

## The Impact of Calcium Initiative (Ca-In) Program on Parental Compliance: A Quasi-Experimental Study

**RAMIREZ, Sheryl H.<sup>(1)</sup>; OUABED, Safiya M.<sup>(2)</sup>; MENDOZA, Elijah Arvhin M.<sup>(3)</sup>; DE LOS SANTOS, Mikee Nathalie R.<sup>(4)</sup>; DOMINGO, Alyssa Ricci B.<sup>(5)</sup>; ERESE, Gail Michelle F.<sup>(6)</sup>; MAUNGCA, Andrea L.<sup>(7)</sup>; ORTUOSTE, Arielle Ann A.<sup>(8)</sup>; PINEDA, Frances Diamond M.<sup>(9)</sup>; RIEL, Amber Jane M.<sup>(10)</sup>; SIVILLA, Jermaine C.<sup>(11)</sup>**

- (1)  0000-0002-7217-7433; Emilio Aguinaldo College. Manila, NCR, Philippines. sheryl.ramirez@eac.edu.ph  
(2)  0009-0001-1325-0450; Emilio Aguinaldo College. Manila, NCR, Philippines. safiyaouabed@gmail.com  
(3)  009-0001-8011-0642; Emilio Aguinaldo College. Manila, NCR, Philippines. arvhin.mendoza123@gmail.com  
(4)  0009-0007-1681-2272; Emilio Aguinaldo College. Manila, NCR, Philippines. mikeenathaliedls@gmail.com  
(5)  0009-0002-2336-5179; Emilio Aguinaldo College. Manila, NCR, Philippines. dalysaricci@gmail.com  
(6)  0009-0000-2718-8427; Emilio Aguinaldo College. Manila, NCR, Philippines. gailfernandez925@gmail.com  
(7)  0009-0008-2444-9706; Emilio Aguinaldo College. Manila, NCR, Philippines. andrea.maungca@gmail.com  
(8)  0009-0003-3396-7752; Emilio Aguinaldo College. Manila, NCR, Philippines. ortuostearielle@gmail.com  
(9)  0009-0004-7916-0257; Emilio Aguinaldo College. Manila, NCR, Philippines. shibabz0333@gmail.com  
(10)  0009-0009-8662-1871; Emilio Aguinaldo College. Manila, NCR, Philippines. amberjaneriel077@gmail.com  
(11)  0009-0004-8602-3816; Emilio Aguinaldo College. Manila, NCR, Philippines. sivillajermaine@gmail.com  
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### ABSTRACT

Calcium, along with other micronutrients, is a key component of bone health and development in children. This study assessed the difference in compliance with calcium-rich meal plans following the Calcium Initiative (Ca-In) program and determined the compliance changes according to demographic profile. A quantitative quasi-experimental design was employed, using a single-group pre- and post-intervention approach to evaluate compliance. From a total community population of 904 individuals, 35 parents or legal guardians of children aged 6–9 years were selected through snowball sampling in coordination with local officials. The structured intervention provided significant findings on calcium intake practices through an information triad—Calcium Micronutrient Briefer, Calcium Basket Video, and Calcium Wheel Pamphlet. Pre-intervention meal plan compliance yielded an average of  $\bar{x}=2.623$ . Strikingly, the post-intervention compliance demonstrated moderate compliance of 0.377. In comparison, demographic factors had no significant impact on compliance levels. A comprehensive campaign was developed from these findings to effectively educate parents in community health settings to optimize and sustain nutritional adherence. This research advances the discourse on child health promotion and emphasizes the importance of health education programs in mitigating nutrient deficiencies. Amplifying such initiatives could further integrate calcium dietary practices into primary health promotion within underserved communities. Future studies can strengthen the generalizability and transferability of the results by expanding the sample size and applying rigorous probability sampling techniques. Hence, this research is epitomized by the maxim 'Healthy Children, Healthy Communities, Healthy Society.'

