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*Article*

# K-SARAP Mix: Bridging Filipino Culinary Heritage and Nutrition in Food Supplementation for Pre-school Children

**Rosalinda A. Abuy**
Southern Luzon State University
*Correspondence: sallyabuy@gmail.com*

**Abstract**

*This study developed K-Sarap Mix, a nutritious food supplement for preschool children, particularly those who are undernourished or experiencing stunted growth. The selected grains and vegetables for K-Sarap Mix underwent physicochemical analyses (moisture, water activity, lead test) and microbiological tests (total plate count, molds, yeast, thermotolerant coliform, total coliform, and Escherichia coli). Grain and vegetable selection considered macro- and micronutrient content, local availability, affordability, and moisture levels. K-Sarap Mix is composed of rice (Oryza sativa), mung beans (Vigna radiata), acorn squash (Cucurbita maxima), and upland kangkong (Ipomea reptans). The resulting powder mixture is green in color, with a leafy odor, slightly sweet taste, and fine mouthfeel. Its formulation was guided by the 2018 Recommended Energy and Nutrient Intake (RENI) for preschoolers (ages 3–5) established by the Food and Nutrition Research Institute, Department of Science and Technology (DOST-FNRI). K-Sarap Mix successfully passed all physicochemical and microbiological tests. Nutritional analysis revealed it is rich in macro- and micronutrients, providing 359.97 kcal/100 g, with total carbohydrates of 74.27%, protein of 50.56 kcal/100 g, and fat content of 25–35%. Key micronutrients include calcium (47.33 mg/100 g), sodium (15.80 mg/100 g), and B-complex vitamins: B1 thiamine (5.78 mg/100 g), B3 niacin (2.82 mg/100 g), B5 pantothenic acid (1.24 mg/100 g), and B6 pyridoxine (0.42 mg/100 g). Sensory evaluation using a 5-point Hedonic Sensory Scale with smiley faces for children and a 7-point Hedonic Scale for experts showed K-Sarap Mix was "liked very much" by preschoolers and rated highly acceptable by experts.*

***Keywords***: *Development, Food Supplement, K- Sarap Mix, Preschool children, Nutritional Analysis, Physicochemical Analyses*

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## Introduction

A nation's future rests on the health and well-being of its children, for good health serves as the foundation of human development. In the Philippines, where food is deeply intertwined with culture, identity, and family traditions, ensuring proper nutrition for young children is both a social responsibility and a cultural imperative. However, many Filipino children continue to miss the opportunity to reach their full potential due to persistent problems of undernutrition and stunting (World Vision Organization, 2016). Globally, the burden of malnutrition remains alarmingly high, with the Global Nutrition Report (WHO, 2018) noting that over 150.8 million children under five are stunted and 50.5 million are wasted. In Southeast Asia, the Philippines consistently records high rates of child malnutrition, placing Filipino children among the most nutritionally at risk in the region, with only Indonesia and East Timor showing higher prevalence (FNRI, 2018).

Local statistics underscore the severity of the problem. The Food and Nutrition Research Institute (2018) reports that one in three Filipino children aged 5–10 years is either stunted or underweight. Nutritional deficiencies in calcium, protein, iron, vitamin D, and other micronutrients remain widespread, impairing physical growth, brain development, and learning potential. The Provincial Nutrition Action Office (2018) of Quezon Province documented alarming cases of underweight, stunted, and wasted children, highlighting that chronic malnutrition is not only a national crisis but also an intensely localized reality. If left unaddressed, these conditions have long-term consequences: diminished educational attainment, reduced productivity in adulthood, and the intergenerational perpetuation of poverty (Adair et al., 2013; Save the Children, 2016).

Addressing malnutrition in the Philippines also requires sensitivity to cultural food practices. Filipino households often rely on staple grains, root crops, and locally available vegetables, yet children's diets remain inadequate in variety and nutrient density (Garg, Rosal, & Baldevarona, 2019). Research suggests that culturally appropriate food supplementation, using locally sourced ingredients familiar to Filipino palates, can significantly improve child nutrition while maintaining cultural acceptability (Del Mundo & Chua, 2017). Previous initiatives, such as fortified snacks and vegetable-based supplements, have demonstrated potential. However, these often lack integration of indigenous or locally preferred food sources, resulting in lower acceptance and sustainability (FNRI, 2018).

