

NUTRI-MEALS ON WHEELS: A COMMUNITY-DRIVEN BUSINESS MODEL FOR BREAKFAST FEEDING PROGRAMS UTILIZING THE PINGGANG PINOY FRAMEWORK

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Abstract— Childhood malnutrition remains a significant concern in the Philippines, impacting health and educational outcomes. While school-based feeding programs (SBFPs) exist, many face challenges in funding, logistics, and sustainability. Breakfast, recognized as crucial for children's well-being and learning is often overlooked in existing SBFPs. This study introduced the "Nutri-Meals on Wheels" (NMOW) model, a subscription-based breakfast feeding program utilizing mobile food trucks and a centralized commissary. NMOW aimed for a sustainable operation from generating suspended meals for schoolchildren through a community-driven subscription model utilizing a "Buy One, Help One" (BOHO) initiative. The methodology involved a pilot simulation of the NMOW business model through a consumer survey involving a teacher-facilitated and parent-endorsed support system to fully implement a community breakfast feeding program among primary public-school children in Baguio City, Philippines. The survey gathered data on perceived meal quality by integrating the nutritional guidelines of the Pinggang Pinoy framework tailored for the age group, six to nine years old. The findings included perceptions into parental willingness to participate in a sustainable breakfast program, their preferences regarding meal options and delivery, and potential financial viability. This study benefits stakeholders by providing valuable data on the feasibility and acceptability of an innovative, community-driven breakfast feeding model that can contribute to improved nutrition and school readiness for Filipino public-school children. The findings also offered valuable insights for policymakers, non-governmental organizations, and potential social entrepreneurs in establishing effective and sustainable breakfast feeding initiatives in the Philippines potentially serving as a template for Public-Private-Partnership.

Index Terms: breakfast, Buy One Help One, feeding program, Pinggang Pinoy Framework

Introduction

The socioeconomic status of an individual is a contributory factor to health status as it dictates their lifestyle [1]. Childhood malnutrition is a significant concern in the Philippines, affecting health and educational outcomes. International organizations like UNICEF have urged the Philippine government and its constituents to strengthen services on health and nutrition among children [2]. Existing initiatives in the Philippines include the school-based feeding program (SBFP) by the Department of Education, targeting kindergarten to grade six public elementary students, and the supplemental feeding program (SFP) by the Department of Social Welfare and Development, focused on daycare students [3]. These programs are set to operate for 100 to 120 days, providing children with recommended well-balanced food [4]. School feeding programs are also prominent in other countries. In the United States, child nutrition programs, including the national school lunch program, school breakfast program, child and adult care food program, summer food service program, and after-school snacks and meals, are a focus of USDA's Food and Nutrition, aiming to encourage child health and school preparedness through nutritious meals provided at schools [5]. Asian countries like South Korea and Japan have enacted laws supporting free lunch projects at school canteens. In South Korea, school lunch meal programs are available to all primary students [6]. In Japan, almost 100% of elementary and junior high schools have implemented school canteens providing students with lunches [7].

While SBFPs and SFPs in the Philippines address malnutrition, they face challenges such as limited funding, inefficient food distribution, difficulties in maintaining food quality, outdated equipment and procurement processes, and staffing shortages [3]. Traditionally, meals for feeding programs are prepared by parents or teachers in the school. Concepts like decentralized and centralized kitchen models are being incorporated, often with community involvement [8]. Mobile food trucks have also been explored to improve access to nutritious meals. For example, in 2022, the Office of the Vice President, in collaboration with the Department of Education and National Nutrition Council, launched the Kalusugan Food Trucks to deliver nutritious meals to undernourished children, particularly in underserved areas [9]. However, existing SBFPs are usually dedicated to serving snacks and lunch, with breakfast feeding programs remaining largely unexplored. Breakfast is widely described as the most important meal of the day. Studies show that children who regularly eat breakfast tend to take in more nutrients [10]. Breakfast consumption provides children with necessary nutrients and energy, helping them stay active and receptive to school activities [11]. Skipping breakfast in children aged 12-14 years is often due to not feeling hungry, lack of time, lack of appetite, and influence from family and community factors such as food insecurity [12], [13]. Early childhood nutrition is vital for children's health and well-being, as eating habits formed during this phase have a lasting impact. Parental modeling, feeding strategies, and early exposure to nutritious food are crucial in shaping children's dietary preferences and behaviors [14]. Nutrition has important components needed for physical growth and development, nervous systems, the brain, and the refinement of intellectual level and intelligence [15]. Research indicates that children's food preferences are strongly linked to consumption patterns, and early exposure to a variety of healthy foods increases the likelihood of developing lasting healthy eating habits [16]. The influence of parents, environmental factors, and a child's innate preferences interrelate, highlighting the importance of understanding these dynamics to promote positive dietary behaviors [17]. Strategies like repeated taste exposure can also encourage healthier choices [18]. Addressing the challenges of existing programs and the often-overlooked importance of breakfast, particularly in a sustainable and community-driven manner, provides the motivation for the NutriMeals on Wheels program.

