Original article

In what ways can Community Integrated Management of Neonatal and Childhood Illnesses (C-IMNCI) improve child health?

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Abstract

Background: In addition to access to quality health services, family child care practices play a major role in improving child health and achieving reduction in childhood mortality.

Objective: To assess the effect of community integrated management of neonatal and childhood illness interventions on family practices for child care.

Methods: A comparative cross-sectional survey was conducted in Dabat District, northwest Ethiopia. A total of 800 mothers or caretakers of children of under two years form the Community Integrated Management of Childhood Illnesses intervention and non-intervention areas were selected using a multistage sampling procedure and interviewed in November 2007.

Result: Three hundred thirty seven (84.3%) of the mothers from the intervention area and 358 (89.5%) from non-intervention area were illiterate. Thre vast majority (99.5%) of the fathers in each of the areas were farmers. Mothers/care takers from community IMNCI intervention areas reported better child care practices in terms of time of breastfeeding initiation (OR=9.10, 95% CI=5.45, 12.43), avoiding prelacteal feeding (OR=11.01, 95% CI=7.98, 15.43), initiation of supplementary feeding (OR=3.63, 95% CI=2.23, 5.93) compared to mothers/care takers form non intervention areas. Regarding water, personal hygiene and environmental sanitation, statistical significant differences were observed in using a safe drinking source of water (OR=6.36, 95% CI=4.49, 9.01) and availability of pit latrines (OR=43.52, 95% CI=25.46, 67.89) between the intervention and non-intervention areas. The likelihood of seeking care for diarrhea was about five times and that of fever is three times higher in the intervention areas compared to the non-intervention one.

Conclusion: Community IMNCI has positive effects on child feeding, disease prevention, health care seeking practices and these practices are expected to improve child health and survival. Thus the program needs to be scaled up in other areas. Further studies may assess the actual effect of the intervention on child morbidity and mortality. [*Ethiop. J. Health Dev.* 2011;25(2):143-149]

Introduction

Nearly 11 million children die every year in the world, before reaching their fifth birthday and most of these deaths occur during their first year of life. The great majority of the deaths take place in developing countries. More than half of these deaths are due to acute respiratory infections, diarrhea, measles, malaria and HIV/AIDS. In addition, malnutrition underlies 54% of all child deaths (1).

Ethiopia has one of the highest infant and child mortality rates in the world. According to the 2005 Ethiopian Demographic Health Survey (EDHS) the infant mortality rate is 77/1000 live births and under five mortality rate 123/1000 live births (2). The survey also showed that mortality is higher in rural than urban areas. Only 17% of children were fully vaccinated by 12 months of age, 57% received BCG vaccination and 29% were vaccinated against measles. Sixty seven percent of children's stool was left uncontained and only one in three Ethiopian children aged 4-5 months were exclusively breast fed (2). The major causes of morbidity and mortality in Ethiopian children less than 5 years old are acute respiratory infections (mainly pneumonia), diarrheal diseases, malaria, malnutrition and vaccine preventable diseases (3).

The IMNCI strategy includes both preventive and curative interventions that aim to improve practices in health facilities, the health system and at home (4).

With the aim of reducing the unacceptably high childhood mortality and morbidity and promoting child health and development, Ethiopia adopted the IMNCI strategy in 1996 (5).

The third component of the IMNCI, Community IMNCI (C-IMNCI), which deals with the improvements of household and community practices is an integrated child care approach that aims at improving household practices

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that are likely to have the greatest positive impact on child survival, growth and development within the overall framework of community capacity development (6).

As an initial step towards implementation of the household and community component of IMNCI in Ethiopia, two districts, namely Dabat (North Gondar) and Wukro district (Tigray), were selected as pilot areas. In these districts a baseline survey and needs assessment were carried out. After training of voluntary community resource person's IEC were given to key family and household regarding IMNCI practices. One community resource person was assigned for 50 households to inform, educate and mobilize each household. Four years have elapsed since the initial training and community interventions. Thus it is important to examine the changes that have occurred in child care practices following the intervention. Moreover, reports from other countries document differing results concerning the effect of C-IMNCI interventions (7- 9).

