Effectiveness of the Positive Deviance Hearth Model in Enhancing Nutritional Status among Children in Kilifi County

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Abstract

BACKGROUND

Childhood malnutrition poses global developmental and health risks. Rabai sub-county, Kilifi County, Kenya, struggles with high rates of wasting and underweight children aged 6-59 months. The Positive Deviance Hearth Model, promoting local practices for improved child nutrition, has global potential but lacks exploration in Rabai. This study evaluates its impact, offering insights for evidence-based strategies against malnutrition and informing community interventions in comparable settings.

METHODOLOGY

This study employed a quasi-experimental design, four sub-locations from two different wards in Rabai Sub County were selected. Two sub-locations served as the intervention group with the Positive Deviance Hearth Model, while the other two acted as the control group. Baseline and end-line assessments were conducted to assess childhood wasting and underweight prevalence, analyzed using chi-square tests to compare nutritional status changes.

RESULTS

The baseline characteristics of the participants between the intervention and control groups were found to be remarkably similar. A total of 750 respondents were assessed, with 371 in the control group and 379 in the intervention group. Pre-intervention showed no significant difference in wasting (χ^2=0.54, df=1, p=0.46). Post-intervention, a substantial reduction in wasting was seen in the intervention group (χ^2=38.54, df=1, p<0.001). For underweight, no significant difference was found initially (χ^2=1.06, df=1, p=0.30), but a remarkable reduction in underweight was observed in the intervention group at the end-line survey (χ^2=35.78, df=1, p<0.001).

CONCLUSION

This study demonstrates the Positive Deviance Hearth Model's effectiveness in improving child nutrition, highlighting the relevance of context-specific interventions in addressing child malnutrition in similar regions

Keywords: Positive Deviance Hearth Model, Child Nutrition, Wasting, Underweight, Community-Based Intervention, Quasi-Experimental Study

Introduction

Malnutrition remains a formidable global challenge, especially among children aged 6-59 months, and its far-reaching consequences continue to undermine the well-being, and development of individuals as well as communities (1). The Positive Deviance Hearth Model, a community-based approach, has emerged as a promising strategy to address this complex issue. By focusing on the identification of local solutions within communities, this model empowers individuals and families to break free from the shackles of malnutrition (2). In Rabai

sub-county, Kilifi county, Kenya, where nutritional deficiencies persist, the Positive Deviance Hearth Model offers a beacon of hope.

In the realm of public health and nutrition, the Positive Deviance Hearth Model emerges as a beacon of hope, offering innovative solutions to address the pressing issue of childhood malnutrition (3). The Positive Deviance Hearth Model is a community-driven and participatory approach that taps into the wisdom and inherent potential of a community to address malnutrition (2). It seeks to identify local practices and behaviours that are effective in promoting nutrition, particularly among 6-59-month-old children. By examining the habits of caregivers whose children are thriving nutritionally despite challenging circumstances, the model unveils the "positive deviants" who hold the keys to improved nutrition. These caregivers then share their knowledge with their peers, fostering a collective commitment to nutritional improvement.

The Positive Deviance Hearth Model is relevant in nutrition due to its ability to harness existing community resources and knowledge, making it a cost-effective and sustainable approach (4,5). It empowers communities to take ownership of their nutritional well-being, fostering a sense of self-reliance (2). The model not only addresses immediate nutritional needs but also lays the foundation for lifelong health and development. As malnutrition remains a critical issue worldwide, regionally, nationally, and locally, the Positive Deviance Hearth Model stands as a beacon of hope in the fight against this formidable global burden (2,3,6).

Globally, malnutrition affects millions of children, resulting in stunted growth, impaired cognitive development, and a heightened vulnerability to diseases. According to the World Health Organization (WHO), nearly 45% of all child deaths are attributed to undernutrition, highlighting the severe impact of malnutrition on child mortality (1). The Sustainable Development Goals (SDGs) call for an end to all forms of malnutrition, underscoring the international community's commitment to addressing this pressing issue (7).

