Research Paper

Optimizing Child Health: Development and Validation of a Nutrition Status Improvement Module through Positive Deviance Practices

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ABSTRACT

Childhood nutrition is a critical issue that need to be addressed and as it impacts overall health, especially in developing countries. Some areas have implemented positive deviance (PD) programs to identify positive behaviors and practices from low- income families that successfully maintain normal nutrition, despite conditions similar to those of other low-income families. The aim of this study was to develop and test the validity of a positive deviance-based nutritional status improvement module with the aim of achieving optimal child health. PD principles in the design of this module was to encourage community and family participation in understanding and practicing healthy nutrition behaviors. The research process consisted of several steps. The first steps involved nutritionist, public health expert, community nurse practitioner, pediatrician, and child psychologist collaborated to develop the module. Afterwards the module was tested for content and construct validity. The results of CVI and FVI showed that the module was valid and effective in improving family knowledge, skills, and healthy habits making it suitable to improve children's nutritional and health status in resource-limited and low-income families.

INTRODUCTION

It is crucial for the community to understand how important children's nutritional needs are because their nutritional conditions will greatly affect how well they grow. This is in line with previous research (Jimoh et al., 2018; Mohammed et al., 2020; Scott et al., 2020)(Jimoh et al., 2018; Mohammed et al., 2020; Scott et al., 2020), which showed that there is a relationship between the nutritional status of a child under the age of five and their growth and development. Adequate nutritional support for a child's age is necessary for optimal growth and development. Poor food quality and quantity will cause nutritional deficiencies, which in turn alter brain structure and function. According to multiple researches (Kholisah, 2020; Nafista et al., 2022; Wahyuningsih et al., 2020), nutritional factors, stimulation, and parents' knowledge of stimulants affect child development at the early age of 1-2 years.

There are many nutritional programs have been executed. Examples include the development and validation of a compass model to monitor child growth in Indonesia (Damanik et al., 2024), screening for feeding and swallowing problems in Brisbane (Bell et al., 2019), nutrition and food safety

education, and fish processing di Nigeria (Adegoye et al., 2023).

However, a number of variables often hinder the success the programs. They include lack of community understanding and participation as well as insufficient resources (Kulwa et al., 2014) unhealthy feeding (Hulu et al., 2022), and lack of culturally appropriate approaches (Susilawati & Amalia, 2023; Wardani et al., 2024) and the problem of poverty (Farooq et al., 2020; Panda et al., 2020). This is where positive deviance (PD) programs offer innovative solutions by using beneficial habits that already exist in the community (Chek et al., 2022).

PD refers to unique behaviours or practices within a population that contribute unconsciously to the prevention of problems (Siswati et al., 2022). These behaviours often distinguish individuals or groups that exhibit PD from those that do not. For example, mothers in this group may exhibit higher levels of motivation and autonomy in feeding their children and rarely provide foods that lack essential nutrients (Gebreayohanes & Dessie, 2022). Families with positive deviance (PD) typically offer a diverse and nutritious diet that includes foods like meat, shrimp, fish, pumpkin, spinach, and other green vegetables (Boulom et al., 2022). They also prioritize maternal attention in their parenting (Apriyanto et al., 2017); hygiene and access to clean water (Budiono et al., 2024); and health services, vaccine administration, and care for sick children (Sugianto et al., 2020). Local resources and cultural practices influence the behaviors that vary by region.

According to multiple researchers (Assefa et al., 2018; Kosugi et al., 2020; Singh et al., 2019), certain communities have local wisdom, principles, and social capital that can address various nutrition issues. This is especially true for feeding, caring, hygiene, and health-seeking practices. Therefore, the availability of a module that is relevant and easily understood by everyone using existing PD practices in the family is crucial to the success of this program.

We hope that this module can serve as an effective and practical intervention tool to improve the nutritional status of children, especially in areas where malnutrition is quite common.

METHODS
The study was conducted in three stages: need assessment, development of modules, and validation of modules. Ethical approval from the UniSZA Human Research Ethics Committee at Universiti Sultan Zainal Abidin, Malaysia, (UniSZA/UHREC/ 2020/202(1)), and Medan Health Department were obtained.