### RESUMO

O cálcio, juntamente com outros micronutrientes, é um componente essencial para a saúde óssea e o desenvolvimento infantil. Este estudo avaliou a diferença na adesão a planos alimentares ricos em cálcio após o programa Iniciativa do Cálcio (Ca-In) e determinou as mudanças na adesão de acordo com o perfil demográfico. Foi empregado um delineamento quase-experimental quantitativo, utilizando uma abordagem de pré e pós-intervenção com um único grupo para avaliar a adesão. De uma população total de 904 indivíduos na comunidade, 35 pais ou responsáveis legais de crianças de 6 a 9 anos foram selecionados por meio de amostragem em bola de neve, em coordenação com autoridades locais. A intervenção estruturada proporcionou resultados significativos sobre as práticas de ingestão de cálcio por meio de uma tríade de informações: Boletim Informativo sobre Micronutrientes e Cálcio, Vídeo sobre a Cesta de Cálcio e Folheto sobre a Roda do Cálcio. A adesão ao plano alimentar antes da intervenção apresentou uma média de  $\bar{x} = 2,623$ . Surpreendentemente, a adesão após a intervenção demonstrou um nível moderado de 0,377. Em comparação, os fatores demográficos não tiveram impacto significativo nos níveis de adesão. Uma campanha abrangente foi desenvolvida a partir dessas descobertas para educar efetivamente os pais em ambientes de saúde comunitária, visando otimizar e manter a adesão à nutrição. Esta pesquisa contribui para o debate sobre a promoção da saúde infantil e enfatiza a importância de programas de educação em saúde na mitigação de deficiências nutricionais. Ampliar tais iniciativas poderia integrar ainda mais as práticas dietéticas de cálcio à promoção da saúde primária em comunidades carentes. Estudos futuros podem fortalecer a generalização e a transferibilidade dos resultados, expandindo o tamanho da amostra e aplicando técnicas rigorosas de amostragem probabilística. Portanto, esta pesquisa sintetiza a máxima "Crianças Saudáveis, Comunidades Saudáveis, Sociedade Saudável".

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## **Introduction**

Calcium is an essential micronutrient crucial for bone health and supporting various physiological functions, particularly in children (Narayanam et al., 2021). In the Philippine context, adequate calcium intake is necessary for school-aged children for growth, development, and disease prevention. However, several families have had limited access to calcium-rich foods such as milk, cheese, and tofu due to increasing food costs amid economic inflation. This led to a potential decrease in dietary calcium intake among Filipino children.

Calcium deficiency in children can result in significant health issues, including rickets, fractures, and impaired muscle function (Chaudhari & Dadheech 2023). Studies highlight that achieving peak bone mass during childhood through optimal calcium intake is critical for long-term health. (Horiuchi et al., 2019). Although calcium-enriched dietary options and supplements are widely available, many children across the Philippines do not have an adequate level of calcium intake, placing them at an increased risk of acquiring calcium deficiency-related conditions.

The study examined the impact of the Calcium Initiative (Ca-In) program on parental compliance with providing calcium-rich meal plans for their children. The intervention, tailored for Filipino households, consisted of educational resources to promote increased calcium intake in their dietary practices. This research targets a gap in studies on parental meal plan compliance and aims to strengthen the better understanding of ways to improve children's nutritional health in the Philippines.

The objective of this study was to determine the significant difference in compliance with dietary calcium meal plans among the respondents pre- and post-intervention. Additionally, compliance levels of the respondents were identified based on their demographic profiles.

This study was grounded in the Health Promotion Model (HPM), wherein preventative health measures and the role of nursing professionals in supporting proactive self-care are consistently highlighted. Proposed by Nola J. Pender, this model suggests that people are biopsychosocial beings shaped by their environment, which strives to create conditions that allow the full expression of human potential. The framework was used to interpret differences in dietary calcium meal plan compliance before and after the intervention among parents of early school-aged children. In addition, the study elucidated several key aspects that influence meal planning behavior such as parental knowledge, beliefs, self-efficacy, and social support, alongside environmental factors like access to calcium-rich resources.

The study evaluated the impact of the Calcium Initiative (Ca-In) program on parental compliance with calcium-rich dietary meal plans, focusing on pre- and post-intervention adherence. The structured intervention was implemented on 35 parents of children aged 6 to

9 years located in Barangay 666, Ermita, Manila, the adopted community of Emilio Aguinaldo College–Manila Marian School of Nursing. Conducted procedurally from February to March of 2024, the researchers observed the meal plan compliance every 15 days.

The researchers identified multiple limitations. First, the sample size of 35 respondents and the use of a snowball sampling technique, along with the absence of a control group, reduce the generalizability of the findings. The self-reported data through the Dietary Calcium Intake Compliance Tool (DCICT), a retrospective method, may have introduced recall bias and impacted the accuracy of their calcium intake. External variables that may have affected the respondents' compliance with prescribed meal plans were outside the researcher's control. The 45-day intervention period gives a brief overview of behavior and may not capture long-term behavioral changes or sustained compliance in the dietary changes. Furthermore, the study design and the differences in adherence levels likely influenced the findings of the respondents.

