

## IMPACT EVALUATION OF POSITIVE DEVIANCE HEARTH IN MIGORI COUNTY, KENYA

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## ABSTRACT

A Positive Deviance (PD) Hearth intervention is a home and neighborhood-based nutrition program for children who are at risk for protein-energy malnutrition in a low resource community. The intervention uses the 'Positive Deviance' approach to identify those behaviors practiced by the mothers or caretakers of well-nourished children from poor families and transfers such positive practices to other mothers who are equally disadvantaged economically. Positive Deviance Hearth intervention is designed to treat malnourished children, enable the families to sustain their rehabilitation at home on their own and to prevent malnutrition in younger siblings. However, PD Hearth intervention monitoring system in Migori only assesses a program's ability to treat, one of the three PD Hearth objectives. Thus, there was need for impact evaluation to measure outcomes of the PD Hearth intervention to sustain rehabilitation and prevent malnutrition in younger siblings. The objectives of the study were to determine the level to which PD Hearth enables families to sustain rehabilitation at home on their own and to identify the practices which influence PD Hearth outcomes. The study was designed as a pipeline quasi-experimental and mixed method was used to collect data and perform statistical analyses. Single stage cluster sampling was used to identify 53 and 54 children on the intervention and comparison group in five communities. Weight measurements of the children on the intervention aged 6 to 59 months at the entry, exit and graduation stages were retrieved from Kenya Medical Research Institute Family AIDS Care and Education Services programme activities reports. Anthropometry (height measurements) for the children on the intervention and comparison children was taken. Caregivers filled in a questionnaire, assisted by the researchers as necessary. At entry, 18.9% children on the intervention had moderate underweight while 43.4% had mild underweight. At current status though, 3.8% and 34.0% had moderate and mild underweight respectively. The regression model predicted that Weight-for-Height (WAZ) of the children on the intervention at current status lied on 51.5 percentile, thus, normal for underweight. Increased feeding frequency made the largest contribution to weight gain than other caregiver practices. Therefore, the Migori County government in collaboration with the Ministry of Health needs to scale up PD Hearth intervention to reverse cases of Moderate Acute Malnutrition (MAM) and prevent Severe Acute Malnutrition (SAM) in the County.

**Key words:** Positive Deviance, Hearth sessions, rehabilitation, malnutrition, impact evaluation, caregiver practices

## INTRODUCTION

Childhood malnutrition is a serious problem worldwide [1]. Nearly 195 million children are stunted and 125 million are underweight due to inadequate nutrition [2]. Child malnutrition is attributed to 3.5 million mortality cases every year for under-five years olds [1]. In addition, childhood malnutrition causes a third of the disease burden for the world's under-five years olds each year [3].

In Kenya 6.7% of children under five years suffer from wasting, 16.1% from underweight and 35.3% are stunted [4]. Similarly, 17.1% and 2.8% of children under-five years in Migori County are moderately and severely underweight [5]. In addition, 32.3% and 13.9% are severely and moderately stunted while 6.4% and 1.3% are moderately and severely wasted [5].

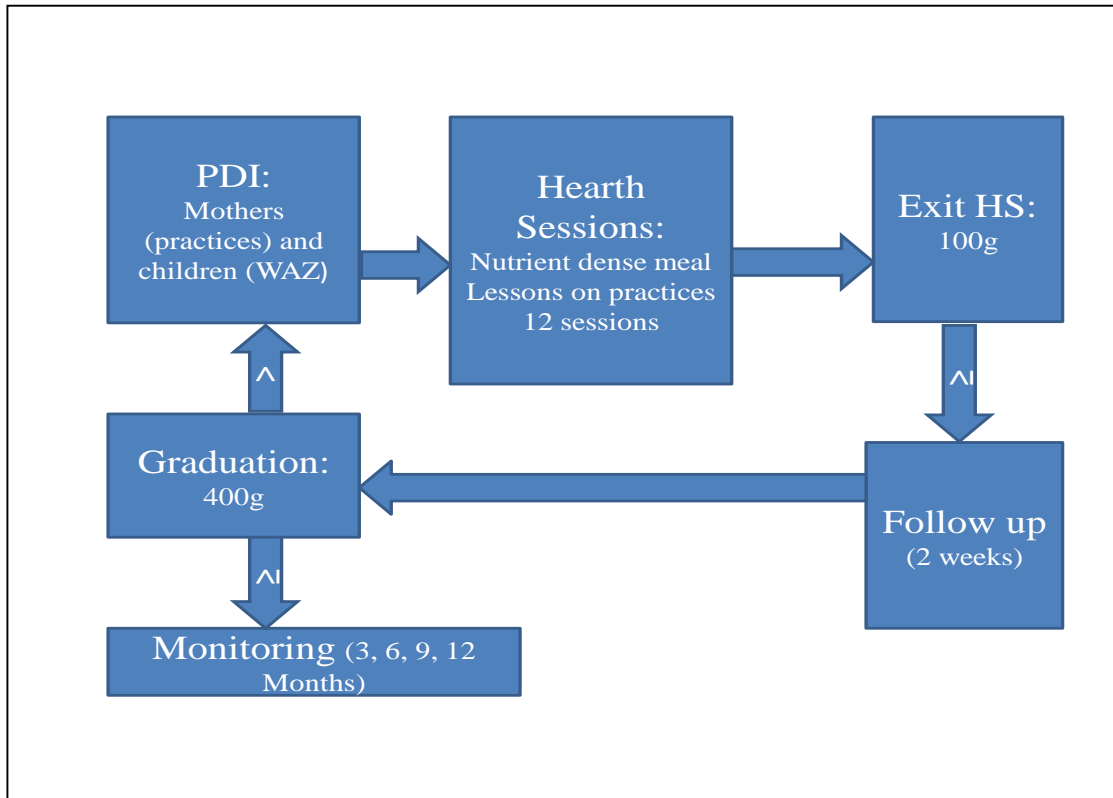
Recovery from malnutrition occurs with improvement in children's diets [1]. This includes conforming closely to the recommended infant and young children nutrition practices, exclusive breastfeeding and intake of the appropriate nutrient proportions. Studies have identified Positive Deviance (PD) Hearth approach as the most appropriate intervention in improving childrens' diet [1]. Hearth model is designed to treat malnourished children, enable the families to sustain their rehabilitation at home and to prevent malnutrition in younger siblings. Thus, PD approach addresses the critical components of the recovery pathways such as improving the mothers caring practices, which are associated with high malnutrition incidences [2].

