

OPPORTUNITIES FOR CANNED AND FORTIFIED FOODS IN SUPPORT NUTRITION AMONG CHILDREN IN PALESTINE

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Abstract

Palestine has been facing food insecurity and malnutrition for years, with indicators of malnutrition in Palestinian children including stunting, wasting, and underweight, which have severe implications for the physical health and intelligence of children. Several factors contribute to cases of malnutrition in Palestine, including damaged infrastructure, limited access to food, and lack of food security and availability of nutritious food. To address the problem of malnutrition, there is an opportunity for canned and fortified foods to support the nutrition of children in Palestine and help achieve the goal of zero hunger. The research method used in this scientific paper uses quantitative descriptive research methods. By analyzing existing research and documents, this paper will provide insight into the opportunities and challenges of using canned and fortified foods to support nutrition in children in Palestine. The prevalence of malnutrition indicators such as stunting, wasting, and underweight among Palestinian children remains a concern, with stunting rates at 8.7% in 2020. As a potential solution, there is an opportunity for canned and fortified foods to support the nutrition of children in Palestine and help achieve the goal of zero hunger, offering an alternative means of providing food aid to the Palestinian people. This paper aims to examine the potential of canned and fortified foods in improving nutrition for children in Palestine. Canned and fortified foods, these innovations are great and have the potential to address the unmet micronutrient needs of vulnerable populations in Palestine. Canned food packaging provides protection and extends shelf life, with studies showing that canned foods can retain nutritional value. Traditional foods like rice, gudeg, kapurung, and tuna fish have been successfully canned to increase their longevity. Fortified foods are an effective strategy for reducing micronutrient deficiencies, with research focusing on various products such as beef cookies, guava jelly drink, fermented red dragon fruit peel drinks, dried tomato pomace, and Moringa leaf biscuits. Both canned food products and fortified foods such as biscuits and other food products have high nutritional value, especially a longer shelf life when compared to fresh products.

Keywords: canned food, fortified food, malnutrition, zero hunger

I. INTRODUCTION

Palestine is a country that has been facing food insecurity and malnutrition for years. This happened because of war that lasted for decades which made access to food very limited. This situation has an impact on the health of the population, especially on the growth of children, such as the risk of experiencing growth retardation, anemia and other health problems caused by malnutrition. In addition, the rate of low birth weight babies reaches 8.4% in Palestine. Based on data from the Palestinian Central Bureau of Statistics (PCBS), indicators of malnutrition that occur in Palestinian children include stunting, wasting and underweight. This is in accordance with the data shown in **Figure 1**, where in 2010 the prevalence of

stunting among children in Palestine reached 10.9%, and fell to 8.7% in 2020(1). This figure is still quite high even though it has decreased in the last decade.

Stunting is a growth and development disorder caused by severe or chronic malnutrition and infection which causes children to become short or very short. The condition of stunting in children will have an impact on the child's physical health and intelligence, and in severe cases there is even a risk of death. Wasting is a condition where a child's weight decreases over time so that their total body weight is far below the standard growth curve. In some cases, wasting can cause edema, which is characterized by swelling in the child's body. Lastly is underweight or a condition when a child's weight is below the average or normal range. In cases of underweight, the child's height looks shorter than normal. Apart from disturbing the child's body, this condition can also cause problems with the child's skin, teeth and bones.

Several factors that contribute to cases of malnutrition in Palestine include the fact that during the conflict and war, infrastructure was damaged and people's access to food was limited, this then exacerbated the problem of malnutrition(2). Then many hospitals and clinics were damaged or destroyed, making people in Palestine also face limited access to health services. Lack of food security and limited availability of nutritious food also contribute to the problem of malnutrition in Palestine. To overcome this problem, there is an opportunity for canned and fortified foods to support the nutrition of children in Palestine and help achieve the goal of zero hunger. Because canned food and fortified food have a relatively long shelf life so they are easy to store, besides that they also do not require complicated processing (3). This could be an alternative support in providing food aid to the Palestinian people. This paper aims to examine the potential of canned and fortified foods in improving nutrition for children in Palestine, as well as the challenges children experienced in accessing adequate nutrition during the war. By analyzing existing research and documents, this paper will provide insight into the opportunities and challenges of using canned and fortified foods to support nutrition in children in Palestine.

