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The Effectiveness of Positive Deviance Hearth (Pos Gizi) to Improve Malnourished Children in Urban Surabaya, Indonesia

Efektifitas Positive Deviance Hearth (Pos Gizi) untuk Perbaikan Anak Kurang Gizi di Perkotaan Surabaya, Indonesia

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ABSTRACT

Background: Positive Deviance Heart (PDH) focuses on processes identifying affordable, acceptable, and sustainable practices used in communities with limited resources. One of PDH's goals is to prevent malnutrition in children by changing societal norms regarding parenting behavior, feeding practices, and health care behavior.

Objectives: This study aimed to determine the effectiveness of PDH implementation in urban areas by assessing nutritional status alteration and changes in child feeding practices.

Methods: This quantitative study with a descriptive-analytic approach used secondary data from a three-month PDH intervention conducted by Wahana Visi, Indonesia. Locations and participants were determined by a purposive sampling method. Twenty-nine (29) participants from three urban villages in Surabaya were involved. Data analysis was performed using frequency distribution, ANOVA, and Chi-square test (95% Confidence Interval).

Results: The PDH implementation in Simokerto Sub-district did not significantly improve the children's nutritional status. Changes in child feeding practices during the Hearth did not significantly affect children's nutritional status ($p>0.05$). There were differences ($p<0.05$) in Z-score alteration based on the time of weighing with or without considering the age groups and the children's residence ($p<0.05$).

Conclusions: The three-month PDH sessions in the Simokerto Sub-district have not been effective in increasing the target of nutritional status. Changes in child feeding practices were not associated with increased children's nutritional status. Based on the time of weighing, the PDH's intervention periods can improve the target of nutritional status.

INTRODUCTION

The problem of malnutrition in Indonesia is still a government concern that must be resolved immediately. In order to reduce child mortality and improve the nutritional status of children according to the objectives of the Sustainable Development Goals (SDG)[1], joint efforts should be made to address the determinants factors underlying malnutrition, which include household food insecurity, inadequate feeding practices, and care, and an unhealthy household environment[2]. Infant and Young Child Feeding (IYCF) is one of the implementations of the Global Strategy for Infant and Young Child Feeding, which recommends IYCF gold standards covering early breastfeeding initiation (IMD) for newborns; giving breast milk (ASI) exclusively from birth to 6 months old; provision of complementary food for breast milk (MP-ASI) starting at the age of 6 months; and continue breastfeeding until the child is 2 years old or more[3]. It is estimated that mortality in children under 5 years can be reduced by up to 15% if access to evidence-based nutrition interventions covers 90% of the population[4]. An intervention strategy at the community level certainly requires support from various parties, from the government and the community to other stakeholders' implementation[5].

Derek Headey et al. estimated that the conditions of the COVID-19 pandemic would exacerbate child malnutrition due to decreased household income, reduced accessibility, and affordability of nutritious food[6]. Based on SSGI data for 2022, the prevalence of under-five children with malnutrition was 17.1%, an increase of 0.1% from 2021 and a rise of nearly 1% from

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2019[7,8]. This condition is a warning sign of an increasing chronic nutritional problem[9].

Positive Deviance (PD) is a "strength" or "asset" based approach based on the belief that in every society, there are individuals who have particular habits and behaviors that enable them to find ways to prevent malnutrition, compared to other members of society who have the same resources and face the same risks[5,10]. Positive Deviance Hearth (PDH) is a manifestation of the implementation of Hearth with a PD approach, which identifies the main challenges in the form of positive deviation behaviors as prevention of nutritional problems by learning and practicing new behaviors in terms of food preparation, feeding, hygiene behavior, and child care[5]. These activities allow the family to maintain the weight gain that has been done. Implementation of Hearth with the PD approach aims to restore the condition of malnourished children, independently maintain good nutritional status of children in their own homes, and prevent malnutrition of infants by changing community norms regarding parenting behavior, child feeding, and health-seeking behaviour[5].

The Surabaya City Government, in collaboration with Wahana Visi Indonesia as a non-governmental organization and Universitas Airlangga (UNAIR), held a Hearth with a PD approach in the Simokerto sub-district. The criteria for participants in this activity were toddlers with undernourished status as indicated by weight for age below -2 SD. In the Hearth activities, parents or caregivers are involved with the aim that after the Hearth activity is complete, the family can practice the positive behaviors learned together. The core of the Hearth activities is to adopt positive deviant family behavior to be applied to families who have children with poor nutritional status. Families with positive deviations are families with less economic status but have toddlers with good nutritional status. Positive behavior, used as educational capital, results from observations made with the people involved. Other observations were also related to the environmental conditions in which toddlers grow, which was carried out using the transect method (area search). The results of the observations will be used as capital in conducting education and counseling for related mothers and toddlers[9,11,12].