A Positive Deviance Hearth intervention is a home and neighborhood-based nutrition program for children who are at risk for protein-energy malnutrition in developing countries. The intervention uses the 'Positive Deviance' approach to identify those behaviors practiced by the mothers or caretakers of well-nourished children from poor families and transfers such positive practices to other mothers who are equally disadvantaged economically. The 'Hearth' is the location for the nutrition education and rehabilitation sessions [6].

Positive Deviance Hearth monitoring system in Migori only assesses program treatment, one of the three PD Hearth objectives. It tracks Weight for Age (WAZ) for each of the participants upon admission to the program, at the end of the PD Hearth sessions, during the two weeks follow up and at graduation from the program. However, by not tracking WAZ after graduation from the PD Hearth program the monitoring systems do not inform on the extent to which the intervention enables families to sustain rehabilitation at home on their own and the extent to which it prevents malnutrition on younger siblings. Based on the researcher's experience in implementing PD Hearth programs this can result to increased cases of relapse. Therefore, the study assessed the extent to which PD Hearth enabled families to sustain rehabilitation at home on their own and the positive deviance caregiver practices which influenced the outcomes of the sustained rehabilitation.

The PD Hearth intervention follows a community model structure which is made of 3 days Positive Deviance Inquiry (PDI), 12 days Hearth sessions, 2 weeks follow up and

1 day graduation as shown in figure 1 [2]. In the study, the outcomes of PD Hearth intervention in Migori County were evaluated for the children on the intervention, at the exit of Hearth sessions, follow up and beyond graduation. A comparison group of children were drawn from the PDI list to provide an indicator of what happened in the absence of the intervention.



**Figure 1: Stages of PD Hearth Intervention (Modified from the CORE Group [6])**

## RESEARCH APPROACHES

### Research Design

A Pipeline quasi-experimental design was used to evaluate the impacts of PD Hearth programs in 53 PD intervention families and 54 comparison families. The study was conducted in five communities located in five (5) locations in Migori County situated in Western Kenya, Nyanza Region. Single stage cluster sampling was used to choose five primary sampling units from a sampling frame of 11 PD Hearth sites implemented between the months of October, 2012 to October, 2013. All the families on the intervention in the five sites were included in the study and the comparison group was chosen from the Positive Deviance Inquiry (PDI) list.

The inclusion criteria for the intervention group were children aged 6-59 months who attained 100 g-400 g weight gain during the Hearth sessions as recommended by the Sphere standards [6]. In addition, graduation from the hearth sessions was considered

as respondents' inclusion criteria. The inclusion criterion for comparison group was children aged 6-59 months who were in the PDI list. The exclusion criterion for the children on the intervention was Hearth session non-response. Also, children who failed to graduate from the program, due to referrals, failure to gain the desired weight and non-commitment by the caregivers were not included in the study.

### Methods, Tools and Procedures

The evaluation was conducted in the months of January and February, 2014, 6 months after graduation from the intervention. Nutrition assessment was used to collect anthropometric measurements and questionnaires were administered to caregivers of the children in the intervention. The questionnaires assisted to collect information on practices adopted after termination of PD programs. Anthropometric measurements of the children on the intervention were taken in two phases. In the first phase, weight and age information at the entry and exit phases was obtained from the host health facilities activity files along with weight measurements at the time of graduation.

In the second phase current anthropometry measurements were taken. Weight and height/length measurements were taken using Center for Disease Control (CDC) approved procedures (CDC, 2007). Weight measurements were taken to the nearest 0.1 kg using the UNICEF approved SECA 150.0 Kg scale (SECA, model 8811021659, Germany). The scale was adjusted after every five measurements to 0.00 reading to enhance precision and accuracy. Weight measurements of the children aged 6 to 12 months were taken using the digital infant scale. Height was measured using height boards for children < 2 years. The same board placed in a recumbent position was used to measure length of children who could not "stand up tall". These measurements were taken to the nearest 1 cm [2,7].

