Evaluating Health Status of Under-Five Children Following a Training of Community Based Volunteers (CBVs) With Information, Education and Communication (IEC) Messages on Malnutrition and Diarrhoeal Diseases in Two Southern Districts of Zambia

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Abstract

Trained health care providers in resource constrained regions such as Zambia are few, overburdened with work and are time constrained. Consequently, they make use of Community Based Volunteers (CBVs) who have proved to be locally accessible, cost effective and appropriate. For CBVs to effectively reduce morbidities in under-fives, they should be trained to focus their IEC material and delivery method to specific needs of individual communities. The objective of this study therefore, was to assess the impact of training CBVs with modified IEC messages towards improving health status of under-five children of Pemba and Gwembe Districts.

The study used a Quasi-experimental study design with intervention and control groups, Pemba and Gwembe Districts and their respective health facilities were selected conveniently, Availability sampling was used for 124 CBVs working under these two facilities of which 82 were from the intervention site and were assessed before and after training, and thereafter conducted IEC for a period of over 3 months. Post intervention data with regard to malnutrition and diarrhoea in both sites were collected at 6 and 9 months. Data was analyzed using SPSS version 24, and paired t and X^2 tests were used and conclusion done at 0.05 significance level.

The knowledge level of CBVs improved significantly from baseline ($\bar{x}$ =5.62±2.3) to post intervention ($\bar{x}$ =9.06 ±0.9) with t(4) = 14.29, p < .01. Trained CBVs delivered selected IEC messages effectively and significantly improved the health status in under-five children within 9 months with findings showing a downward trend for the cases of diarrhoea and malnutrition, from 17.5% to 7.24% and from 15 % to 12.8% for diarrhoeal diseases; and out of the total under-five attendances, children below -2 Z score dropped from 1.27% to 0.27% and 1.12% to 1.08 % for nutrition status in the intervention and control sites respectively.

Keywords: Child health status, IEC messages, Community Based Volunteers intervention, Training, Caretakers Practices, and Caretakers Beliefs.

Introduction

Pakenham-Walsh (2016), noted that "It is tragic that so many children continue to die unnecessarily for want of simple, low-cost interventions that are often locally available. It is even more tragic that many of these children would have been saved if only their caretakers and, indeed, community-based volunteers (CBVs) had basic healthcare knowledge to recognise serious illness requiring urgent, appropriate, life-saving action".

Ignoring these major killer diseases in under-five children puts their long-term health and development of their future full intellectual potentials at great risk. The association between conditions such as malnutrition and diarrheal mortality is cyclical in nature and has been reported for decades (Guerrant et al, 2012).

Every effort that intends to target the killer diseases in under-five children elevates their health status and secures their future health and socio-economic development. The outcome of these efforts is a healthier generation that will contribute effectively by developing their fullest potentials and subsequently effectively contribute to the national socio-economic development {Perry and Zulliger, (2012)}.

Community Based Volunteers provide a critical and essential link with health systems and are a powerful force for promoting healthy behaviours in resource-constrained settings (Perry and Zulliger, 2012). During the past decades, there has been an explosion of evidence and interest concerning CBVs and their potential for improving the health of the populations where trained health workforce resources are limited (WHO, 2009). Numerous contribution and improvement have been made in societies/communities that use and provide enabling resources to CBVs. In areas of breastfeeding, a systematic meta-analysis of a randomized controlled trials, the odds of exclusive breastfeeding were found to be 5.6 times greater in the group of exposed to Community Health Workers (CHWs) intervention compared to the group that was not (Hall, 2011).