Implementation of Hearth is a form of collaboration between local governments, universities, and non-governmental organizations[10]. The division of roles in the implementation of the Hearth involves all layers, starting from the sub-district government, which mobilizes and provides facilities for implementing the Hearth, as well as providing instructions for implementing the Hearth to the Integrated Service Post (*Posyandu*) cadres[12]. Wahana Visi Indonesia (WVI) and Universitas Airlangga (UNAIR) provided financial support, conducted documentation, and liaised with various related partners[11]. As a provider of public health services, the Public Health Centers (Puskesmas) conducts education, monitors children's growth in monitoring activities with students, and operates screening of infants and toddlers[11]. The roles of cadres in the Hearth are monitoring the Hearth, fostering the Hearth, doing documentation, and helping to prepare food during the implementation of the Nutrition Post[12]. The direct involvement of mothers of toddlers has an essential role as beneficiaries and direct benefactors to toddlers, such as by caring for and feeding their children, learning materials and skills from the Hearth, working together, and reminding fellow mothers of toddlers (WVI)[10].

This study aims to analyze the effectiveness of the Hearth activities carried out in the Simokerto sub-district by looking at the differences in Z-scores of body weight for age (WAZ) at the pre-intervention, post-intervention, and during follow-up. Also, the researcher intends to examine the relationship between alterations in feeding practices and changes in children's nutritional status.

METHODS

This study used secondary data from a three-month intervention conducted by Wahana Visi Indonesia with technical support from Universitas Airlangga through the Amerta Kasih program in Simolawang, Sidodadi and Tambakrejo Villages, Simokerto District, Surabaya City, East Java Province, Indonesia. This activity was carried out from August to October 2022. Determining the research target locations was carried out before the implementation of the Hearth by using situation analysis through reports on the prevalence of undernutrition and under-fives published by the Surabaya City Health Office in 2019. The Simokerto sub-district was chosen as the target area because the Simokerto sub-district had the highest population density, with a population of 37,132.05 people/km^2. This population density went hand in hand with the nutritional status of toddlers, according to the Surabaya City Health Office in 2019, which showed undernourishment of 10.64 - 10.85% of the total population. The prevalence of wasting toddlers (height for weight) in the Simokerto sub-district was 4.57 - 7.29%. Therefore, this place was chosen.

Using a purposive sampling method, the researchers chose the sub-district with the largest population, namely Simokerto Sub-district, from a total of 31 sub-districts in Surabaya. In addition, a Simolawang Health Center in Simokero Sub-district oversaw Sidodadi Village, Tambakrejo Village, and Simolawang Village. In this study, the 37 toddlers selected for analysis were determined through a purposive sampling process by first weighing the toddlers' weight in the Integrated Service Post (*Posyandu*) in Sidodadi Village, Simolawang Village, and Tambakrejo Village.

Investigating positive deviation (PD) behavior by WVI was conducted through in-depth interviews with families in the middle to lower economic levels based on the region's economic status and had children with good nutritional status before the hearth sessions. Hearth sessions begin with health education by facilitators from the health center, cooking demonstrations, and eating together for the first 12 days with a target of increasing body weight by 200 grams. After the 12th day of the intervention, activities were replaced with a follow-up period up to the 90th day with a target of increasing

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body weight on day 30, 400 grams and increasing body weight on day 90, 900 grams. Prior to the first day of the intervention, weight was measured, eating habits assessed, and an assessment of the health services received by the toddlers. The data analyzed included growth assessment data, changes in feeding behavior, and perceptions of mothers/caregivers. This research used ethical permission from Universitas Airlangga Surabaya Number 448/HRECC.FODM/VII/2022.