## **Methodology**

The researchers employed a quantitative quasi-experimental design with a single-group pre-test and post-test approach assessing parental compliance on high-calcium food sources for their early school-aged children. This adopted design was attributable to the absence of a control group and the limitations in applying random selection, allowing for an examination of the Calcium Initiative (Ca-In) program's impact despite practical challenges and constraints (Siedlecki, 2020).

To establish the baseline compliance level, the study initiated with a pre-intervention assessment, followed by an intervention consisting of an informative briefier, an educational video on calcium-rich sources, and pamphlets to serve as concise guidelines for the parents throughout the intervention. Subsequently, three post-assessments were conducted to measure changes in dietary calcium intake compliance levels. The statistical analysis of the pre- and post-intervention scores offered insights into the effectiveness of the intervention in improving how parents followed the dietary guideline for their children's calcium intake.

The sampling method applied in this study is a non-probability sampling approach, specifically utilizing the snowball sampling technique. A sample size of 35 respondents from the local census was identified and recruited by the researchers with the assistance of the barangay officials.

The study was thoroughly conducted in Barangay 666, Manila City, situated in the National Capital Region of the Philippines. This locale serves as the adopted community of the Marian School of Nursing. Furthermore, the study's intervention was conducted at the barangay's Daycare Center. As for the pre- and post-intervention assessments, these took place in the respondents' homes to facilitate comfort and natural setting for evaluation. This

community-based approach revealed substantive insights into respondents' compliance with calcium-rich meal plans.

The researchers followed a systematic and ethical approach to conducting the study. Firstly, they secured consent from the Dean of the Emilio Aguinaldo College-Manila Marian School of Nursing ensuring alignment with the school's research agenda and ethical standards. It was followed by an approval acquired from the Institutional Ethics Review Board of Emilio Aguinaldo College-Cavite. Additionally, the Barangay Captain of Barangay 666, Ermita, Manila, granted permission for the study's implementation.

The research team held primary interviews with potential respondents to attain informed consent. The protocols of the study were properly explained including meal plan assessments, interventions, and data collection timelines and procedures. The respondents were thoroughly briefed on the study's objectives, ethical considerations, voluntary participation, and withdrawal rights, and were given opportunities to raise their questions.

### ***Research Protocol***

Phase I. Before the initiation of the intervention, the researchers obtained the respondents' informed consent to ensure compliance with ethical standards. Baseline data were collected including the demographic profile of the respondents, and a comprehensive food frequency questionnaire was utilized to determine the calcium-rich foods given to the children of the respondents.

Phase II. The second phase introduced the intervention methods through a structured program titled Calcium Initiative (Ca-In). This provided the intervention group with an overview of the calcium-rich foods through an information triad: 1) Calcium Micronutrient Briefer, 2) Calcium Basket Video, and 3) Calcium Wheel Pamphlet. These were utilized to elucidate the importance of the calcium micronutrient, the ways to provide calcium-rich foods readily available in their locale, and facilitate a detailed meal plan structured for their children during the interventions of the study.

Phase III. The third phase was initiated upon completion of the second phase. The researchers scheduled follow-up assessments to maintain participant engagement and evaluate the impact of the Ca-In program on parental compliance. Employing a time-series approach, post-intervention evaluations were conducted at 15-day intervals to provide continuous reinforcement and guidance on adherence to the meal plans. The respondents accomplished the Dietary Calcium Intake Compliance Tool (DCICT) to measure changes in dietary behaviors and calcium intake compliance, allowing for comparisons with baseline measurements.

Phase IV. The final phase of the research centered on translating the research findings into actionable recommendations by refining calcium campaign materials to raise awareness

among parents and community stakeholders about the benefits of dietary compliance for children's bone health. From the previously developed information triad, the researchers transformed it into an infographic format to reach a wider population. In addition, a collaboration was formed with the local barangay officials for the promotion of calcium-rich foods among children. This phase aimed to advance child nutrition and public health by connecting study outcomes to practice.

### ***Research Tool***

**Demographic Profile Form.** The Demographic Profile Form or DPF was a statistical instrument designed to collect primary demographic information about the study's respondents, including age, gender, educational attainment, and family income. The respondents were assigned a control number, ranging from C001 to C035, to protect the confidentiality of all data. Additionally, the results were reported in aggregate to maintain anonymity.

