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ORIGINAL ARTICLE

THE EFFECT OF COMMUNITY-BASED NEWBORN CARE INTERVENTION ON SERVICE UTILIZATION FOR SICK NEWBORN AND CHILDREN

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ABSTRACT

Introduction: *Newborn deaths account for 43% of under-five mortality in Ethiopia, and newborn infection contributes to one third of these deaths. The provision of community-based newborn care services through the Health Extension Program platform is a key strategy to increase the utilization of newborn care services by increasing access near the community. In March 2013, the Ethiopian government launched community based newborn care, through which community health workers are trained, supplied with essential commodities, and supervised on the provision of community based newborn care, including the management of severe newborn infections.*

Objective: *To assess the effect of CBNC intervention on improving health care-seeking behavior for community newborn and child health services.*

Methods: *Data regarding sick young infants and sick children who visited health posts have been extracted from integrated community case management integrated community case management/community based newborn care registers pre-and post- community-based newborn care initiation during the first round of community-based newborn care performance review and clinical mentoring meetings. Descriptive and logit regression analyses were used to measure changes in health care-seeking behavior.*

Results: *The number of sick young infants seen at HPs increased 21-fold after the initiation of community-based newborn care. Managed cases of very severe disease and cases of local bacterial infection increased six-fold and four-fold, respectively. Managed cases of pneumonia and diarrhea showed only slight increases.*

Conclusions: *Overall, community-based newborn care has improved the health care-seeking behavior of mothers of sick young infants in Ethiopia. However, care-seeking is still low when compared with the numbers of expected cases.*

Key words: *Sick young infants; sick children; community-based newborn care; care-seeking behavior; pre- and post- community-based newborn care*

INTRODUCTION

Newborn deaths account for 43% of under-five mortality in Ethiopia (1), and newborn infection contributes to one third of these deaths (2). In 2013, the Ethiopian government launched community-based newborn care (CBNC), through which community health workers are trained, supplied with essential commodities, and supported to provide care for newborns who have infections(3,4). Before CBNC, integrated community case management (iCCM) of childhood illness was implemented. One of the main challenges in both programs has been the slow uptake of services by communities and limited care-seeking behavior for sick children and newborns (5,6).

Various interventions to increase the availability, demand, and utilization of health services have been implemented (4,7). At the community level, the Health Development Army (HDA) was launched to mobilize communities to use services and encourage healthy practices. The HDA is an organized network consisting of women (one woman for every five women from neighboring households) who act as a bridge for families to gain access to the services provided by health extension workers (HEW).

Additionally, HEWs play a major role in increasing demand for health services by educating families, conducting active surveillance during house-to-house visits and community mobilization.

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Pregnant mothers' forums, the media, existing social institutions such as 'edir', and women's and religious associations are some of the community platforms used to mobilize the community to boost health service uptake (4).

The objective of this study was to assess whether the CBNC program has improved service utilization by caretakers with sick young infants (SYIs) and sick children (SC) under five years of age.

PATIENTS AND METHODS

Data regarding sick young infants and sick children who visited health posts (HPs) for care have been extracted from iCCM/CBNC registers for pre- and post-CBNC initiation time periods. Data were collected during CBNC performance review and clinical mentoring meetings (PRCMMs) and were analyzed to see if there were changes in the utilization of iCCM and CBNC services.

Design and Setting: The study is a pre- and post-intervention analysis of iCCM/CBNC data collected during PRCMMs at two different times. While national CBNC implementation guidelines call for the first PRCMM to be conducted within three to six months of training, most HPs held them six to nine months after the initiation of the program (7). PRCMMs are important opportunities to mentor and coach HEWs, and to collect important data on the progress and quality of program implementation (4).

The study covered 4,403 HPs from 204 woredas (districts) in the four agrarian regions (Amhara, Oromia, SNNPR and Tigray), where Save the Children support the Federal Ministry of Health (FMOH). Pre-CBNC data were missing in other partner-supported areas, and thus could not be included in this study.

Data relating to the number of cases detected and treatment of SYIs and SC were collected for pre- and post-CBNC time periods. Pre-CBNC is the interval between the last PRCMM held for the iCCM program and the date the HP received CBNC training and supplies. Post-CBNC is the interval between the date the HP had at least one CBNC-trained HEW and supplies, and the date of the first iCCM/CBNC PRCMM. The same technical expert collected information for both periods during the review meetings.

Intervention: CBNC was built on the iCCM platform, and the implementation began in the agrarian regions in January 2014.

For iCCM, HEWs manage sick children with pneumonia, diarrhea, malaria and malnutrition. CBNC added services to manage newborns with very severe disease (VSD) when referral is not possible (8).