This study, therefore, seeks to bridge this gap by developing K-Sarap Mix, a food supplement designed specifically for pre-school children, rooted in Filipino food culture and nutritional needs. The product aims not only to address nutrient

deficiencies but also to be acceptable to young children regarding taste, texture, and cultural familiarity. Specifically, the study will (1) identify vegetables suitable for the formulation of K-Sarap Mix, (2) subject selected grains and vegetables to physical and microbiological testing, (3) test the formulation of K-Sarap Mix through physicochemical and microbiological analysis, (4) evaluate its nutritional content, and (5) determine its acceptability in terms of taste, odor, texture, and color as evaluated by pre-school children and experts. By situating nutrition within Filipino culture, this study contributes to the immediate fight against child undernutrition and the long-term preservation of health and cultural identity.

## Materials and Methods

The researchers developed the formulation of K-Sarap Mix based on FNRI, DOST Philippine Dietary Reference Intakes (2015), Recommended Dietary Allowances for Filipinos; for Energy and Specific Nutrients (Average per Day), Recommended Energy/Nutrient Intake (RENI) of pre-school children (3-5 years old) with ideal weight of male 17.5 kilos and female 15 kilos. The basic need for Energy kcal, Protein, Vitamin A, Vitamin B complex, Folate, Calcium, and Iron requirements for children 3-5 years old were used to select grain and vegetables. The researchers computed the approximate energy and macro and micronutrients that could be yielded in each vegetable through ratio and proportion to determine the needed K-Sarap Mix per 100 grams. The desired amount for each vegetable and grain was mixed and packed in a sterile container weighing 100 grams.

The research study was conducted in Lucban, Quezon. There were (100) pupils of the Day Care Center from Barangay 7 and 9, and ten (10) experts (faculty) of Southern Luzon State University, composed of (4) Food technology, (3) Hotel and restaurant management, and (5) Clinical instructors from the College of Allied Medicine handling Nutrition and Dietetics subjects.

An experimental type of research was used in the development of K-Sarap Mix. At the same time, descriptive evaluation was applied to determine the acceptability of the product concerning physical properties. Proper experimental design was applied, including process and product characterization, achieving variability reduction, control, stability, process optimization, and designing processes and products. The research study was conducted for one year.

Two questionnaires were used to determine the product's acceptability regarding physical properties. The first questionnaire is a consumer acceptability test for pre-school children. A 5-point hedonic sensory acceptability using "smiley faces" was applied; 5 was to like very much, and one was to dislike very much. The second

questionnaire is a 7-point Hedonic sensory acceptability scale answered by an expert; 7 is highly acceptable, and 1 is highly unacceptable. The researchers used different sources to gather data and perform different procedures. Books and electronic sources were used to select grain and vegetables rich in macro and micronutrients needed by pre-school children. The study used the drying and grinding facilities of Southern Luzon State University (SLSU), Lucban, SLSU Judge Guillermo Eleazar in Tagkawayan, Quezon, and DOST in Taguig City. The researchers also seek the services of Microbiology and Testing Laboratory of Southern Luzon State University (SLSU) in Lucban, Quezon, and DOST Region IV in Los Baños, City, and SGS Philippines, Inc. in Makati, City to test the physicochemical analysis and microbiological test of K-Sarap Mix. At the same time, Sentrotek conducted a lead test in Mandaluyong City. Moreover, the nutritional analysis was done by SGS Philippines, Inc. in Makati City, Philippines.

The evaluators were given samples and a descriptive score sheet for the sensory test to record their evaluation. To determine the acceptability of the product, cookies were made from the K-Sarap mix and given to pre-school children of the Day Care Center in Barangay 7 and 9 in Lucban, Quezon.

The methodology used in determining nutritional analyses are by computation (Calories and total Carbohydrates, Calories from Fat, Protein), Gas Chromatography (Saturated Fat, Cholesterol), Dry Ashing Acid Digestion and Quantitation by Atomic Absorption Spectrophotometer (AAS) for Calcium, High Performance Liquid Chromatography for (Vit. B Complex), Dry Ashing, Acid Digestion, and Quantitation by Inductively Coupled Plasma-Optical Emission Spectrometry for Sodium.

The statistical treatment used was percentage in the computation of RENI, while the weighted mean was used to determine K-Sarap Mix's acceptability. The results were analyzed to interpret the laboratories' physicochemical, microbiological, and nutritional analyses.

The items' scoring on the K-Sarap Mix acceptability test for pre-school children was based on the Hedonic five-point scale. In contrast, scoring the items on the expert acceptability test was based on the Hedonic seven-point scale.

## Results and Discussion

The parameters involved in selecting grain and vegetables include evaluating the macro and micronutrient content, availability in the locale, affordability, water activity, and moisture content. All the selected vegetables are less expensive and locally abundant in the research locale. Rice and identified vegetables were used because of their macro- and micronutrient content. The desired amount for each

vegetable and grain was mixed and packed in a sterile container weighing 100 grams. The formulation passed the lead test on the first trial, water activity and moisture content passed the second trial, while it took four trials before it passed the microbiological test. The total calories from K-Sarap Mix were 359.97 kcal/100 g, and the recommended intake of pre-school children is 1350 kcal/day. This means that with 400 grams of K Sarap Mix, the recommended energy intake of the pre-school children will be achieved. K-Sarap Mix has complete macronutrients, namely carbohydrates, protein, and fats.