**Dietary Calcium Intake Compliance Tool.** The researchers constructed the Dietary Calcium Intake Compliance Tool (DCICT), a modified Food Frequency Questionnaire (FFQ) customized to reflect calcium-rich foods commonly available in Filipino households (Food and Agriculture Organization [FAO], 2018). This tool employed a retrospective approach focusing on parental compliance with incorporating calcium-rich food sources into their children's diets to assess the frequency of food group consumption over a specific time frame. The DCICT played an integral role in both pre- and post-intervention assessments as it captured variations in compliance levels with dietary calcium intake. The use of locally available options was emphasized, including various food sources such as grains, legumes, fruits, vegetables, meat, poultry, fish, and dairy products. This structured tool uncovered key findings regarding dietary behaviors and adherence to calcium intake guidelines relevant to the study.

### ***Statistical Treatment***

The study sought to evaluate the effectiveness of a 45-day intervention entailing a calcium-enriched meal plan and milk supplementation. The sample consisted of 35 respondents, comprising parents and guardians of early school-aged children (6 to 9 years old). Descriptive statistical methods, such as frequency distribution and percentage analysis, were utilized to present the respondents' sociodemographic characteristics, including age, gender, educational attainment, and household income. The researchers used a paired sample t-test, which demonstrated a statistically significant improvement in the respondents' knowledge between the pre- and post-intervention periods. Furthermore, post-intervention knowledge acquisition showed significant variation when stratified by demographic parameters. However, this analysis was confined to two categorical variables.

### ***Ethical Consideration***

Ethical considerations were central to the design and execution of this research, upholding the well-being, rights, and dignity of the respondents. Parents or legal guardians were thoroughly informed of the benefits and risks of the study, and their informed consent was secured before the research protocols commenced. The researchers strictly complied with ethical standards, including the Republic Act #10173 or the Data Privacy Act of 2012, safeguarding the privacy and rights of respondents while ensuring fairness, respect, and safety in all stages of the research. Notably, this study underwent review by the members of the Ethics Review Committee of Emilio Aguinaldo College-Cavite and received approval having been free from ethical issues and violations. This was stipulated by the institutional ethics review committee with clearance code 2024-01-030.

### **Results and Discussion**

This research aimed to underscore compliance with the calcium-focused meal plan among the respondents. This section assessed the respondents' demographic characteristics, utilizing graphical presentations and tables to visually depict and interpret the data.

**Table 1.**  
*Age Frequency and Percentage Distribution*

<b>Age Range</b>	<b>Frequency</b>	<b>Percentage</b>	<b>%</b>
18-25	15	43.00	%
26-35	11	31.00	%
36-45	4	11.00	%
46-55	3	9.00	%
>55	2	6.00	%
<b>Total</b>	<b>35</b>	<b>100.00</b>	<b>%</b>

Table 1 displayed the distribution of respondents by age, revealing that 15 (43%) were aged 18-25 years, 11 (31%) were 26–35 years, and 4 (11%) were 36–45 years, with only 2 (6%) aged over 55 years old. The researchers noted that the younger age groups (18-25 and 26-35 years) were mostly biological parents, while older respondents encompassed parents, grandparents, and legal guardians, which aligns with data reported by the Philippine Statistics Authority (PSA, 2023) indicating a high incidence of teenage pregnancy and suggesting that many individuals begin families during these age ranges.

**Table 2.**  
*Gender Frequency and Percentage Distribution*

<b>Gender</b>	<b>Frequency</b>	<b>Percentage</b>	<b>%</b>
Female	28	80.00	%
Male	7	20.00	%
<b>Total</b>	<b>35</b>	<b>100.00</b>	<b>%</b>

Table 2 presented the gender composition of respondents, indicating that 80% of females exhibited higher compliance rates compared to 20% of males, suggesting potential gender-based disparities in parenting approaches. The predominance of female respondents highlights their significant role in the Calcium Initiative (Ca-In) program, aligning with findings by Mkandawire et al. (2022), which note that women often balance professional and household responsibilities to promote children's nutrition, although their increased responsibilities can hinder their ability to meet dietary needs.