Growth Assessment

Assessment of nutritional status was carried out based on weight gain according to the target of the heart program and nutritional status based on the Z-score of body weight for age obtained from the results of body weight measurements by volunteers. Weighing was carried out at the beginning of the intervention, day 10/12 (as the end of the intervention), and the follow-up period, namely day 30, day 60, and day 90, by trained volunteers using digital scales facilitated by WVI. The weight monitoring data was then used to determine the Z-score of body weight for age (WAZ). The results of the Z-score for weight for age (WAZ), which were less than -3.00 standard deviation (SD), were included in the category of low weight (BB), the Z-score for Weight/Age is -3.00 to less than -2.00 SD including the underweight category and -2.00 to +1 SD including the normal weight category.[13]

Assessment of Changes in Feeding Behavior

Data were taken from the results of focus group discussions (FGD) and interviews with trained volunteers using a child feeding practice questionnaire to assess changes in feeding behavior. The questionnaires included feeding frequency, amount, texture, variety of food, responsive active feeding, and practice of cleanliness according to the list of PMBA assessment questions[14]. It aligned with the recommendation of infant and young child feeding practices World Health Organization (WHO)[15]. Then, the alterations in each of these indicators were identified as changes in feeding practices carried out before and after the intervention.

Perceptions of Mothers/Caregivers

Assessment of mothers' perceptions was carried out by analyzing data on the expectations and concerns of mothers/caregivers taken from the results of focus group discussions (FGD) by trained volunteers regarding the implementation of Hearth on the 60th day. The expectations and concerns are then grouped into statements of mothers/caregivers regarding implementing PDH to improve the nutritional status of the children they care for.

Statistical Analysis

Descriptive analysis was used to determine the distribution frequency of changes in nutritional status and perceptions of mothers/caregivers towards PDH activities. The characteristics of the children at enrolment, such as age, sex, and place of residence, were explored based on the child's age group. Analysis of variance (ANOVA) was performed to compare nutritional status (Z-score) at the start of the intervention, day 10-12, day 30, day 60, and day 90, with each age group of child participants. The average Z-score weight/age (WAZ) changes over time by age group, and residence location were presented in plot graphs. The chi-square analysis was used to determine the relationship between alterations in feeding practices and changes in children's nutritional status.

Number of Participants

The number of participants in this study was 29 children with their caregivers. Of the 37 children in the Simokerto sub-district, 8 participants could not be assessed because 3 of them had moved their place of residence, 1 child had a severe illness that required therapy for the disease, 1 child had no weight data at the end of the intervention, and 3 children did not have feeding data.

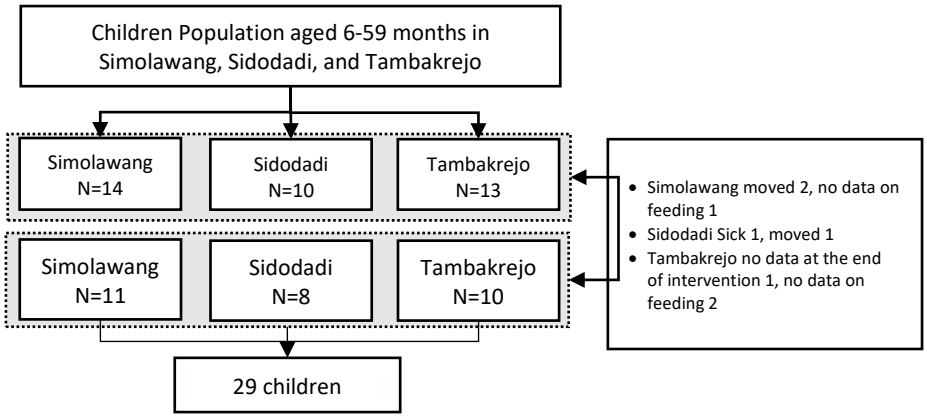

Figure 1. Number of Hearth participants in the Integrated Service Post (Posyandu) in Sidodadi Village, Simolawang Village, and Tambakrejo Village, Surabaya, Indonesia

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RESULTS AND DISCUSSION

Table 1 describes the number of toddlers involved in the Hearth sessions held in Simolawang Village, Sidodadi Village, and Tambakerjo Village. Toddlers involved in Hearth activities have assessed their nutritional status and are declared fit to participate in Hearth activities for 12 days of intervention and 3 months of monitoring. Out of 29 toddlers involved in Hearth activities, the gender distribution was 12 boys and 17 girls. Based on age classification, it was found that the majority of male toddlers came from the 24-35 month age group, namely 53.3%. Meanwhile, most female toddlers came from 12-23 months, namely 83.3%. Based on the classification by village, it was found that the percentage of villages with the highest number of toddlers involved was Simolawang, with 50%. Meanwhile, two other villages, namely Sidodadi and Tambakrejo, each contributed 25% of the toddlers participating in the Hearth activities.