The main objective of this study was thus to assess the effect of C-IMNCI intervention on family practices for child health care in Dabat District which is one of the pilot intervention sites.

Methods

A community-based comparative cross-sectional survey was carried out in 8 *kebeles* (smallest administrative units in Ethiopia) in Dabat District of the Amhara Region, northwest Ethiopia, in November 2007.

The study populations were mothers or care takers of children less than 2 years of age. According to the baseline survey by UNICEF/Ethiopia, the prevalence of care-seeking behavior was estimated to be 30 % (10).

Since the specific prevalence rate in the area in the post intervention period was not known, to calculate the needed sample size, we assumed a 10% difference in the care seeking behavior between intervention and non-intervention groups.

The ratio of intervention to non-intervention group was 1:1. The required sample size for the study was determined using two-population proportion formula and a total of 800 households were calculated.

A multistage sampling technique was used to select the study subjects. There were twenty community IMNCI implementing *kebeles* out of a total 30. Four *kebeles* were randomly selected from the twenty intervention areas and four other *kebeles* were randomly selected from the non-intervention areas. Households were chosen using a systematic random sampling technique and the study participants were selected proportional to the population size of the *kebeles*.

A structured pre-tested Amharic questionnaire was used to collect data from mothers or caretakers by trained interviewers. The questionnaire was first prepared in English. It was then translated into Amharic and back into English to ensure consistency. It included questions on socio-economic characteristics, child feeding practices, health care seeking behavior, personal hygiene practices and environmental health aspects. Cross checking of filled questionnaires was made in randomly selected families and questionnaires were reviewed daily by the supervisors and the principal investigator for completeness and consistency.

Data entry and cleaning was done using EPI-INFO version 2000. Frequencies and proportions were used for description of the study population in relation to socio-demographic and other relevant variables.

Odds ratio and 95% confidence interval were used to assess the strength of association and statistical significances. Binary logistics regression analysis was employed to assess the adjusted effect of each independent variable on the dependant variable.

Verbal consent was obtained from each participant after explaining the objectives and the procedures of the study. Ethical clearance was obtained from the Ethical Review Board (IRB) the Ethical Review Committee of the Faculty of Medicine, Addis Ababa University.

Results

The socio-demographic characteristics of the study subjects are summarized in Table 1. The figures appear to be very similar between the intervention and non-intervention areas with respect to most variables.

A total of 800 households, 400 from the intervention and 400 from the non-intervention areas, with children less than two years of age were involved in the study.

Three hundred thirty seven (84.3%) of the mothers from the intervention area and 358 (89.5 %) from non-intervention one were illiterate. Three hundred ninety five (98.8%) and 393 (98.3%) mothers were housewives in the intervention and non-intervention areas, respectively.

Three hundred ninety five (96.8%) of the caretakers in the intervention area and 390 (97.5%) in the non-intervention area were married. In both groups the vast majority (99.0%) of fathers were farmers. The majority of mothers in both groups were housewives.

Two hundred ninety two (73%) households from the intervention and 272 (68%) households from non-intervention area had family sizes greater than five, per household.

Table 1: **Socio-demographic Characteristics of the Households of the Study Population, Dabat District, Nov. 2007**

