*B-ICON Proceeding*

# THE EFFECT OF THE CALGARY FAMILY INTERVENTION MODEL APPROACH IN CHOOSING HEALTHY SNACKS ON THE PREVENTION OF FOODBORNE DISEASES IN SCHOOL CHILDREN AT SDN 38 BENGKULU CITY

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**Abstract**

Foodborne disease (FBD) is a significant public health concern worldwide, particularly among school-aged children, who are more susceptible to consuming unsafe or unhealthy snacks sold around schools. Poor hygiene, lack of parental supervision, and limited knowledge about food safety often contribute to the high incidence of foodborne illnesses in this population. Therefore, improving children's understanding and behavior toward healthy snack selection is crucial in preventing FBD. This study aims to determine the effect of the Calgary Family Intervention Model (CFIM) approach on the selection of healthy snacks for the prevention of foodborne disease among schoolchildren at SDN 38 Bengkulu City. The CFIM emphasizes collaboration between children and their families to promote health behavior change through education, communication, and family engagement. This research employs a quantitative method with a quasi-experimental design using a one-group pre-test and post-test approach. The sample consisted of 41 second-grade students at SDN 38 Bengkulu City, selected through a total sampling technique. Data were collected using a structured knowledge questionnaire and analyzed statistically using the Wilcoxon Signed Rank test to evaluate differences before and after the intervention. The results showed a significant improvement in students' knowledge regarding the selection of healthy snacks after the CFIM-based intervention ($p < 0.05$). These findings indicate that the CFIM approach effectively enhances children's awareness and decision-making skills in choosing safe and nutritious foods. It is expected that this model can be implemented as a sustainable educational strategy to promote food safety and overall health among school-aged children.

**Keywords**: Calgary Family Intervention Model, Foodborne Disease, Health Education, Healthy Snacks, School Children

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## INTRODUCTION

School-aged children are in a period of rapid growth and development, so they need adequate nutrition. They spend most of their time at school, which encourages them to eat food in the school environment. However, the snacks available are often not guaranteed to be clean and nutritious.

Consumption of unhealthy foods can cause negative effects such as food poisoning, foodborne diseases (FBD), and problems with child growth and development (Syarifuddin et al., 2022).

School-aged children are in a phase of active growth and development, making them vulnerable to nutritional problems. Short-term risks associated with malnutrition may include the development of apathetic behavior, difficulties in communication, and obstacles in other areas of development. Long-term effects may include reduced intelligence quotient (IQ), cognitive dysfunction, sensory integration issues, difficulties in focusing attention, low self-esteem, and declining academic performance (Saputri et al., 2021).

Foodborne disease (FBD) is a global public health issue that has a significant impact on human health, daily life, and healthcare systems (Faour-Klingbeil & Todd, 2020). The WHO states that 600 million people suffer from foodborne diseases, with up to 1 in 10 people contracting illnesses due to food contamination and 420,000 people dying as a result (Faizah Nurfajri & Kurnia, 2021).

Foodborne diseases are illnesses caused by pathogens that enter the body through the consumption of contaminated food, and can be toxic or infectious. Although often referred to as “food poisoning,” this term is not entirely accurate. Foodborne diseases include illnesses caused by chemical or biological factors, as well as cholera, diarrhea, and certain parasitic diseases.

Data from the Centers for Disease Control and Prevention (CDC) in the United States indicates that approximately 76 million people experience food poisoning each year, with 300,000 requiring hospitalization and 500 deaths. In 2017, there were 5,293 cases of food poisoning, 2,041 people fell ill, and 3 died (Annisa et al., 2023). Findings from the Food and Drug Supervisory Agency (BPOM) indicate that 48% of children's food does not meet safety standards, as it contains harmful chemicals and is microbiologically contaminated. BPOM data for 2023 shows 1,722 cases of food poisoning (Octaviana & Ramadhani, 2021).

The provinces with the highest number of poisoning cases in 2022 and 2023 were West Java with 265 and 293 cases, respectively. In Bengkulu Province, there were 156 poisoning cases in 2023, with one fatality. The city of Bengkulu reported 51 cases of food poisoning. One of the foodborne diseases is diarrhea caused by E. coli bacteria in the city of Bengkulu in 2022 at the UPTD Kuala Lempuing, which had the highest number of cases in Bengkulu Province with 1,100 cases of diarrhea, UPTD Bentiring reported 600 cases, and UPTD Betungan reported 580 cases.

