Original article

Assessment of voluntary community health workers participation and contribution in mHealth intervention

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Abstract

Background: Voluntary community health workers (vCHWs) live within the community and are identified and trained to assist in disseminating preventive health messages at individual and community level in support of Health Extension Workers (HEWs). They use house to house visit to disseminate preventive health messages. The Objective of this manuscript is to assess how use of mobile phone with mHealth application help in facilitating vCHW routine health related work.

Methods: The study employed pre and post intervention cross sectional survey on phone use of vCHW at Abeshge and Ezha woredas of Guraghe zone, SNNPR. Data was collected using pretested structured questionnaire. Pre and post mHealth intervention impact on health outcome was measured by performing a community based survey of mothers and comparing the pre-post intervention differences between the two woredas. SPSS 20 statistical software was used to analyze data.

Results: A total of 85 vCHW serving both woredas participated in the study. Following intervention, nearly all respondents in Abeshge claimed using mobile phone for work related matters compared to only 27.5% of those in Ezha. The majority of respondents in Abeshge reported use of mobile phone as a means of communication to inform mothers time of vaccination campaign (66.7%) and attendance of ANC (68.(%). Comparison of selected maternal health indicators like number of ANC attendance, place of delivery, percentage of professionally assisted delivery and etc did not show strong statistical difference between the two woredas.

Conclusion: Participants are currently using mobile phone which is an important entry point to facilitate provision of relevant maternal and child health information to mothers through vCHW. [*Ethiop. J. Health Dev.* 2015;29(3):154-159]

Key words: Voluntary community health workers, participation, mHealth, Ethiopia

Introduction

The last two decades witnessed major developments in improving the health status of Ethiopian population. Nevertheless, studies indicated that still much work is needed to improve the current, relative higher maternal and child mortality and morbidity (1). The major health problems of the country are largely attributed to preventable communicable diseases and nutritional disorders (2). More than 90% of child deaths are due to pneumonia, diarrhea, malaria, neonatal problems, malnutrition and HIV/AIDS (1, 3). The major causes of maternal death are obstructed/prolonged labor (13%), ruptured uterus (12%), severe preeclampsia/ eclampsia (11%), and malaria (9%) (3, 4).

Universal access to health care by availing well equipped institutions and well trained health professional in Ethiopia is yet a long way to go. There are still evident constraints in health human resources, equipment and supplies. In 2012 in Ethiopia, the ratio of medical doctors to population was 1:56013, Health Officers to population was 1:25709, and all nurses to population ratio was 1:3012 (1). Research suggests that countries with such extreme shortages need to rapidly increase the health human resources particularly at the rural communities (5, 6). In Ethiopia, currently there are over 34,000 health extension workers (HEWs) who were trained and deployed to all health posts in rural settings (3).

The Health Extension Program (HEP) was launched by the Government of Ethiopia with an objective to, among others; improve access to basic health services to the rural population (3, 7). Female HEWs who have completed 10^{th} grade schooling are trained and deployed to communities to improve health service delivery by among others improving demands for service. Such salaried HEWs are supported by vCHWs who are often referred to as one to five network and women development army in disseminating preventive health messages at household level. Anecdotal evidences suggest that vCHWs are important resources in promoting health and ensuring availability of relevant health messages at household level (8). They are chosen to play such role based on the level of their literacy, communication skills, credibility and previous experiences and demonstrated relatively improved healthy lifestyle in the community in which they live. These volunteers often receive on the job training on maternal and child health, hygiene, sanitation and malaria prevention by HEWs. In addition to transmission of relevant health messages they liaise information on households and individual members of the community on health with HEWs and support the latter during campaigns related to immunization, epidemic and/or emergency in case identification and community mobilization (9, 10).