Characteristics	Intervention (%) (n=400)	Non-intervention (%) (n=400)
Maternal age (years)		
15-19	23 (5.8)	38 (9.5)
20-29	174 (43.5)	203 (50.8)
30-39	163 (40.8)	145 (36.3)
40-49	40 (10.0)	14 (3.5)
Paternal age (years)		
20-30	111 (27.8)	146 (36.6)
31-40	154 (38.5)	187 (46.9)
41-50	96 (24)	59 (14.8)
>51	39 (9.8)	7 (1.8)
Maternal educational Status		
Illiterate	337 (84.3)	358 (89.5)
Read and write	23 (5.8)	26 (6.5)
One to six grade	33 (8.3)	13 (3.3)
Seven to twelve grade	7 (1.8)	3 (0.7)
Paternal educational Status		
Illiterate	205 (51.3)	234 (58.5)
Read and write	11 (29.0)	139 (34.8)
One to six grade	59 (14.7)	24 (6.0)
Seven to twelve grad	20 (5.0)	3 (0.8)
Maternal occupation		
Housewife	395 (98.8)	393 (8.3)
Others	5 (1.2)	7 (1.7)
Paternal Occupation		
Farmer	398 (99.5)	398 (99.5)
Others	2 (0.5)	2 (0.5)
Parental marital Status		
Married	387 (96.8)	390 (97.5)
Others	13 (3.2)	10 (2.5)
Family size		
1-5	108 (27)	128 (32.0)
6-12	292 (73)	272 (68.0)
Child age (Months)		
<5	100 (25.0)	95 (23.7)
6-11	102 (25.5)	110 (27.5)
12-18	117 (29.5)	117 (29.5)
19-23	81 (20.0)	78 (19.3)
Child gender		
Male	202 (50.5)	209 (50.9)
Female	198 (49.5)	191 (49.1)

Breastfeeding was initiated within one hour after delivery in 240 (60%) of the children in the intervention area while this was the case only in 58 (14.5%) of the children in the non-intervention area. The odds of initiating breastfeeding within one hour from delivery in the intervention area is about 9 times higher than for those in the non-intervention areas. (Adjusted OR=9.10, 95%CI= 6.45, 12.43).

On the other hand, pre-lacteal feeding was given for 84 (21.0%) of the children in the intervention area compared to 304 (76.0%) in the non-intervention areas. The odds of pre-lacteal feeding being about 11 times higher in the non-intervention areas (Adjusted OR=11.01; 95%CI=7.98, 15.43).

Of the 250 children who started to take complementary feeding in the intervention area, 222 (88.8) did so between 6-9 months of age. On the other hand in the non-intervention area out of 247 who took complementary food, 169 (68.4%) started doing so in the same period (Adjusted OR=3.63; 95%CI=2.23, 5.93) (Table 2).

Three hundred eighty eight (97.0 %) of the children from the intervention area were exposed to sunlight compared to 364 (91 %) in the non-intervention area. The likelihood of sunlight exposure in the intervention area was 3 times higher than that of the non-intervention areas (AOR=3.10, 95%CI=1.50, 6.23) (Table 2).

Of those children older than 6 months of age, 84.0% and 81.0% of them in the intervention and non-intervention areas respectively, received vitamin A supplements in the last six months preceding the study. The difference is however not statistically significant (AOR 1.63; 95%CI= 0.89, 2.99) (Table 3).

On the contrary, a large difference was noted in DPT_3 coverage (OR=18.2; 95%CI 2.48, 139.4), though overall it was generally high in the study area. Of those children aged 12-23 months, 197 (99.7%) received DPT_3 in the intervention area while 178 (91.3%) did so in the non-intervention area. Similarly, measles immunization coverage was significantly higher in the intervention area ($P<0.001$).

Two hundred (50.0%) of the households in the intervention area were using safe drinking source of water, and only 65 (16%) had safe water source in the non- intervention areas. The use of a safe drinking water source in the intervention areas was about six times higher then that of the non-intervention areas. The association between a safe drinking water sources and disease was found to be strong, even after confounding variables were controlled. (Adjusted OR=6.36; 95%CI=4.49, 9.01) (Table 4). Pit latrines were observed in 71.5% of the households in the intervention areas contrasted to only 5.5% in the non intervention (Table 4).

More than 96.0% of the caretakers washed their hands during preparing food and before feeding their children. There was no statistically significant difference in the hand washing practice while preparing food (Adjusted OR=0.56 (0.16, 1.99), while some difference was noted between intervention areas (99%), and non-intervention areas (96%) on hand washing practice before feeding the child (Table 4).

