

Evaluation of the Effect of Pd/Hearth Model on the Nutritional Status of the Children 6-59 in Uganda: A Case Study of Ziobwe, Luwero District

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Abstract: *Malnutrition is the major cause of mortality in children below five years, accounting for up to 60% of the mortality. Although health facility or institutional based approaches have been used to prevent or rehabilitate malnutrition in Uganda, their effect has not been comparably felt in the rural areas where facilities are not well equipped or are nonexistent. Inadequate community screening and referral system and lack of community participation in the management process may have been responsible for the persistent high prevalence of malnutrition. In Uganda, there is no published research that has been done to find out the effect of PD/Hearth model on the management and/or prevention of malnutrition in children less than 5 years through improved childcare, feeding and health seeking practices of caregivers. The main objective of this study was to determine the effect of PD/Hearth model on the management of malnutrition in children 6-59 months and improvement of childcare, feeding and health seeking practices among the caregivers in Ziobwe Sub-county, Luwero district.*

Keywords: Positive Deviance, Hearth, Malnutrition, Health seeking behaviors, Childcare practices and feeding practices

1. Introduction

The Positive Deviance (PD) methodology is an asset-based or strength-based model. It is built on the belief that in every community there are certain individuals called “Positive Deviants”. Positive deviants are individuals in the community with unique and special practices and behaviors that enable them and their children to have better health outcomes than their neighbors who share the same resources and face the same challenges (Save the Children International, 2009).

A “Hearth” is a home setting where nutrition education and rehabilitation are conducted (CORE GROUP, 2003). Caregivers and hearth volunteers prepare an extra calorie dense meal that is fed to the malnourished children. PD/Hearth is a model for preventing and rehabilitating malnutrition from homes using locally available foods and other resources. The rehabilitation process utilizes 26 days of close monitoring where children are fed on an extra energy meal prepared by the caretakers of malnourished children guided by trained community volunteers and light caregivers. Light caregivers refer to the positive deviants identified in the community. Positive Deviance (PD)/Hearth focuses on what is positive and possible, then draws upon the resources and solutions inherent in a community rather than focusing on problems and needs that can only be addressed with outside intervention (Schooley & Morales, 2007)

Positive Deviance/Hearth can also be used to address other health problems including malnutrition in pregnant women and HIV and AIDS prevention. The approach is also used to promote neonatal and child health through interventions such as promotion of exclusive breastfeeding (Schooley & Morales, 2007). PD/Hearth model focuses on bringing about sustainable behavior change at a community level, concentrating on tackling the key causes of under nutrition namely childcare, feeding practices and health seeking

behaviors of mothers and/or caregivers thus contributing to improved nutritional status (GOAL, 2010).

PD/Hearth approach utilizes model caregivers to be the change agents within their own communities. Their unique practices and behaviors in the aspects of childcare, feeding and health seeking are identified and then strengthened and scaled up to the entire community. These Positive Deviance behaviors are likely to be affordable, acceptable, and sustainable by the wider community because their peers are already practicing them (World Vision International, 2015)

It is believed that the PD/Hearth approach was initiated in the 1970s in Vietnam by Save the Children, and has since been implemented all over the world by many different organizations (World Vision International, 2015) including World Vision International which has projects in more than 35 countries using PD/Hearth to address child malnutrition.

In Africa, PD/Hearth model has been implemented in more than 35 countries by many Non Governmental Organizations (NGOs) (World Vision International, 2015). In Ligobwa village, Malawi, PD/Hearth realized a decrease in malnutrition prevalence rate from 47% to 27%, with in a period of five years (CORE GROUP, 2003). In Guinea, PD/Hearth model implemented by Adventist Development and Relief Agency (ADRA), a Non Governmental Organization, reduced severe acute malnutrition from 20% to 5% and moderate acute malnutrition from 23% to 20% in children 6-23 months old. Severe acute malnutrition is measured by weight for height Z-Score of <-3 SD while moderate acute malnutrition is measured by weight for height Z-Score of <-2 SD. (PD/Hearth Technical Advisory Group (TAG), 2009). In Uganda, PD/Hearth is a “fairly” new phenomenon that has been implemented by a few Non Governmental Organizations in rural communities. World Vision-Uganda and Management Sciences for Health (MSH) are among the Non Governmental Organizations that are

spearheading the implementation of this model in partnership with ministry of health (STRIDES, 2014).