This study introduced the NutriMeals on Wheels (NMOW) model. The primary objective of NMOW was to establish a sustainable breakfast feeding program for schoolchildren. The study aimed to assess the feasibility and acceptability of this innovative, community-driven breakfast feeding model. Specifically, the methodology involved a pilot simulation to gather data on 1) Perceived meal quality, integrating nutritional guidelines; 2) Parental willingness to participate; 3) Parental preferences regarding meal options and delivery; and, 4) Potential financial viability.

The study sought to provide valuable data and insights for stakeholders, policymakers, non-governmental organizations, and potential social entrepreneurs to aid in establishing effective and sustainable breakfast feeding initiatives in the Philippines.

This study contributes an innovative model for a sustainable breakfast feeding program, utilizing mobile food trucks and a centralized commissary, a subscription-based model with a "Buy One, Help One" (BOHO) initiative, and drawing on the Pinggang Pinoy nutritional framework. It provides empirical data from a pilot simulation assessing the feasibility, acceptability, behavioral impact, and financial sustainability of this model from the perspectives of students, parents, teachers, and subscribers.

II. Methods and Results

The methodology involved a pilot simulation of the NMOW program. The feeding program component was conducted at Apolinario Mabini Elementary School (AMES) in Baguio City, Philippines, a selected public elementary school. The school was chosen based on student population size, existing feeding programs, and referral. The business simulation component was implemented at the University of the Cordilleras to assess the feasibility of the food truck-based delivery system and the subscription model. The feeding program took place in the school's Home Economics classroom, which offered sufficient space for the students.

A purposive sampling technique was used to select participants directly involved in the program. Participants included elementary school students from grades one to four, aged six to nine years old, as this age group is categorized together in the Pinggang Pinoy framework for recommended nutritional intake. Parents or guardians of participating students who expressed interest and committed to the program were included to provide feedback on feasibility, meal quality, and overall program effect. School administrators and teachers were also included to provide insights. Participants were excluded if they declined informed consent, wished to withdraw, were not at the pilot school site, or had serious dietary restrictions/medical conditions that would standardize data collection on breakfast consumption patterns. Before data collection, formal permission was obtained from school administrators. A Memorandum of Agreement was drafted and signed between the University of the Cordilleras and Apolinario Mabini Elementary School, formalizing the partnership. Participants were informed about the study's purpose. Signed informed consent forms were obtained from parents and the school principal, while child participants received verbal explanations in simple terms. Ethical considerations, including voluntary participation, confidentiality, and the right to withdraw, were strictly observed. Data was collected over a period of 15 school days.

The study utilized a mixed-methods research design, combining quantitative and qualitative approaches through a convergent parallel design to comprehensively analyze the logistics, behavioral impact, and financial sustainability of the NMOW program. Data sources included surveys and focus group interviews conducted with parents, elementary students, their advisers, and subscribers. For the quantitative aspect, structured questions were used in data gathering. A six-point Likert scale was used to measure adults' (parents' and teachers') perceptions of NMOW's objectives, their roles, and observations of children's eating behavior. The same scale assessed subscribers' perceptions of the subscription model. For children's breakfast experience, a dichotomous scale with smiling and sad faces was used. Data was analyzed using descriptive statistics, including frequency, percentage, and arithmetic means, to summarize survey results and quantify opinions/preferences on program quality, convenience, and efficiency.