Table 2: **Child Feeding Practice and Exposure to Sunlight in Dabat district November, 2007**

Variable	Intervention area (%)	Non-intervention Area (%)	Crude Odds ratio (95% CI)	Adjusted* OR (95% CI)
Complementary feeding started at 6-9 months				
Yes	222 (88.8)	169 (68.4)	3.66 (2.22, 6.06)	3.63 (2.23, 5.93)
No	28 (21.2)	78 (31.6)	1	1
Sun exposure				
Yes	388 (97.2)	364 (91)	3.49 (1.68, 7.39)	3.10 (1.50, 5.23)
No	11 (2.8)	36 (9)	1	1

* adjusted for maternal education, age, child age, parental marital status, paternal education, maternal occupation

Table 3: **Immunization and vitamin A supplementation status Dabat Woreda, November, 2007**

Variable	Intervention Area	Non-intervention Area	Crude Odds ratio (95% CI)	Adjusted* OR (95% CI)
Received vitamin A supplement in the past 6 months				
Yes	224 (84.2)	198 (80.8)	1.27 (0.80, 2.00)	1.63 (0.89, 2.99)
No	42 (15.8)	47 (19.2)	1	1
DPT3 vaccine received				
Yes	197 (99.5)	178 (91.3)	18.81 (2.59, 142.8)	18.21 (2.48, 139.4)
No	1 (0.6)	17 (8.7)	1	1
Measles vaccine received				
Yes	190 (96)	158 (81.0)	5.56 (2.40, 13.36)	6.54 (2.75, 15.54)
No	8 (4)	37 (19.0)	1	1

* adjusted for maternal education, age, child age, parental marital status, paternal education, maternal occupation

Table 4: **Personal and Environmental Hygiene Characteristics, Dabat Woreda, November, 2007**

Variable	Intervention Area	Non-intervention Area	Crude odds ratio (95% CI)	Adjusted OR (95% CI)
Drinking water source				
Safe	200 (50.0)	65 (16.3)	5.15 (3.70, 7.17)	6.36 (4.49, 9.01)
Unsafe	200 (50.0)	335 (83.7)	1	1
Hand washing before preparing food				
Yes	392 (98.7)	396 (99.0)	0.49 (0.15, 1.66)	0.56 (0.16, 1.99)
No	8 (2.0)	4 (1.0)	1	1
Hand washing before feeding the child				
Yes	397 (99.0)	384 (96.0)	5.51 (1.56, 29.71)	6.41 (1.76, 23.38)
No	3 (1)	16 (4.0)	1	1
Use of soap while washing hands				
Yes	38 (9.5)	12 (3.0)	3.39 (1.68, 6.98)	3.70 (1.87, 7.34)
No	362 (90.5)	388 (97.0)	1	1
Pit latrine available				
Yes	286 (71.5)	22 (5.5)	43.11 (26.63, 69.77)	43.52 (25.46, 67.89)
No	114 (28.5)	378 (94.5)	1	1

The practice of using soap in washing hands was very low in both (9.5%) areas (3.0%), though it was higher in the intervention areas. One of the kebeles (Arebur) from the intervention area and three of the kebeles (Kenta, Gurnamba and Chiladiba) from the non-intervention group were malarious areas.

All (100%) of the households in the intervention area and 99.0% of the households from the non-intervention areas had ITN. When asked whether the child had slept under the ITN the previous night, 78.0% (n=78) of the households in the intervention area answered positively while 91.2% (n=271) of the households did in the non-intervention areas replied positively. This difference was statistically significant in favor of non-intervention areas (Adjusted OR=2.94; 95% CI= 1.6, 5.5).

Over a quarter (29.0%) of the women, in the intervention area who knew about family planning (FP) method were using FP during the survey compared to 17% in the non-intervention area.(Adjusted OR=1.72; 95%CI=1.19, 2.40) (Table 5).