Concerning diarrheal diseases prevention, the contribution of CBVs was demonstrated through a number of studies, a randomized controlled trial in which CHVs made routine weekly visits to all households to promote hand washing in an urban slum population in Karachi, Pakistan led to a 53% reduction in the incidence of childhood diarrhoea and a 50% reduction in the incidence of childhood pneumonia (Luby, 2008); CBVs proved to be essential in Bangladesh, where they moved from collective interventions or group approach to an one on one approach as they were asked to visit 12.5 million households nationwide once to train one woman in the household on how to prevent diarrhoea, and how to prepare and administer home-based ORS with available sugar, salt and water. At its completion in 1990, 90% of mothers in the 12·5 million households reached by the program knew how to prepare ORS (Chowdhury A, Cash, 1996). The use of ORS for treating diarrhoea in Bangladesh increased nationally from 1% of all cases in the 1980s to 40% in 1993 (Perry, 2000), and recently it was reported that Bangladesh has the highest ORS usage rate in the world, with a reported 81% of children with diarrhoea given ORS in 2011 (NIPORT, 2011).

Zambia has embraced the concept of using the Community Health Workers (CHWs) and has done tremendous job through its cooperating partners that include USAID, World Vision, and faith-based institutions among others. These CHWs are a link between the community and the Rural Health Centres and as such they trained by these partners with the full support of the government. Zambia has developed a CHWs strategy to formalise and standardise their training and roles played in the health sector, as a result (Global Health Workforce Alliance, 2013).

The Zambia has further adopted an upgrade of CHWs now known as Community Health Assistant (CHAs). This is an emerging national initiative born in the year 2011, with a one year formalised pre-service training, this cadre was designed to work under a rural health post and designate 20% of work at the health post and 80% in the community (MoH, 2012), but the challenge for now lies within the supervision to realise the intended purpose, as most of them now spend most of their time at the health post and mostly doing work beyond their training (Kapenda, 2016).

Although there is A CHWs training manual developed under the support of the Zambia MoH, a number of partners have developed some modules capturing what is in the national CHWs manual and have developed IEC material basing on such training. CHWs are trained on a wide range of topics that include Family Planning, Maternal and Child Health, Intergraded Community Case Management, HIV/AIDS, Nutrition, Malaria, Tuberculosis, Immunisation, and waster sanitation (source).

In Zambia, the current status of under-five mortality is estimated to be at 119/1,000 live births, averagely higher than the statistics of under-five in Africa. These mortality rates are unacceptably high. The major causes of child mortality in Zambia include among others malaria, pneumonia, diarrhea, malnutrition and anemia (UNICEF Zambia, 2011). It is observed that the child health care is been at the epi-center of the Ministry of Health (MoH) activities and programs, and so much efforts have been put into child health programs but the overall progress has not been that satisfactory. It was observed that between 2013 and 2015, Pemba district experienced the magnitude increase in diarrhoeal and malnutrition diseases that stood at approximately 3% and 1% (from 21.5 to 24 % and 3.7 to 4.7 %) respectively (Pemba DHO, 2015).

Health care workers in resource constrained regions are reported to be few and overburdened with work and are time constrained to offer IEC

and in addition CBVs who work hand in hand with them are not adequately trained to handle IEC on under-five conditions and to effectively contribute in the reduction of morbidities in under-fives, thus, the need to emphasize and continue to train Community Based Volunteers on a number of conditions including malnutrition and diarrhoeain order to reduce the high morbidity and mortality rates among the under-five year olds in the study locations. These CBVs are favored because they speak the same language and share the same socio-cultural values and reside in the same neighborhoods and can access and monitor the under-five children caretakers' practices towards prevention of these diseases regularly (source).

According to Australian Institute of Health and Welfare (2017), health status is described as a holistic concept that is determined by more than the presence or absence of any disease. It is often summarised by life expectancy or self-assessed health status, and more broadly includes measures of functioning, physical illness, and mental wellbeing. Kulkumi et al (2015) view health status in children as all health issues related to morbidity patterns and nutritional deficiencies in children.

So, this intervention study hopes to evaluate the health status of under-five children whose mothers have received IEC from Trained Community Based Volunteers on malnutrition and diarrhoeal conditions in order to improve the under-fives health status.