**Table 3.**

*Educational Attainment Frequency and Percentage Distribution*

<b>Educational Attainment</b>	<b>Frequency</b>	<b>Percentage</b>	<b>%</b>
Elementary Graduate	19	54.00	%
High School Graduate	12	34.00	%
College Graduate	2	6.00	%
No Education	2	6.00	%
<b>Total</b>	<b>35</b>	<b>100.00</b>	<b>%</b>

Table 3 reflected the educational background of the respondents, revealing that over half (54%) were elementary graduates, while 34% were high school graduates, and both college graduates and those with no educational attainment comprised 6% each. These findings suggested a demographic with limited access to higher education, and they align with research by Sarkar et al. (2023), which indicates that parental education is a key determinant of children's health and nutrition, promoting positive behavioral changes that enhance health outcomes.

Table 4 presented the monthly family income of respondents, indicating that 83% earn less than ₺5,000 annually, while only 11% fall within the ₺5,001-₺10,000 range, and a mere 3% report higher incomes.

**Table 4.**

*Family Income Frequency and Percentage Distribution*

<b>Family Income</b>	<b>Frequency</b>	<b>Percentage</b>	<b>%</b>
Less than ₺5,000	29	83.00	%
₺5,001- ₺10,000	4	11.00	%
₺10,001-₺15,000	1	3.00	%

₱15,001-₱20,000	1	3.00	%
<b>Total</b>	35	100.00	%

This suggests that the majority belong to a low-income bracket, potentially affecting their participation and compliance with programs similar to the Ca-In program; as noted by Kirk et al. (2018), family income significantly influences healthcare decisions and children's health and nutrition outcomes, highlighting the importance of household economics in shaping dietary choices.

**Table 5.**

*Mean Pre-Intervention Dietary Calcium Meal Plan (DCMP) Compliance*

<b>Calcium-rich Food</b>	<b>Mean</b>	<b>Compliance Interpretation</b>
Milk Biscuit	3.400	High
Bread	3.371	High
Milkfish/Tilapia/Galunggong/Tulingan	3.171	Moderate
Orange Juice	3.171	Moderate
Egg	3.144	Moderate
Milk	3.000	Moderate
Chicken meat	3.000	Moderate
Pork meat	2.971	Moderate
Squash	2.971	Moderate
Sardines (canned)	2.943	Moderate
Monggo beans	2.886	Moderate
Tofu/Taho/Soy milk	2.886	Fair
Dalandan	2.829	Fair
Dalanghita/Kyat-kyat/Orange	2.800	Fair
Papaya	2.657	Fair
Beef meat	2.486	Fair
Malunggay leaves	2.486	Fair
Peanuts	2.457	Fair
Tuyo/Tinapa	2.400	Fair
Water spinach	2.400	Fair
Saluyot leaves	2.343	Fair
Carrot	2.314	Fair
Cheese	2.286	Fair
Tomato	2.229	Fair
Baguio beans	2.200	Fair
Guava	2.086	Fair
Okra	2.057	Fair
Broccoli	2.029	Fair
Oatmeal	1.886	Fair
Tahong/Tulya/Halaan	1.857	Fair
<b>Weighted Mean</b>	<b>2.623</b>	<b>Moderate</b>

Note: Mean compliance scores are categorized into three levels: high (3.33-4.00), moderate (2.67-3.32), and fair (2.00-2.66)

Table 5 revealed differing levels of pre-intervention dietary supplementation among respondents regarding different food categories, with high compliance for bread (x=3.371) and biscuits (x=3.400), indicating parents' willingness to provide these easily accessible items. In contrast, foods such as oatmeal (x=1.886) and mussels/clams (x=1.857) exhibited low compliance, suggesting potential challenges in acquisition or reluctance to offer them to children, ultimately limiting exposure to diverse foods; factors like taste preferences and food neophobia can further influence children's acceptance of certain foods (Taylor et al., 2015).

These findings underscore that parents often prioritize readily available and affordable foods, influenced by factors such as convenience and economic constraints. The grand mean score of 2.623 denotes overall moderate adherence to the calcium meal plan, reflecting how factors like availability, affordability, and convenience shape parental food choices, with a tendency to prioritize inexpensive and easily prepared staples (Cohen et al., 2014; French et al., 2019).