A self-administered questionnaire was given to each caregiver to identify practices that influence PD outcomes. The questionnaire comprised of four sections: demographic data, behavior change, improved local capacity and community participation and empowerment. The demographics section was made up of six variables; gender, marital status, age, level of education, work experience and employment status. Behavior change section consisted of 16 questions categorized into four variables: caregiver practices, health seeking behavior, hygiene practices and positive behavior practiced in PD Hearth. Improved local capacity section comprised of eight questions corresponding to a single variable, the local capacity to implement PD Hearth. The last section contained four questions to address two variables, the community participation and empowerment. The questionnaire was tested for internal reliability using Cronbach alpha coefficient. Co-efficient above 0.631 was considered sufficient to ensure the questionnaire reliability.

### Data Analysis

Data were analyzed using WHO Anthro 2005 computer program to determine the Z-Score values from the anthropometric data. Children were classified as mildly stunted, underweight or wasted if HAZ, WAZ or WHZ was < -1 HAZ, < -1 WAZ and < -1 WHZ or moderate when < -2 and severe if the values were < -3 SD. The resulting Z-Score values were transferred to Microsoft Office Excel 2007 for generation of



percentages and statistical significance. Sorting the Z-Scores by cluster, age, sex and nutrition indicators, they were transferred to SAS 9.1 for Windows where univariate analysis was performed to generate means, standard errors (SE) and statistical significance for each of the anthropometric parameters under study. Statistical Packages for Social Sciences (SPSS) version 16.0 2007 was used to generate descriptive statistics, frequencies and means, and non-parametric values for the caregiver responses on behavior change and local capacity. It was also used to perform linear standardized multiple regression modeling and to compare means for feeding frequencies using both paired sample and independent sample *t*-test. Linear standard multiple regression modeling was used to assess the caregiver practices (feed Vitamin A rich food, frequency of attending post natal clinic, increased feeding frequency, frequency of washing hands, feed child on healthy snack, ensure family members participation in child care and take child to a health provider) to predict increase in weight (weight at current status), after controlling for the influence of age, marital status and level of education. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity. The model equation shown below was adopted to determine the weight attained at the current status variable.

$$y = a + \beta X_1 + \beta X_2 + \beta X_3 + \beta X_4 + \beta X_5 + \beta X_6 + \beta X_7 + e$$

Model equation

$X_i$  represents caregiver practices (in subsequent order as given in table 4) that predicted changes in weight at current status. A probability value of  $\leq 0.05$  was considered significant.

$$y = 16.04 + (1.34) + (-0.89) + (-6.87) + 1.58 + (-0.44) + 3.00 + 0.01 + 1.63 = \mathbf{12.72 \text{ Kg}}$$

### Ethical Approval

This research was approved by the National Commission for Science, Technology and Innovation (NACOSTI), Office of County Commissioner and County Education Director. Letters of intent explaining the reason for carrying out the research were sent to both Macalder and Kehancha District Hospitals, the intervention's host facilities. Through the letters, the researcher assured the collaborators of his guarantee to protect the anonymity and confidentiality of the participants and information given. The research also followed the guidelines for nutrition assessments, data collection, analysis and interpretation in Kenya. These included seeking written and verbal consent from the caregivers of the children prior to taking anthropometric measurements.

## RESULTS

### Characteristics of the respondents

The mean age at recruitment for children on the intervention was ( $22.3 \pm 1.3$  months) and comparison children were ( $22.2 \pm 1.1$  months). At current status the mean age for the two groups (children on the intervention and the comparison children) were

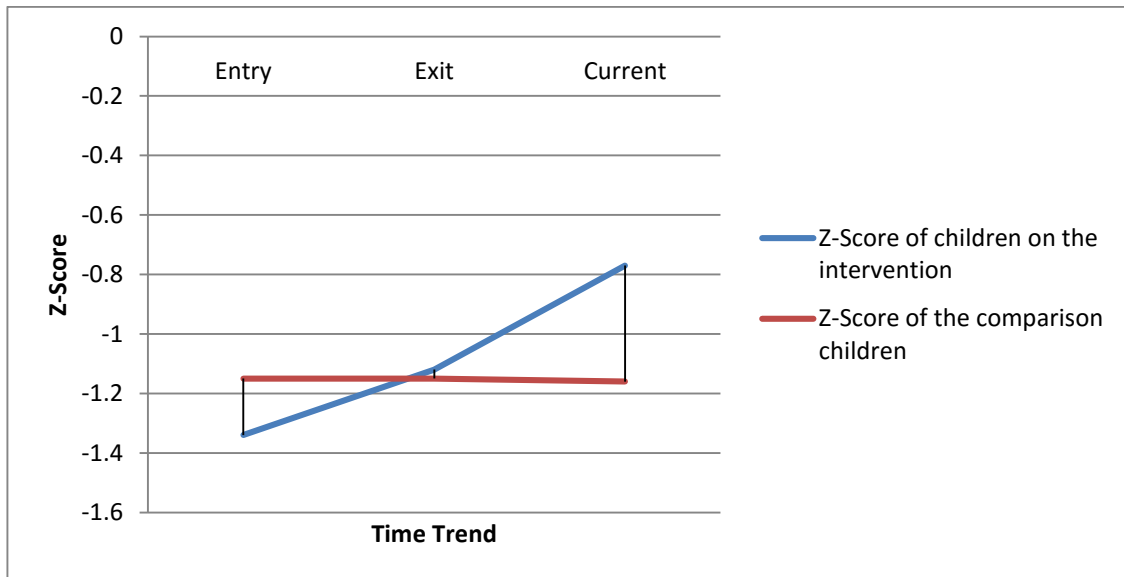
28.5±1.0 and 27.7±1.2 respectively. The mean WAZ for the comparison children (-1.15±0.10) at PDI was higher than that of the PD children on the intervention at entry (-1.34±0.09). However, at current status, WAZ was greater for children on the intervention group (-0.77±0.09) than their corresponding counterparts (-1.13±0.11) and statistically significant at ( $P=0.014$ ). With regard to gender, there was no significant difference ( $P>0.05$ ) with more females (58.5% and 57.4%) belonging to both the group for children on the intervention and comparison groups than males (41.5% and 42.6%), respectively.