Table 1. Characteristics of the children in Integrated Service Post (Posyandu) in Sidodadi Village, Simolawang Village, and Tambakrejo Village who follow Positive Deviance Heart (PDH)

Variables	Total N=29	Age Group			
		6-11 Months	12-23 Months	24-35 Months	36-60 Months
		n=4	n=7	n=17	n=4
Sex					
Male	12	50.0%	16.7%	53.3%	25.0%
Female	17	50.0%	83.3%	46.7%	75.0%
Village(s)					
Simolawang	11	50.0%	50.0%	33.3%	25.0%
Sidodadi	8	25.0%	0.0%	40.0%	25.0%
Tambakrejo	10	25.0%	50.0%	26.7%	50.0%

This behavioral investigation resulted in several positive deviant behaviors, namely: 1) The family provided a *variety of food* with complete side dishes in the form of animal protein, eggs, vegetables, and staple foods; 2) Parents applied the *Parenting Pattern of Children* who were not given snacks and the father took turns caring for the child with the mother; 3) Parents accustomed children to live a *Clean Life* by constantly washing their feet before getting into bed and boiling refilled water before giving it to children; 4) Parents paid attention to the child's *Health Patterns*. When the child was sick, the children would be given shallots first, and the next day, they would immediately be taken to a health care facility.

Growth Assessment

The 90-day weight gain was insufficient to achieve the expected weight gain target at the Hearth intervention. Improved nutritional status only occurred in 10.3% of children, with only 3 children achieving the target weight gain of >900 grams on the 90th day. The increase in children's weight on days 10/12 looks promising, as shown in Figure 2. The graph shows an increase in the prevalence of children with normal weight and a decrease in the number of children with very underweight.

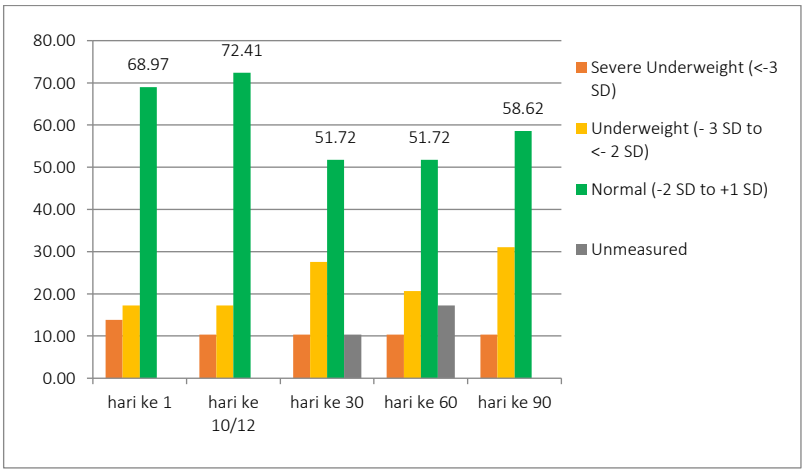

Figure 2. Results of monitoring weight and nutritional status weight by age from day 1 of intervention to day 90 in Integrated Service Post (Posyandu) in Sidodadi Village, Simolawang Village, and Tambakrejo Village

In the first 1 month, to be precise, two weeks of follow-up with the expectation of starting the adoption of PD behavior in their respective homes, there was a decrease in the number of children with normal weight. The same thing also happened on the 60th day, where the prevalence of toddlers with normal weight did not increase from the previous 1-month interval. This indicates that the child's weight during the follow-up period is insufficient for catch-up growth to achieve normal nutritional status (Figure 2). Weight gain

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after 3 months is targeted at 900 grams as a passing criterion, with a target for the first 1 month of 400 grams and a target for weight gain for the second and third months, at least reaching 250 grams per month[11]. This inadequate weight gain resulted in not achieving the graduation target to catch up with growth, expecting to achieve normal nutritional status on day 90. Similar studies conducted in Ethiopia in 2016 and in rural Rwanda in 2021 showed that activity (PD /Hearth) is significantly related to reducing children with poor nutritional status[16,17]. Weight data for 3 children on day 30 and several 5 children on day 60 were not obtained because the toddler in question could not be present and was not at home, so data on weight gain could not be monitored during monitoring activities.