**Table 6.***Mean Post-Intervention DCMP Compliance*

<b>Calcium-rich Food</b>	<b>Mean</b>	<b>Compliance Interpretation</b>
Bread	3.686	High
Milk Biscuit	3.686	High
Milk	3.686	High
Egg	3.571	High
Orange juice	3.400	High
Dalandan	3.371	High
Milkfish/Tilapia/Galunggong/Tulingan	3.343	High
Chicken meat	3.286	High
Sardines (canned)	3.229	Moderate
Dalanghita/Kyat-kyat/Orange	3.171	Moderate
Tofu/Taho/Soy milk	3.114	Moderate
Papaya	3.057	Moderate
Pork meat	3.029	Moderate
Cheese	2.971	Moderate
Malunggay leaves	2.971	Moderate
Monggo beans	2.943	Moderate
Tuyo/Tinapa	2.886	Moderate
Peanuts	2.886	Moderate
Squash	2.857	Moderate
Carrot	2.829	Moderate
Beef meat	2.800	Moderate
Tomato	2.771	Moderate
Beef meat	2.714	Moderate
Tomato	2.686	Moderate
Saluyot leaves	2.629	Moderate
Okra	2.600	Moderate
Guava	2.514	Moderate
Baguio beans	2.514	Moderate
Oatmeal	2.457	Fair
Broccoli	2.343	Fair
<b>Weighted Mean</b>	<b>3.000</b>	<b>Moderate</b>

*Note: Mean compliance scores are categorized into three levels: high (3.33-4.00), moderate (2.67-3.32), and fair (2.00-2.66)*

Table 6 indicated a grand mean of 3.000 for dietary calcium meal plan compliance, reflecting moderate compliance and improvement from the pre-intervention mean of 2.623. These findings suggest progress in encouraging children to follow a balanced diet. Post-implementation, most respondents showed moderate dietary compliance, with high compliance in items like bread ( $x=3.686$ ), biscuits ( $x=3.686$ ), and milk ( $x=3.686$ ). Moderate compliance was observed for essential foods such as pork ( $x=3.029$ ), papaya ( $x=3.057$ ), and cheese ( $x=2.971$ ). However, lower compliance was noted for broccoli ( $x=2.343$ ) and oatmeal ( $x=2.457$ ), indicating potential issues with availability or palatability.

To enhance compliance, interventions should focus on increasing the consumption of foods with moderate scores. For low-income families seeking sustainable dietary changes, addressing food access and affordability is essential (Ravikumar et al., 2022). While the Calcium Initiative (Ca-In) program positively influenced dietary calcium intake, improvements are still needed, particularly regarding vegetable consumption (Welker et al., 2018).

**Table 7.**  
*Mean DCMP Compliance levels Pre-and Post-Intervention*

<b>Intervention</b>	<b>n</b>	<b>Mean</b>	<b>SD</b>	<b>p-value</b>	<b>Remarks</b>
Pre	35	2.622	0.662	0.0012	Significant
Post 1	35	3.118	0.779		
Pre	35	2.622	0.662	0.0091	Significant
Post 2	35	2.882	0.633		
Pre	35	2.622	0.662	0.0079	Significant
Post 3	35	3.004	0.718		

*Note: Significant if p-value is less than 0.05 level of significance*

In the second post-intervention stage, compliance decreased slightly to 2.882, a drop of about 0.236 from the first stage, yet remained substantially higher than the pre-intervention mean (p-value = 0.0091). The mean compliance score during the third post-intervention phase was 3.004, reflecting a moderate decrease of approximately 0.114 from the initial stage but a modest increase of 0.122 from the second. Despite these fluctuations, the result remained statistically significant (0.0070), demonstrating sustained improvement compared to baseline values.

These findings align with Gobel et al. (2020), which emphasize the importance of continued nutrition education for parents to ensure compliance with meal plans. Collaborative efforts between local NGOs and healthcare providers are essential for providing financial support and nutritional education to families. Research by Somboonkul and Sukmag (2020) shows that parents involved in school nutrition programs improve their food-provision practices. Coccia et al. (2019) also created a family-focused nutrition ecosystem initiative to enhance parental knowledge and compliance with meal plans. Collectively, these studies emphasize the positive impact of dietary interventions on parental compliance and the need for focused educational efforts to promote healthier eating practices.

