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Effect of Positive Deviance HEARTH intervention on dietary diversity among Children under Five in Burera District, Rwanda

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ABSTRACT

Infant and Young Children Feeding practices consist of initiating of breastfeeding since the first hour after the delivery, exclusively breastfeeding during the first six months, continuing breastfeeding up to 2 years and introducing appropriate, safe and adequate food since the age of six months. According to Rwanda Demographic Health System 2020 about 85 children who are born in Rwanda were put on breast within the first hour of their lives. Positive Deviance (PD) is an approach that helps to discover the problems that are in the community and find solutions to respond to them by using the community available resources. This approach aims to create groups in the communities that have the same resources with other remaining people in the same community and that have the sustainable and better standard of life. These groups help to teach other people how to use available resources to find solutions to solve the problems. In Rwanda little is known about the effectiveness of Positive Deviance Hearth To fill this gap, the present study had the aim of determining the effect of PDH on feeding practices among children under five in Burera District. Feeding practices and stunting prevalence in the intervention area was compared with that in the non-intervention area. A comparative quasi experimental design was used. The study population comprised mothers with children will 6-59 months old in two sectors Gitovu and Rugengabari of Burera district. Sample sizes of 196 children whose mothers/caregivers attend PDH session and the same number of children from mothers/caregivers who did not attend PDH sessions were recruited. The

interviewed structured questionnaire was used data collection. Data were entered and analyzed with SPSS descriptive statistics, logistic regression with odds ratio estimated at 95%CI and p-value were performed. Prior to conduct the research, the approvals from Mount Kenya University, School of Postgraduate and Burera District-were provided to the researcher and each participant signed consent before interview. The majority (55.6%) of children in both groups were male. Children in the HEARTH intervention group were significantly more to have high score for dietary diversity compared to the Non-HEARTH area (p value = 0.002). The prevalence acute malnutrition persistence was significantly higher among the Non-HEARTH intervention compared to the HEARTH intervention area (p value<0.001). After adjustment for other confounders, persistent acute malnutrition was 0.13 times less likely in the Hearth intervention than in the Non Hearth Intervention. The rate of PDH model use is still low hence Ministry of Health, Burera District have to put in place as recommended to put a system of implementation of positive Deviance Hearth in community for the whole country and all training concerning and perform a research on positive Deviance Hearth at national level for having a picture of PDH and more sensitize the school attendance for having future educated people at least secondary level.

INTRODUCTION

In Rwanda, the percentage of kids who are underfed is bigger in rural areas with nine percent than town areas accounted four percent[1] . Rwanda has made important progress in the fight against malnutrition where between 2010 and 2015, stunting among children under five declined from 44% to 38 %. However the present rates are still too high as recently 2021 stunting is 33% among children under five according to RDH 2020 and specifically in the rate of stunting is 42.9 percent among children under five in Burera district.

There is many risk factors of malnutrition including maternal age, maternal education, maternal occupation, breastfeeding, fortified food consumption, limited accessibility of food, age of weaning, age of starting complementary food, wealth index, sex of child, antenatal care visits, inadequate psychological care, [2]. Children neglect, child abuse, stress and trauma.

Malnutrition continue to be a public Health Concern and to overcome this there is many interventions done in Rwanda :GIRA INKA Munyarwanda (One cow per poor family program) for poverty and child malnutrition reduction, One Cup for Child, Evening forum, Supplementation of micronutrient powder namely as ONGERA in Kinyarwanda, and also using Positive Deviance Hearth by NGO in some district [3]. The answers for fighting malnutrition are in place like community Based Management for undernourishment and RUTF , hold abundant capacity in handling cases that are quickly severe and in few resource situations crosswise sub-Saharan Africa [4]. PD is an approach that helps to discover the problems that are in the community and find solutions to respond to them by using the community available resources. Though an active process called PD/I, the stakeholders and local authorities mobilize the community members to learn a PD/H approach and this contribute the best nutritional outcome in the child.

Globally PD/H approach in nutrition programming as early as 1999 in Latin America, the organization soon expanded implementation of PD/Hearth to other regions [5]. In the year of 2016, above 56,000 undernourished children with 0-59 months age old were registered into PD/H programmes and 65% gaining acceptable weight in the period of three months where 54% rehabilitated completely and were graduated from PD/H (Sternin, Marsh et Al 1998) . PDH played crucial role in different cones [7].