Phase I: Needs assessment
In the process of developing an intervention module for undernourished from low-income families, where the study focuses on the differences in practices within the families of normal nourished and undernourished children. The focus of assessments was the practices of low-income families with normal nourished children.

A review of the literature indicates that no previous module has specifically addressed PD-based approaches. However, a limited number of intervention studies have implemented this approach. Additionally, we conducted interviews with 80 mothers from low-income families to examine the nutritional status differences between normal and malnourished children. We then develop and adopt the interview results based on existing local food resilience. We expect this to offer a more comprehensive understanding of the factors influencing children's nutritional status within the context of low-income families.

Five experts (nutritionist, public health expert, community nurse practitioner, paediatrician, and child psychologist) collaborated to develop the module. The literature review found that there was no previous module on PD. However, few intervention studies have used PD, with a specific focus on feeding and caregiving practices (Hidayat, 2009) and feeding practices only (Sari et al., 2023), care

practices (Chipili G et al., 2021), not specific PD components in relation to feeding, caring, hygiene and health seeking practice (Minani et al., 2022).

The module was developed based on the field assessment using the PD questionnaire from CORE scoring of the questionnaire by adopting 4 practices (feeding, caring, hygiene, and health-seeking practices). The development of the module was based on established standards (Cook & Beckman, 2006). This includes the design of the front page, which includes the table of contents, preface, and cover; the introduction, which includes background, objectives, ideas, practice indicators, and success indicators; the content section, which includes descriptions of practice activities and practicum materials; as well as the back page and bibliography (Bhamani et al., 2023; Kosugi et al., 2020)

Phase II: Development of modules

The modules need to be adaptive and engaging, given the various issues that families face. Cultural factors, household responsibilities, economic issues, comprehension issues, and lack of desire to practice are some of the challenges families faces. In addition, it was important to develop an approach that was comprehensive yet accessible, given the anticipated range of personal characteristics related to educational background, ethnicity, and age.

Therefore, the researcher requested experts of one nutritionist, one pediatrician, one nutritionist, a public health expert, a community nurse practitioner, a pediatrician, and a child psychologist from various health fields to thoroughly review the intervention development module and its content. Based on the experts' feedback and opinions, the researcher reviewed and reorganized the module's content. The experts reached consensus on their opinions, which led to the creation of context-appropriate activities and approaches (Bhamani et al., 2023).

The researchers examined the best strategies for families with children under five. The module features six topics, each tailored to

align with the module's theme. They implemented this to discourage individuals from repeating the same actions. Hence, the researchers developed engaging and effective materials and practices. Each sentence, paragraph, and module were adjusted to age, education, and income so that the language used was simple to understand, straightforward, and all-encompassing.

Phase III: Validation of module

To validate the module and ensure its relevance, experts were gathered. Experts consisted of one nutritionist, one paediatrician, one nutritionist, a public health expert, a community nurse practitioner, a paediatrician, and a child psychologist. The selection of these six content experts was performed deliberately to capture diverse feedback based on their different specializations (Parmenter & Wardle, 2000). The checklist, which covered six topics, comprised of 49 items. These included four items related to the introduction of positive deviance programs, eight items related to feeding practices, eleven items related to caring practices, seven items related to hygiene practices, nine items related to health-seeking practices, and ten items for the evaluation of positive deviance programs, all based on a thorough literature review.

Five experts were given a Google form to rate each module, with a scale of 1 for 'strongly disagree,' 2 for 'disagree,' 3 for 'agree appropriate,' and 4 for 'strongly agree'. The content validity index (CVI), one of the most commonly used methods for content validation, was calculated using the following formula: I-CVI = (agreed items)/ (number of experts), and S-CVI/Ave = (sum of I-CVI values)/ (number of items) (Yusoff, 2019).

A CVI value of 0 (relevance scale of 1 or 2), and a CVI value of 1 (relevance scale of 3 or 4). Comments and suggestions were added to the items to find out more about areas for improvement. Experts who agreed to participate received a Google Drive link containing the necessary materials, including

their consent and a brief explanation of the module, to enhance their understanding of the intervention measures. Experts had two weeks to assess and provide feedback.

Before moving on to the intervention, 40 mothers and carers of malnourished children at Terjun Public Health Centre tested the module for validity and reliability after receiving expert assessment and feedback.