Now a day, health information communication technologies are playing critical role in the pace at which information is disseminated and consequently improved health care delivery (6). Among these technologies the application of mobile phones in health

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is now gaining momentum including in remote rural settings of developing countries (6, 11).

mHealth initiative has shown promising outcomes in reaching underserved populations, particularly those in rural areas(11, 12).The results include changing health behaviors and outcomes and addressing a wide variety of healthcare challenges including treatment adherence and compliance and improved information flow (6, 11, 12).

mHealth intervention was designed to support HEW's maternal and child health care delivery by addressing communication challenges experienced by HEWs at community level. The project was introduced by Addis Ababa University, College of Health Sciences with financial support from WB and AFDB in Abeshge and Ezha woredas of Guraghe zone, SNNPR. The project envisions to improve the flow of information between health extension workers (HEWs), supervisors, and volunteer community health workers (vCHWs), and ultimately between HEWs and communities themselves with an application of mobile technology. This intervention is eventually aims to improve maternal and child health service delivery.

In implementing mHealth scheme, however, key questions on whether use of such technologies is feasible at vCHW level, what type of mobile health application should be applied for vCHW and with what expectation remains hugging.

In recognition of the limited educational background of vCHWsit is important to design an application that could be easily used for this target group. Accordingly, we designed mHealth system that can be used by vCHWs to share information with women and HEWs in the community.

The objective of this manuscript is therefore to assess the contribution of mobile technology in facilitating vCHWs maternal health related works thereby improving maternal and health service utilization.

Methods

Intervention: This particular study was part of the wider mHealth intervention, that was undertaken in Abeshge and Ezha woredas of Guraghe zone, SNNPR from 2012 - 2014. The two interventions woredas were selected randomly. In this intervention, two vCHW from each Kebele of Abeshge wereda totaling 56, were provided with an ordinary mobile phone, in addition to the supply of SMS based software installed mobile phone to the HEW. While HEWs in Ezha are provided with similar mobile phones, vCHWs were not. In addition, vCHWs in Abeshge were trained along with HEWs on the purpose of the intervention and how to use the phone for intended purpose. Free air time worth of 25 birr was granted monthly to vCHWs to facilitate use of mobile technology for the intended purpose.

vCHWs in Abeshge were expected to make missed-call/ or direct call to HEWs when they meet unregistered pregnant mothers, newborns or for any reproductive, maternal, neonatal, and child health encounters in their community and/or household. Besides vCHWs take similar action if birth is taking place at home or for any other emergencies that require HEW's attention. Following such call, HEW visits the mother or child and take appropriate action as well as enters their information to the Frontline SMS-based mobile health application system. Subsequently, HEWs also call back vCHWs for follow up as well as to seek vCHWs support.

Data Collection: Voluntary health workers in Ezha were selected for interview through a lottery method, while in Abeshge those who were provided with mobile phone were selected and interviewed. Pre-tested structured questions were used for the interview. Trained research assistants collected data while completeness were verified on a daily basis by supervisor assigned at woreda level.

Impact on health outcome is determined by performing a community based survey of mothers and comparing the pre and post intervention differences between treatment 1, Ezha (partial intervention Woreda- control for this study), and treatment 2, Abeshge (full intervention Woreda). Analysis was done using SPSS 20 statistical software (Detail methodology of the community based survey described on MCH impact study).

Results

A total of fifty six vCHWs from 28 kebeles in Abeshge woreda were provided with mobile phone of which 45 of them were available during the study and interviewed. In Ezha, 40 vCHW from 28 kebeles participated in the study.

The vCHW in the two Woredas had a comparable population profile (Table1). Forty four percent of participants from Abeshge and 60.0% of those from Ezha were females. The majority of vCHWs from both woredawere31 to 40 years old (66.6% -vs- 65% for Abeshge & Ezha respectively) and were married. Close to a third of participants from both Abeshge and Ezha attended more than grades 8th while over 50% have completed elementary education.