For the qualitative aspect, open-ended questions, observations, and interactions were used. Focus group interviews were conducted with elementary students using the adapted Children Eating Behavior Questionnaire (CEBQ), an instrument developed in the UK to assess children's eating behavior [19]. This allowed children to provide feedback on taste, quality, satisfaction, and fullness using a child-friendly format with emojis and visual scales. A feedback survey for parents assessed their perception, involvement, and support, patterned after questionnaires from previous studies on parent perception of school meal programs [20], [21]. A separate survey for teachers gathered observations and feedback on program implementation. Another survey for subscribers assessed the business model's market feasibility. Qualitative data were analyzed from interviews and focus groups using thematic analysis to identify key themes related to meal accessibility, satisfaction, and program feasibility. Thematic analysis involves reviewing data, coding notable remarks, combining codes into categories, and analyzing their meaning [22]. The NMOW program design included a centralized commissary kitchen to facilitate large-volume food preparation, adhering to food safety standards. Commissary kitchens are commonly used in food service to produce, prepare, maintain meal quality, and streamline processes, enhancing safety by centralizing preparation. This system streamlines resources and increases operational efficiency. Mobile food trucks were used for meal delivery, playing a fundamental role in logistical operations due to their mobility. Food trucks allow delivery to multiple sites and overcome limited kitchen facilities in schools. The meal planning consisted of a 20-day breakfast cycle, approved by a dietitian and tailored for students aged six to nine years. Meals were aligned with standards from UNICEF and the Philippines' Pingang Pinoy framework. Meals were designed to be visually appealing, considering food presentation, sensory perception, and packaging, as these factors influence children's eating behaviors. The financial model incorporated a subscription-based system and the "Buy One, Help One" (BOHO) concept. Inspired by TOMS Shoes' "Buy One, Give One," BOHO means that when private companies subscribe for their employees' breakfast, a percentage equivalent to one meal is donated to a partnered elementary school student. The concept of "suspended meals" was also incorporated, adapted from the Italian tradition of *caffè sospeso* where customers pay for two drinks but consume one, leaving the second available for someone else for free. Revenue streams for continuous financial feasibility include a private-public partnership model. Encouraging private entities to adopt the program as part of their corporate social responsibility (CSR) activities is key. Local Government Units (LGUs) can provide support through subsidies and incorporating the program into their employee meal programs. For the pilot simulation at the University of the Cordilleras, professors and faculty subscribed to the BOHO plan, generating suspended meals for the elementary students. The results and findings from the surveys and group interviews conducted for the NMOW breakfast feeding program at Apolinario Mabini Elementary School and the subscription-based business simulation at the University of the Cordilleras. Data were organized around five key sections: students' attendance, participation, and meal satisfaction; students' breakfast experiences; parental perceptions and involvement; teachers' evaluations of program impact; and subscribers' purchasing motivations and feedback. The results highlight the program's effectiveness in promoting consistent healthy eating behavior, enhancing food satisfaction, and demonstrating the viability of the public-private partnership initiative and CSR among partners.