This study was done to determine the current nutritional status of children who participated in the PD/Hearth sessions for nutritional rehabilitation in Zirowwe Sub County, Luwero district, Central Uganda. The study was also done to determine the childcare, feeding and health seeking practices of caregivers of children who attended the hearth sessions with the intent to find out whether PD/Hearth resulted in sustainable rehabilitation of the malnourished children and adoption of the recommended positive behavioral practices by the caregivers. The main purpose for conducting this study was to contribute to the reduction of malnutrition in children under five years through improved childcare, feeding and health seeking practices using PD/Hearth model.

2. Background to the study area

The study evaluated the PD/Hearth program implemented by MSH in Zirowwe Sub-county, Luwero District in Central Uganda. Luwero district is located approximately 50km north of Kampala (the Capital City of Uganda) along Kampala-Gulu highway (UBOS, 2009). Zirowwe Sub County has an estimated population of 45, 797 people with almost the same number of males as females. Zirowwe Sub County has 4 Government Health Centres (1 Health Centre III and 3 Health Centre IIs) and a big number of privately owned health clinics. Agriculture and petty trade are the main economic activities in Zirowwe Sub County. Bee keeping for production of honey is also practiced. People in Zirowwe grow cassava, matoke (plantain), potatoes, sweet bananas, maize, cabbage, passion fruits, pineapples and mangos. Main animals reared include cattle, goats, sheep, chicken, and ducks. (*Uganda Bureau of Statistics, 2009*)

3. Statement of the Problem

Much as there have been traditional approaches for managing malnutrition and despite, decades of the MOH, UNICEF and USAID investment, malnutrition prevalence rates in children under 5 years in Uganda for long have remained significantly high; recently at 33% chronic malnutrition (stunting), 14% underweight, 5% acute malnutrition (wasting) and 50% Anaemia (UDHS, 2011). One in every 19 Ugandan children dies before the first birthday and childhood mortality is higher in rural areas than in urban areas (UDHS, 2011). Malnutrition is the major cause of under five mortality, accounting for up to 60% of the mortality (USAID, 2010). Malnutrition in children is a life threatening condition that undermines their health and development (UDHS, 2006). The resulting mortality, morbidity and loss of productivity impede social and economic development (Uganda Nutrition Action Plan (UNAP), 2011)

The trend may have been aggravated by inadequate community screening and referral, selective institutional oriented approaches of management and lack of community participation in the management process. The facility or institutional based approaches are obviously not so effective in the rural areas where the health facilities are not well equipped or non-existent. Many interventions have not paid

attention to the barriers to child care and infant feeding at community and household level. (MSH-STRIDES, 2011)

However, an asset-based, home-oriented approach (PD/Hearth) to prevent and/or rehabilitate malnutrition and promote appropriate childcare, feeding and health seeking behaviors has been initiated in Uganda (MSH-STRIDES, 2013). This model allows community members to participate in the rehabilitation process using their own available resources and from their homes. Non Governmental organizations such as World Vision-Uganda and Management Sciences for Health (MSH) have been implementing PD/Hearth model in partnership with Ministry of Health in many districts of Uganda such as Luweero, Mayuge, Kayunga and Kamwenge (MSH, 2014)

In Uganda, there is no published research that has been done to find out the effect of this model in preventing and/or rehabilitating malnutrition and bringing about sustainable behavioral change for caregivers in the aspects of childcare, feeding practices and health seeking.

The study therefore, was done to bridge the gap and determine the effect of PD/Hearth model on the management of malnutrition in children 6-59 months and improvement of childcare, feeding and health seeking practices of caregivers who participated in the program.

4. Purpose of the study

The main purpose for conducting this study was to contribute to the reduction of malnutrition in children under five years through improved childcare, feeding and health seeking practices of caregivers using PD/Hearth model.