Methodology

This study was designed to train CBVs and empower them with the necessary resources that enabled them share with the caretakers of children under-five of Pemba and Gwembe Districts using an HBM as a conceptual framework. The study site was Pemba and Gwembe Districts of the southern province of Zambia, located at about 250 km from Lusaka, the capital city of Zambia. The area is mainly rural and its population lives on subsistence farming.

This study used a quasi-experimental design with intervention and control groups, and with a mixed method approach involving qualitative and quantitative complementary methodological approaches. The study design comprised of four phases: (1) the desk review and the Situation Analysis, (2) intervention phase which involved the development of training material, the training of CBVs using the newly developed IEC materials on malnutrition and diarrhoeal diseases, the intervention group conducted home visits for the purpose of training the under-five care takers and the other group was designed to be the control group that carried on a routine health IEC, and (3) Monitoring and Evaluation phase.

The study population earmarked for IEC was adult caretakers who met the selection criteria and have young children aged between 4 months to 4 years and had been residing in Pemba and Gwembe districts for over six months. The total number (124) of active CBVsfrom both districts were enrolled in the study and were selected using availability sampling method. The group of CBVs (84) from Pemba District participated as an intervention group whereas the group from Gwembe district participated as a control group. Health Centers in these two districts were selected conveniently. Activated Health Beliefs Model was used to implement the health education strategies.

A pre and post testing of CBVs was conducted to ascertain the improvement in knowledge and skill after training. The CBVs in the intervention group were later subjected to training with the best HBM strategies to provide IEC messages. IEC material on nutrition and management of diarrheal cases was developed and used to train the CBVs in the intervention group. The CBAs in the Control group were not trained and were only encouraged to conduct IEC using the already existing materials and methods. The Health IEC approach was conducted house to house in the comfort of community members. A monitoring tool was developed and used before and after the gathering of data pertaining to the outcome of health education on the two key public health factors affecting health status of under-five children.

A pilot study was done by conducting orientation training to 10 CBVs in the neighboring Monze District and deployed them to conduct IEC for one week in their respective communities. This was designed to highlight the problems such as poor understanding of some questions in the CBV pre-test/post-test questionnaire, error in the CBV training manual, determine the length of time of each activity or any other difficulties in conducting IEC at

community level that may surface in the major study.

The researcher sought ethical approval and clearances from the ERES Converge Research Ethics Committee, then from the Zambia National Health Research Authority, the Provincial Health Office, and the two District Health Offices (Pemba and Gwembe). The CBVs in the two districts were asked to voluntarily participate in the training and study programs.

Data were analyzed using a software package for social sciences Version 22.0 (SPSS-V22.0) and the data for CBVs pre and post course interventions were entered in the system. The Chi-square for test, Analysis of variance and paired t test was used and conclusions made at > 0.05 significance level.

Development of IEC material and a CBVs training manual

The IEC material and the CBVs training manual were modified and designed with HBM approaches to fill in the gaps that were identified during the desk review with inclusions of important elements that concern the under-five year old children such as increasing knowledge and practices on the identification of early signs of dehydration, preparation of Home-made ORS, strategies to treat drinking water and to frequently offer fluids whenever a child is having diarrhoea. Also, more inclusions on the strategies to prepare age- appropriate foods, to encourage caretakers to invest in extra efforts and time in the preparation of children's food that could be differently prepared at different time and/or done separately.

Results

Table 1. Demographic data for CBVs participants

Variable	Category	n (%)
Age of CBVs	Mean ± SD	36.11±7.9
Experience as a CBVs (years)	Mean ± SD	5.89±1.9
Gender	Male	75 (60.5)
	Female	49 (39.5%)
Educational Levels of CBVs	Never been to School	2 (1.5%)
	Primary	84 (68%)
	Secondary	38 (30.5%)
Employment Status of CBVs	Formal Employment	7 (5.5%)
	Informal Employment	65 (52.5%)
	Unemployed	52 (42%)
CBVs training	Formally Trained	95 (77%)
	Informally trained	29 (23%)

Table 1 shows that the mean age of CBVs participnats was 36.11±, the mean of years of experience was at 5.89± 1.9, the majority of CBVs participants were males (60.5), and a little more than half (52.5%) were in informal employment and more than three quarters 77% of these received formal training.