More caregivers for children on the intervention (66.7%) were young mothers aged 18 to 30 years, and 88.5% had primary education with only 11.5% holding secondary education. None of the caregivers in the intervention group attained post-secondary education. Similarly, 75.3% of the comparison groups were aged 18-30 years. Like their intervention group counterparts, 80.1% had primary education with only 6.5% attaining secondary education. However, unlike all caregivers for the children on the intervention who had at least primary education 13.4% of these mothers had not attained any level of education.

### Rehabilitation sustenance

At entry, 18.9% children on the intervention had moderate underweight while 43.4% had mild underweight. At current status though, 3.8% had moderate underweight and 34.0% had mild underweight. For the comparison children, 13.2% and 49.1% had moderate and mild underweight at entry. However, at current status, 3.7%, 7.4% and 44.4% had severe, moderate and mild underweight, respectively. Indeed, for children on the intervention there was a statistically significant increase in WAZ from graduation ( $M= -1.13$ ,  $SD= 0.71$ ) to current status ( $M= -0.77$ ,  $SD= 0.68$ ),  $t(52) = -3.355$ ,  $P < 0.01$  (two tailed). The mean increase in WAZ was 0.36 with a 95% confidence interval ranging from 0.57 to 0.14. In addition, the magnitude of the difference in the means (mean difference = 0.36, 95% CI: 0.57 to 0.14) was very large (eta squared=0.17) indicating a big size effect.

The increase in mean WAZ of the children on the intervention was progressive and statistically significant from entry through exit, graduation and current status as shown in figure 2. Weight-for-Age increment between exit and current status was nearly twice the increment between entry and exit stages of the PD Hearth intervention, an indication of sustained rehabilitation. The rate of rehabilitation sustenance was dependent on the age, gender and the community where the intervention was situated.



**Figure 2: Gradient of WAZ at Entry, Exit and Current Status (bars represent SD)**

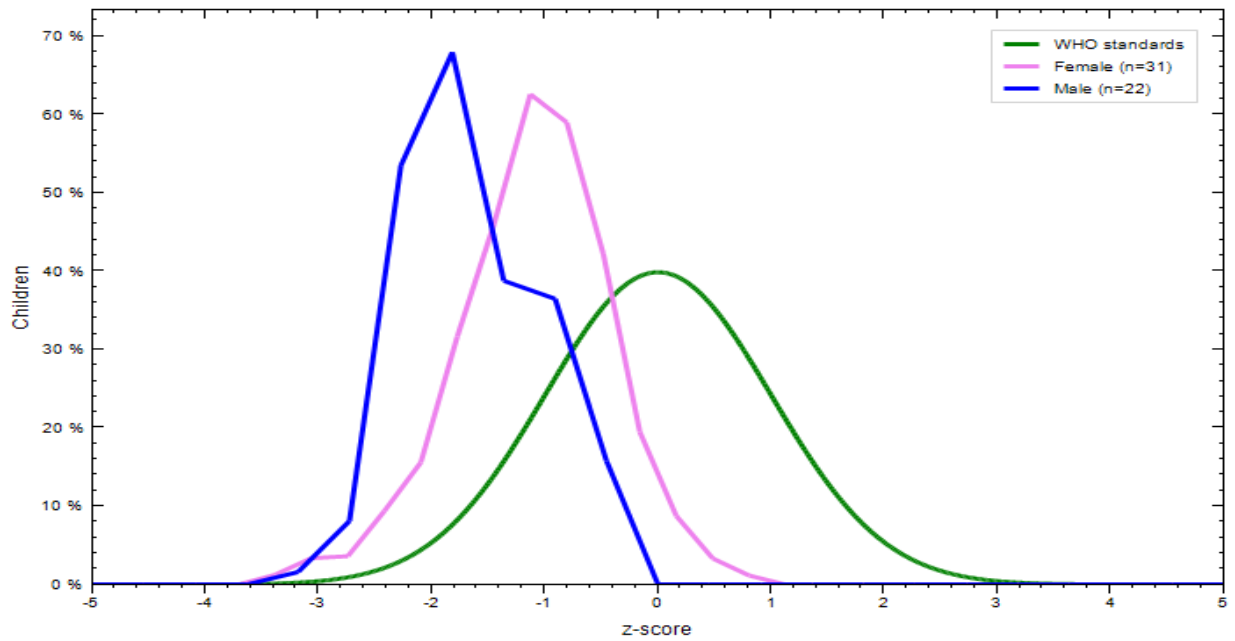
### Rehabilitation sustenance across age categories

At current status, majority of the children on the intervention (12-24 months age category) had attained normal nutrition status for underweight, but majority of the comparison children had mild underweight and were at risk of moderate acute malnutrition (Table 1). For the children on the intervention, there was significant difference in mean WAZ at entry, graduation and at current status ( $P=0.023$ ). Also, the mean WAZ at current status was greater than at graduation, an indication of sustained efforts by the caregivers. Similar results were noted in age categories 6-12 months, 24-36 months and 36-48 months for the children on the intervention. However, for the comparison group, apart from the 24-36 months age category, WAZ was lower at current status, an indication of deterioration in their nutrition status.