Food plays an important role in the spread of various diseases. Diseases caused by contamination in food are called foodborne diseases. These diseases arise because food is exposed to chemical, physical, or microbiological hazards. Transmission occurs through the consumption of food

contaminated by bacteria, viruses, parasites, or chemicals such as heavy metals. Symptoms resulting from foodborne diseases generally depend on the type of infection source, with common symptoms including diarrhea, vomiting, nausea, and stomach pain (Nurmawati et al., 2019).

Unsafe food consumption can cause various health problems, ranging from mild symptoms such as nausea and dizziness to more serious conditions such as vomiting, diarrhea, muscle cramps, paralysis, disability, and even death. In pregnant women, food poisoning can also have serious effects, including causing permanent defects in fetal growth and development.

School snacks that are not guaranteed to be healthy can cause poisoning, digestive disorders, and, if consumed over a long period of time, can lead to nutritional deficiencies. In addition, unhealthy foods can also affect children's academic performance at school (Berliana et al., 2021).

Long-term consumption of foods containing harmful dyes and preservatives, such as formaldehyde and borax, can trigger various health problems, including allergic reactions, diabetes, immune system disorders, and even the risk of developing cancer (Berliana et al., 2021).

To address this issue, a comprehensive assessment of the systems and subsystems that affect children, including the family environment, is needed. The assessment should cover not only the individual, but also interactions with family members. The Calgary Family Intervention Model (CFIM) is an effective approach for changing cognitive, affective, and behavioral aspects in dealing with family functional problems (Nasrullah et al., 2020). Parents play an important role in family life, and good parenting can improve health and well-being, while preventing health and social problems in future generations. (Husna et al., 2022).

The role of parents as mentors is an effort in which parents accompany and help their children, including in meeting their nutritional needs. In addition, parents also serve as motivators by providing encouragement and increasing their children's interest in consuming nutritious foods. As facilitators, parents provide for their children's various needs. In terms of nutritional fulfillment, parents strive to provide nutritious foods in portions that are appropriate for their children's bodies. (Bellandira Cholana et al., 2023).

Research Nasrullah, 2020 (Nasrullah et al., 2020) shows that CFIM has an effect on knowledge, attitudes, and practices regarding the selection of healthy snacks. Murtoyo, 2023 (Murtoyo, 2023) states that CFIM family therapy is effective in improving the efficacy of family caregivers for ODS. Nurbadriyah, 2019 (Nugroho & Banase, 2023) proving that CFIM is effective in improving knowledge of anemia prevention among preschool children. Prihartanti, 2023 (Prihartanti et al., 2023) stated that counseling with effective modules improves knowledge of feeding stunted children.

According to research conducted Murtoyo, 2020 (Murtoyo, 2023) After psychoeducation, family therapy using the Calgary Family Intervention Model (CFIM) was conducted, and statistical test results showed that in the intervention group, the p-value was 0.005, while in the control group, the p-value was 0.132. This means that family therapy using the Calgary Family Intervention Model (CFIM) is effective in improving the efficacy of families as caregivers for ODS.

Preliminary study results at SD N 38 Bengkulu, through observation and interviews with 15 second-grade students, show that students often buy snacks outside of school and purchase snacks from the school canteen that are not hygienic. The snacks are sold openly and without packaging. Students frequently purchase snacks at the canteen or within the school premises, such as meatballs, sausages, tempura, colored drinks, and fried snacks without packaging. Only around 3 students bring their lunch, but not every day.

Based on the above issues, the researcher was interested in conducting a study titled “The Effect of the Calgary Family Intervention Model Approach in Choosing Healthy Snacks on the Prevention of Foodborne Diseases in School Children at SDN 38 Bengkulu City in 2025.” This was an effort to prevent the risk of foodborne diseases in children.

## METHODS

This study is quantitative, using a quasi-experimental one-group pre-posttest design conducted on school-aged children to improve their knowledge of foodborne disease prevention. The subjects' knowledge was measured before and after the intervention using the Calgary Family Intervention Model (CFIM) approach. The independent variable in this study was CFIM, while the dependent variable was the children's knowledge.

The study was conducted at SDN 38 Kota Bengkulu, located in Lempuing Village, given that this area had the highest incidence of diarrhea in 2022, with 1,100 cases reported at the Kuala Lempuing Health Center. The study was carried out from May 16 to May 30, 2025. The population consisted of all school-aged children at SDN 38 Kota Bengkulu, with a sample of 41 second-grade students selected using a total sampling technique. Inclusion criteria were children living with their parents, second-grade students, able to read, write, understand verbal and nonverbal information, and willing to be respondents. Exclusion criteria were respondents who did not complete the education or withdrew from the study.