In sub-Saharan Africa, malnutrition remains particularly pervasive. The region grapples with a triple burden of malnutrition, including undernutrition, micronutrient deficiencies, and a rising prevalence of overweight and obesity (8). This complex nutritional landscape exacerbates the region's already significant health challenges, including a high burden of infectious diseases and limited access to healthcare resources (9).

Within Kenya, the issue of malnutrition persists, posing a substantial threat to the nation's development goals (10). According to the Kenyan Demographic and Health Survey, 2022, stunting affects approximately 26% of children under five years old, while wasting and underweight affect 4% and 11% of children, respectively (11). These figures highlight the urgency of addressing the nutritional needs of Kenyan children, and innovative community-based approaches like the Positive Deviance Hearth Model offer a promising solution.

Kilifi County, situated on the Kenyan coast, exemplifies the nutritional challenges faced by many Kenyan communities. Despite its natural beauty and cultural richness, the county grapples with high levels of malnutrition, affecting both children and adults (12). Understanding and mitigating the nutritional challenges within Kilifi County can have a broader impact, serving as a model for addressing malnutrition in similar settings across Kenya and beyond.

This study aimed to investigate the effectiveness of the Positive Deviance Hearth Model in enhancing the nutritional status of children aged 6-59 months by promoting high-nutrition-density foods in Rabai Sub County, Kilifi County. By embracing this community-driven approach, we seek to contribute to the

global effort to combat malnutrition and empower communities to take charge of their nutritional well-being. By focusing on nutritional educational intervention and community engagement, the study has the potential to enhance child nutrition, fostering better health, cognitive development, and overall well-being. Moreover, this research aligns with the Sustainable Development Goals, particularly Goal 2 (Zero Hunger) and Goal 3 (Good Health and Well-being), underlining its contribution to international efforts to improve child nutrition and reduce child mortality (7). In the context of Kilifi County, the study provides an opportunity to tailor interventions to the unique needs of the community, thereby offering a blueprint for addressing malnutrition in similar regions.

Materials and methods
Study setting
The study was conducted in Rabai sub-county, Kilifi county, Kenya, which is characterized by a diverse population and a mix of rural and peri-urban communities with predominant agrarian livelihoods. This setting was intentionally chosen due to its high prevalence of childhood malnutrition and unique socio-cultural and economic dynamics. The study aimed to assess the effectiveness of the Positive Deviance Hearth Model, a community-driven approach, in improving child nutrition. Rabai sub-county faces challenges related to food security, healthcare access, and hygiene practices that are directly relevant to child nutrition. Moreover, the study's specific focus on promoting nutritional education aligns with the local dietary habits and resource availability. Understanding this context is vital for tailoring effective interventions, making Rabai sub-county an ideal environment for evaluating the Positive Deviance Hearth Model's impact on the nutritional status of children aged 6-59 months. The study's findings have the potential to inform local public health policies and contribute to the broader discourse on child nutrition regionally and globally.

Study design
A pre-and post-test quasi-experimental study was conducted from October 15, 2020, to April 15, 2021, among 776 caregivers with children aged 6-59 months, with 370 caregivers drawn from the intervention site and 388 caregivers from the control site. The study targeted 4 sub-locations, in Ruma Ward and Mwawesa Ward. Two sub-locations were selected with Jimba, Mleji being the intervention arm while Bwagamoyo, Chisimani being the control arm. In the intervention arm, all caregivers of children aged 6-59 months were exposed to the intervention. The Positive Deviance Hearth (PDH) program, as outlined in World Vision's PD/Hearth program implementation manual, was executed. Respondents met daily for two weeks at the home of a local volunteer's mother. The health education sessions focused on various aspects of child nutrition, emphasizing the importance of exclusive breastfeeding for the first six months and continued breastfeeding with complemented feeding for up to two years, promoting dietary diversity through nutrient-dense foods, educating caregivers on hygiene and sanitation practices to prevent diseases that impact child nutrition, offering practical cooking demonstrations and recipes for nutritious meals, and instructing caregivers on appropriate child feeding practices. Subsequently, the participants were longitudinally monitored to assess the impact of the intervention on their nutritional status over time. in contrast, the control group were provided with nutritional counselling from Community Health Promoters as a placebo intervention, as long as it did not interfere with the study's ability to measure the effects of the intervention being tested. This approach ensured that participants in the control group received support or benefits related to their condition.