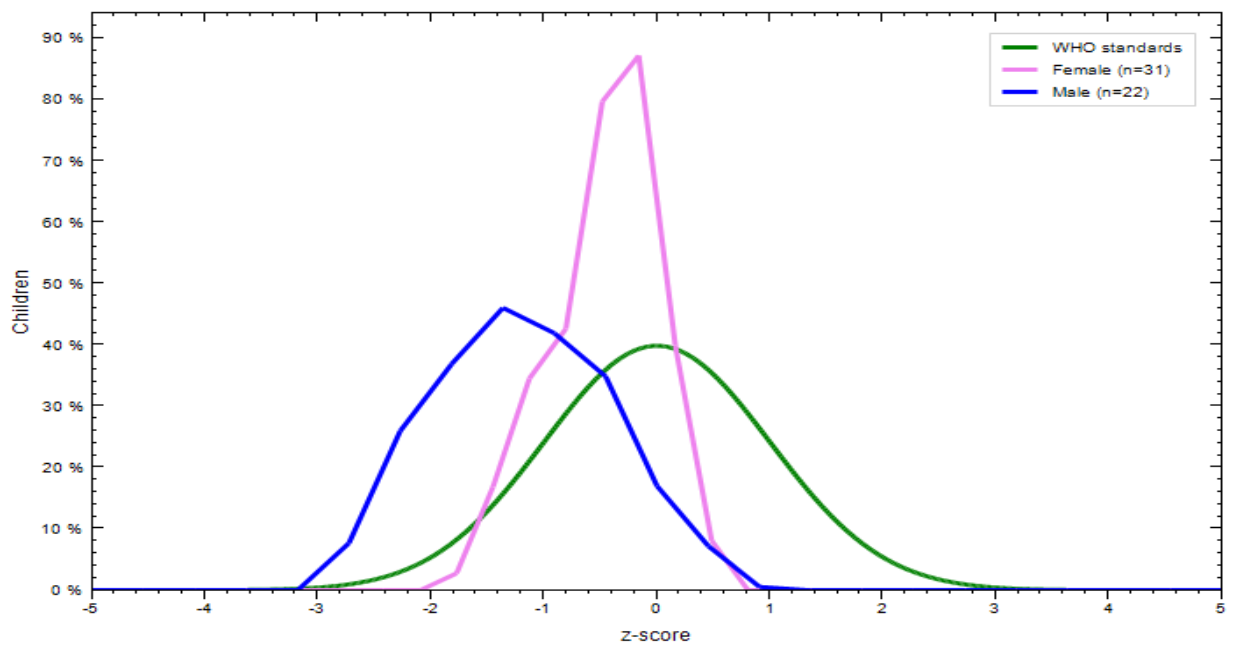
### Rehabilitation sustenance by gender and WHO Reference Standards

Female children recorded gains in WAZ for both the children on the intervention and comparison groups, but the male children on the intervention group had the highest improvement in WAZ after graduation (Table 2). Figure 3 and 4 show the difference, by gender, in WAZ of the children on the intervention from the WHO reference standards at graduation and current status. At graduation, more than 60% of both males and females were still substantially shifted to the left of the distribution curve for WAZ compared to the reference population. But more males (68%) were shifted too close to -2 scores than females (62%) who were concentrated close to -1 scores. At current status, few males (44%) were slightly shifted to the left of the distribution curve for WAZ compared to the reference population (close to -1 score). On the other hand, 88% of the females perfectly matched the distribution curve for WAZ compared to the reference population (close to 0 score). Thus, the families of children on the intervention sustained the nutrition outcome beyond graduation for both male and female children.





**Figure 3: Distribution of WAZ for children on the intervention by gender, graduation**



**Figure 4: Distribution of WAZ for children on the intervention by gender, current status**

### Rehabilitation sustenance in communities

With regards to communities (Table 3), at current status, children on the intervention had normal nutrition score for underweight (score higher than -1) in all the communities, except Kegonga with mild underweight children. Also, the children on the intervention had improvement in mean WAZ compared to entry and graduation, an indication of sustained progress.

### Practices which influence PD Health Outcomes

On average, meal frequency was significantly higher among the caregivers of children aged < 24 months and > 24 months at entry than at current status ( $5.9 \pm 3.5$  and  $4.4 \pm 2.2$ ;  $5.3 \pm 3.3$  and  $5.2 \pm 2.2$ ,  $P < 0.001$ ) respectively. Although almost equal proportions of children at entry and current status consumed food from 4 food groups, only 66% of the children at entry consumed vitamin A rich foods. On the contrary, 81.1% of children at current status were fed on vitamin A rich vegetables, and as many as 96.2%, 84.6% and 90.2% had increased feeding frequency, increased food variety and increased feeding frequency, respectively, after sickness. Thus, caregivers at current status fed more diverse foods and balanced diet on the average than at entry.