RESULTS

Phase I: Needs assessment

Eighty mothers from low income families were interviewed and they were equally distributed into normal nourished and undernourished. It was revealed that children in the normal nourished group were mainly boys (n=25, 62.5%), with the majority being Javanese (47.5%). The majority of the children in this study are between the ages of 13 and 24 months (32.5%), and the mother's age ranges primarily from 20 to 35 years old (90%), as does the mother's age at delivery (95%). Most of the mothers in this group are currently married (80%). The highest level of education for mothers is generally below high school (55.5%), while for fathers it is high school (52.5%). All mothers of children with normal nutritional status are housewives and do not work, while the majority of fathers are self-employed (50%). The majority of families in this group had up to two children (67.5%). Males made up the majority (52.5%) in the undernourished group of 40 children, and 45% of the affected children were between 13 and 24 months of age. 80% of the mothers fall between the ages of 20 and 35, with 85% of them married at the time of delivery. The highest level of education for mothers was high school (57.5%), while

82.5% of fathers had completed high school. Most mothers in this group are housewives (62.5%), and most fathers are self-employed (40%). The majority of families in this group also had up to two children (72.5%).

A total of five experts, consisting of one nutritionist, one paediatrician, one nutritionist, a public health expert, a community nurse practitioner, a paediatrician, and a child psychologist.

To maximize interaction and engagement between participants and researchers, all participants recommend that the reception of interventions be conducted in a relaxed and participatory atmosphere. Some individuals express their reluctance to participate in PD programs due to their lack of education and difficulty in obtaining information. Most of them stated that they preferred PD intervention. Some of the potential obstacles to the intervention mentioned are related to low income, which primarily arises from cultural aspects such as feeding practices, obtaining family approval (husband and in-laws), managing household and parenting tasks to make time for sessions, and finding childcare. However, they also offer other options, for example, by persuading that many people can be drawn to attend the session.

Phase II: Development and Validation

The PD-based module comprising six themes was developed as an intervention for children below five years old in low-income families. The intervention module has an attractive and engaging front and back cover, a clearly indicated, culturally sensitive table of contents, and description of activities for each module.

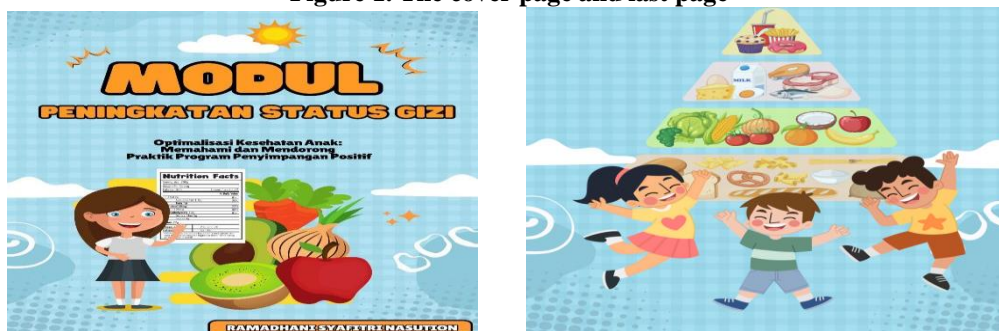**Figure 1. The cover page and last page**

Table 1 presents a concise summary of the topics, objectives, description and duration of every intervention module. These modules are organized through a systematic process, starting from identifying needs, formulating themes and objectives, setting goals, to estimating duration. Preliminary testing is carried out to ensure the effectiveness of the module before it is widely implemented. This table helps us understand the structure and guide the implementation of the program in a directional manner.