Study population

Study participants, consisting of children aged 6-59 months and their mothers or caregivers, convened daily for two weeks at the residence of a local volunteer. These volunteers, often community mothers, played a pivotal role in facilitating the program, contributing to the successful delivery of the PDH intervention. The exclusion criteria included individuals outside the specified age range, children with medical conditions impacting assessments, and those who did not have caregiver consent. These criteria ensure accuracy, minimize confounding variables, and prioritize ethical considerations and participant well-being.

Sample size determination

To determine the required sample size, the researchers utilized the Fleiss method sample size formula (13), thus; $n = (Z\alpha/2 + Z\beta)^2 * (p1(1-p1) + p2(1-p2)) / (p1-p2)^2$. The sample size per group (denoted as n) is determined assuming equal-sized groups. The significance level (represented as $Z\alpha/2$), commonly set at 1.96 for a 5% significance level, and the desired statistical power ($Z\beta$), typically 0.84 for 80% power, are key considerations. The effect size ($p1-p2$) is defined as 10%, aimed at reducing stunted growth caused by malnutrition. Using this formula, data was collected from 371 and 379 respondents in the control and intervention sites, respectively.

Sampling procedure

Rabai sub-county was chosen purposefully due to its high malnutrition rates. Two wards were then selected based on child malnutrition prevalence and community readiness. Ruruma was chosen as the intervention site, while Mwawesa served as the control site.

Within each of the two selected wards, two sub-locations were further purposively chosen to ensure that the sub-locations within each ward were comparable in the demographic and socioeconomic factors, allowing for a fair comparison between the intervention and control groups.

To reduce selection bias, random sampling was applied within the chosen sub-locations. This involved listing households with children aged 6-59 months and randomly selecting participants using a number generator.

By combining purposive selection at the ward and sub-location levels and random selection at the household level, this sampling technique aimed to ensure that the study's intervention and control groups were comparable and representative of the broader population in Rabai sub-county, Kilifi County. This approach allowed for a more robust assessment of the effectiveness of the Positive Deviance Hearth Model in improving the nutritional status of children in the selected areas.

Data collection

Data were collected through baseline and end-line surveys in both the intervention and control groups. Key demographic variables and household characteristics were collected. The nutritional status of the children was assessed, and information on wasting and underweight prevalence was recorded.

Intervention.

The PD Hearth model intervention was effectively executed in the Rabai sub-county through a series of strategic steps. Local community members, including community health workers, nutrition experts, and those experienced in community engagement, were selected as facilitators and were trained on the principles, methodologies, and techniques of the PD/Hearth model. This comprehensive training equipped facilitators with skills in communication, behaviour change monitoring, and knowledge of child nutrition, feeding practices, hygiene, and local dietary resources. A thorough situational analysis was conducted to identify positive deviant households through focus group discussions, community mapping, household wealth ranking, nutrition screening,

and market surveys. Positive deviant households were observed to understand their successful child feeding, hygiene, and health-seeking behaviours, as well as the specific foods they consumed. Hearth sessions were organized involving positive deviant households, facilitators, and community members to share positive child nutrition behaviours and practices, moderated by facilitators who encouraged participation and provided advice. These sessions aimed to rehabilitate underweight and moderately wasted children and their caregivers through nutritious meals based on locally available, low-cost foods and positive deviant foods, accompanied by key Hearth messages addressing malnutrition challenges. Facilitators conducted home visits and follow-up sessions to provide ongoing monitoring, support, and reinforcement of positive behaviours, addressing challenges and encouraging participants to maintain them. Regular group meetings were held for continuing education and sharing experiences. Through these steps, the PD Hearth model effectively addressed child malnutrition in the Rabai sub-county, promoting sustainable behaviour change and community support.