The caregivers' breastfeeding behaviors differed significantly at entry and at current status ( $P < 0.023$ ). At entry, only 13% of children were breastfed within an hour of birth and no caregiver exclusively breastfed. After the intervention, 60.4% of the caregivers with newborn children reported having fed their infants within an hour. Besides, 71.2% of the caregivers with infants 0-6 months reported having exclusively breastfed at current status.

Significant differences ( $P = 0.05$ ) were observed between caregiver hygiene practices at entry and at current status, with caregivers at current status exhibiting better hygiene practices during feeding. They were more likely to wash their hands after leaving latrine and before feeding a child and more likely to give healthy snack to a child. They were also more likely to involve their family members in ensuring better child care, attending postnatal clinics once in a month and taking a child to health providers. Although there were better hygiene practices beyond graduation, the number of children who had diarrhea within two weeks increased from 5% to 37.7% at entry and current status respectively. However, unlike at entry, most caregivers (42.3% vs. 2%,  $\chi^2 = 9.7$ ,  $P = 0.02$ ) took their children with diarrhea to hospital, with a few giving increased fluids and homemade Oral Rehydration Salt compared to current status.

Linear standardized multiple regression was further used to assess the caregiver practices which predicted increase in weight at current status after controlling for the influence of marital status and level of education (Table 4). Increased feeding frequency of the malnourished under-fives had the largest unique contribution to weight gain ( $\beta = -0.73$ ). The model equation was used to determine the best fit weight at current status which was found to be 12.72 kg. Thus, the regression model predicted the increased weight at current status as 12.72 kg based on the best fit line.

## DISCUSSION

The study was designed as a pipeline quasi experiment to determine the level to which PD Hearth enabled families to sustain rehabilitation at home on their own and identify the practices which influenced PD Hearth outcomes on children on the intervention. The study demonstrated that PD Hearth rehabilitated acute malnutrition during Hearth sessions and beyond graduation from the program.

Although children on the intervention were more underweight initially, they were treated sooner and had better nutritional status than the comparison children at current status. The PD Hearth intervention significantly reduced the amount of time that malnourished children remained underweight compared to malnourished children in the comparison group. This is an important finding, as poor nutrition is one of the major determinants of long term health status and is consistently linked to poor cognitive and development outcomes over the lifespan [1]. The current finding concurs with earlier studies that PD Hearth program is initiated to treat moderate and mild malnourished children [6]. Also, a previous program evaluation found that PD Hearth interventions sustain malnutrition recovery in infants (42.9 %) better than the comparison group (53.7%) [8].

With regard to gender, female children sustained rehabilitation better than their male counterparts for both the children on the intervention and comparison group. Recovery in the intervention group though was more distinct. The finding was consistent with the proposition that PD Hearth model successfully improves children's nutritional status [1]. Furthermore, the findings on the sustenance of the PD outcomes after the program implementation were positive for two studies, with both studies revealing sustenance of the PD outcomes [9,10].

Different levels of rehabilitation occurred for children on the intervention in most of the communities. This could be attributed to a number of reasons including influence by the study site, the receptiveness of the families of children on the intervention, the role of community leaders in the specific sites, the implementing Community Health Workers (CHWs) and the facilitation by the funding Non-Governmental Organization (NGO) [11].

Data from the NGO's food security indicators established that food security had become worse over the life of the PD Hearth project. For instance, households classified as "food insecure with severe hunger" increased from 23% in the baseline survey to 37% in the final survey [12]. In spite of this, there was a significant reduction in underweight cases in the 5 communities. Perhaps, this could be due to better caregiver practices learned during the Hearth sessions, especially, increased feeding frequency. An earlier study revealed that better intervention outcomes ( $P=0.003$ ) were identified in mothers who reported feeding children the recommended portion of green vegetables ( $P=0.001$ ) [13]. Correspondingly, children on the intervention with increased feeding frequency were more likely to meet their daily requirement than the comparison group [14, 15].

## LIMITATIONS

The study was conducted in 5 locations where the PD Hearth intervention had been rolled out. In each of the 5 locations two or more PD Hearth intervention sites had been initiated; however, only one intervention site was studied in each of the locations. This has the possibility of introducing non-systematic bias and low precision which will reduce the magnitude of association between the PD Hearth intervention outcomes and the predictors. Single stage cluster sampling was used to target a large enough sample which offset the loss of precision and improve randomization.

## CONCLUSION

The study demonstrated that PD Hearth intervention is suitable in rehabilitation of moderate and mild underweight in malnourished children. The intervention treated acute malnutrition during the Hearth sessions and sustained rehabilitation of the treated children an indicator that the caregivers of the children on the intervention had improved care practices. Increased feeding frequency was the most notable care practice which predicted increased weight in the rehabilitated children.