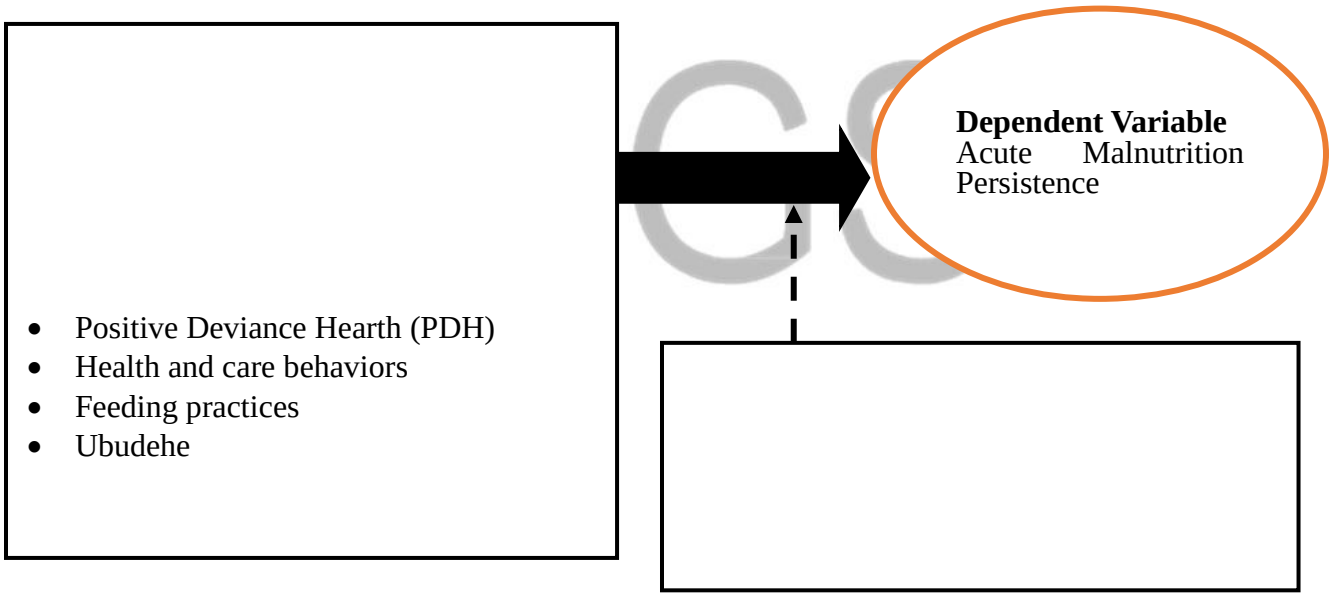
worldwide such the following countries Haiti where it reduced categorically malnutrition, Bangladesh and Haiti in Asia, Nigeria and Burkina Faso in Africa, this PDH was one among interventions to be used for reducing malnutrition. [8].Similarly in the country of Kenya this approach performed was effective to reduce malnou-

rished cases (Plan International,2007).In fact PD/H provides a sustainable mechanism for improving nutrition status of children U5 using few available resources in community[9].

In Rwanda 2008-2013 Catholic Relief Service in its project USAID Higa Ubeho, developed Village Nutrition Schools (VNS) as a community-based approach built on the Positive Deviance Hearth (PD/H) methodology to increase group members' knowledge to quickly rehabilitate malnourished children and prevent future cases malnutrition [10].A positive Deviance Hearth played crucial role in Ruhango district where there was a high prevalence of malnutrition before intervention and then after intervention the rate reduced categorically for example in Kabagali Sector of Ruhango there was a prevalence of 140 wasted children and after enrolled 95 % cured and discharged.

Conceptual framework

The conceptual framework highlights the independent, dependent and intervening variables as it discussed in literature review it helps one to understand how those variables are.



Research design

A quasi-experimental design was used to determine the effect of Positive Deviance Hearth (PHD) Intervention on feeding practices cases U5 in Burera District.The study was conducted in communities of Burera District in February 2022.All the families on the PDH intervention and control were included in the study .The inclusion criteria for the PD/H was children aged 6-59 months who attained 100-400 g weights gain during the Hearth sessions. This design is the most chosen to be used as it is allowing to involve in study well as the researcher is getting the real information because the parents are implementing the approach while a researcher is also on ground for follow up how they are conducting sessions in hearth.

Sample Size

Sampling was performed using Casagrande formula with confidence interval of 95% and margin error of 5%.

This formula is used when the study has two groups and one is exposed while other is not exposed).