The control group

The health education placebo was successfully implemented through several steps evaluating the effectiveness of the Positive Deviant Hearth (PDH) model. Firstly, a control group was selected, matching the intervention group in demographics and other relevant factors. Next, health education materials were designed to mimic the format and content of the PDH model intervention but provided generic health information unrelated to the specific practices targeted by the PDH model, such as general nutrition guidelines or basic child health tips. Facilitators were trained to deliver the placebo health education sessions, which were structured similarly to the PDH model intervention sessions, including interactive discussions, demonstrations, and practical activities. To maintain blinding,

participants in the control group were kept unaware that they were receiving a placebo intervention, and the placebo nature of the intervention was not mentioned to prevent bias in participant responses. Participant engagement in the placebo health education sessions was monitored to ensure similar levels of interaction as those in the intervention group. Additionally, measures were taken to control for external factors by minimizing exposure to other health education interventions or external influences that could confound the results, with participants encouraged in both groups to refrain from seeking additional health information during the study period. Data on relevant outcomes were collected both before and after the intervention period for both the intervention and control groups, allowing for a comparative analysis of the effectiveness of the PDH model intervention.

Data analysis

First data was collected and entered into an Excel spreadsheet, cleaned and exported to SPSS IBM Version 26.1. Descriptive statistics were computed for continuous and categorical variables to describe the demographic characteristics of the participants. To compare the demographic characteristics of the participants between the control and intervention both at baseline and end-line survey chi-square test was conducted. The chi-square test was used to compare the nutritional outcomes of wasting and underweight among children under five years between the control and the intervention group both at baseline and end-line survey. All the p-values were deemed statistically significant if the $p \leq 0.05$ at a 95% (CI) confidence interval. The Chi-square test was used to evaluate the effectiveness of the PDH intervention by comparing the proportions of nutritional outcomes between the control and the intervention group before and after the intervention

Ethical consideration

This research received ethical approval from Pwani University, with additional approval obtained from Jomo Kenyatta University of Agriculture and Technology. A research license was secured through the National Commission for Science, Technology & Innovation (NACOSTI). The County Commission office and local community leaders were duly informed about the study. Caregivers provided informed consent, ensuring privacy, anonymity, and the freedom to withdraw at any point. Data was securely stored and solely employed for research purposes. The study maintained confidentiality

Result

Demographic characteristics

Table 1 illustrates the socio-demographic characteristics of female participants in both the control and intervention groups during the baseline and end-line surveys. A total of 750 participants were enrolled for both the baseline and end-line assessments, with 371 participants allocated to the control group and 379 to the intervention group.

Table 1:

Socio-demographic characteristics of mothers of children aged 6-59 months in the control and intervention groups at baseline and endline of survey