Table 1: **Socio-demographic profile of the Study Population**

Variables	Categories	Abeshge (N)	%	Ezha (N)	%
Sex	Male	25	55.6	16	40
	Female	20	44.4	24	60
Age	21-25	2	4.4	-	-
	26-30	8	17.7	7	17.5
	31-35	12	26.6	14	35
	36-40	18	40	12	30
	41+	5	11.11	7	17.5
Marital Status	Married	41	91.9	39	97.5
	Single	4	8.9	1	2.5
Education	G 1-6	24	53.3	20	50
	G 7-8	10	22.2	6	15
	G9-10	11	24.5	14	35
Service Year	1-5 years	20	44.4	28	70
	6-10	22	48.9	9	22.5
	11-15	3	6.6	3	7.5

vCHWs were found to be responsible for 30 households. Thirty-seven percent of those in Abeshge and 45% of those in Ezha claimed to spend about 4 days per week for their health related work by visiting households, health post visit, and health center. It was found that 64.4% of those from Abeshge and 65.0% of those from Ezha meets with local HEWs on average 4 days/month for advice, consultation, and to discuss on any work related issues.

Before the intervention, 37.8% of Abeshge, and 32.5% of Ezha respondents had mobile phone of their own. Among these, 24.4% of Abeshge, and 17.5% of Ezha reported to use their mobile phone for personal reasons. After the mHealth intervention, however 95.6% of those from Abeshge own project phone while mobile phone ownership has increased to 67.5% in Ezha. Post intervention comparison of mobile phone usage among the vCHWs of the two woredas showed that,100% claimed to use mobile phone for work related matters in Abeshge, while 27.5% of those from Ezha used their personal phone to share information with HEWs (Table 2).

Table 2: **Voluntary community health workers mobile phone ownership and use (Pre and Post intervention)**

Variables	Categories	Time	Abeshge		Ezha	
			N	%	N	%
Mobile phone ownership	Yes	2012	17	37.8	13	32.5
	No		28	62.2	27	67.5
	Yes	2013	43	95.6	27	67.5
	No		2	4.4	13	32.5
Using phone for community health work related activities	Yes	2012	11	24.4	7	17.5
	No		34	75.6	33	82.5
	Yes	2013	45	100	11	27.5
	No		-	-	29	72.5
Means of informing dates of vaccination campaign	House to House Visit	2012	44	97.8	40	100
	Mobile Phone		1	2.2	-	-
	House to House Visit	2013	15	33.3	35	87.5
	Mobile Phone		30	66.7	5	12.5
Means to remind pregnant mothers on ANC	House to House Visit	2012	45	100	40	100
	Mobile Phone		0	-	0	0
	House to House Visit	2013	14	31.1	36	90
	Mobile Phone		31	68.9	4	10

Concerning the type of health related duties, evidence from pre intervention shows that 97.8% of vCHWs from Abeshge, and 100% of those from Ezha do home visit as a means of communicating/informing timing of vaccination campaigns which has changed for those in Abeshge while it remains nearly the same for those in Ezha. Following intervention, more than two third of those from Abeshge used mobile phone as means of communicating with HEW and mothers on informing on issues related to vaccination and ANC. In Ezha however, about 90% of participants indicated that home visit remains popular means to inform mothers about vaccination and ANC.

It was also indicated that among mothers who communicated about their labor to vCHWs, 73.3% of the women from Abeshge were said to have used mobile phone. On the other hand, majority of Ezha respondents claimed that family member come to report about laboring mothers (Fig 1).