Objectives

General objective

To determine the effect of PD/Hearth model on the management of malnutrition in children 6-59 months and improvement of childcare, feeding and health seeking practices among the caregivers.

Specific Objectives

- i. To determine weight for age change of PD/Hearth children.
- ii. To assess the childcare practices of PD/Hearth mothers/caregivers.
- iii. To assess the child feeding practices of PD/Hearth mothers/caregivers.
- iv. To determine the health care seeking practices of PD/Hearth mothers/caregivers.

Methodology

5. Results

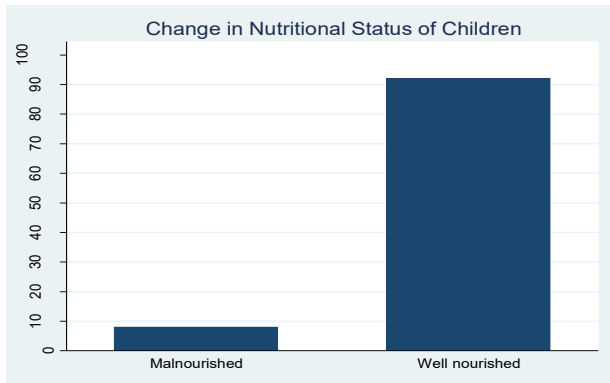


Figure 1: Change of the nutritional status

Only 8% of the children enrolled under this model were still malnourished at the time of the study.

Bi-variate analysis

Feeding practices of caretakers and change in the nutritional status of children

A majority (94%) of children who were breastfed exclusively up to six months were significantly well nourished (p=0.040). Children who were fed at least four times a day were significantly well nourished (p=0.032) (Table 1)

Table 1: Feeding practices and change of the nutritional status of the children

Characteristic	Nutritional status		p-value
	Malnourished N=8 (%)	Well nourished N=93 (%)	
Did you exclusively breastfeed the child up to six months?			0.040**
Yes	5 (6)	85 (94)	
No	3 (27)	8 (73)	
Feeding child at night			0.233
Yes	4 (13)	26 (87)	
No	4 (6)	67 (94)	
Starting complementary feeding			1.000
9 months	1 (8)	13 (92)	
At 6 months	7 (8)	81 (92)	
Number of times feeding children in a day			0.032**
At least 3 times	5 (14)	30 (86)	
4 times	1 (4)	23 (96)	
More than 4 times	2 (5)	40 (95)	
Giving child snacks			0.285
Yes	7 (7)	90 (93)	
No	1 (25)	3 (75)	

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Child care practices of caretakers and change in the nutritional status of children

A majority (94%) of children whose mothers could give more drinks/fluids during a diarrhea attack were significantly well nourished (p=0.024). 94% of children whose mothers increased the frequency of breast feeding in case breast milk is not enough were significantly well nourished (p=0.045). Almost all (95%) children whose caretakers thought enough food is the most important need a child needs were significantly well nourished (p=0.043). Caretakers who desired one to four children, majority (96%) of their children were significantly well nourished (0.046). Caretakers who desired to use a modern method of family

planning had a significantly higher proportion (93%) of children well nourished (p=0.020).(Table 2)

Table 2: Child care practices of caretakers and change in the nutritional status.

Variables	Nutritional status		p-value
	Malnourished N=8 (%)	Well nourished N=8 (%)	
Care of sick child			0.857
Refer to hospital	5 (7)	65 (93)	
Given more foods	2 (10)	18 (90)	
Give medication	1 (9)	10 (91)	
Amount of fluids given to a child with diarrhea			0.024**
Same	2 (10)	18 (90)	
More	6 (7)	75 (93)	
What to do if breast milk is not enough			0.045**
Give other foods	6 (9)	59 (91)	
Increase frequency of breast feeding	2 (6)	34 (94)	
Who child stay with when caretaker is away			0.595
Father	5 (7)	69 (93)	
Fellow children	2 (13)	13 (87)	
Other relative	1 (8)	11 (92)	
The most important need for children			0.043**
Enough food	4 (5)	79 (95)	
Good clothes	1 (17)	5 (83)	
Good education	1 (17)	5 (83)	
Immunization	2 (50)	2 (50)	
Number of desired children			0.046**
1-4	1 (4)	27 (96)	
4+	7 (10)	66 (90)	
Aware of family planning use			0.438
Yes	8 (8)	87 (92)	
No	0	6 (100)	
Desired to use family planning			0.002**
Yes	6 (7)	85 (93)	
No	2 (20)	8 (80)	