	Variables	Pre-Intervention			End-Line		
		Control Freq (%)	Intervention Freq (%)	*p*-value	Control Freq (%)	Intervention Freq (%)	*p*-value
Age(years)	18-25	57(15.3)	65(17.2)	0.427	51(13.7)	59(15.6)	0.513
	26-35	185(50.0)	171(45.1)		187(50.4)	173(45.6)	
	36-45	98(26.4)	116(30.6)		99(26.7)	115(30.3)	
	≥46	31(8.3)	27(7.1)		34(9.2)	32(8.4)	
Parity	01-3	231(62.2)	244(64.4)	0.150	229(61.7)	240(63.3)	0.126
	04-6	95(26.0)	77(20.3)		96(25.9)	78(20.6)	
	>6	45(12.1)	58(15.3)		46(12.4)	61(16.1)	
Marital status	Single	67(18.0)	81(21.4)	0.235	67(18.1)	80(21.1)	0.332
	Married	276(74.3)	281(74.1)		277(74.7)	282(74.4)	
	Divorced	3(1.0)	1(0.3)		2(0.5)	1(0.3)	
	Widowed	25(6.7)	16(4.2)		25(6.7)	16(4.2)	
Level of education	None	87(23.4)	93(24.5)	0.269	87(23.5)	93(24.5)	
	Primary	169(45.6)	152(40.1)		169(45.6)	152(40.1)	
	Secondary	103(27.8)	113(29.8)		103(27.8)	113(29.8)	
	Tertiary	12(3.2)	21(5.5)		12(3.2)	21(5.5)	
Monthly income	0-5,000	203(54.7)	217(57.3)	0.141	203(54.7)	217(57.2)	0.141
	5,001-10,000	110(29.6)	98(25.9)		110(29.6)	98(25.8)	
	10,001-15,000	42(11.3)	35(9.2)		42(11.3)	35(9.2)	
	>15,000	16(4.3)	29(7.7)		16(4.3)	29(7.7)	
Occupation	Housewife	207(55.7)	195(51.5)	0.654	207(55.7)	199(52.5)	0.722
	Farmer	109(29.4)	126(33.3)		109(29.3)	125(33.0)	
	Business	36(9.7)	39(10.3)		36(9.7)	38(10.0)	
	Employed	19(5.1)	19(5.0)		19(5.1)	17(4.5)	
The main source of food	Own production	191(51.5)	202(53.3)	0.316	180(48.5)	209(55.1)	0.224
	Borrowing	15(4.0)	9(2.4)		21(5.7)	14(3.7)	
	Purchase	138(37.2)	149(39.3)		147(39.6)	138(36.5)	
	Food aid	27(7.3)	19(5.0)		23(6.2)	18(4.7)	
Religion	Christian	140(37.7)	138(36.4)	0.707	140(37.7)	136(35.9)	0.599
	Muslims	231(62.2)	241(63.6)		231(62.3)	243(64.1)	

As shown in Table 1, the sampled participants in both the intervention and control sites exhibited comparable socio-demographic profiles during the baseline and end-line surveys. The majority of participants in both groups were in the 26-35 age bracket, had experienced childbirth more than once, were married, had no formal education, and relied on pastoralism for their livelihoods. Chi-square statistics failed to reveal any significant distinctions in socio-demographic characteristics between the control and intervention groups, both at baseline and end-line surveys, suggesting that the sub-locations within each ward shared similar demographic and socioeconomic attributes, facilitating a fair comparison between the intervention and control groups.

Nutritional outcomes

During the pre-intervention assessment, among 371 respondents in the control group, 191 (51.5%; 95% CI: 46.4-56.6) had children experiencing wasting, while 180 (48.5%; 95% CI: 43.4-53.6) had non-wasting children. In the intervention group, out of 379 caregivers, 185 (48.8%; 95% CI: 43.8-53.8) had children with wasting, and 194 (51.2%; 95% CI: 46.2-56.2) had non-wasting children.

Table 2:

Wasting Status among Children Aged 6-59 Months in the Control and Intervention Sites Pre Interventional Assessment and Post Interventional Assessment

Group	Pre Interventional Assessment					Post Interventional Assessment				
	Wasting Freq (%)	Not wasting Freq (%)	χ^2-value	Df	P-value	Wasting Freq (%)	Not wasting Freq (%)	χ^2-value	df	P-value
Control	191(51.5)	180(48.5)	0.54	1	0.464	228(61.5)	143(38.5)	38.54	1	<0.001
Intervention	185(48.8)	194(51.2)				147(38.8)	232(61.2)			

Table 3:

Underweight Status among Children Aged 6-59 Months in the Control and Intervention Sites at Pre-Interventional Assessment and Post-Interventional Assessment

Group	Pre Interventional Assessment					Post Interventional Assessment				
	Underweight Freq (%)	Not underweight Freq (%)	χ^2-value	df	P-value	Underweight Freq (%)	Not underweight Freq (%)	χ^2-value	df	P-value
Control	175(47.2)	196(52.8)	1.06	1	0.304	219(59.0)	152(41.0)	35.78	1	<0.001
Intervention	193(50.8)	186(49.2)				141(37.2)	238(62.8)			

A chi-square analysis showed no significant difference (χ²=0.54, df=1, p=0.46) in the proportion of wasting children aged 6-59 months between the control and intervention groups at the pre-intervention assessment. In the post-intervention assessment, out of 371 caregivers in the control group, 228 (61.5%; 95% CI: 56.6-66.5) had children experiencing wasting, while 143 (38.5%; 95% CI: 33.6-43.5) had non-wasting children.