Table 1. Intervention modules, objective, description and duration of module

Module title page	Objective	Description	Duration
Topic 1: Introduction to Positive Deviance Programs	To address and improve the nutritional status of children aged 6-<60 months in low-income families using the positive deviance	Informed consent Introduction to undernutrition and overcoming it through positive deviance Programs	40 minutes
Topic 2: Feeding Practices	Introduce feeding practices from the family positive deviance, ranging from food types, processing methods, and frequency of feeding. Improving the implementation of feeding practices for malnourished children with the positive deviance program in low-income families	Feeding frequency and texture (food processing) Types of food Diversity of food	1 week
Topic 3: Caring practices	Encouraging families to undertake other practice programs that support affectionate parenting as demonstrated by the positive deviance families	Family ensures food availability at home. Family members play with the child (singing and training stimulation). The child is supervised when eating and playing. Other family members are trained to look after the child (older siblings) At least eat together at night. Train the child to self-feed starting from the age of 1.5 years, accompanied by family. Father is involved in child care.	2 days
Topic 4: Hygiene practices	Implementing proper and correct hygiene practices in families who have children aged 6-<60 months.	Proper body hygiene practices include: Bathing practices Dental hygiene Hair hygiene Hygiene during urination and defecation Cleanliness of clothing Hygiene practices at mealtime Home and neighborhood hygiene practices	2 days
Topic 5: Health-seeking practices	Implement health care practices that successfully improve health status in malnourished children.	Complete basic immunization (HepB, DPT, polio, BCG, measles). Provision of standard medicine as the first step when sick (paracetamol, self-prepared oral rehydration salt) Using mosquito nets foot better protection Covering drinking water storage/wells	2 days

| | | Early assessment at the Health Centre when sick and only give the medicine given by the health worker | |
| Topic 6: Programmed Evaluation of Positive Deviance | Assess a program of positive deviance practices, including feeding, caring, hygiene, and health-seeking practices. | Assessment of nutritional status includes: a. Body weight b. Hemoglobin c. Body fat (skinfold) d. Body mass index Use of nutrition stations Assessment of feeding practices Assessment of other caring practices Assessment of hygiene practices Assessment of Health-Seeking Practice | 1 week |

Table 2 shows the Content Validity Index (CVI) for each module based on evaluation by five experts. The average age of the participants is 48.2 years (SD ± 15.2), with a range of 33 to 66 years. Most experts hold a doctoral degree (60%), while the rest hold a master's degree (40%). All are from Indonesia and have an average work experience of 20.8 years (SD ± 12.1) in Indonesia (range: 10-35 years).

Table 2. Content Validity Index (CVI) for Each Module Based on Expert Evaluations (n=5)

Module	Scientific accuracy	Content	Literary presentation	Illustrations	Material-specific and understandable	Legibility & printing	Quality of information	Overall Average
Introduction program	1	1	1	1	1	1	1	1
Feeding practice	1	1	1	1	1	1	1	1
Caring practice	1	1	1	1	1	1	1	1
Hygiene practice	1	1	1	1	1	1	1	1
Health-seeking practice	1	1	1	1	1	1	1	1
Evaluation program	1	1	1	1	1	1	1	1

CVI (Content Validity Index): the number of expert panel members who rated the item (index of 3 or 4) divided by the total number of expert panels members (n=5). CVI is higher than 0.79, the item is appropriate. If between 0.70 and 0.79, the item needs revision. if the scores are less than 0.70, the item is eliminated.

A total of 40 mothers who have malnourished children continued to perform Face Validity Index (FVI) and reliability where the module is given in the form of a book and given 1 week to understand the contents of the module. After that, proceed by providing a questionnaire in the form of google form to display the FVI (face validity index).

Table 3 presents analysis of the face validity index (FVI) for the module improving the nutritional status of children. The I-FVI value for all subscale items (relevant, difficulty, length, and essence) is>0.95, indicating an excellent level among mothers. Overall, the S-FVI score (average I-FVI) for all topics ranges from 0.98 to 1.0, indicating that the module has excellent performance. In addition, based on the comments given, the mothers so that the module content is easy to understand, well structured, useful, and interesting. No major problems were reported. Furthermore, upon completion of face validity measurements, Cronbach's alpha was also used to test the internal consistency of items in each topic (Hamid et al., 2021). The overall Cronbach's α value is 0.75, indicating that the item used in the instrument validation has an acceptable value α > 0.70) (Taber, 2018).