** Significant below 0.05

Health care seeking practices of caretakers and change in the nutritional status of children

As shown in table 3, majority (95%) of children who completed the immunization schedule were not significantly well nourished (p=0.067). 95% of children whose caretakers sought medical care within 24 hours in case the child gets sick were significantly well nourished. Caretakers who knew how to prepare homemade ORS had a significantly higher proportion (93%) of their children well nourished.

Table 3: Health care seeking practices of caretakers and change in the nutritional status of children

Variable	Nutritional status		p-value
	Malnourished N=8 (%)	Malnourished N=8 (%)	
Number of times child is bathed			
Once	1 (8)	12 (92)	0.674
Twice	4 (11)	31 (89)	
More than 2 times	3 (6)	50 (94)	
Wash hands with soap after visiting toilet			
Yes	1 (11)	8 (89)	0.539
No	7 (8)	85 (92)	
Did child complete immunization			
Yes	5 (5)	90 (95)	0.067
No	3 (50)	3 (50)	
What to do if child gets sick			

Seek care within 24 hrs	5 (5)	86 (95)	0.037**
Seek medical care after 24 hrs	3 (30)	7 (70)	
Know to prepare homemade ORS			
Yes	6 (7)	77 (93)	0.048**
No	2 (11)	16 (89)	
Who mainly decides to seek medical care for sick child			
Mother	0	6 (100)	1.000
Father	0	4 (100)	
Both	8 (9)	83 (92)	

** Significant below 0.05

6. Discussion of Findings

The weight for age change of PD/Hearth children

Only 8% of children under the PD/Hearth model remained malnourished after the intervention. Such success stories have been realized in a number of countries in Africa where this model has been used to fight malnutrition in children. In Malawi, a decrease in malnutrition of 20% was realized in just a period of five years, CORE GROUP, (2003), whereas in Guinea, the Adventist Development and Relief Agency reported a 15% reduction of acute malnutrition among children of 6-23 months (TAG, 2009). This is not only in Africa, the PD/Hearth model has successively improved the nutritional status of children in a number of developing countries (Sternin M *et al.*, (1999); Bolles K. *et al.*, 2002; Sethi V *et al.*, 2003); such results have also been realized in Vietnam Dearden K, Quan N, Do M, *et al.*, (2002) and Pakistan (Marsh DR, M Shafique, A Ambreen, *et al.*, 2003). This therefore, makes the PD/Hearth model an appropriate model in fighting malnutrition in developing countries.

Childcare practices of PD/Hearth mothers/caregivers.

Majority (80%) of caregivers reported increasing fluid intake whenever their children had diarrhea. Children who were given more fluids during diarrheal episodes were significantly well nourished ($p=0.024$) than the children given same amount of fluids. This was in line with findings in Ghana, Mahama *et al.*, (2014) where mothers who were aware of the recommended practice when their babies had diarrhea had significantly well-nourished children than the mothers who were ignorant about the recommended practice in cases of diarrhea. The vital distress with diarrhea is the risk of dehydration from loss of body fluids, so management of diarrhea is intended at preventing the real culprit (dehydration) and this can be treated safely at home. This explains why children given lots of fluids during diarrheal episodes are well-nourished.

Less than half (36%) of mothers increased the frequency of breastfeeding whenever breast milk was not enough. Mother/caregivers who increased the frequency of breastfeeding when the breast milk was little had statistically significant ($p=0.045$) well-nourished children compared to the mothers/caregivers who opted to give other foods when the breast milk was little. Women in Zirobwe Luwero district need to be sensitized on the importance of breastfeeding their babies frequently in order to stimulate more milk production as noted in a study conducted by Sisk and colleagues (Sisk *et al.*, 2006).