Data analysis was performed univariately to describe the characteristics of respondents using measures of central tendency such as mean, standard deviation, median, maximum, and minimum values with a 95% confidence interval, as well as frequency distribution and percentages for

categorical data. Bivariate analysis was performed to examine the relationship between variables using the Wilcoxon signed rank test because the data were not normally distributed.

The research procedure began with explaining the objectives, benefits, and procedures to prospective respondents, requesting consent, providing informed consent, explaining the schedule of activities, completing the initial questionnaire, observing knowledge of healthy snack selection, and educating mothers of students about healthy snack selection. The researcher conducted the CFIM intervention four times by gathering children and mothers in separate rooms. The first meeting focused on educating mothers about the FBD concept, while the second to fourth meetings involved monitoring via WhatsApp to remind mothers to convey information to their children. The final meeting included an evaluation and post-test.

This study obtained ethical clearance from the Ethics Committee of the Bengkulu Ministry of Health Polytechnic with number No.KEPK.BKL/185/04/2025. This study has adhered to the principles of health research ethics. The researchers have upheld the rights of research subjects, including the right to information, freedom of choice, data confidentiality, and protection from risks that may arise during the research process.

The researchers also requested and obtained written consent (informed consent) from the students' parents as the authorized parties. All personal data obtained in the study is kept confidential and is only used for this study. The researchers will not disclose any information that could reveal the identity of the respondents.

## RESULTS AND DISCUSSION

### Results

Based on the results of the study, the researchers involved 41 respondents at SD N 38 Bengkulu City. The characteristics of the respondents are shown in the following table:

Table 1. Overview of Respondent Characteristics (n=41)

| No | Variable | F (%) |
|---|---|---|
| **1** | **Child's Age** | |
| | Mean | 8.05 |
| | Min-max | 7-9 |
| | Elementary School | 0.849 |
| | CI 95 % | 7.89-8.21 |
| **2** | **Child's Gender** | |
| | Male | 23 (56.1%) |
| | Female | 18 (43.9%) |
| **3** | **Mother's Age** | |
| | Mean | 31.68 |

| | | |
|---|---|---|
| | Min-Max | 26-41 |
| | SD | 4.361 |
| | CI 95 % | 30.31-33.06 |
| **4** | **Maternity Education** | |
| | Elementary School | 2 (4.9%) |
| | Junior High School | 9 (15%) |
| | Senior High School | 25 (61.0%) |
| | Higher Education | 3 (7.3%) |
| **5** | **Information** | |
| | Not yet | 35 (85,4%) |
| | Ever | 6 (14,6%) |

Based on Table 1, the results of the analysis show that the average age of the children is 8 years old. Meanwhile, the average age of the parents is 32 years old, with the youngest being 26 years old and the oldest being 41 years old. The gender of the children in this study is predominantly male at 56.1%. The majority of mothers have a high school education at 61%. The analysis results for information regarding whether participants had previously received information or not are as follows: 85.4% of mothers had never received information about foodborne diseases, while 14.6% of parents had already received information.

The children's knowledge before the intervention was administered was presented based on the results of measurements taken from 41 respondents. The data is presented in the form of mean values, standard deviations, medians, 95% confidence intervals, and categories as follows:

Table 2. Overview of Knowledge Scores Before Intervention (n=41)

| Variable | n | Mean (SD) | Median | CI 95% | Normality Test |
|---|---|---|---|---|---|
| Before Intervention | 41 | 54.68 (10.811) | 60.00 | 51.27-58.10 | 0.014 |

Based on Table 2, it can be seen that the average knowledge score before the intervention was 54.68 with a 95% confidence interval ranging from 51.27 to 58.10. The children's knowledge after the intervention is presented based on the results of measurements of 41 respondents. The data is presented in the form of mean, standard deviation, median, and 95% CI as follows:

Table 3. Overview of Knowledge Scores After Intervention (n=41)

| Variable | n | Mean (SD) | Median | CI 95% | Normality Test |
|---|---|---|---|---|---|
| After Intervention | 41 | 84.88 (9.945) | 87.00 | 81.74-88.02 | 0.017 |

Based on Table 3, it can be seen that the average knowledge score after the intervention was 84.88 with a 95% confidence interval ranging from 81.74 to 88.02. After conducting a normality test, a p-value < 0.05 was obtained, which means that the data was not normally distributed. Therefore, the following nonparametric tests were conducted:

Table 4. The effect of children's average knowledge in choosing healthy snacks on the prevention of foodborne diseases before and after intervention (n=41)

| Variable | n | Mean (SD) | CI | Z | Difference | *P Value* |
|---|---|---|---|---|---|---|
| **Pengetahuan** | | | | | | |
| Sebelum Intervensi | 41 | 54.68 (10.811) | 51.27-58.10 | -5.599 | 30.2 | 0,000* |
| Setelah Intervensi | 41 | 84.88(9.945) | 81.74-88.02 | | | |

Table 4 shows that the average knowledge score of children before the intervention was 54.68 (10.811). The average knowledge of children after the intervention was 84.88 (9.945), with an increase of 30.2. The Wilcoxon Sign Rank Test statistical test showed a p-value of 0.000 ≤ α 0.05, indicating a significant difference in the average knowledge of children before and after the intervention. It is concluded that the Calgary Family Intervention Model (CFIM) approach has an influence on the selection of healthy snacks for the prevention of foodborne diseases at SDN 38 Kota Bengkulu.

**Discussion**

The results of the study showed that the average age of the children was 8 years old. This shows that most of the children were at the elementary school stage of development. The results of this study are in line with research conducted by Nurfajri & Kurnia, 2021 (Faizah Nurfajri & Kurnia, 2021), The results of the study show that the average age of children is 8-9 years old (45.1%). This is supported by research by Ratnasari & Purniasih, 2019 (Ratnasari et al., 2019), The results of the study show that 15% of respondents were aged 7-8 years old.

In line with research by Febriani *et al*., 2018 (Febriani et al., 2018), the results of the study show that 37.5% of respondents were 8 years old. This age falls within the concrete operational stage of cognitive development according to Piaget's theory of development, in which children begin to understand cause-and-effect relationships and think more logically, but still need direct guidance in decision-making, including choosing healthy foods or snacks.(Arsad et al., 2023).

The characteristics of respondents based on the gender of their children showed that 56.1% were male and 43.9% were female. This is in line with the research conducted. Nurmawati *et al*., 2019 (Nurmawati et al., 2019) 55.4% male and 44.6% female. This study is also in line with research conducted by Suryani et al., 2019. (Suryani et al., 2019) 54.3% were male and 45.7% were female. In

line with research by Febriani *et al*., 2018 (Febriani et al., 2018), The results of the study show that 75% of respondents were male and 25% were female.

Based on the results of the study, the average age of mothers is 32 years old. The results of this study are in line with research Asmah *et al*., 2024 (Asmah et al., 2024) shows that 78.4% of mothers are aged between 25 and 40 years old. This is supported by research Suprapto *et al*., 2022 (Suprapto, 2022), The results of the study show that 62.5% of mothers are aged between 25 and 34 years old. This is in line with the study. Pitasari *et al*., 2025 (Pitasari, P. D., WM & Santoso, 2025) The average age of mothers is 32.7 years. This indicates that as a person gets older, they are more likely to adopt healthier lifestyles.

The characteristics of respondents based on their mothers' education in the intervention group showed that 61% had a high school education as their highest level of education. This is in line with the research conducted Sari *et al*., 2024 (Puspa Sari et al., 2024) The results of the study show that 43.6% of respondents have a high school education. This study is also in line with research conducted by Asmah *et al.*, 2024 (Asmah et al., 2024) shows that 53.6% of mothers have completed their education. Mothers with higher education tend to have better access to information and understanding of nutrition, food safety, and the risks of foodborne diseases. This knowledge may enable them to make more informed decisions in choosing and preparing healthy snacks, as well as implementing better hygiene practices at home (Saputri et al., 2021).

The characteristics of respondents based on information in the intervention and control groups were 85.4%. In line with the study Husna & Safitri, 2022 (Husna et al., 2022) As many as 70.4% of mothers have never received information about nutritious foods. Mothers who lack information about foodborne diseases are unlikely to be aware of the dangers or risks associated with consuming unhygienic or contaminated food. A lack of information about foodborne diseases can make mothers less critical in choosing snacks, whether prepared at home or purchased outside.

The results showed that the average knowledge of children about foodborne diseases before the intervention was 54.68. This value reflects that most children still have a low level of knowledge about the dangers of diseases caused by unhygienic food, including understanding the importance of choosing healthy snacks. Only 9 out of 41 respondents were able to correctly answer questions about the definition of healthy snacks.