- **Student Attendance and Satisfaction:** Data over a 15-day period showed consistent attendance during the program, with the daily target of 30 students reached on Days 7, 8, and 15. The lowest attendance was 16 students on Day 4. Variations were attributed to reasons such as examination days, absences due to sickness, the ending school year, or class cancellations. Satisfaction scores showed almost all students were satisfied, with few instances of dissatisfaction. Nine out of 15 days had 100% satisfaction ratings when attendance maxed at 30 students. Observations indicated students were more likely to finish and enjoy rice meals compared to sandwiches or soup-based meals.
- **Student Breakfast Experience:** A group interview with 40 students (grades 1-4) revealed mostly positive responses. 100% of attendees enjoyed their meals due to taste, appearance, and variety, making them look forward to breakfast. 95% were eager to try new meal options and meals with drinks. All interviewed students reported feeling full, awake, and energized after eating. 100% gave affirmative responses to statements like "If I am given the chance, I will always eat NutriMeals breakfast" and "I am happy eating my breakfast with NutriMeals," indicating willingness for continued participation. Meal consumption pace varied, with 57.5% finishing within 30 minutes and 42.5% taking longer.
- **Parental Perceptions and Involvement:** A survey of 40 parents (grades 1-4) showed strong agreement on the NMOW program objectives. The statement "NMOW provides my child with a healthy meal efficiently" received the highest mean score (M=5.75), supported by 83% "Strongly Agree" and 15% "Agree". Parents believed NMOW helps children develop awareness of balanced breakfast importance (M=5.725) and instills consistent, healthy breakfast eating behavior (M=5.675). Overall reception of objectives was highly positive, with only one "Disagree" response recorded across all 10 statements. Parents also acknowledged an active role in supporting the program. Monitoring their child's eating habits at home to support NMOW goals received the highest mean score (M=5.725). High agreement was also seen for encouraging daily breakfast (M=5.675) and advocating for continued support (M=5.625). Sense of belongingness received a lower mean but was still a strong agreement (M=5.30), indicating high involvement despite potentially lower emotional attachment. The most agreed upon observation was children looking forward to breakfast daily (M=5.65). The lowest mean score was for observing fewer complaints about being hungry during school hours (M=5.125), which was still interpreted as "Strongly Agree". Results demonstrate NMOW's positive influence on children's breakfast habits, attitude, and behavior, supported by high mean scores (mostly above 5.3) showing parents' understanding and support.
- **Teacher Evaluations:** A survey of 20 teachers/coordinator showed strong awareness and approval of the program. Statements on program awareness, communication, and alignment with school goals for child nutrition received 90% or more strong agreement. Teachers strongly agreed that NMOW aligns with school goals (M=5.95). They recognized the program's influence on student behavior, noting it helps students develop better eating habits (M=5.85) and appear more focused in class (M=5.7). High agreement indicates perceived improvements in student attentiveness, energy, and class participation. Teachers' comments highlighted increased student enthusiasm, punctuality, attention span, and classroom performance. One teacher noted a previously absent student became excited to attend school because of the program. Logistical challenges included delays in class attendance while students finished meals and the need for clearer orientation for advisers. Despite challenges, teachers expressed willingness to support NMOW through awareness-building and monitoring, with scores between 5.65 and 5.90 for these items.
- **Subscriber Sustainability and Acceptability:** A survey of 36 respondents (faculty, administrator, students) at the University of the Cordilleras showed strong understanding and support for the BOHO model. Statements on awareness of the BOHO model (M=5.72) and feeling encouraged to subscribe knowing it helps a child (M=5.61) had two of the highest means, showing the business model encouraged subscriptions. 61% would recommend NMOW, and 64% were more inclined to continue subscribing because of the program's mission. Key reasons for subscribing were social benefit (28 responses), convenience (21), affordability (19), and nutritional value (19). Constructive feedback included suggestions for more meal variety, improved packaging, and beverage inclusion. Data indicated subscribers value both the social cause and service quality.

III: Discussions

The results demonstrate that the NutriMeals on Wheels program effectively addresses several key challenges in providing nutritious school breakfasts. The program's success in fostering consistent attendance and high satisfaction among students highlights the positive behavioral impact of providing regular, enjoyable meals. Students' reported enjoyment of meals due to taste, appearance, and variety, along with their eagerness to try new options, aligns with research indicating that food presentation and sensory perception significantly influence children's willingness to eat healthy foods. The finding that students felt full, awake, and energized supports the understanding that breakfast provides essential nutrients and energy for school activities. While the pace of consumption varied, the overall positive experience encourages consistent eating habits. Even reluctant eaters were observed eventually eating the food, reinforcing the importance of repeated exposure and appealing meal variation.