Table 5: **Reproductive Health Characteristics of Mothers Related to the Index child in Dabat District, Northwest Ethiopia, November, 2007**

Variable	Intervention Area	Non-intervention Area	Crude odds ratio (95% CI)	Adjusted* OR (95% CI)
Use of family planning				
Yes	117 (29.2)	68 (17)	2.02 (1.44, 2.83)	1.72 (1.19, 2.40)
No	283 (70.8)	332 (83)	1	1
ANC during last pregnancy				
Yes	174 (43.5)	105 (26.2)	2.16 (1.60, 2.91)	2.29 (1.68, 3.13)
No	226 (56.5)	295 (73.8)	1	1
Number of ANC visits				
≥4	56 (31.8)	17 (16.2)	0.41 (0.23, 0.76)	0.43 (0.23, 0.79)
1-3	118 (68.2)	88 (83.8)	1	1

Less than a half (44.0%) of the mothers in the intervention area had ANC during their last pregnancy compared to 26.0% in the non intervention area. Around one-third (32.0%) and 16.0% in the intervention and non-intervention area respectively, had 4 or more ANC visits. (Adjusted OR=0.43; 95%CI= 0.23, 0.79).

The three harmful traditional practices that were investigated were uvulectomy, female genital mutilation and milk teeth removal. In the intervention areas around 44.0% had uvulectomy, 2.0% had female genital mutilation and 27.0% had milk teeth removal while in the non-intervention areas, 91.0% had uvulectomy, 3.7.0% female genital mutilation and 34.0% milk teeth removal. There were no differences in the practice of female genital mutilation, but there was a statistical difference in the practice of uvulectomy (adjusted OR=13.0; 95% CI=8.64, 19.62) and milk teeth removal practices (adjusted OR=1.52; 95%CI 1.13, 2.11) between the intervention and non intervention areas.

Over one-third (36.0%) of the children in the intervention areas had a history of diarrhea 2 weeks preceding the survey, compared to 47% in the non intervention areas (adjusted OR= 0.46; 95% CI =0.33, 0.65). The likelihood of seeking care for diarrhea is about five times and that of fever three times higher in the intervention areas compared to the non-intervention areas (Table 6).

Table 6: **Morbidity and care seeking characteristics, Dabat District, November, 2007**

Variable	Intervention area	Non-intervention Area	Crude odds ratio (95% CI)	Adjusted* OR (95% CI)
History of diarrhea				
Yes	142 (35.5)	186 (46.5)	0.63 (0.48, 0.84)	0.45 (0.33, 0.65)
No	258 (64.5)	214 (53.5)	1	1
Care-seeking for diarrhea				
Yes	90 (63.4)	47 (25.5)	5.19 (3.23, 8.35)	5.03 (3.04, 8.33)
No	52 (36.6)	139 (74.5)	1	1
History of fever				
Yes	228 (57.0)	232 (58.0)	101 (0.73, 1.27)	0.98 (0.66, 1.22)
No	172 (43.0)	168 (42.0)	1	1
Care seeking for fever				
Yes	110 (48.9)	55 (24.0)	3.03 (1.99, 4.61)	2.77 (1.92, 4.31)
No	115 (51.1)	174 (76.0)	1	1

Discussion

In this study, community IMNCI intervention and non-intervention areas were compared for different household and community practices that are known to have a big impact on child survival, growth and development.

Parent's educational status, occupation, marital status and age of the relevant household members from both the intervention and non-intervention areas were comparable. The family size, gender and child age distribution of both groups were also similar indicating that differences between intervention and non-intervention areas are unlikely to be due to these factors.

About 60% of the children in the intervention areas were given on the breast within an hour compared to 15% in the non- intervention areas. WHO and UNICEF recommend that newborns be put on the breast within one hour after birth (10). This practice may determine whether breast feeding succeeds or fails, and whether a strong psychosocial bond develops between the mother and her infant (11). Similar results were reported on the effect of community based IMNCI in Uganda (Base line 31% and follow up 62%) and South Africa (40%, 65%) (7-8). In Malawi, there was little difference after intervention (69%, 71%) the reason being poor targeting of interventions to pregnant mothers and the baseline rate was high (9).

About 21.0% of children had received pre-lacteal feeding in the intervention areas compared to 76% in the non-intervention areas showing a significant difference that indicates a possible effect of the community-based interventions. The rate in the intervention area is still

high indicating the need for sustainable intervention for the change in behavior.