Table 3. Face Validity

Items	Relevancy Item		Difficulty Item		Helpfulness item		Essentiality item		
	No. agreed item	I-FVIa	No. agreed item	I-FVI	No. agreed item	I-FVI	No. agreed item	I-FVI	S-FVI/Aveb
Module compatibility	40	1.00	40	1.00	40	1.00	40	1.00	1.00
The effectiveness of the module	40	1.00	40	0.98	40	1.00	40	1.00	0.99
Easy to apply	40	1.00	40	1.00	40	1.00	40	1.00	1.00
Clarity of the module	40	1.00	40	1.00	40	1.00	40	1.00	1.00
The right time	40	1.00	40	1.00	40	1.00	40	1.00	1.00
Clear and directed	40	1.00	40	1.00	40	1.00	40	1.00	1.00
Materials that meet local needs and are accessible	40	1.00	40	0.97	40	1.00	40	1.00	0.99
In accordance with the cultural and social context.	40	1.00	40	1.00	40	1.00	40	1.00	1.00
Interactive.	40	1.00	40	1.00	40	1.00	40	1.00	1.00
Motivating	40	1.00	40	1.00	40	1.00	40	0.97	0.99
Easy to understand	40	1.00	40	1.00	40	1.00	40	1.00	1.00
Design and illustration of interesting images	40	1.00	40	1.00	40	1.00	40	1.00	1.00

[a]**I-FVI (item-level face validity index): the value was calculated by adding the items rated 3 or 4 (agreed item) and divided by the total number of responses in the item's evaluation.**
[b]**S-FVI/Ave (scale-level face validity index based on the average method): the value was calculated by taking the sum of the I-FVI scores and dividing by the total number of items.**

Table 4 shows the responses and recommendations of experts. Every expert's response and recommendation has been reviewed and amended according to the

relevant feedback to ensure that every aspect discussed or suggested gets the right attention and the right solution.

Table 4. Recapitulation Matrix of Experts' Comments and Revision of the Module

Comments	Revision
Consider the module on preparation and feeding tips when holidaying or travelling (content)	The suggestion was followed and information on feeding tips while travelling was included (Module 2)
It is necessary to describe the behavioural items that are to be measured so that they are more operational (assessment)	The suggestion was followed where the behavioural items are clearly measurable such as in terms of frequency, choices of food (Module 2) and frequency of family interaction (Module 3)
Module objectives, practice, and look at the menu in terms of the level of doneness of the food (assessment)	Improvements have been made to the objectives of the course, practice and menu preparation by taking into account the level of properly prepared dishes (Module 2)
In terms of diversity, adapting to the availability of food commonly consumed by the target population (assessment)	The module has been customized and developed based on the availability of local food that is easily accessible and most of the food is obtained from the family's livelihood (Module 2)
Add praying before meals to the positive approach (content)	The suggestions have been improved to include prayers before and after meals. The subjects of the study mostly adhered to Islamic beliefs, which led to the composition of prayers in accordance with Islamic principles (Module 3)
Changes in the good emotional regulation of family members make it necessary to elaborate on 'good emotional regulation' so that it can be measured (assessment)	Improvements have been made to the regulation of emotions in children by teaching children to recognize emotions, such as exemplifying with pictures of happy, sad, angry, and afraid, and avoiding exemplifying things that are not good in front of children and understanding the condition of children if children are sad (Module 3)
Keeping in mind the usual parenting habits/culture (culture)	The suggestions have been included in the module because the practice is adopted from the habits/culture of low-income families with normal nutritional status of their children and taking into account the characteristics of the community so that the parenting pattern that will be practiced is easy to imitate (Module 3)
Add the point of keeping children from interacting with children who have respiratory diseases (assessment)	People have suggested using masks, avoiding children with respiratory issues, and immediately consulting with health workers for further examination (Module 5)
Consider creating a reminder or record of your child's immunization schedule (assessment)	The suggestions have been made with member health centers to record immunization progress for each child in the form of a "KIA book" that monitoring of immunization progress is complete (Module 5)
Add monitoring result column to the evaluation matrix (assessment)	suggestions have been made on the evaluation matrix by creating a table per item of practice components ranging from feeding, caring, hygiene and health seeking practices and filled in per day for the behavior performed (Module 6)

DISCUSSION

Education for the improvement of nutritional status for certain family groups, such as low-income families, requires a good module to ensure the delivery of appropriate content and sustainability of the content. Hence the increased expectation of better knowledge and more reliable implementation of module contents. Families and developing children expect a good module to provide better results, leading to optimal child health.