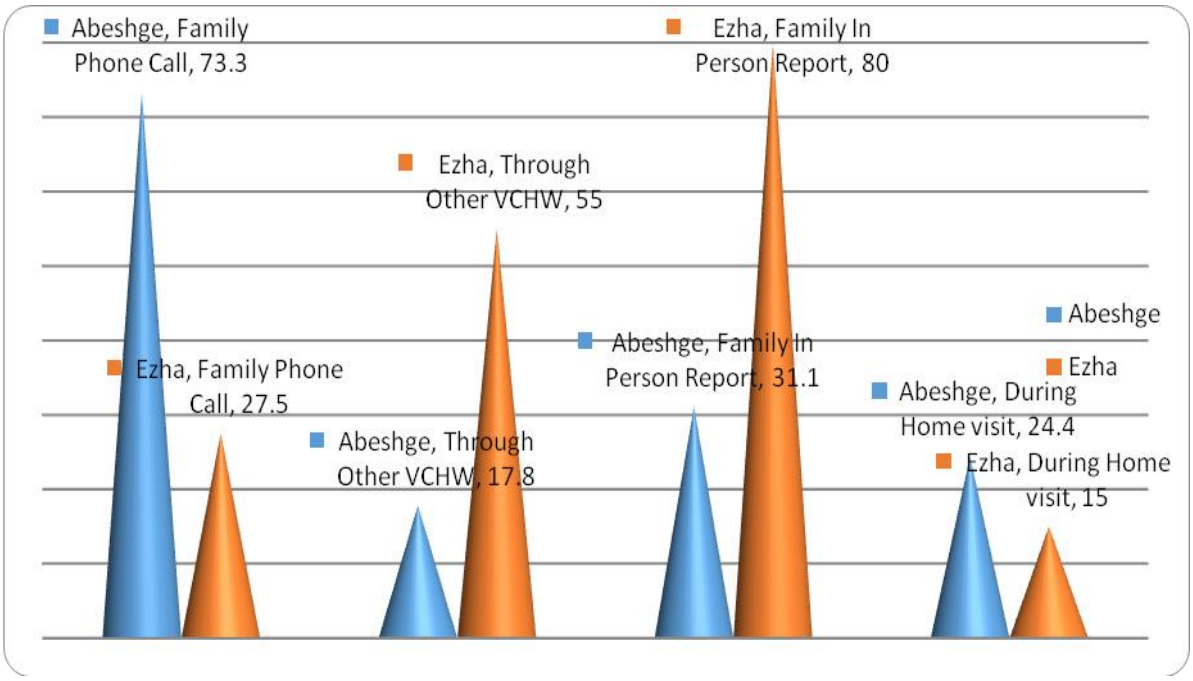

Figure 1: **Mothers means of reporting labor to vCHWs following intervention**

Comparison of the selected MCH health outcomes showed that non-intervention woreda has significantly high proportion of women with four or more ANC visits (60%) as compared to 32% in intervention woreda. Similarly, those in non-intervention woreda were found to use contraceptive (46%) against those in the intervention woreda (37%). Finding reveals that proportion of women getting ANC service at home (30%) is much higher in intervention woreda as compared to (2%) at the non-intervention (Table 3) The percentage of children who had full immunization was found to show no difference in Abeshge (59%) and Ezha (58%) woredas.

Assessment on major challenges encountered by volunteers in both woredas in connection to mobile phone use includes network failure, inconsistency of electric power for charging phones and cost of air-time (table 4).

Table 3: **Comparison of selected maternal health indicators between Abeshge & Ezha woredas following intervention**

Selected indicators	Abeshge (%)	Ezha (%)	P -value	Z- value
Percentage of more four or ANC visits	31.5%	59.84%	0.0001	-13
Percentage of ANC service by HEWs at home	29.7	1.7	0.0001	18
Percentage of home delivery	35.8%	33.7%	0.12	-1.5
Percentage of professionally assisted delivery	64.2%	66.3%	0.11	1.6
Delivery conducted by HEW	20	21	0.76	0.30
Contraceptive prevalence rate	37.1%	45.8%	0.0001	-3.8

Table 4: **Reported challenges in mobile phone use, post intervention**

Items	Categories	Abeshge		Ezha	
		N	%	N	%
irregularity of electric power	Yes	20	44.4	9	50
	No	25	55.6	9	50
Network failure	Yes	36	80	13	72.2
	No	9	20	5	27.8
Air time expense	Yes	13	28.9	14	22.2
	No	32	71.1	4	77.8

Discussion

Shortage of trained health professionals affects deployment of such professionals to all rural settings. Under such circumstances trained voluntary community health workers often referred to as one-to-five networks and women development army in Ethiopian context are important health resources. They play important role in promoting health and mobilize communities who could hardly access health care. Similar studies have documented that vCHWs are members of the community who are exemplary in their own household health care and trained to support HEWs in a voluntary basis on health programs (10, 11).