## RECOMMENDATIONS

Based on the results of the study a number of recommendations can be made. The Migori County government in collaboration with the Ministry of Health needs to scale up PD Hearth intervention to reverse cases of MAM and prevent SAM. The policy makers need to integrate the Hearth community model structure in nutrition education programs to prevent malnutrition in children. In addition, Ministry of Health and NGOs need to foster interventions that promote increase in feeding frequency and encourage nutrition education among mothers.

**Table 1: Nutrition Indicators for Children across Age Categories**

| <b>Variable/Age</b>     | <b>Intervention Group<br/>(n=53)</b> | <b>Comparison Group<br/>(n=54)</b> |
|-------------------------|--------------------------------------|------------------------------------|
| <b>6-12 Months (%)</b>  | 9.4 (n=5)                            | 5.6 (n=3)                          |
| Age (Mean±SE)           | 12.0±0.2                             | 10.6±0.7                           |
| WAZ at entry (Mean±SE)  | -1.45±0.13                           | -1.24±0.38                         |
| Graduation (Mean±SE)    | -0.93±0.15                           | -                                  |
| WAZ-Current (Mean±SE)   | -0.71±0.17                           | -1.49±0.47                         |
| <b>12-24 Months (%)</b> | 41.5 (n=22)                          | 25.9 (n=14)                        |
| Age (Mean±SE)           | 22.0±0.7                             | 18.6±0.9                           |
| WAZ at entry (Mean±SE)  | -1.33±0.17                           | -0.87±0.20                         |
| Graduation (Mean±SE)    | -0.81±0.17                           | -                                  |
| WAZ-Current (Mean±SE)   | -0.76±0.17                           | -0.99±0.29                         |
| <b>24-36 Months (%)</b> | 30.2 (n=16)                          | 44.4 (n=24)                        |
| Age (Mean±SE)           | 35.7±0.9                             | 29.6±0.7                           |
| WAZ at entry (Mean±SE)  | -1.26±0.14                           | -1.32±0.16                         |
| Graduation (Mean±SE)    | -1.03±0.24                           | -                                  |
| WAZ-Current (Mean±SE)   | -0.87±0.20                           | -1.08±0.14                         |
| <b>36-48 Months (%)</b> | 18.9 (n=10)                          | 24.1 (n=13)                        |
| Age (Mean±SE)           | 47.0±0.2                             | 37.9±0.9                           |
| WAZ at entry (Mean±SE)  | -1.38±0.24                           | -1.12±0.18                         |
| Graduation (Mean±SE)    | -1.07±0.23                           | -                                  |
| WAZ-Current (Mean±SE)   | -0.65±0.08                           | -1.30±0.21                         |

**WAZ:** Weight-for-Age Z-score; **SE:** Standard Error



**Table 2: Nutrition Indicators for Children by Gender**

| Variable/Gender        | Intervention Group | Comparison Group |
|------------------------|--------------------|------------------|
| <b>Female (n)</b>      | 31                 | 31               |
| Age (Mean±SE)          | 28.0±1.8           | 26.7±1.6         |
| WAZ at entry (Mean±SE) | -1.11±0.11         | -1.16±0.13       |
| Graduation (Mean±SE)   | -0.77±0.18         |                  |
| WAZ-Current (Mean±SE)  | -0.47±0.08         | -0.93±0.16       |
| <b>Male (n)</b>        | 22                 | 23               |
| Age (Mean±SE)          | 29.2               | 29.0±1.7         |
| WAZ at entry (Mean±SE) | -1.65±0.12         | -1.14±0.17       |
| Graduation (Mean±SE)   | -1.17±0.16         | -                |
| WAZ-Current (Mean±SE)  | -0.58±0.24         | -1.40±0.14       |

**WAZ:** Weight-for-Age Z-score; **SE:** Standard Error

**Table 3: Nutrition Indicators for Children in the Five Communities**

| Variable/Community              | Intervention Group | Comparison Group |
|---------------------------------|--------------------|------------------|
| <b>Maroo (n)</b>                | 12                 | 12               |
| Age (Mean±SE)                   | 32.1±3.0           | 28.1±3.1         |
| WAZ at entry (Mean±SE)          | -1.28±0.19         | -0.91±0.22       |
| WAZ at current status (Mean±SE) | -0.91±0.17         | -1.26±0.20       |
| <b>Nyakune (n)</b>              | 12                 | 12               |
| Age (Mean±SE)                   | 26.9±3.2           | 27.1±2.6         |
| WAZ at entry (Mean±SE)          | -1.11±0.09         | -0.57±0.22       |
| WAZ at current status (Mean±SE) | -0.45±0.10         | -0.93±0.26       |
| <b>Thimlich (n)</b>             | 10                 | 10               |
| Age (Mean±SE)                   | 29.2±2.6           | 23.8±2.8         |
| WAZ at entry (Mean±SE)          | -1.26±0.22         | -1.80±0.14       |
| WAZ at current status (Mean±SE) | -0.53±0.16         | -1.13±0.33       |
| <b>Ntimaru (n)</b>              | 9                  | 10               |
| Age (Mean±SE)                   | 28.2±4.1           | 29.4±2.3         |
| WAZ at entry (Mean±SE)          | -1.26±0.19         | -1.14±0.26       |
| WAZ at current status (Mean±SE) | -0.53±0.14         | -1.39±0.30       |
| <b>Kegonga (n)</b>              | 10                 | 10               |
| Age (Mean±SE)                   | 24.4±0.8           | 29.6±2.5         |
| WAZ at entry (Mean±SE)          | -1.79±0.26         | -1.12±0.15       |
| WAZ at current status (Mean±SE) | -1.42±0.29         | -0.96±0.17       |