Field Methods, Measurements, and Data Analysis

All SYIs under two months of age and SC aged two to 59 months for whom caregivers sought care for illness were used to determine the caseload in the two time periods. These data were compared with published estimates of annual disease incidence rates: 7.6% of neonates for of very severe disease (VSD) (9), 27% for pneumonia, and three episodes of diarrhea annually for children under five years (10). Woreda-level demographic information was used for denominators. Data for the treatment of VSD were analyzed for the post-CBNC time period only because HEWs were not authorized to treat these cases beforehand. Malaria and malnutrition, part of community case management, were excluded from analysis in this study due to seasonal characteristics and the absence of complete data.

The data-entry platform and data-extraction format were developed as part of the PRCMM facilitator's guide. Data were entered into DHIS2 and analyzed with Stata version 13.

The study used descriptive statistics to allow comparison between the two time periods, and regression models to measure changes in utilization. The relative differences between the two time periods, coverage (percentage) and mean were calculated to determine service utilization. To calculate the mean number of SYIs, SC and specific disease cases per annum (see Table 4), the data used were annualized. First, we calculated monthly averages, then the annual number of cases were estimated by multiplying by 12. The actual data extracted for each HP covered an average of 7.4 months pre-CBNC and 8.1 months post-CBNC.

Ethical Aspects: The FMOH Child Survival Technical Working Group and the subgroup responsible for the CBNC monitoring and evaluation framework provided oversight to the study. The data analyzed did not have individual patient-level data and names.

[1]Local indigenous self-help association in most part of Ethiopia

RESULTS

A total of 4,403 HPs that conducted PRCMMs between December 2014 and March 2015 were included in the study. Data extracted for each HP covered an average of 7.4 months pre-CBNC and 8.1 months post-CBNC. This distribution varied regionally, from 5.4 months in Southern Nations, Nationalities, and peoples (SNNPR) to 7.9 months in Amhara for pre-CBNC, and from 6.6 months in Amhara to 9.4 months in Oromia for post-CBNC. Despite these variations, all HP records included two to three quarters of implementation (Table 1).

The timings of woreda review meetings were distributed randomly during 2014 and the first quarter of 2015. To standardize the data for comparison, the number of cases per month were computed for all children seen. We found a significant 19-fold increase in the utilization of CBNC treatment services in the post-CBNC time period (Table 2). Six times as many newborn VSD cases and four times as many local bacterial infection (LBI) cases were seen (see Table 3). However, there was only a small (.01) increase in the utilization of services for sick children (aged two to 59 months). This also reflects the fractional increases in the treatment of pneumonia (.01) and diarrhea (.08) (see Table 3).

Table 1: Distribution of the health posts observed by region and period

Region	# of HPs	# of observations			Average months of recorded data in the study	
		Pre-CBNC	Post-CBNC	%	Pre-CBNC	Post-CBNC
Amhara	1,120	1,120	1,120	25.4	7.9	6.6
Oromia	1,656	1,656	1,656	37.6	8.9	9.4
SNNPR	1,376	1,376	1,376	31.3	5.4	8.1
Tigray	251	251	251	5.7	6.1	7.2
Total	4,403	4,403	4,403	100	7.4	8.1

Table 2 : Total Number of Sick Young Infant and Sick Children Seen Monthly at Health Post Pre- and Post-CBNC n= 4403

Age catagory	Pre -CBNC	Post -CBNC	Fold change
Months/weeks	#	#	times(fold)
Sick Young Infant			
0-2 months	579	11,333	18.6
Neonate	442	9,600	20.7
5-8 weeks	137	1,733	11.6
Sick Children			
2-59 months	308,521	331901	0.1

*Fold changeis calculated ((Post-CBNC-Pre-CBNC)/Pre-CBNC)

We observed a significant increase in CBNC service users (SYIs), both in terms of absolute size (9,600 vs 1,733) and frequency of fold change (20.7 vs 11.6) among neonates, compared to those aged five to eight weeks (see Table 2). Increased care-seeking behavior at early periods of birth is very important, as the first day, week and month of birth are periods where the risk of VSD and other neonatal complications is high. Examining the change by type of disease for SYIs, the increase in service uptake of VSD cases (6.3) at HPs was higher than for LBI cases (4.2) (Table 3).

Comparing the total number of SYIs with specific cases, there was a substantial increase in the total number of neonates and SYIs, much higher than for specific diseases such as VSD and LBI (see Tables 1 and 3). While a total of 11,333 caregivers of SYIs sought care at HPs post-CBNC, 528 VSD and 580 LBI cases were diagnosed. Nonetheless, data in Figure 2 show that care-seeking remains very low compared to estimates.

We also calculated the mean number of SYI and SC cases per HP per annum. The data in Table 4 reveal a significant positive change for the post-CBNC period, particularly for newborns, although the numbers of VSD and LBI cases were small.