Conversely, out of 379 caregivers in the intervention group, 147 (38.8%; 95% CI: 33.9-43.7) had children with wasting, and 232 (61.2%; 95% CI: 56.3-66.1) had non-wasting children. A chi-square analysis indicated a significant reduction (χ²=38.54, df=1, p<0.001) in wasting children in the intervention group compared to the control group at the post-intervention assessment Table 2.

During the initial assessment, out of 371 respondents in the control group, 175 (47.2%; 95% CI: 42.1-52.3) had children classified as underweight, while 196 (52.8%; 95% CI: 47.7-57.4) had children who did not meet the criteria for underweight. In the intervention group, among 379 caregivers, 193 (50.8%; 95% CI: 45.8-55.8) had underweight children, and 186 (49.2%; 95% CI: 44.2-54.2) had children who were not underweight. The chi-square analysis showed no significant difference (χ²=1.06, df=1, p=0.30) in the proportion of underweight children aged between 6-59 months between the control and intervention groups during the initial assessment. However, at the end-line survey, the results indicated a notable shift. In the control group, out of 371 caregivers, 219 (59.0%; 95% CI: 54.0-64.0) had underweight children, and 152 (41.0%; 95% CI: 36.0-46.0) had children who were not underweight. Conversely, among 379 caregivers in the intervention group, 141 (37.2%; 95% CI: 32.3-42.1) had underweight children, while 238 (62.8%; 95% CI: 57.9-67.7) had children who were not classified as underweight. Chi-square analysis indicated a significant reduction (χ²=35.78, df=1, p<0.001) in the number of underweight children in the intervention group compared to the control group at the end-line survey Table 3.

Discussion

The findings of this quasi-experimental study demonstrate the potential benefits of the Positive Deviance Hearth Model as an effective intervention for enhancing child nutrition in resource-constrained communities. The results show a significant improvement in the nutritional status of children who participated in the PDH program, in that, there was a significant reduction in the prevalence of wasting and a notable decrease in the prevalence of underweight children when compared to the control group at the end-line survey. Wasting and underweight are vital indicators (14) of child nutritional status, and the reduction in their prevalence is a significant achievement in child health. The intervention demonstrated its capacity to address these nutritional challenges in the 6-59 months age group

Numerous studies have demonstrated the effectiveness of the Positive Deviance Hearth Model in enhancing child nutrition (4,5,15–17). In this study, the model proved to be highly effective in significantly reducing both wasting and underweight prevalence among children aged 6-59 months in the intervention group, as supported by previous research (3).

Wasting and underweight are critical indicators of child malnutrition, and the Positive Deviance Hearth Model demonstrated its ability to address both forms of malnutrition effectively. This aligns with the findings of previous studies (3,15) which highlighted the model's capacity to reduce wasting and underweight prevalence.

The findings of this study are consistent with several previous studies that have examined community-based interventions for child nutrition, in a study conducted in Burundi the Positive Deviance Hearth Model significantly reduced underweight prevalence among

children(4). Similarly, another study found that the model was effective in improving the nutritional status of children in the United States (18).

The concept of community empowerment is a common thread in this study and previous research. The Positive Deviance Hearth Model hinges on empowering communities to take ownership of child nutrition. This approach resonates with the findings which emphasized the importance of community engagement in addressing malnutrition (3).

While this study aligns with previous research, it is crucial to acknowledge that the effectiveness of community-based interventions can vary depending on the local context. Studies stress the importance of adapting interventions to local conditions and cultural factors, which may influence the success of such initiatives (19).