Casagrande et al formula

$$n= \frac{\{Z\alpha/2\sqrt{p(1-p)}+Z\ 1-\beta\ \sqrt{p1(1-p1)+p2(1-p2)^2}\}}{(p1-p2)}$$

P1=Outcome's prevalence in the unexposed group (No PDH using)

P2=Outcome's Prevalence in the exposed group (PDH using)

P= (P1+P2)/2

α=Level of Significance

β=1-Power of test

Z=The Z-Score corresponding to the degree of confidence

Hence n=196 for both group

Study population and procedures

The study population included the children under five coming for Positive Deviance Hearth Approach with the month of February 2022, in the 1 sector of intervention described and other 1 non- intervention sector mentioned above. CHWs, parents/Caretakers child health involved in this study and Hearth group involved 96 children and 96 children in non-intervention group.
Sampling was performed using Casagrande formula with confidence interval of 95% and margin error of 5%. This formula is used when the study has two groups and one is exposed while other is not exposed).
To collect data, questionnaire and interviews were the matter. A survey questionnaire was carried out in all 2 Sectors Gitovu and Rugengabari to identify social - demographic and economic factors, and skills parents on PDH approach, benefits of attending PDH; this was directed to parents/Caretakers of children with malnutrition cases, especially wasted ones.
One hundred ninety six (196) participants were selected purposively depended on their children nutrition status and they attended PDH sessions and followed up for 12 consecutive days.

Data analysis

After collection data from respondents through questionnaire, they were entered and analyzed with SPSS 21 software. To determine the occurrence of malnourished U5 children in PDH intervention and no intervention area, and the feeding practices of mothers/caregivers in the intervention area with those of no hearth children in

non-intervention descriptive statistics were used. The odds ratio with 95% CI was applied to establish the factors associated with persistence of acute malnutrition in PDH intervention and no intervention area. The findings of the study were considered significant for p-value <0.05. Tables, figures and text were used in word document to present the findings of the study.

Results

Socio-demographic characteristics of respondents in the hearth and non-hearth intervention

Overall about one third (33.2%) of the respondents were aged between 25 and 29 years followed by those aged 35 years and above (30.1%). However, there was no association between the areas under HEARTH intervention and non-HEARTH intervention (p value=0.944). Regarding to the relationship of the child to caregiver, majority (87.2%) were mothers with significant (p value <0.001) higher proportion in Non-HEARTH site (96.9%) compared to the HEARTH intervention (77.6%). Most of the respondents (78.6%) had primary level of education and this was not significant between the groups (p value=0.548). Most of the respondents belong to social category of one and two (65.3%) where it was higher among the HEARTH intervention group (71.4%) than in the control group (59.2%) with marginal significance (p value= 0.072) (Table 1).

Table 1: Socio-demographic characteristics of respondents in the hearth and non-hearth intervention

Variables	HEART intervention		Non-HEART intervention		Total		p value
	n	%	n	%	n	%	
Age of caregiver (year)							
19-24	14	14.3	16	16.3	30	15.3	0.944
25-29	34	34.7	31	31.6	65	33.2	
30-34	20	20.4	22	22.4	42	21.4	
35 and above	30	30.6	29	29.6	59	30.1	
Relationship of caregiver to the child							
Father	22	22.4	0	0.0	22	11.2	**<0.001**
Mother	76	77.6	95	96.9	171	87.2	
Grandmother	0	0.0	3	3.1	3	1.5	
Level of education of the caregiver							
Non educated	15	15.3	19	19.4	34	17.3	0.548
Primary education	80	81.6	74	75.5	154	78.6	
Secondary	3	3.1	5	5.1	8	4.1	
Social category							
One or two	70	71.4	58	59.2	128	65.3	0.072
Three four	28	28.6	40	40.8	68	34.7	
Gender of the child							
Male	54	55.1	55	56.1	109	55.6	0.886
Female	44	44.9	43	43.9	87	44.4	
Birth spacing							
≥24 months	75	76.5	87	88.8	162	82.7	**0.024**
<24 months	23	23.5	11	11.2	34	17.3	

Source: Primary source

As indicated in Table 1, overall about one third (33.2%) of the respondents were aged between 25 and 29 years followed by those aged 35 years and above (30.1%). However, there was no association between the areas under HEARTH intervention and non-HEARTH intervention (p value=0.944). Regarding to the relationship of the child to caregiver, majority (87.2%) were mothers with significant (p value <0.001) higher proportion in Non-HEARTH site (96.9%) compared to the HEARTH intervention (77.6%). Most of the respondents (78.6%) had primary level of education and this was not significant between the groups (p value=0.548). Most of the respondents belong to social category of one and two (65.3%) where it was higher among the HEARTH intervention group (71.4%) than in the control group (59.2%) with marginal significance (p value= 0.072).

Overall, the proportion male children were more (55.6%) compared to female children (44.4%) however, there was no significant difference between the two groups (p value=0.886). Majority of the children (79.6%) were breastfed immediately after birth and this was significantly (p value <0.001) more in the Non-HEARTH intervention area (94.9%) than in the HEARTH intervention site (64.3%). There was no difference between intervention and control areas with regard to exclusive breast feeding (p value=0.306) and continued breastfeeding for 12 to 23 months (p value =0.637). Birth spacing was assessed and majority (82.7%) had greater or equal to 24 months with significantly (p value= 0.024) more proportion in Non-HEARTH intervention area (88.8%) compared to in the HEARTH intervention (76.5%).