Majority of the caregivers (82%) revealed that the most important need of a child is enough food. Children whose mothers/caregivers mentioned food as the most important need for children were significantly well nourished ($p=0.043$) than the children whose mothers/ caretakers mentioned other needs other than food. This finding is supported by a study in USA (Collins *et al.*, 2006) where child survival programs are called upon to consider food as the basic requirement for children in the fight of malnutrition in children which conquered with a study in Washington DC (Cook *et al.*, 2004). In a similar study in Malawi (Manary *et al.*, 2004) 96% of the children who were not wasted were from families that considered food as the most basic for children. Mothers in Zirobwe, Luwero district have to be educated on the importance of food to a growing child.

Only 28% of caregivers desired to have 4 children and less, majority (72%) desiring to have more than 4 children. Children whose parents desired to have less than 4 children were significantly well nourished ($p=0.046$) compared to those children whose parents desired to have more than 4 kids. These findings are consistent with those from a study to determine predictors of weight among children that revealed an association of family size with increase risk of severe malnutrition (Jyoti *et al.*, 2012). In addition, a study conducted by Rholes and colleagues were able to explain how working models of parenting and parent-child relationships form well before child birth and that the models were systematically associated with attachment styles in adult relationships with their children (Rholes *et al.*, 2007). That means that parents who anticipate to have few children also anticipate a close relationship with their children; no wonder they appeared well nourished.

Majority of mothers (90%) had ever used family planning. Mothers/caretakers of children who had used family planning had significantly well-nourished children ($p=0.002$) than those who had not used family planning. This is supported by findings by Tsui *et al.*, (2010) where family planning is positively associated with well-nourished children. This clearly indicates that well-spaced children are given adequate attention by their mothers/ caretakers who promote their growth and well nourishment. In addition, the family is able to have children they are able to provide enough resources of which food is key.

The child feeding practices of PD/Hearth mothers/caregivers

89% of the mothers had practiced exclusive breastfeeding for the first 6 months. Children who were exclusively breastfed for the first 6 months were significantly well nourished ($p=0.040$) than the children who were not exclusively breastfed. This was consistent with studies conducted in Vietnam and China (Nakamori *et al.*, 2006 and Yang Wang *et al.*, 2011) respectively; where exclusive breastfeeding was significantly associated with well-nourished children. All these studies were in agreement with World Health Organization recommendations; according to a WHO, 2006 report, one of the ways identified to fight against malnutrition in infants was encouraging all mothers

to exclusively breastfeed their babies for the first six months of life. This clearly indicates that breast milk keeps babies healthy since it supplies all the essential nutrients in correct quantities; it can be digested with ease, meaning that babies who exclusively breast feed don't experience constipation and diarrhea. It cannot even upset the stomach like the other feeds because it is always at the right temperature, clean and free from bacteria. It also protects the babies against allergies and other common illnesses; this explains why babies who exclusively breastfeed are well nourished. There is need for continued sensitization of the mothers on the importance of exclusive breastfeeding for the first 6 months; this will help fight malnutrition which is among the leading causes of death among children below 5 years.

About 2/3 (66%) of the mothers were feeding their children 4 times and/or more per day. Children who were fed at least more than four times a day were significantly well nourished ($p=0.032$) than the other children. This was consistent with a study conducted in China (Gulden et al., 2000) where Gulden stressed out those children who were malnourished were not frequently fed due to inadequate food in households. Frequent feeding is very essential for not only preventing malnutrition but for proper child development. WHO recommends that children should be breastfed 2 – 3 hourly but the frequency can be increased depending on the child's feeding needs (WHO, 2013). This explains why the children in Ziobwe, Luwero district fed more than 4 times a day are well-nourished than their counterparts who were fed less than four times.

