less likely to be favored by the population in their responses. Cause effect relation was difficult to establish as in whether it was really ASHA's visit which triggered the action taken by the neonate's mother.

## 6. Conclusion

The pre hospital primary health care by the community health workers to the neonates was assessed in a rural community of India. The community health workers addressed as ASHA visit the neonate and the mother in the first 28 days of life. The current study demonstrated that higher number of visits by ASHA helped her in identification of signs and symptoms of illness of neonates. Majority of the identified neonates (61.1%) were referred timely by ASHA to nearest primary health center and rest were given home based care. 15% of all those with sign and symptoms underwent inpatient hospitalization; all at private facility. Every neonate was cured.

## Ethics approval

The ethical clearance was sought from the institutional ethical committee for biomedical research vide letter no.134/A/11/16/Academics/MC/2016/176. After explaining the objectives of the study, written informed consent of all participants was obtained before gathering any information and this information will be kept strictly confidential.

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None declared.

## CRediT authorship contribution statement

**Mitasha Singh:** Conceptualization, Methodology, Software, Visualization. **Charvi Dhamija:** Data curation, Investigation, Writing – original draft, preparation. **Pooja Goyal:** Writing – review & editing. **Shweta Goswami:** Writing – review & editing.

## Declaration of competing interest

None Declared.

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