A binary logistic regression analysis, not presented here, reveals that the *p*-values for these effects are zero – the introduction of CBNC has significantly increased the utilization of HPs for neonatal health conditions.

Table 3: Total number of monthly cases seen at health posts pre- and post-CBNC (n = 4,403)

Category	Disease	Pre-CBNC	Post-CBNC	Fold increase*
		Number	Number	
Sick young infants	VSD	72	528	6.3
	LBI	112	580	4.2
Sick children	Pneumonia	61,684	66,710	0.1
	Non-severe diarrhea	125,965	130,746	0.0

Table 4: Mean number of cases of sick young infants and sick children seen per annum (annualized) per health post during pre- and post-CBNC interventions (n = 4,403)

Age category	Cases	Period	Mean	St. err.	95% conf. inter
0-2 months	Total SYIs (< 2 months)	Pre-CBNC	1.6	0.43	(0.77, 2.40)
		Post-CBNC	31.3	0.49	(30.37, 32.30)
	Total neonate (< 28 days)	Pre-CBNC	1.2	0.31	(0.63, 1.84)
		Post-CBNC	26.4	0.48	(25.43, 27.32)
	VSD	Pre-CBNC	0.2	0.09	(0.03, 0.37)
		Post-CBNC	1.5	0.04	(1.37, 1.54)
	LBI	Pre-CBNC	0.3	0.25	(–0.18, 0.80)
		Post-CBNC	1.6	0.06	(1.49, 1.71)
2-59 months	Total SC (2-59 months)	Pre-CBNC	70.5	2.05	(66.52, 74.54)
		Post-CBNC	75.9	1.18	(73.61, 78.25)
	Pneumonia	Pre-CBNC	14.1	0.8	(12.55, 15.67)
		Post-CBNC	15.3	0.37	(14.56, 15.99)
	Non-severe diarrhea	Pre-CBNC	29.1	1.03	(27.09, 31.11)
		Post-CBNC	30.2	0.6	(28.97, 31.34)

Additional analysis was run on the changes between the two time periods by comparing the number of cases seen with estimates of the expected number of cases. Figure 1 shows that, despite increases in the post-CBNC period, a considerable number of cases are still not being seen at HPs.

HEWs are expected to treat VSD and LBI cases when referral is not possible. Figure 2 shows that more than two-thirds of VSD cases identified started treatment at HPs and more than three quarters completed the seven-day treatment. We also found that 66% of LBI cases were treated at HPs.

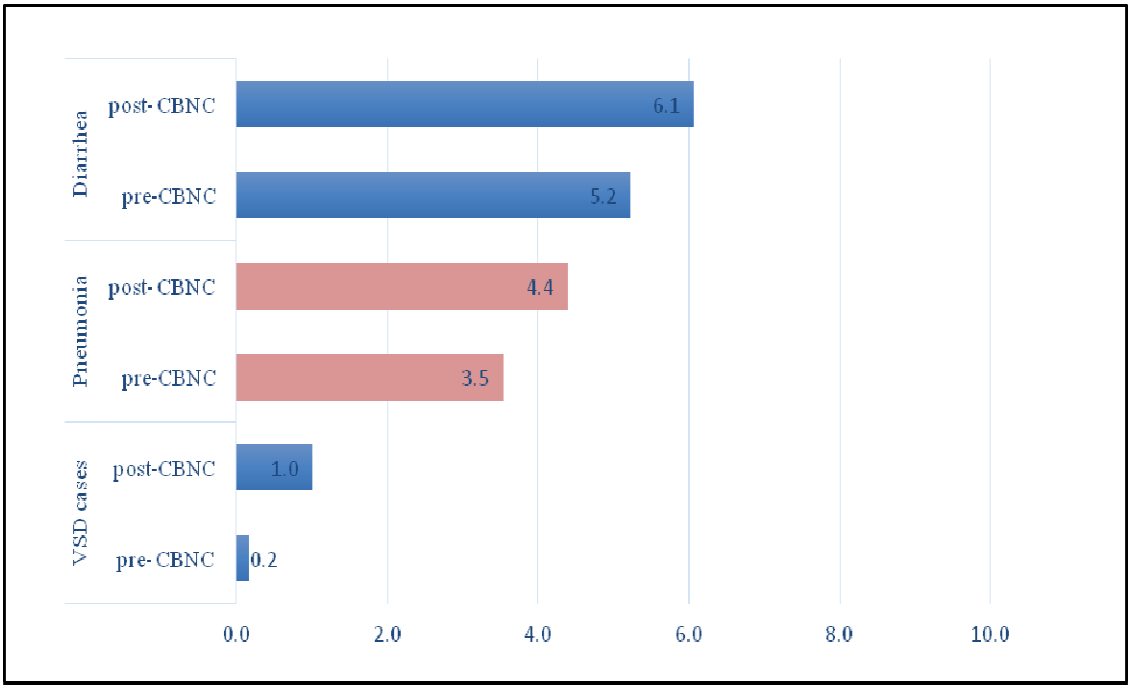

Figure 1: Percent coverage of selected diseases from an estimated summary incidence in both periods