The K-Sarap Mix 100 grams has a Total carbohydrate content of 74.27 percent, which meets the daily carbohydrate requirement for 55-79 percent pre-school children. Carbohydrates provide the body with energy and regulate blood glucose, sparing proteins for energy, helping break down fatty acids, and preventing ketosis, sparknotes.com (2019). The calories from Protein were 50.56 kcal/100 grams, while the recommended energy intake for Protein is 32 grams. It only shows that K-Sarap Mix is a good source of protein and can substitute other protein sources. Moreover, protein from K-Sarap comes from vegetables, meaning it has low cholesterol. Proteins do most of the work in the cells and are required to structure, function, and regulate the body's tissues and organs. The primary functions of protein are repair and maintenance of body tissues including development and repair; primary source of energy, involved in the creation of some hormones such as insulin and secretin; enzymes production that increase the rate of chemical reaction in the body; transportation and storage of molecules such as hemoglobin and ferritin; and forms antibodies that help prevent infection, illness and disease, sciencelearn.org.nz (2011).

The micronutrients present in K-Sarap Mix are Calcium and Sodium. The Calcium content of K Sarap is 47.33 mg/100 mg, while the recommended dietary intake per day is 550 mg. It only means that K-Sarap Mix can supplement the dietary needs of pre-school children for calcium. Other sources of calcium must be considered to meet the dietary demand of pre-school children for calcium. Mineral calcium is stored in the bones, muscle cells, and blood. Calcium is essential for forming bones and teeth, muscle contraction, normal functioning of many enzymes, blood clotting, and normal heart rhythm, msdmanuals.com/home (2019). K-Sarap Mix has 15.80 mg/ 100 g of sodium, while the pre-school need for sodium is 300 mg. It means that the product can supplement the need of pre-school children for sodium. Sodium is a mineral that carries an electrical charge, an electrolyte. Electrolytes facilitate muscle contraction and nerve cell transmission. It works as a fluid balance, in concert with potassium to maintain normal water balance in the body, and maintenance of normal fluid levels controlling the body's blood volume, healthyeating.sfgate.com (2018). Moreover, K-

Sarap Mix is a good source of Vitamin B Complex, which has vitamins: B1 Thiamine, B3 Niacin, B5 Pantothenic acid, and B6 Pyridoxine. B Vitamins are water-soluble, which means the body does not store them; thus, the diet must supply these Vitamins daily. Vitamin B1 helps the body use carbohydrates from food to produce energy, which is needed for the health of the brain, muscles, and nervous system, as well as for the growth, development, and function of cells in the body. Vitamin B3 Niacin aids in the conversion of food into energy, helps enzymes in the body function properly by helping the body use other B vitamins and make and repair DNA (the genetic material found in all body cells), needed for the production of hormones, such as sex and stress hormones, and helps with the function of the digestive and nervous systems and skin. Vitamin B5, Pantothenic acid, breaks down fats and carbohydrates for energy, plays a role in the production of sex and stress hormones in the adrenal glands and neurotransmitters, helps the body use other vitamins, such as riboflavin, and Vitamin B5 is needed to produce red blood cells and cholesterol. Vitamin B6 Pyridoxine, is needed by the body to use and store protein and carbohydrates from food (in the form of glycogen, stored energy in the muscles and liver), required for more than 100 enzyme reactions in the body, it aids in the formation of hemoglobin (a substance in red blood cells that carries oxygen through the blood) and neurotransmitters and hormones that influence mood and regulate the body's clock and, involved in immune function and brain development and function, verywellfit.com (2019).

Pre-school children evaluated the product as very much or highly acceptable in taste, odor, texture, and color. It is highly acceptable in terms of color, odor, and texture, while it is slightly acceptable in terms of taste, as evaluated by an expert. The overall acceptability is highly acceptable.

K-Sarap Mix is a good food supplement for pre-school children. Its nutritional content showed that the product helps address macro and micronutrient deficiencies in children, especially in calcium and Vitamin B Complex.

Based on the study's findings, the following recommendations are made: 1. Test the K-Sarap formulation on shelf life; 2. Test the acceptability of K Sarap Mix on diverse food products; 3. determine the effectiveness of K-Sarap Mix in improving signs of undernutrition and stunted growth among pre-school children; 4. Conduct a study on product marketability; and 5. Create a packaging design.

## Conflict of Interest

The author declares no conflict of interest.

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