The main result of the study was the development and validation of a module designed for children with malnutrition. It is important to ensure the face and contents validity of any new module be obtained from experts and users. This study aimed to tailor intervention materials to be applicable with

the income status and life context of the participants.

Limitations in the development of previous modules often hinder the success of the program. Among identified limitations are poor level of understanding of the community and its participation (Susanti et al., 2023) lack of resources (Kulwa et al., 2014), improper feeding (Hulu et al., 2022), and the lack of culturally appropriate approaches (Susilawati & Amalia, 2023; Wardani et al., 2024).

Therefore, interventions to understand the problems/limitations, interventions on malnourished children, modules are designed using language that is easy to understand, so that in providing interventions to families with malnourished children, modules with good designs must be practical and easy to understand. This is where the PD program offers creative solutions by using positive practices that already exist in society (Budiono et al., 2024). PD describes families with similar income circumstances who achieve good nutritional status (Farooq et al., 2020; Sunardi & Martha, 2021). A population performs PD through its distinctive methods and practices, unconsciously contributing to the solution of the problem (Siswati et al., 2022).

It is important to note that CVI is an important part of validating the results and assessing the appropriateness and practicality of the intervention (Yusoff, 2019). The module validation has a good too perfect CVI score, which is evident from the high applicability and relevance in this intervention. In line with the literature involving experts at the needs assessment and content development stages, the validation and accuracy of expert participation and involvement at each level contributes to a high to perfect CVI score and increases its relevance and content. Methodologies and adaptations based on expert advice are added to the needs of the target population. Similarly, research in Nigeria focusing on developing a module to teach women fish processors about nutrition and food safety has been developing and validating instructional material which requires understanding on the population, high-quality and relevant graphics, and the involvement of relevant experts. The content validation was using the CVI (Adegoye et al., 2023).

In addition, the module contains encouraging languages, interacting images and interesting activities that can attract as well as engage the reader's mindset to increase readiness for practice. Research shows that using a variety of strategies to engage participants helps participants stay focused on understanding, conceptualizing, arguing productively and behaving well as a group (Azam et al., 2022; Stern & Nyiratunga, 2017). Role-playing, demonstrations, skill-based training, and reflection can increase experiential learning. Therefore, we seek to encourage their involvement and commitment by including a variety of activities in our interventions (Bhamani et al., 2023; Wight et al., 2015). Similar research, with a compass model for monitoring the growth of children with Android mobiles to prevent malnutrition, was conducted in Medan (Al Rahmad et al., 2022; Damanik et al., 2024). This model does not provide solutions for malnourished children (Damanik et al., 2024), but the use of Android-based applications can serve as a reference for the development of the possible future PD module.

We recommend a face-to-face approach in these sessions to enhance the user's knowledge and skills. We conduct face-to-face sessions for 2 weeks, covering all module implementations. In addition, this varying frequency of sessions guarantees that users remain unencumbered amid the demands of their lives. Doing these sessions in groups can also help mothers find a place of togetherness where they can meet other mothers who are going through the same thing and talk about their problems. This will establish a support group that mothers can rely on, as well as a place where they can speak freely.

In order to maximize the benefits of health teachings, research has found that social and cultural relevance is essential. Therefore, we

developed this module with a strong emphasis on maintaining its teachings within the cultural elements of Medan. Therefore, it is crucial to develop the module step by step and to consider the needs of stakeholders when developing interventions (Lam et al., 2018).

It is hoped that this module which has undergone validation processes can be further assessed on its usefulness in a wider population. Converting the delivery method using multimedia such as educational videos will be more useful and use less manpower. A research report using learning modules and videos has shown in improving family knowledge and attitudes on malnutrition in Kalimantan, Indonesia (Heryyanoor et al., 2022).

CONCLUSION

This study marks an important point in the development of the nutrition status improvement module for child health optimization, which consists of six modules designed around a theme. Healthcare workers dealing with community nutrition and mothers can use the module as a practical reference. Positive deviance understanding has been shown to provide solutions to the problem of nutrition which is found within the community itself. This approach is considered not only empowering but also effective in the context of child health optimization using resources from within.

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