The proportion of children with malnutrition during follow-up (days 30, 60, and 90) showed higher values than the initial intervention and monitoring results at the end of the intervention, namely on days 10/12 (Figure 2). Analysis using a repeated measure ANOVA test with 95% CI was carried out to investigate further whether there were differences in children's nutritional status based on the time of weighing, namely before the intervention period (weighing 1), the period after the intervention (weighing 2), the follow-up period which includes the 30th day (weighing 3), the 60th day (weighing 4) and the 90th day (weighing 5). The repeated measure ANOVA test assumes the data has the same variance with a Sphericity value > 0.05. The test results on the Z-score of weighing results carried out five times show a sphericity value of 0.171.

Table 2. Analysis of differences in children's nutritional status based on weighing time in Integrated Service Post (Posyandu) in Sidodadi Village, Simolawang Village, and Tambakrejo Village

Source	Type III Sum of Squares	df	Mean Square	F	p-value
time	1.370	4	0.343	6.969	<0.001*
time * age_group	1.208	12	0.101	2.048	0.042
time * wards	1.960	8	0.245	4.985	<0.001*
time * age group * kelurahan	3.207	20	0.160	3.261	<0.001*
errors(time)	2.163	44	0.049		

Repeated measure ANOVA test; *) Significant if p-value <0.05; df (degree of freedom)

The results of the ANOVA test showed differences in changes in the Z-score based on the time of weighing with or without considering the distribution of age groups and the location where the children lived (Table 2). Estimating the Z-score for weight/age in all participants based on the time of weighing (A) and the estimation of the marginal means Z-score based on the age group, it was found that there was a tendency to decrease the Z-score at the time of the first monitoring, namely day 10/12 for the group aged 6-11 months, while at the same time, other age groups experienced a trend of increasing Z-scores. As has been reported in a similar study in Bangladesh in 2021, the participation of children at a younger age, especially at the age of 6-11 months, had a better impact compared to later ages.[18]. During the thi[rd] weighing, namely the 30th day, exactly 2 weeks after the family did not receive intervention in the form of education, cooking demonstrations, and eating together, there was a tendency to decrease the Z-score in all age groups, in all sub-districts (Figure 3 B and C). The decrease in the Z-score occurs because the child does not achieve the targeted weight gain. Risk factors that affect the decline in children's nutritional status include lack of food intake and the presence of disease[19]. In addition, parenting styles lacking in supporting children to adopt good eating patterns also affect children's nutritional status[20]. However, this study could not analyze the causes of weight loss due to the limited data available. The tendency of the Z-score to increase again on day 60 (weighing 4) and day 90 (weighing 5) only occurred in the 12-23 month age group but not in other age groups. Based on the location of residence, it was found that the weighing results in the Sidodadi sub-district showed a decrease in the Z-score of Weight/Age on the 30th day of weighing, then increased on the 60th day of weighing, but then decreased again on weighing on the 90th day (Figure 3C).