Health care seeking practices of PD/Hearth mothers/caregivers

Majority of mothers (90%) sought medical care within first 24 hours of onset of illness on their children. Mothers/caretakers who sought medical care within 24 hours whenever their children were ill had well-nourished children ($p=0.037$) than the mothers/caretakers who took more than 24 hours to seek for medical care when their children were ill. This is in agreement with studies in Nigeria and Guatemala (Alphonsus et al., 2015 and Aigbokhaode et al., 2015) respectively. This shows that households and the entire community should be able to recognize when their children need treatment outside home; failure to recognize signs of childhood illnesses makes mothers keep children at home and as the infection increases the children get prone to being malnourished. Sensitization on signs and symptoms of childhood illnesses to the mothers is recommended to enable mothers to recognize that their children need immediate health attention.

Majority of the caregivers (79%) knew how to make home prepared ORS. Children whose mothers/caretakers knew how to prepare ORS were well nourished ($P=0.048$) than those children whose mothers/caretakers never knew how to prepare ORS. This was in agreement with a study conducted in India where use of ORS had a positive relationship with stunting (Brennan et al., 2004). This is evident that ORS is the best protective ration for controlling diarrhea and rehydration; supported by World Health Organization (WHO, 2006). It is very important for mothers to be taught how to prepare ORS, Brennan and colleagues also stressed that it is also advisable to use home- based ORS than those

available in attractive packets in the market. This should be adopted by all caregivers of children under 5 years in Ziobwe, Luwero district since it is a very inexpensive way to manage diarrhea at home.

A total of 101 PD/Hearth children between 6-59 months participated in the study. The median age of children was 37 months, majority (46%) of the children weighed 13-15 kilograms. 92% of children were well-nourished (WAZ >-2 SD) at the time of the survey. Similarly, 101 caregivers who previously participated in the PD/Hearth program were considered for the study. 89% of mothers reported practicing exclusive breastfeeding for the first six months. Majority (94%) of children who were breastfed exclusively up to six months were significantly well nourished ($p=0.040$). 87% of caregivers started complementary feeding at 6 months. 65% feed their children four times and/or more a day. Children who were fed at least four times a day were significantly well nourished ($p=0.032$). 96% of caregivers give their children snacks in between main meals. 80% of caregivers increase the amount of fluids given to their children when they get diarrhea. Majority (94%) of children whose mothers could give more drinks/fluids during a diarrhea attack were significantly well nourished ($p=0.024$). Only 36% of caregivers increase the frequency of breastfeeding when the breast milk is not enough for the child. 94% of children whose mothers increased the frequency of breast feeding in case breast milk was not enough were significantly well nourished ($p=0.045$). 82% of caregivers thought food is the most important need a child needs. Almost all (95%) children whose caretakers thought enough food is the most important need a child needs were significantly well nourished ($p=0.043$). Only 28% of caregivers desired to have 1-4 children. Caretakers who desired one to four children, majority (96%) of their children were significantly well nourished ($p=0.046$). 90% of caregivers desired to use a modern method of family planning. Caretakers who desired to use a method of family planning had a significantly higher proportion (93%) of children well nourished ($p=0.020$). 94% of children had completed immunization schedule. Majority (95%) of children who completed the immunization schedule were not significantly well nourished ($p=0.067$). 90% of caregivers sought medical care within 24 hours when their children were ill. 95% of children whose caretakers sought medical care within 24 hours in case the child gets sick were significantly well nourished. 79% of caretakers knew how to locally prepare ORS. Caretakers who knew how to prepare homemade ORS had a significantly higher proportion (93%) of their children well nourished.

7. Conclusion

The PD/Hearth model yields profound results in improving the nutrition status of children. Majority of caregivers practiced the recommended appropriate behavioural practices in the aspects of childcare, feeding and health seeking. Caregivers' practices particularly giving more fluids during diarrheal episodes, increasing the frequency of breastfeeding when the breast milk was low, desire to have less than 4 children, desire to use family planning, exclusively breastfeeding children up to six months, feeding children at least more than four times a day and seeking

medical care in 24 hours when child gets sick were predictors of the improvement in the nutritional status of children.

8. Recommendation

There is need for a monitoring process to ensure that such adopted practices continue to be practiced by caretakers of children below five years in Ziobwe sub-county. This model should also be scaled up in all areas of Uganda having a problem of malnutrition.

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