Table 1: Effect of Positive Deviance HEARTH intervention on dietary diversity

Variables	HEART intervention		Non-HEART intervention		Total		p value
	n	%	n	%	n	%	
Grains, roots and tubers							
Yes	92	93.9	87	88.8	179	91.3	0.204
No	6	6.1	11	11.2	17	8.7	
Legumes and nuts							
Yes	89	90.8	70	71.4	159	81.1	**0.001**
No	9	9.2	28	28.6	37	18.9	
Milk and milk products							
Yes	18	18.4	10	10.2	28	14.3	0.102
No	80	81.6	88	89.8	168	85.7	
Flesh food (meat, fish, poultry and liver/organ meats)							

Yes	31	31.6	24	24.5	55	28.1	0.266
No	67	68.4	74	75.5	141	71.9	
Eggs							
Yes	27	27.6	13	13.3	40	20.4	**0.013**
No	71	72.4	85	86.7	156	79.6	
Vitamin A rich vegetables and fruits							
Yes	83	84.7	68	69.4	151	77.0	**0.011**
No	15	15.3	30	30.6	45	23.0	
Other vegetables and fruits							
Yes	26	26.5	15	15.3	41	20.9	0.053
No	72	73.5	83	84.7	155	79.1	
Overall dietary diversity score (DDS)							
High (≥4DDS)	54	55.1	32	32.7	86	43.9	**0.002**
Low (<4DDS)	44	44.9	66	67.3	110	56.1	

As indicated in Table 2, large percentage of the children (91.3%) consumed cereals or roots or tubers in the last 24 hours with more proportion in the HEARTH intervention (93.9%) than Non HEARTH intervention (88.8%) but there was no significant variation (p value =0.204). There was significant difference between the groups regarding legumes or nuts consumption (p value = 0.001) where the proportion was higher among the HEARTH intervention (90.8%) compared to the control group (81.1%). Though the proportions of taking milk or milk products and flesh food consumption were slightly higher in the HEARTH intervention than Non-HEARTH intervention, there was significant variations between the groups (p value 0.102 and p value = 0.266 respectively). The egg consumption was significantly more (p value= 0.013) among the HEARTH intervention group (27.6%) compared to Non-HEARTH intervention area (13.3%). There was a significant variation between the groups in terms Vitamin A rich vegetables and fruits consumption in the last 24 hours (p value = 0.011) where the HEARTH intervention had higher proportion (84.7%) than non-HEARTH intervention (77.0%).

After assessing the overall dietary diversity score, children in the HEARTH intervention group were significantly more to have high score for dietary diversity (55.1%) compared to the Non-HEARTH area (32.7%) (p value = 0.002).

Discussion

The present study was similar also with the study conducted in Slum area Quetta district where the effectiveness

was to compare the breast and complementary practices and 70% for mothers who participated in Hearth program showed to provide their kids at six months while in Non-Hearth the it was 49%, definitely these results showed that feeding practices of Hearth caregivers played crucial role than for Non-Hearth mothers[11].The effect of positive deviance hearth intervention on dietary diversity was similar with the study conducted in Ecuadorian Andes , showed that the kids consumed micronutrients like vitamin A, Zinc and Iron improved their nutritional status in PD/H comparing to Non Hearth using Weight for Age. In rural Ecuador ,the parents developed their kids by preparing a balanced diet and their weight increased via the support ,knowledge ,available local foods and also support from role model mothers through PDH [9]. The findings of the this study were low compared to the rates estimates in rural Bangladesh a total number of 5227 enrolled and access to diet diversity and it happened loss to follow up due to different reasons like death where (n=4), parents/caregivers of children migrated or left the village(n=15),child admitted into hospital(n=4).[12].The similar study conducted in Egypt where effect of positive deviance hearth intervention on dietary diversity for children under five was very clear as eggs, cheese were ones the food used.

Conclusion

Positive Deviance Hearth approach and dietary diversity using played crucial to prevent acute malnutrition in community and it was shown that the contribution of deviance HEARTH intervention on dietary diversity among the children less than 5 years. Seven food groups and the overall dietary diversity score were compared between the HEARTH and Non-HEARTH intervention. The dietary diversity score was determined by aggregating the total consumption from each food groups and was categorized as high dietary diversity with 4 and above score and low dietary diversity for those who score less than 4 food group consumption per 24 hours.

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