The strong support from parents and teachers is crucial for the program's success and sustainability. Parents' high agreement on NMOW's objectives and their acknowledged role in supporting their children's eating habits at home underscore the vital role of family involvement in promoting healthy eating. Teachers' observations of improved student attentiveness, energy, and classroom participation corroborate the link between nutritious breakfast and enhanced cognitive and behavioral outcomes. Although logistical challenges like class delays and the need for clearer orientation were noted, the overall willingness of teachers to support the program is a positive indicator. From a logistical standpoint, the study explored different delivery methods. While the pilot simulation assessed the food truck system for business feasibility, observations from the feeding program itself highlighted that pre-packed meals offer more convenience and ensure timely delivery for students. Ensuring meals arrive 30-45 minutes before the first class allows students sufficient time to eat without disrupting their schedule. Subscribers also preferred breakfast meals packed in packaging. The centralized commissary kitchen contributes to maintaining meal quality, safety, and operational efficiency, addressing challenges faced by traditional decentralized models. Financially and structurally, the NMOW model, based on a private-public partnership and the

BOHO concept, showed promise for sustainability. Subscribers at the University of the Cordilleras demonstrated strong understanding and support for the BOHO model, with the social benefit of helping children being a key motivator for subscription, alongside convenience, affordability, and nutritional value. This indicates that cause-based consumption is increased when paired with well-designed services, aligning with social marketing theory. The willingness of subscribers to recommend and continue their subscription due to the program's mission further builds loyalty. Parental willingness to promote and participate, especially when their feedback is considered, also supports long-term program viability. The positive acceptance of the BOHO model suggests that socially driven initiatives can be financially sustainable when they align with community values and social benefits.

IV: Conclusions

The NutriMeals on Wheels (NMOW) program was evaluated across three dimensions: behavioral impact on students, logistics and accessibility, and parental needs in relation to long-term financial sustainability. Based on the findings from students, teachers, parents, and subscribers, the program demonstrates effectiveness in influencing children's healthy eating habits and shows market acceptability. At the behavioral level, students showed improved nutritional behaviors, eating patterns, energy levels, motivation, and focus. Meal excitement and satisfaction increased among students, while teachers observed greater classroom engagement and focus. These results indicate that regular nutritious breakfasts have positive effects on students' health and also their attitude and behavior in school. Regarding logistics and accessibility, the program's success relies on efficient meal distribution for beneficiaries and convenient delivery for subscribers. Pre-packed meals proved more convenient for students, ensuring timely delivery. Subscribers also preferred packaged meals. Timely arrival of meals (30-45 minutes before the first class) is crucial for students to consume them without disrupting class time. These logistical strengths enhance satisfaction and ensure meals support daily school routines. In terms of parental needs and financial sustainability, parents provided valuable support for NMOW, appreciating its positive behavioral impacts on their children and the ease it brings to their daily lives. Parental willingness to promote and participate further indicates potential for long-term support, especially when their feedback is incorporated into planning. The "Buy One, Help One" model was positively accepted by subscribers, supporting the notion that socially driven initiatives can be financially sustainable when aligned with community values and social benefits. Based on the study results, the researchers propose several impactful recommendations for future studies and program implementation. First, it is essential to investigate the long-term impacts of the NMOW program on academic performance and student attendance. A deeper understanding of these effects can provide valuable insights into the program's overall effectiveness. Additionally, considering a longer timeframe for evaluating the program's effects on students' nutritional status and physical development would offer a more comprehensive picture of its benefits. To enhance the accuracy of these evaluations, conducting before-and-after assessments or interviews would establish a baseline, allowing for a clearer measurement of the changes observed in the children. Moreover, exploring the program's effectiveness and adaptability for other age groups and educational levels would broaden its applicability and potential impact. Incorporating a reward system alongside the feeding program could further assess its influence on students' eating behavior and motivation, fostering healthier habits. Future evaluations should also include logistical variables, such as traffic conditions and weather disruptions, to better understand their impact on meal delivery and program consistency. Lastly, it is crucial to emphasize the importance of sustaining and scaling school-based feeding initiatives. This can be achieved through stakeholder engagement and partnership-building involving health institutions, private companies for sponsorship and employee meal subscriptions, as well as local government units. Such collaboration will ensure that program responsiveness, impact, and community involvement are maintained, ultimately enhancing the program's effectiveness and reach.

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