The Outcome of training CBVs

Table 2. Outcome of Training CBVs on Diarrhoea and Malnutrition in Children

Selected areas that showed improvement on CBVs Knowledge towards Diarrhoea	n=82				
	Pre-training		Post-training		
	N	%	n	%	p Value
• Effects of Diarrhoea on Child's Health	64	78	80	97.6*	0.010
• Vaccination against Diarrhoea	70	85.4	81	98.8*	0.000
• Why Dehydration gets worse in Children	44	53.7	76	92.7*	0.010
Signs and Symptoms of Dehydration	58	70.7	80	97.6*	0.006
• Prevention of Dehydration in Children	31	37.8	79	96.3*	0.010
• Home-made ORS	30	36.6	78	95.1*	0.010
Selected areas that showed improvement on CBVs Knowledge towards Malnutrition					
• Synergy between Diarrhoea and Malnutrition	23	28	79	96.3*	0.044
• Long-term Effects of Malnutrition on Children	26	31.7	75	91.5*	0.034
• Exclusive Breastfeeding during child's illness	60	73.2	79	96.3*	0.000

*X^2 test was used and illustrates significant results

The table 2 above illustrates that all the selected areas showed improvement after training and they were statistically significant at 0.5.

Table 3. Mean Score of CBVs Before and After Training

	N	Minimum	Maximum	Mean	Std. Deviation
Total score before	82	2.00	10.00	5.6220	2.26972
Total score after	82	7.00	10.00	9.0610	0.86563
Valid N (listwise)	82				

Table 3 above illustrates knowledge improvement of CBVs from baseline ($\bar{x}$=5.622±2.3) to post intervention ($\bar{x}$=9.061 ±0.9).

Table 4. Testing the Means Before and after Training

Paired Samples Test						t	df	Sig. (2-tailed)
	Paired Differences							
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
CBVs total score before & after training	-3.43902	2.17788	.24051	-3.91756	-2.96049	-14.299	81	.000

Table 4 above demonstrates that CBVs knowledge levels on prevention of diarrhoea and malnutrition increased significantly from baseline to post training with t (4) = 14.299, p < .01 (one-tailed).

Monitoring CBVs Activities

Monitoring CBVs was conducted in the month of December 2017 for the purpose of tracking records of what they have been doing and ascertain the success in the implementation of the project.

Table 5. IECs conducted by the time of follow up during Monitoring

Titles of IEC delivered	Gwembe District		Pemba District	
	N (42)	Mean	N (82)	Mean
Total number of IEC talks conducted in the past 10 weeks	1414	33.7	3,328	40.6
1. Talk on hygienic practices	124	2.9	76	0.9
2. Talk on improving Sanitation practices	112	2.7	207	2.5
3. Talk on best practices to avoid food contamination	80	1.9	162	1.9
4. Talk on Hand washing as a measure of diarrhoea prevention	140	3.3	408	5
5. Talk on signs and symptoms and danger of Dehydration	60	1.4	392	4.8
6. Talk on home-based ORS preparation	94	2.2	502	6.1
7. Talk on benefits of exclusive breastfeeding	82	1.9	469	5.7
8. Talk on Feeding a balanced diet	122	2.9	208	2.5
9. Talk on weight monitoring	87	2.3	110	1.3
10. Talk on synergy of diarrhoea and malnutrition	38	0.9	73	0.9
11. Talk on deworming of <5 children	99	2.4	392	4.8
12. Talk on the dangers of Malnutrition late in life	132	3.2	166	2
13. Talk on future diseases that come as a result of poor feeding in <5	161	3.9	142	1.7
14. Others	83	2.0	21	0.3

Table 5 shows that on average each CBV had delivered 40.6 and 33.7 IEC sessions from the intervention and control sites respectively. The most frequently shared topic by CBVs was ($\bar{x}$=6.1) SSW Solution or home-based ORS preparation from the intervention site and ($\bar{x}$=3.9) talk on the future diseases that come as a result of poor feeding from the control site.