**Table 8.**  
*Mean Post-Intervention DCMP Compliance by Demographic Profile*

<b>Demographic</b>	<b>Variables</b>	<b>n</b>	<b>Mean</b>	<b>SD</b>	<b>p-value</b>	<b>Remarks</b>
Age	18-25	15	3.047	0.720	0.9330	Not Significant
	26-35	11	2.847	0.735		
	36-45	4	3.183	0.756		

	46-55	3	3.122	0.919		
	>55	2	3.000	0.990		
Gender	Male	7	2.838	0.802	0.5494	Not Significant
	Female	28	3.054	0.705		
Educational Attainment	Elementary	19	2.936	0.712	0.5915	Not Significant
	Graduate	12	2.974	0.737		
	High School Graduate	2	3.667	0.047		
	College Graduate	2	3.167	1.179		
Family Income	No Education	29	2.941	0.720	0.5683	Not Significant
	Less than ₱5,000	4	3.177	0.799		
	₱5,001-₱10,000	1	3.667	—		
	₱10,001-₱15,000	1	3.700	—		
	₱15,001-₱20,000					

Note: Significant if p-value is less than 0.05 level of significance

The post-intervention dietary calcium compliance did not differ significantly by age ( $p=0.9330$ ), although the highest compliance was among those aged 36-45 ( $x=3.183$ ,  $SD=0.756$ ). Gender did not significantly impact compliance ( $p=0.5494$ ), however females had a marginally higher score ( $x=3.054$ ) than males ( $x=2.838$ ). Research suggests women display varying responses to food cues, especially energy-rich foods (Manippa et al., 2017), and mothers often engage more in supportive food parenting than fathers (Jansen et al., 2022).

College graduates attained the highest compliance ( $x=3.667$ ), whereas compliance among elementary ( $x=2.936$ ) and high school graduates ( $x=2.974$ ) remained moderate, corroborating the findings of Stenhammar et al. (2007), which found higher intake of nutritious foods among college-educated parents. Income also did not have a significant effect on compliance ( $p=0.5683$ ), although the ₱15,001-₱20,000 income group scored highest ( $x=3.700$ ), supporting Verra et al. (2023) and Romanos-Nanclares et al. (2018), who found that parents' nutritional knowledge and socioeconomic status play a role in dietary compliance.

### ***Nutritional Campaign Material***

The Ca-In program utilized a Calcium Micronutrient Briefer, Calcium Basket Video, and Calcium Wheel Pamphlet to instruct parents on incorporating dietary calcium into their children's meals. The intervention resulted in a significant rise in meal plan compliance among parents, highlighting the effectiveness of the educational triad in promoting healthier eating patterns. Expanding these resources to neighboring local government units could further enhance the program's overall impact. To optimize the campaign, the researchers substituted the briefer with an infographic and disseminated the materials locally to reach a wider parent population.

## **Discussion**

The study aimed to determine differences in compliance with the dietary calcium meal plan among 35 parents in Barangay 666, Ermita, Manila, the adopted community of Emilio Aguinaldo College–Manila, Marian School of Nursing. The researchers utilized a modified questionnaire and analyzed the data through frequency distribution and paired sample T-tests.

The respondents were largely young individuals, ages 15–25 representing 43% (n=15) of the sample. 31% (n=11) were in the 26–35 age bracket, while the 36–45 and over-55 brackets represented 11% (n=3) and 6% (n=2), respectively. Majority of the respondents were female as they comprised 80% (n=28) of the group compared to 20% (n=7) for males. In terms of education, 54% (n=19) completed elementary school, 34% (n=12) reached high school, and 6% (n=2) either attended college or had no formal schooling. A large majority of the group (83%; n=29) reported a monthly income of less than ₱5,000. The remaining respondents were distributed across higher income brackets: ₱5,001–₱10,000 (11%; n = 4), and both the ₱10,001–₱15,000 and ₱15,001–₱20,000 ranges at 3% each (n = 1). The high number of young parents in this study reflects national trends where early motherhood is often associated with limited education and poverty (Salvador et al., 2016).

Research by Berge et al. (2011) suggests that younger parents tend to have more difficulty following nutrition and health guidelines. They report higher consumption of unhealthy foods and lower levels of physical activity. These factors emphasize why targeted interventions like the Ca-In program support this demographic.

Over half of the respondents (54%; n=19) finished elementary school, 34% (n=12) reached high school, and 6% (n=2) either attended college or had no formal schooling. This coincides with research indicating that parental education has a vital role in child nutrition by increasing access to nutritious complementary foods and enhancing understanding of the necessity of proper nutrition (Syauqan & Muzayanah 2024).