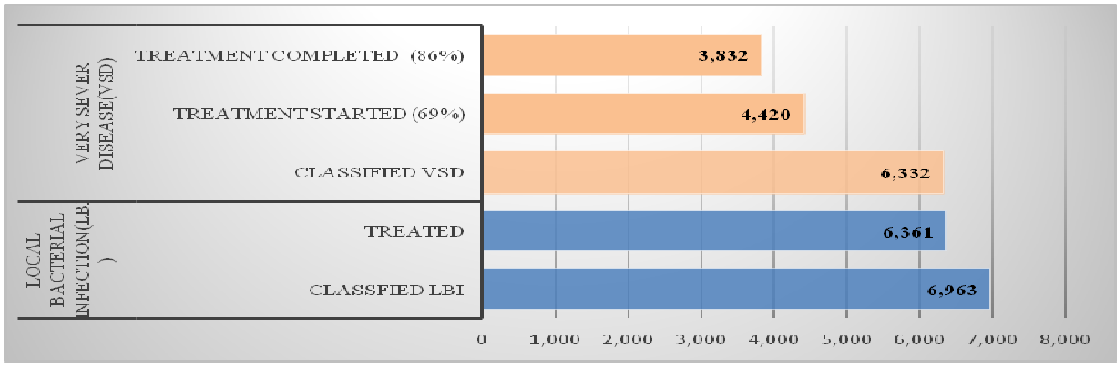

Figure 2: Treatment of LBI and VSD post-CBNV period

One of the limitations of the study is that it did not consider the number of cases identified or treated at HCs and hospitals. In other studies, caregivers sought treatment directly at HCs (10,11). Thus, the utilization of health services overall may be undercounted, and proportions of expected cases may have been exaggerated.

DISCUSSION

This analysis of the effect of the CBNC program on the utilization of newborn and child health services shows that it has significantly increased for newborn illnesses.

Possible contributory factors include the existence of a strong HEP platform, the recent implementation and application of lessons learned from a working iCCM platform (13), strong implementation that included standardization of the program, effective partnerships between the FMoH/RHBs and other stakeholders, high-quality training, routine supportive supervision, and review meetings (13).

The study findings show that there is a wide discrepancy between the total number of SYI and actual number of CBNC cases, particularly for VSD and LBI.

The implication is that although contacting mothers with newborns is an important entry point for capturing cases, promptly identifying severe disease cases and linking them to the HEW can effectively save more newborn lives.

The findings presented above on treatment part indicates that HEWs were able to treat 86% of VSD cases and 91% of LBI cases. There is also previous evidence from iCCM that HEWs were treating cases effectively and the general quality of care was high (5).

Even though there was a measurable increase in newborns seen by HEWs, the proportion of estimated expected cases remains very low. This is consistent with iCCM findings that health service utilization for children under five is lower than expected and only rises slowly during early program roll out (6,14-16). The iCCM program also found that SYIs under two months were brought in much less frequently than older children (6). Low utilization of health care for newborns has been associated with cultural and geographic barriers, and with financial access constraints (14). What these figures do not reflect is the possible utilization of HC and hospital services for neonates. Accurate program data on direct care-seeking, diagnoses, and referrals to higher levels of care are not available.

More than two thirds of the cases classified as VSD started treatment at HPs and three quarters of those completed the seven-day course. This demonstrates the potential for good-quality care at the community level. In the post-CBNC time period, there was little change in the utilization of pneumonia, diarrhea, and malaria services under iCCM.

Thus, even though iCCM and CBNC systems are integrated, there did not seem to be any knock-on effect from CBNC initiation. Despite encouraging improvement in the utilization of newborn care services, the progress is far below what was expected. HEWs were able to treat the significant majority of cases to the extent that caregivers were able to seek care at the HP. This study also could not reveal the significant positive impact of CBNC in relation to increasing the service uptake of other childhood sickness. To work in an integrated way, this would require a more coordinated response by FMoH, partners, research institutions at upstream level, and local administration, health authorities and service providers, HDA and communities at grass-root level.

Though the study provides important insights into the effect of CBNC on care-seeking behavior of child and new community case services, it is by no means complete. Further studies should be encouraged to investigate care-seeking across the continuum of care and referral linkages.

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Conflict of interest

The authors have no conflicts of interest of declare.

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