Evaluation of the Health Status of under-five children in Pemba District after intervention

The investigator collected data related to under-five children malnutrition and diarrhoea morbidity and mortality from Pemba District of Health Office. This was done at six (6) and nine (9) months after the intervention to assess any improvement in under-five year old children.
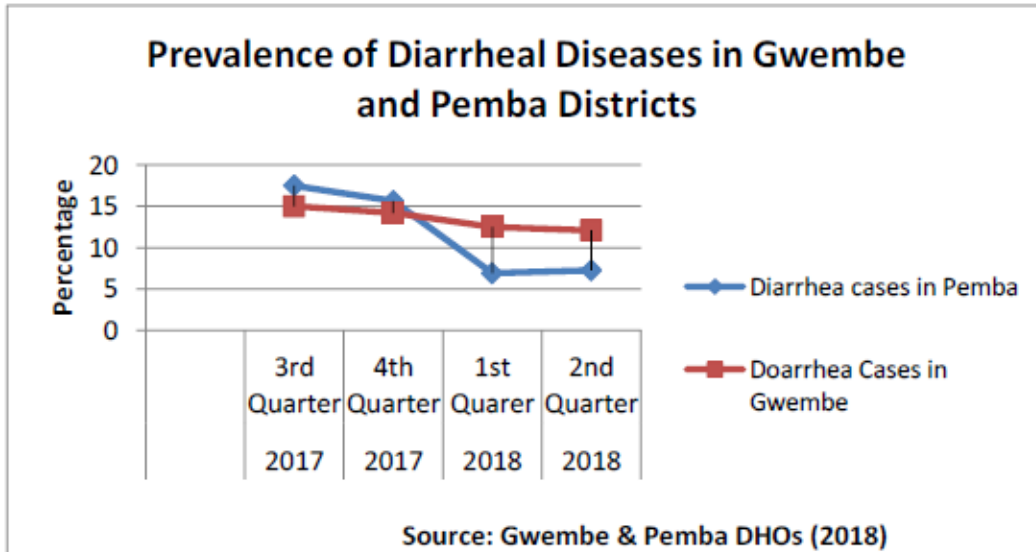
Figure 1. Prevalence of Diarrhoea in Gwembe and Pemba Districts

The figure 1 above shows a downward trend in the patterns of diarrhoeal diseases in Pemba District from 3rd quarter of 2017 to 2ndquarter of 2018 from 1252 (17.5%) to 799 (7.24 %).
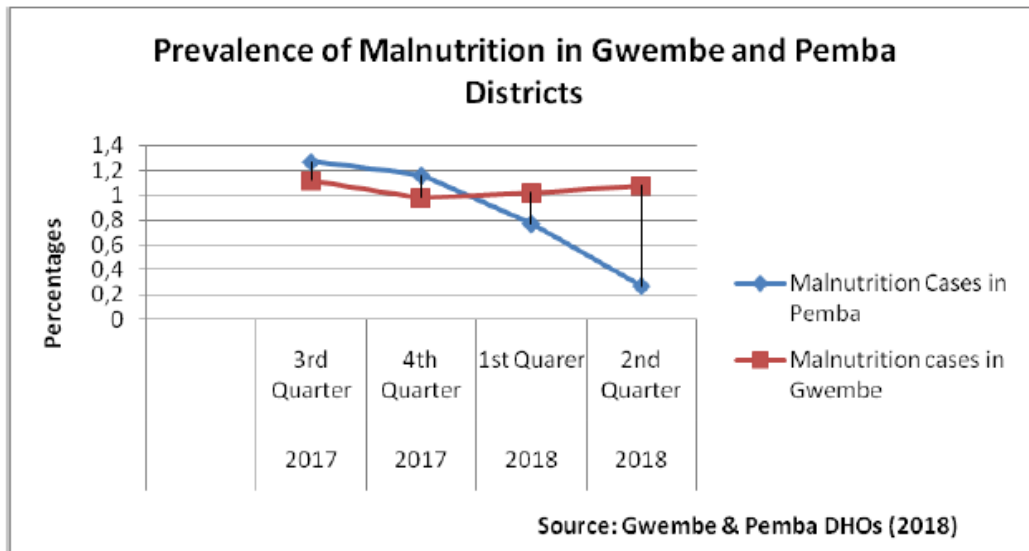