Majority of the respondents (83%; n=29) reported monthly earnings less than ₱5,000, with smaller proportions in higher income brackets. While higher household income is generally associated with better compliance with health and nutrition programs due to improved living conditions (Bagaipo & Napiere 2024), recent evidence also demonstrates that low-income families can effectively engage in nutrition interventions and achieve significant improvements in food security (Marshall et al., 2022). These outcomes reveal that despite economic constraints, low-income parents in this study were able to participate in the Ca-In program. This demonstrates that structured community-based nutrition interventions can be potentially effective, even in resource-limited settings.

Prior to the Calcium Initiative (Ca-In) program, the pre-intervention assessment showed a baseline adherence level of 2.623. After the educational triad was implemented, the mean score rose to 3.000, showing a measurable shift in compliance levels. This result aligns with a quasi-experimental study by Lv e Brown (2010), which found that theory-based

interventions effectively increase calcium intake with improvements that remain unchanged during follow-up assessments. Furthermore, the success of the program's multimodal approach is reinforced by Seward et al. (2016), who observed that multi-strategy interventions such as training, resources, and ongoing support, result in higher compliance with nutrition guidelines compared to standard care. By addressing multiple learning facets, the Ca-In program has helped parents move from baseline awareness to active compliance.

A detailed examination of the 45-day period displays a fluctuating but positive trend. At the 15-day mark, adherence reached its peak with a mean of 3.118 ( $p=0.0012$ ). By day 30, this figure dipped to 2.882, though it remained above the original baseline. By the final assessment on day 45, the score showed a slight recovery to 3.004. Despite these mid-study shifts, the statistical analysis confirms that the improvements remained consistent compared to the pre-intervention levels. This observation is supported by Meffert e Gerdes (2010), stating that while adherence to nutritional programs may decline slightly over time, it can remain high compared to the initial level. Their research indicates that even with minor variations, maintaining a level of compliance above the baseline correlates with favorable health outcomes.

Demographic factors like age, gender, education, and income revealed no significant differences in compliance levels. Based on the study's hypotheses and findings, the Calcium Initiative (Ca-In) program's educational triad effectively improved compliance and may benefit from expansion to nearby communities to foster healthy eating practices. It was found in a systematic review of successful nutrition programs in low- and middle-income countries that community-based interventions can be replicated with sustained outcomes when they integrate nutrition education with active community engagement (Hossain et al., 2017). This strengthens the potential expansion of the Ca-In program in comparable low-income environments.

## **Conclusion**

Ultimately, this study demonstrates that the Calcium Initiative (Ca-In) program, through its educational triad of a Calcium Micronutrient Briefer, Calcium Basket Video, and Calcium Wheel Pamphlet, markedly increased dietary compliance with the calcium meal plan among parents in Barangay 666, Ermita, Manila. Post-intervention results revealed a significant increase in adherence to calcium-rich meal plans, particularly within the first 15 days, with sustained compliance across later assessments. Although no significant differences were found across demographic factors such as age, gender, education, or income, the Ca-In program proved successful in promoting healthier dietary habits. Expanding this program to neighboring communities may further enhance nutritional practices and support the adoption of sustained healthy eating behaviors among low-income families.

## **Recommendations**

The researchers recommend enhancing future studies by including additional sociodemographic factors such as race, marital status, number of children, while expanding the sample size to improve the generalizability and transferability of findings for the Calcium Initiative (Ca-In) program. Employing probability sampling methods, extending the intervention time frame, and implementing stricter tracking protocols, such as daily food diaries, would increase study rigor.

Broader adoption of the Ca-In program across underserved areas, in collaboration with barangay officials, can promote continued dietary compliance among Filipino families. Integrating the program into existing health policies and national dietary guidelines could further support nutrition campaigns aimed at influencing parental behavior. Additionally, future research should explore cultural, social, and parental factors to better address barriers and enhance compliance.

## **Implications**

The present study offers several significant implications for future action. In the domain of education, there is a pressing need to design and implement comprehensive parental education campaigns that not only promote calcium intake but also cultivate sustainable, evidence-based nutritional behaviors. In practice, expanding targeted health education initiatives focused on improving calcium dietary practices, particularly within underserved and resource-limited populations, is essential.

From a research perspective, future investigations must prioritize increasing sample sizes and adopting rigorous probability sampling techniques to strengthen the generalizability, transferability, and applicability of findings. Looking ahead, national scaling of interventions, supported by the integration of digital technologies, presents an opportunity to enhance the reach, optimization, and sustainability of dietary calcium adherence across diverse communities, thereby advancing broader public health goals.

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