This study found that 89.0% of children in the intervention areas started complementary feeding (CF) at 6-9 months compared to 68.0% in the non-intervention areas, again showing a possible impact of the intervention contributing to lowering malnutrition. Improving CF is a critical aspect in addressing malnutrition particularly stunting in young children and in saving almost 60.0% of children who die because of the underlying contributions of poor nutrition (4).

In this study vitamin A supplementation coverage showed no difference between the two groups (OR1.7; 95%CI =0.8, 2.01). This may be related to the effect of the high coverage of the supplementation during the polio eradication campaigns. Similar results were found in Uganda, where national polio eradication campaigns were conducted, Vitamin A supplementation coverage was 74% in non-intervention areas and 79%) in intervention areas (7).

A remarkably high immunization coverage was found in both intervention and non-intervention areas with a statistically significant difference between the two groups. This may be due to the effect of the expanding Health Extension Program and the attention the immunization program was given by the Government at a national level in addition to the community based IMNCI intervention.

Improvements in hygiene practices often require integrated programs to provide latrines, safe water and soap, as well as to make families more aware of the importance of hand washing habits and maintaining latrines (12). In this study, there were significant differences in drinking water source, hand washing before feeding the child and the availability of pit latrine between the intervention and non-intervention areas whereas there was no difference in hand washing habits during food preparation. The percent of households practicing hand washing is very high in both groups. On the contrary the use of soap, though significantly different, is very low in both groups. Lack of knowledge or the inability to acquire soap could be the reasons for the low use. As soap is the most effective way of removing pathogens promotional work in that line needs to be strengthened.
Availability of ITN in both groups was very high. But its use was found to be significantly higher in the households in the non-intervention areas. The families in the intervention areas revealed that they received the ITN's four years earlier than the non-intervention areas. Besides, the ones they received were not the long lasting ones, and are now very old. This indicates the need for follow up of ITN supply and their replacement.

In this study, 44.0% of the mothers in intervention areas had attended antenatal care at least once during their last pregnancy compared to 26.0% in the non-intervention areas. On the other hand, only 32.0% of those, who used antenatal care had the minimum number of the WHO recommended four or more visits in the intervention area compared to 16.2% in the non-intervention areas. Thus, while community IMNCI may be having a positive effect on ANC use, more work needs to be done to achieve an acceptable number of ANC visits.

The possible effect of community based IMNCI on health care seeking is also shown by the finding that care takers had sought care for 63% of children with diarrhea and 49% with fever in the intervention area compared to 24 % and 26 % in the non-intervention areas, respectively. It also appears that health care seeking has generally improved compared to a previous report of 16% (13).

Where the index of children's fathers educational status was 7-12 grades, health care seeking was four times than higher than those with lower educational background. This may be related to the effect of education on care seeking behavior and decision making capacity of the fathers.

There was significant difference in performing uvulectomy and false teeth removal between in the two areas. It again appears that the IMNCI intervention had a positive effect on these practices. In both groups the number of female children who were circumcised is very low. This may be related to the fact that the practice of female genital mutilation (FGM) is generally not accepted in the study areas.

This study is the first of its kind that has explored the effect of community IMNCI in Ethiopia. Having a comparison group (non-intervention area) improves the validity of the study. On the other hand and because of the cross-sectional nature of the design, the results may not be conclusive in terms of cause and effect relationship, though the use of multiple logistic regressions did help control certain confounders. In addition, this study did not address the effect of community IMNCI on child morbidity and morality which is the main outcome of interest in child health. A study in the Tigray (north Ethiopia) has reported that sensitizing communities to key behaviors can lead to increased childhood survival (14).

In conclusion, community IMNCI has positive effects on nutritional, diseases' prevention, health care seeking, reproductive health practices and avoidance of harmful traditional practices and getting rid of these practices are expected to improve child health and survival. Thus the program needs to be scaled up in other areas. Furthermore, other studies that address the actual effect of the interventions on child morbidity and mortality is needed. Attention should be given to utilization and replacement of ITNs and timely resource mobilization is required to provide safe drinking water.

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