Figure 2. Prevalence of Malnutrition in Gwembe and Pemba Districts

The figure 2 shows a downward trend in the patterns of Malnutrition in Pemba District from 3rd quarter of 2017 to 2nd quarter of 2018 from 186 (12.7 %) to 45 (0.27 %).

Discussion

A CBVs training manual and a modified IEC Material

The development and modification of the IEC material and training manual for CBVs was done to include the topics and areas on preventive measures of malnutrition and diarrhoeal diseases that were identified during the desk review.

This modified training manual was expected to improve and equip the CBVs with the knowledge that they need to transfer to the individual caretakers, families and communities they serve. In order to evaluate the effectiveness of the developed and modified IEC material, the researcher used an analysis wheel as suggested by O'Sullivan et al (2003). This involved asking a group of CBV participants and community members what they see, feel, think, and what they feel like doing when they see the produced IEC material. Such an analysis helped the researcher assess the perception of the material and measure it against intended purpose. Where

people's responses were different from what the communication of the material was intended to portray, then adjustment was made.

In order for CHWs not to be viewed as providers of cheap or inferior-quality healthcare, they need to be properly trained. If properly trained they can provide an affordable first-contact level of care within the Primary Health Care (PHC) system (Puoane et al, 2017). The researcher followed certain adult learning principles that stress that adult learning occurs best when learners are self-directed, fills immediate needs, involves the learner, shows respect to the learner, and draws on the experiences of the learner. In this study, the researcher finds it useful to reach out to individual learners and caretakers in their communities, in their comfort and respond to their prevailing needs as in the example of preparing rehydration home based sugar salt solution for the management of diarrhoea and dehydration in children, hence, the CBVs were trained in these specific needs areas prior to intervention and they showed improvement from the researcher instituted pre and post course training tests to the CBVs and results of the post course training were statistically significant (p<0.05). The knowledge level of CBVs improved significantly from baseline ($\bar{x}$=5.62±2.3) to post-test ($\bar{x}$=9.06±0.9) with t (4) = 14.29, p < .01 (one-tailed). These findings are in agreement with results from a study that was conducted in rural Haiti by Brandon et al (2017) in which they trained and assessed three different groups of CHWs and the CHWs knowledge levels improved significantly soon after training, with ANOVA for 113 participants who attended the trainings. The pre-test and post-test results showed significant improvement in knowledge scores over time (Wilks' lambda = .88, F (1, 110) = 14.65, p < .001). These study findings also narrate similar results with studies reviewed by Abdel et al (2016) which revealed that all the eight studies reviewed showed significant improvement on knowledge and skill towards cardiovascular disease management in different low- and middle-income countries.

However, in the two studies that were conducted at five sites in Bangladesh, and that assessed the post-course knowledge levels among the trainees (intervention group) showed that the knowledge levels of CHWs did not change while those in in Guatemala showed an average increase of 11% and the scores of CHWs in Mexico, South Africa and Thailand decreased over time. This study finding pointed to the importance of conducting refresher courses for the CBVs to maintain and keep up the drive on knowledge and skill that they would have acquired. This was emphasised by the study that was conducted in Uganda by Kuule et al (2017). Their study findings showed that more refresher trainings were associated with better overall performance {adjusted odds ratio (aOR): 12.2, 95% confidence interval (CI): 1.6–93.6, P = 0.02} of Community Health Volunteers. Hence the need to conduct refresher courses for the trainees at stipulated periods.