Supported by research conducted Purwadi *et al*., 2020 (Novriyanti Purwadi et al., 2020) Knowledge before intervention was assessed, with 77.8% of participants scoring in the poor category. These findings are consistent with those of Boway (2019), who found that promotional media had an impact

on elementary school students' knowledge of diarrhea prevention. This low level of knowledge may be due to a lack of information received by children from their school environment, family, and educational media (Nasrullah et al., 2020).

The results of the study show that after the intervention, the average knowledge of children increased to 84.88. This increase reflects the effectiveness of the intervention in raising children's awareness of the importance of choosing safe and nutritious foods to prevent foodborne diseases. With improved understanding, it is hoped that children will be more selective in choosing snacks that do not contain harmful ingredients such as artificial colors, preservatives, and other chemicals that can endanger health.

In the post-test results, 34 out of 41 children were able to correctly answer questions about the definition of healthy snacks. This improvement indicates that the Calgary Family Intervention Model (CFIM) approach, which involves educating mothers, is effective in improving children's understanding. Through increased knowledge among mothers, there is better communication and education within the family, enabling mothers to repeatedly convey information about healthy snacks in a way that is appropriate for children's understanding.

This research is also supported by research conducted by Irma *et al*., 2023 (Irma, Lestari et al., 2023). Education on diarrhea prevention through videos and short lectures at SDN 12 Kendari City showed positive results, with an average post-test score of 79.33. The education provided also played a role in shaping children's mindsets to be more aware of the health risks of consuming unhygienic food. Thus, this intervention can be used as a preventive measure in improving children's health from an early age.

The results of this study indicate that the Calgary Family Intervention Model affects mothers' knowledge of foodborne disease prevention, as determined by the Wilcoxon Rank test with a p-value ($p<0.05$) before and after the intervention. The results of the Wilcoxon Signed Rank Test statistical analysis show a p-value of $0.000 < \alpha$ 0.05, so H0 is rejected and H1 is accepted. This means that there is an effect of the Calgary Family Intervention Model (CFIM) on mothers' knowledge regarding the prevention of foodborne diseases among schoolchildren at SDN 38 Kota Bengkulu in 2025.

In line with the research conducted Nasrullah *et al*., 2020 (9) about the Calgary Family Intervention Model Approach in Choosing Healthy Snacks as a Preventive Behavior Against Food-borne Diseases in Children in Surabaya. There is an influence of the CFIM approach in choosing healthy snacks on the behavior of preventing food-borne diseases in school-age children in Surabaya, with the results of the Wilcoxon Signed Rank Test showing a p-value of 0.000.

The Calgary Family Intervention Model (CFIM) approach in this study was implemented through direct interaction with mothers as food holders. This activity was designed so that mothers could obtain educational materials from researchers on topics related to the prevention of foodborne diseases, particularly in the context of choosing healthy snacks for school-age children. After receiving the materials, mothers were given the opportunity and time by researchers to convey the information to their children.

Researchers reminded mothers through WhatsApp groups three times to facilitate effective knowledge transfer from parents to children. CFIM encourages active family involvement in the health education process, strengthening communication between mothers and children. Changes in children's knowledge levels regarding the prevention of Foodborne Diseases (FBD) are closely tied to the important role of the family, particularly the positive perceptions formed through the Calgary Family Intervention Model (CFIM) approach.

The family's positive perception of the benefits of CFIM in improving healthy behavior in children begins with an effective engagement process, in which mutual trust between nurses and families is strengthened. This mutual trust encourages families to be more open to receiving education and more motivated to apply healthy behaviors in their daily lives (Nurbadriyah, 2019).

According to Leaahey & Wright (2023), trust is the main foundation for the formation of ideas, opinions, and assumptions held by individuals and families. In the context of behavioral change, increasing knowledge acts as a mediator that bridges the transformation of attitudes and actions. The implementation of the Calgary Family Intervention Model (CFIM) approach can run smoothly because it involves family members.

## CONCLUSION

Based on the results of the research and discussion, it can be concluded that the average age of the children was 8.05 years, ranging from 7 to 9 years, while the average age of the mothers was 31.68 years, ranging from 26 to 41 years. Most of the children were boys (56.1%), the majority of mothers had a high school education (61.0%), and 85.4% of the mothers had never received information about foodborne diseases. The average level of knowledge before receiving health education was 54.68, which increased to 84.88 after the intervention. The study found a significant influence of the Calgary Family Intervention Model (CFIM) approach on the selection of healthy snacks for the prevention of foodborne diseases among school children at SDN 38 Bengkulu City in 2025, with a p-value $\leq 0.05$ (0.000).

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