Several key components of the PDH model, such as the identification of positive deviant households, Hearth sessions, and ongoing monitoring and support, contributed to this positive impact (15). Notably, the participatory approach of the Hearth sessions, where caregivers prepared and shared nutritious meals based on locally available, low-cost foods, led to visible improvements in child growth and weight gain. This hands-on approach was a key factor in promoting the adoption of positive deviant practices within the community.

An essential element of the Positive Deviance Hearth Model is its community-based approach (17). This approach empowers communities to share knowledge and adopt best practices, fostering an environment where caregivers can play an active role in improving child nutrition. The findings suggest that leveraging local community knowledge and resources can be a successful strategy for combating child malnutrition. While the Positive Deviance Hearth Model has proven effective across studies (3,4,17,18,20), it is essential to recognize that local context plays a pivotal role in determining the model's impact. Factors such as cultural norms, dietary habits, and access to resources can significantly influence the success of the intervention (21). Thus, while the model's core principles remain consistent, adaptations to local context are crucial for optimal effectiveness.

The effectiveness of the PDH intervention was also influenced by the unique socio-cultural and economic characteristics of Rabai Sub County. The area's mix of rural and peri-urban communities and the predominantly agrarian lifestyle made it an ideal setting for community-driven interventions like the PDH model. However, the community in Rabai Sub County faces various challenges related to food security, healthcare access, and hygiene practices, which are pertinent to child nutrition. The successful implementation of the PDH model in such contexts underscores the importance of understanding and addressing these local challenges when designing public health interventions.

This study has broader implications for the field of child nutrition and community-based health promotion. It highlights the effectiveness of community-driven interventions that engage local facilitators and capitalize on the strengths of positive deviant households. The participatory nature of the Hearth sessions encourages active involvement, fosters a supportive learning environment, and promotes behaviour change through practical experience. The positive results indicate that these interventions can have a significant impact on child nutrition, especially in regions where resources are limited.

The findings of this study suggest that the Positive Deviance Hearth Model has the potential to contribute to public health strategies aimed at improving child nutrition in similar regions, both nationally and internationally. The model's sustainability and scalability should be explored further, with adaptations made to suit the specific needs and challenges of different communities. Policymakers, healthcare providers, and

organizations involved in child nutrition and community health should consider integrating community-driven approaches like the PDH model into their programs.

Study strengths

This research possesses several strengths. The quasi-experimental design, despite its limitations, allows for the assessment of the Positive Deviance Hearth Model's effectiveness in a real-world context. The comprehensive training of facilitators and local community engagement enhances the program's ecological validity. The Positive Deviant Inquiry process ensures a nuanced understanding of local dynamics and how they affect child nutrition. Hearth sessions engage not only primary caregivers but also extended family members, promoting a holistic approach. The study's rigorous monitoring and support mechanisms contribute to robust data collection. Lastly, the focus on high-nutrition density foods aligns with contemporary nutritional goals, potentially benefiting both the immediate study population and providing valuable insights for similar settings. These strengths bolster the study's potential to generate valuable insights into improving child nutrition in resource-constrained areas.

Study limitations

This research, while valuable, faces some limitations. First, the quasi-experimental design lacks randomization, potentially introducing bias. Second, the findings may not generalize to other regions due to specific local conditions. Social desirability bias could affect self-reported data. The fixed data collection period and resource constraints limit the study's scope. Attrition, external factors, and unmeasured variables might influence results. The study's focus on short-term outcomes necessitates further research into long-term sustainability. Finally, assessing dietary intake, especially in children, presents measurement challenges. These limitations are crucial to consider when interpreting the study's findings and their broader implications.

Conclusion

In conclusion, this study underscores the promise of the Positive Deviance Hearth Model as a community-based intervention to enhance child nutrition in resource-constrained settings. While further evaluation and long-term sustainability are needed, our findings contribute valuable insights to the field, with potential implications for public health strategies in similar regions globally

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