Monitoring CBVs Activities

1 Monitoring and evaluation of CBVs post training are essential in identifying problems, challenges, and providing prompt solutions in order to keep on track and maintain the quality of performance by CBVs. The methods used to monitor and evaluate the performance of CBVs include direct observations of their performance in their communities, direct interviews with the CBVs and interviewing their supervisors who are mostly Environmental Health Technicians at their local Health Center.

2 During the monitoring and evaluation, the researcher found out that each CBV had delivered an average of 40.6 and 33.7 IEC sessions in the intervention and control groups respectively. The study showed an increase in the frequency of IEC delivery after training in the intervention group as compared to the control group, thus, the significance of training CBVs on specific conditions such as malnutrition and diarrhoeal disease.

3 The most frequently shared topics by CBVs were ($\bar{x}$=6.1) "SSW Solution or ORS home-based preparation" in the intervention group and ($\bar{x}$=3.9) "Talk on future diseases that come as a result of poor feeding in <5 children" in the control group. The most shared topic in the intervention group was found to be one of the areas that needed improvement as demonstrated by the CBVs poor score during the pre-course training test {30 (36.6%) baseline to 78 (95.1%) post-test}, therefore, this current study findings demonstrated the importance of

training CBVs as they develop a sense of focus, direction and also gain confidence in areas that they did not have better understanding. Studies have shown that when supervision of the village-level health services was vigorous and extra resources were directed to primary health care, child mortality improved (Hill et al, 2000).

Improvement in the Health status of Under-five children

The current study has shown success in the intervention group of CBVs as the current study findings showed a downward trend on the morbidity and mortality rates due to malnutrition and Diarrhoeal diseases in under-five year old children within 9 months, the cases of diarrheal diseases show a downward trend from 17.5% to 6.9% at 6 months and 7.24% at 9 months; and from 15 % to 12.5% at 6 months and 12.8% at 9 months in the intervention and control sites respectively; and out of the total under-five attendances, the number of children underweight below -2 Z score dropped from 1.27% to 0.77 % at 6 months and 0.27% at 9 months and 1.12% to 1.02% at 6 months and 1.08 % at 9 months in the intervention and control sites respectively. The improvement could be more if CBVs are not multifaceted and loaded with many activities including those in malaria, TB, and in HIV contact tracing programs, and Total Led sanitation just to mention a few. Thus their performance is heterogeneous, context specific and influenced by a number of factors that may hinder the full impact of CBVs on Child morbidity in the intervention population and this calls for a new Community Based Agent group like Child Health Support Group that can specifically carry out childhood disease prevention intervention like conducting IEC in under-five children.

Substantial evidence shows that Community Based Volunteers (CBVs)'s allocated to specific disease interventions can tremendously improve the home based practices and health-care seeking behaviors and also have a large impact on child morbidity and mortality rate. Boone et al (2016), in their study conducted in Guinea Bissau, argued that improved health systems and services, as well as high-quality community-based interventions, are necessary to reduce child morbidity and mortality. Additionally, due to difficulties in health care service delivery ranging from socio-demographics, literacy, political stability and availability of resources; community based interventions remain crucial to the reduction of child morbidity and mortality rates.

Conclusion

A number of factors are proved to influence the improvement of child health status following IEC intervention; this study shows that shifting from the traditional way of IEC delivery to a much more focused and individualized IEC with specific and selected IEC messages to specific health conditions in the comfort of clients have improved health outcome in the intervention study area as compared to a control study area that used a traditional method of IEC delivery. The study findings also revealed significant improvement in the knowledge of CBVs through training, and it is presumed that their increased knowledge was subsequently transferred to communities they serve hence the health status improvement recorded in Pemba District, an intervention area, on Malnutrition and Diarrheal disease morbidity. The study would recommend, to the MoH, the adoption of a modified IEC with shift from collective to a one on one approach that allows the CBVs to assess and attend to specific individual needs of a client, and also to come up with the formulation of a new child support group which is proposed to be named "Under-five Year Olds' Health Support Group"(UFYOSG).

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