**WAZ:** Weight-for-Age Z-score; **SE:** Standard Error

**Table 4: Linear multiple standardized regression model for caregiver practices**

| Model                                    | Unstandardized Coefficients |            | T     | Sig.        |
|--|-----------------------------|------------|-------|-------------|
|  | B                           | Std. Error |       |             |
| 1 (Constant)                             | 16.04                       | 1.63       | 9.84  | <b>.000</b> |
| Feed Vit A rich Foods                    | -1.13                       | .95        | -1.19 | <b>.240</b> |
| Frequency of Attending Post Natal Clinic | -.87                        | .37        | -2.34 | <b>.025</b> |
| Increased Feeding Frequency              | -6.62                       | 2.30       | -2.87 | <b>.007</b> |
| Frequency of Washing Hands               | 1.40                        | .62        | 2.25  | <b>.031</b> |
| Healthy Snack                            | -.37                        | 1.03       | -.36  | <b>.723</b> |
| Family Members Participation             | 2.63                        | 1.05       | 2.51  | <b>.017</b> |
| Take Child to Health Provider            | .009                        | 1.58       | .006  | <b>.995</b> |

Dependent variable: Current Weight (P<0.05)

B: Beta; T: t-test

**Table 5: Caregiver practices at entry and current status**

| Practices                       | Entry (%) | Current (%) | Chi-square | P values |
|---------------------------------|-----------|-------------|------------|----------|
| Hand washing                    | 16.0      | 90.6        | 6.1        | 0.01     |
| Healthy snack                   | 41.4      | 80.8        | 35.9       | 0.01     |
| Family participation in care    | 76.3      | 85.7        | 4.8        | 0.03     |
| Attending postnatal clinics     | 31.1      | 64.7        | 4.1        | 0.01     |
| Taking child to health provider | 93.8      | 43.2        | 14.7       | 0.04     |

(P&lt;0.05)

## REFERENCES

1. **Le Roux MI, Le Roux K, Comulada SW, Greco ME, Desmond AK, Mbewu N and JM Rotherum-Borus** Home Visits by Neighborhood Mentor Mothers Provide Timely Recovery from Childhood Malnutrition in South Africa: Results from a Randomized Controlled Trial. *Nutrition Journal*. 2010; **9**: 1-10.
2. **United Nations Children's Fund (UNICEF)** Tracking progress on child and maternal nutrition: a survival and development priority. Unicef.org. 2009: 1-9.
3. **Bentley EM, Wasser MH and MH Creed-Kanashiro** Responsive Feeding and Child Under nutrition in Low and Middle Income Countries. *The Journal of Nutrition*. 2011; 501-07.
4. **Kenya Demographic Health Survey** Nutrition of Women and Children. Kenya National Bureau of Statistics 2008-09; 141-158.
5. **Kenya Health Information System (KHIS)** Nutrition: Number of Children Underweight in CWC by Gender. 2014.
6. **McNulty J and CORE Group** *Positive Deviance/Hearth Essential Elements: A Resource Guide for Sustainably Rehabilitating Malnourished Children (Addendum)*. CORE Group Publications, Washington D.C. 2005: 4-56.
7. **Piroska A and B Bullen** The Positive Deviance/Hearth Approach to Reducing Child Malnutrition: Systematic Review. *Tropical Medicine and International Health*. 2011; **16**: 1354-1366.
8. **Sethi V, Kashyap S, Aggarwal S, Pandey R and D Kondal** Positive Deviance Determinants in Young Infants in Rural Uttar Pradesh. *Indian Journal of Pediatrics*. 2007; **74**: 594-595.
9. **Nti AC and A Lartey** Effect of Caregiver Feeding Behaviors on Child Nutritional Status in Rural Ghana. *International Journal of Consumer Studies*. 2007; **31**: 303-309.
10. **Peacock S, Konrad S, Watson E, Nickel D and N Muhajarine** Effectiveness of Home Visiting Programs on Child Outcomes: A Systematic Review. *BMC Public Health*. 2013; **13**: 1-14.
11. **McNulty J and ES Pambudi** Finding and Lessons Learned: An In-Depth Assessment of the Large Scale Implementation of PD/Hearth in Indonesia Funded by USAID Food for Peace. 2008b; 12.
12. **World Vision** Food Security End Phase Report. Nyatike IPA Reports. 2014; 34-39.



13. **Parvanta CF, Thomas KK and KS Zaman** Changing Nutrition Behavior in Bangladesh: Successful Adaptation of New Theories and Anthropological Methods. *Ecology of Food and Nutrition*. 2007; **46**: 221-244.
14. **Marsh RD, Schroder GD, Dearden AK, Sternin J and M Sternin** The Power of Positive Deviance. *Education and Debate*. 2009; 331.
15. **Marsh D, Pachon H and D Schroeder** Design of a Prospective, Randomized Evaluation of an Integrated Nutrition Program in Rural Viet Nam. *Food and Nutrition Bulletin*. 2002; **23**: 36-47.