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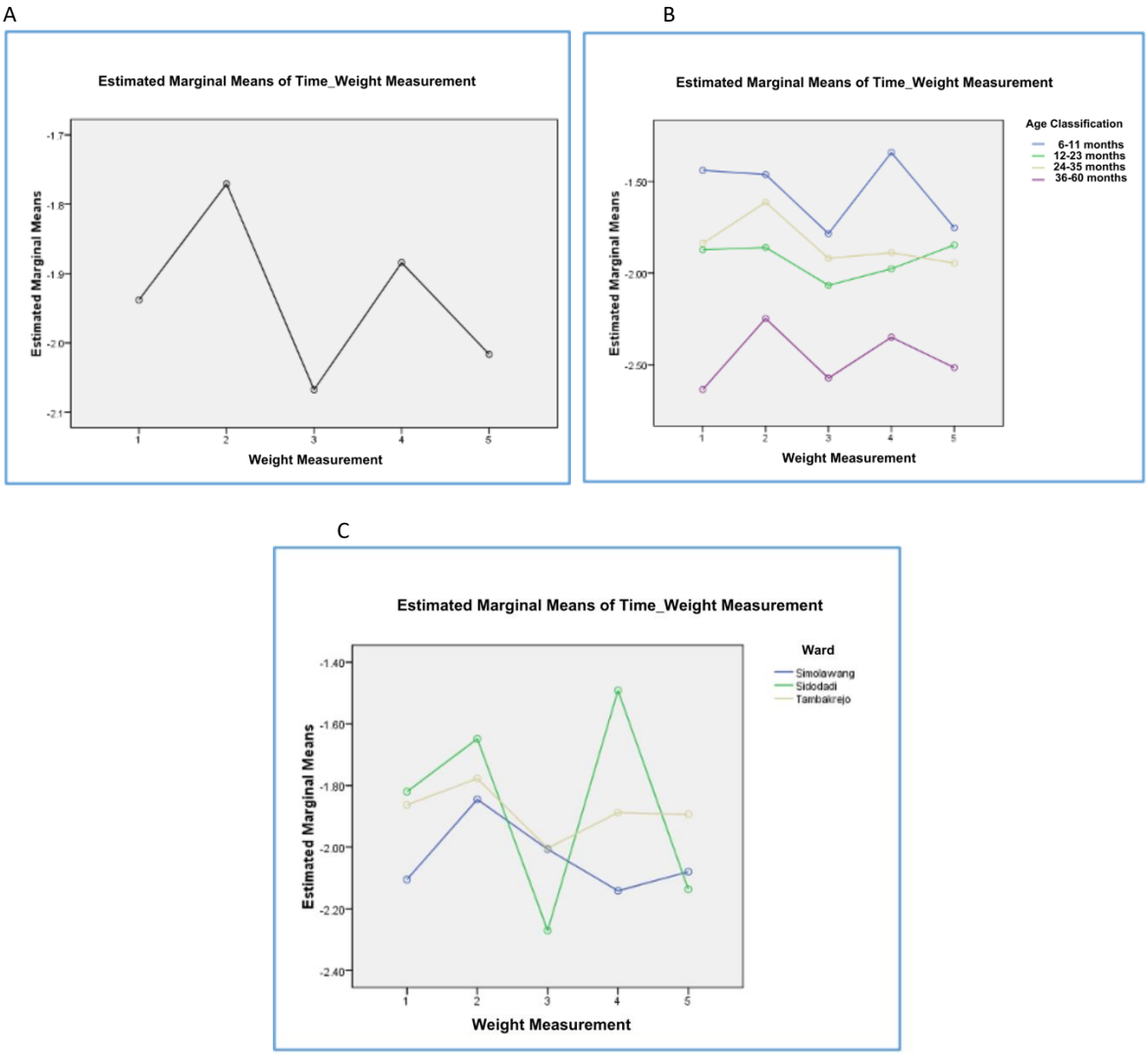

Description: (1: 1st day), (2: 10/12th day), (3: 30th day), (4: 60th day), (5: 90th day)

Figure 3. A) Graph of the mean Z-score plot of weight/age in intervention monitoring from weighing results; B) Graph of the mean Z-score plot of weight/age in intervention monitoring from weighing results by age group; C**)** Graph of the mean Z-score weight/age for monitoring interventions from weighing results based on the residential district

Weight gain during the intervention period looks more promising for the child's catch-up growth when compared to the results of weighing during the follow-up period. Improved nutritional status at a younger age shows better results than at later ages. It follows the results of previous studies, which show that intervention at an earlier age is more effective for nutritional growth and overall development.[18]. Implementation of positive behavior at the toddler's home during the follow-up period requires assistance in solving problems faced by the mother/caregiver of the toddler. It can be assumed from the results of the Z-score difference test based on weighing time with or without considering the distribution of age groups and location of residence (Table 2). At the third weighing, to be precise, on the 30th day, there was a decrease in the Z-score in all age groups and regions. The weighing on the 30th day results from the behavior implemented at the interval between the second weighing, namely the 10/12 and 3rd days. At that time, there were no extension meetings, cooking, and eating together as was done at the last time, namely between the first and second weighing. These results seem to differ from previous studies in Sulawesi after the 2018 earthquake, which showed that PDH could change negative behavior regarding eating behavior, personal hygiene, child care behavior, and health care behavior[21]. Another study in Ecuador 2017 also showed improvements in child feeding practices (IYCF) and Z-scores for weight/age after 12 days of intervention and a follow-up period of up to 6 months[22].

Assessment of Changes in Feeding Behavior

On the 60th day, monitoring and assessment of changes in child feeding behavior are carried out to determine what changes have occurred in child care after receiving health education, parenting, nutrient-dense menus, and examples of PD behavior that can be implemented at home. Changes in feeding practices according to PMBA recommendations include

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frequency, amount, variety, texture, responsiveness, and hygiene practices[15]. We present the data on whether or not there are improvements in infant and child feeding practices. Changes in child feeding practices were not statistically related to age group, neighborhood of residence, or child's nutritional status at the end of the PDH intervention (day 90) (Table 3).