In this study, vCHWs are responsible to follow on 30 households by providing them with relevant health information in consultation with HEWs. Similar finding indicated that every vCHW is given responsibility for 25 to 30 households in their community to promote positive health practices through household visits.

Despite variation of level of commitments, some studies reported that vCHW are expected to teach members of their community on positive health outcomes once every two weeks (8, 9, 11). The current study demonstrated that on average voluntary health workers visit families up to four times per week and also mostly communicate with their fellow health extension workers up to 4 days/ month times. This testifies the sense of volunteerism to contribute to improved health outcomes at community level. This was further affirmed by global assessment on the experience of community health workers to contribute health related millennium development goals (10).

In this study, vCHWs play an important role in encouraging women to attend antenatal care and deliver at health posts, and facilitate immunization and family planning activities. Similar roles of volunteers were also reported by other studies (10,11)

Before the intervention, it is clear that health messages were communicated through home visits. However, after the intervention, mobile phone has become important channel to complement delivery of health information to women particularly in the intervention woreda where project phone and free monthly air time was provided for volunteers. The usage rate of mobile phone for health related duties has evidently increased in the intervention Woreda. This finding shows that volunteers at the intervention woreda adapted new communication approach due to improved access to phone, knowledge of its potential for work facilitation, and supply of free air time. Such change on method of communication is believed to facilitate information flow in their work, motivate and raise their work morale and saving their time and energy that would otherwise be spent on travel.

The high mobile penetration in Africa which facilitates mobile phone based communication totally changed the quality of life of ordinary individuals. Mother's tendency to seek health related support is not something unexpected.

Various mobile phone based interventions have been piloted using different application approaches. These include phone call (personal or automated calls with or without toll-free numbers), text messages (including personal text reminders or mass texting for community mobilization), data transfer for health record tracking or clinical decision support, mobile telemedicine devices for patient monitoring or diagnosis, multimedia messaging, and the like (12, 13). But the current intervention involves volunteer community health workers with minimum support (mobile phone and air time) to maintain contact with HEWs by only "missed call" to the HEWs who would call back and provide support as required.

The project anticipated that supply of phone and air time for vCHW improve selected maternal and child health process outcomes in the intervention woreda as compared to non-intervention woreda. Although other studies documented evident differences in improving health service utilization with the introduction of mHealth, there were no strong differences in selected health outcomes. This may suggest the fact that mobile health intervention does not make much difference on maternal health outcomes at vCHWs level. Yet, there is growing body of evidence where use of mHealth tools improves effectiveness of community level health workers (14, 15). Lack of evidences of this in this study could be explained by the fact that firstly vCHWs share information and want to ease their pressure, secondly inconsistency in power supply and poor network may have contributed to lack of strong differences between intervention and non-intervention woredas.

Conclusion:

The current study has generated evidence where ordinary mobile phone use coupled with SMS based application for vCHW has improved communication between vCHWs and mothers. Nonetheless, there was no strong difference in terms of selected maternal health outcomes between intervention and non-intervention woredas. However, barriers such as weak network, irregular electric power supply and cost of air time all poses challenges to consistent use of technologies. This needs to be given due attention by concerned authorities. It is very interesting to note that with increasing use of mobile phones, communication between community level health workers has improved which needs to be strengthened. Thus, voluntary workers mandatory phone ownership, be it supplied by the concerned or self, is recommended

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