Table 3. Changes in feeding practices of Positive Deviance Hearth participants in Integrated Service Post (Posyandu) in Sidodadi Village, Simolawang Village, and Tambakrejo Village

Questions: Is there any change in feeding practice after joining PD Heart?	Total n=29	Yes n=21 (%)	No n=8 (%)	p-value
Age group distribution				
6-11 months	4	19.0	0	0.451
12-23 months	6	19.0	25.0	
24-35 months	15	52.4	50.0	
36-60 months	4	9.5	25.0	
Village(s)				
Simolawang	11	28.6	62.5	0.228
Sidodadi	8	33.3	12.5	
Tambakrejo	10	38.1	25.0	
Weight/Age category on the 90th day				
Severe Underweight	3	14.1	0	0.140
Underweight	9	38.1	12.5	
Normal	17	47.6	87.5	

Chi-square test; *) Significant if p-value <0.05

Although changes in child feeding practices during this Hearth session did not show a significant relationship to children's nutritional status (p>0.05), efforts to change behavior in feeding practices should be continued, considering that changing behavior requires much time. Parents are the key to success in feeding and changing children's eating behavior[23]. Feeding children according to recommendations includes various factors, namely age appropriateness, frequency of feeding, amount of food given, the texture of food, variety or diversity of food ingredients, active responsiveness of children in feeding, and good hygiene behavior in preparing food, water sources, behavior wash hands before eating, and wash cutlery[24,25]. Recommendations and examples of food menus at Hearth should be presented according to the age group by considering the texture of the food and the variety of food ingredients. As shown in Figure 2B, the 6-11 month age group only experienced a tendency to increase Z-scores only at the fourth weighing and then decrease again at the fifth weighing (end of the intervention). If the menu recommendations are difficult to adopt in the 6-11 month age group, special modifications must be made for that target group. The 6-11 month age group has a different texture and amount of food than the older age group[15,24,26].

Increasing the variety of children's diets, especially the consumption of animal-source foods, needs to be considered considering its role as the best source of protein that children need[27–29]. Research results in 2020 show that the availability of diverse animal-sourced foods is out of reach for nearly 800 million people[29]. Socio-economic factors play a role in providing food for various children, given the affordability of foodstuffs, especially animal sources[30–34]. In conducting child-feeding interventions, it is essential to consider the diversity of children's diets and family socio-economic factors that significantly influence chronic malnutrition in children.[30,34–37].

Food consumption increased, from increasing the number of main foods eaten, from the number of mouthfuls from 2 to 3 spoons of the leading food to gradually increasing to 5 or even 10 spoons of rice. Some mothers regulate the amount of food for their children by setting the frequency of eating to increase the amount consumed. The amount of food consumed by children should pay attention to the recommendations for feeding infants and children according to age[15,38]. However, this study does not yet have data that is strong enough to monitor the amount consumed daily by children because there is no monitoring of daily food consumption, either 24-hour recall or other methods.

The support of people around, especially the family, by inviting children to eat together at family meal times, providing nutritious food for toddlers, and providing emotional support has a role that cannot be ignored in feeding.[15,39]. The eating behavior of children who are responsive to feeding is significant and can affect their nutritional status in the future[40]. It is hoped that it will improve the child's appetite through several efforts during the Hearth intervention, including presenting printed food in attractive shapes and sharing eating activities. It might be one of the supporters of the increase in body weight in the first 10-12 days of intervention when there was the activity of eating together, which they did not get in the following days (Figure 2). The mother/caregiver and family's commitment contributes to how children are cared for[41]. Parenting, including children feeding, should involve fathers with preferences for their children's food and their families[42].

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Perceptions of Mothers/Caregivers

Strengthening mothers'/caregivers' commitment to child feeding practices was carried out by assessing the data of expectations and concerns of mothers/caregivers who attended the 60th day of weighing. Data collection on the expectations and concerns of mothers/caregivers regarding the implementation of Hearth is aimed at strengthening the commitment of mothers/caregivers to improving the nutritional status of children together with the Hearth implementation program. We get the mother's high expectations for the child's weight gain, continued implementation of Hearth, and consulting services. Some mothers expected that there would be adjustments in the timing of Hearth sessions and the development of Hearth menus and activities. We obtained data from 23 mothers/caregivers of toddlers because the rest could not be present during the 60th monitoring day.

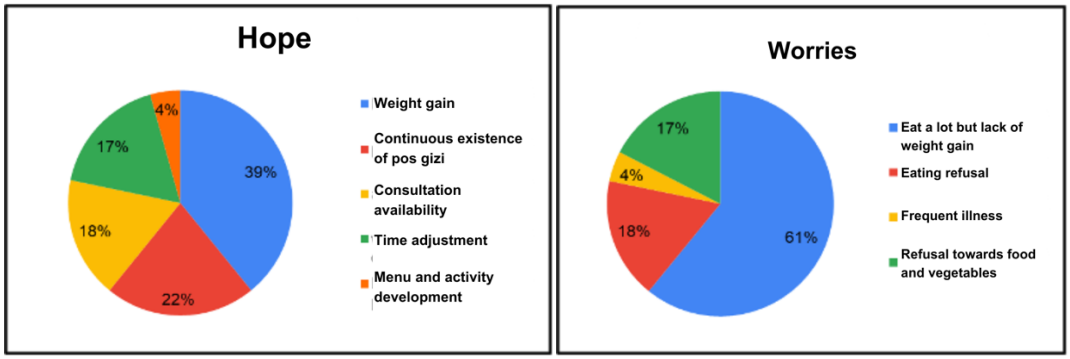

Figure 4. Expectations and concerns of mothers on the implementation of Positive Deviance Hearth in Integrated Service Post (Posyandu) in Sidodadi Village, Simolawang Village, and Tambakrejo Village

Figure 4 above shows that most mothers expect to gain weight for their children by attending PD Hearth and hope that PD Hearth can continue to be implemented in their area. As many as 18% expected consulting services during PD Hearth to make finding solutions to their feeding problems easier. Most of the mothers/caregivers seem to have the same concern; the child eats in large quantities but does not gain weight.

The trend of the Z-score based on the time the weighing was carried out showed a significant difference in the sub-district where the child lived ($p<0.001$), as visualized in Figure 3C. It reminds us that other factors contribute to children's growth: food security, sanitation, and clean water[43,44]. Environmental health and sanitation factors are essential in determining children's nutritional status related to recurrent infectious diseases[43,45]. Solid and liquid waste management at Hearth locations requires attention and intervention to support the success of a nutrition intervention program. The smell of solid and liquid waste in the alleys of residents' houses, which was smelled during visits and field observations, indicated a waste disposal system that was not optimal. Environmental pollution is one of the risk factors for malnutrition, which can lead to impaired absorption of nutrients, especially diarrhea[45,46].

Environmental and sanitation factors become limitations in the analysis and discussion of this study. In addition, this study did not explore monitoring data on children's food consumption in the form of 24-hour recall, Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ), acceptance of the menu served, quality of drinking water, and safe food serving methods.

The results of this study suggest that there should be attention to providing safe food for toddlers in the kitchen for cooking, a place to wash equipment, and the safety of food that is ready to be served. We also found that several toddlers experienced illness, especially coughs and colds, within one to two months. However, disease data and medical records related to diseases in children are not available.

Hearth interventions with joint feeding, as carried out on day 1 to day 10/12, need to be carried out at a later time with longer intervals so that mothers of toddlers are expected to adapt to the expected behavior changes more quickly. The assistance provided should be accompanied by childcare services so mothers can discuss problems with feeding their children at home. Increasing the role of cadres as companions needs to be strengthened, especially in overcoming mothers' concerns about caring for their children, both those directly related to feeding and co-morbidities in children. The preparation of an intervention strategy needs to consider the appropriateness of the intervention, especially in terms of preparing menus and recommendations for feeding children according to age groups. Utilization of maternal and child health (MCH) books can be considered as a medium of communication and promotion of feeding besides emphasizing its function in monitoring children's growth. Monitoring daily food consumption, both 24-hour recall and other methods, can make it easier to identify feeding problems and formulate recommendations, especially in urban areas with less economic status.

CONCLUSIONS

Hearth sessions in Simokerto District for 3 months have not improved the nutritional status of all targets. However, there were significant differences in Z-score changes based on the time of intervention, with or without considering the division of age groups and the location of the children's residence, especially on days

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10/12. Changes in feeding practices during the current Hearth program were not associated with changes in the child's nutritional status. It is expected that the results of this study will serve as material for developing a model for implementing Hearth in urban areas by considering the various potentials and problems we found.

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CONFLICT OF INTEREST AND FUNDING DISCLOSURE

All authors have no conflict of interest in this article. Wahana Visi Indonesia funded the Hearth sessions in the Simokerto Sub-district.

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