II. METHODOLOGY

The research method used in this scientific paper uses quantitative descriptive research methods. The writing method used in writing this review article is a comparative writing method by collecting various sources obtained from several research journals and books. The literature study was carried out online starting on November 9 2023 using Google Scholar, Elsevier, and Academia. The characteristics of the journals searched focus on journals that discuss research that has been conducted by other researchers, the potential, benefits and utilization of canned and fortified foods in terms of nutritional fulfillment in the period 2014 to 2024. Apart from that, literature studies were also carried out by searching for articles and books related to fulfilling children's nutrition are also about zero hunger. The complete literature study can be seen in the following chart (**Figure 2**).

III. RESULTS AND DISCUSSION

Palestine is one of the eastern Mediterranean regions that suffers from the burden of malnutrition, especially among children. Malnutrition in children, especially in the early stages of life, is considered to have a high risk of impaired cognitive and physical growth and can also increase the risk of infectious diseases (4). Hidden hunger, that is, a chronic deficiency of vitamins and minerals in the diet, affects approximately one third of the world's population. Malnutrition is more than just calories and indicates a deficiency in any or all of the following: energy, protein, or essential vitamins and minerals. Malnutrition is the result of insufficient food intake, both in terms of quantity and quality (5). 'Zero Hunger' is a fundamental human right in human life (6). Guaranteeing freedom from hunger is not only a moral responsibility and policy choice, but is part of human rights (7). Therefore, foods aid is needed that is easy to store, easy to process and high in nutrition.

Canned food

According to Winarno (8), packaging functions as a container so that ingredients or food are easy to carry and safe while traveling. Where packaging can protect the product, both from external and internal influences. Such as protecting from excess sunlight, humidity, and protecting against the effects of improper handling (9). One type of packaging in food preservation technology is canning. The canning technique allows food to have a longer shelf life due to the thermal process. The goal of thermal processing in canned foods is to achieve commercial sterility conditions. Heat treatment of food affects its characteristics, including sensory and nutritional attributes. However, according to new trends in thermal processing, processed canned foods provide at least the same nutritional value as fresh products (10). Following are several studies that have been carried out by several researchers regarding the nutritional quality of canned food.

In 2014, Syamsir, et.al conducted research on canned rice as an alternative emergency food. Researchers used three different rice varieties, namely IR 42, IR 64 and Cisadane. Where rice is cooked using coconut milk and spices, then added with chicken which is cooked separately and then canned. Use of additional ingredients such as chicken, carrots and spices which act as enhancers of the product's taste. From the research results, the best canned food is made using IR 64 rice with a fluffier rice texture. And the addition of chicken meat and spices increases the nutritional value for protein and other nutritional content (11).

Another food canning was carried out in 2015 by Nurhikmat, et.al. Research was carried out on traditional food from Yogyakarta, namely Gudeg (**Figure 3**). Gudeg is a traditional food made from young jackfruit, areh (thick coconut milk), chicken meat, eggs, cowpeas, and krecek skin. Because gudeg has a fairly high water content, the shelf life of gudeg is relatively short, namely around 48 hours. So it is hoped that the canning technique can extend the shelf life of gudeg. From the results of shelf life and organoleptic research, it was found that gudeg was still suitable for consumption until the 15th month (12).

In 2019, Nurhikmat, et.al (13) conducted research on canning traditional food typical of North Luwu, East Sulawesi, Kapurung (**Figure 4**). Kapurung is a food made from sago, made into lime balls and then cooked with a mixture of fish or chicken and various vegetables. Usually, after making limestone, it must be consumed immediately because it easily spoils or spoils. In this research, limestone was tried to be preserved by canning by sterilizing it at 121°C for 15 minutes and then through a cooling process. After that the product is quarantined for 14 days. From the results of this experiment, canned lime has a shelf life of 12 months at a temperature of 30°C. And based on chemical and microbiological tests, the results are in accordance with BPOM Perka number 24 of 2016 concerning Commercial Steric Foods, and are declared safe for consumption.

The next researcher, Widnyana, in 2019 wrote an article about the process of canning Tuna fish. As we know, fish is a type of animal protein that has a relatively short shelf life. This is related to the level of freshness of the fish product itself. So canning fish is a technique to extend the shelf life of the fish itself. The process of canning tuna fish starts from sorting the size of the fish, placing it in cold storage, washing, cutting, then the cooking process, then showering or cooling the fish. After that, pre-cleaning and cleaning is carried out, metal detecting testing, then meat filling, medium filling, can closing or seaming, sterilization, incubation (stored in storage), labeling and packaging (14). With this process, fish that undergo the canning process have a longer shelf life than before.

The process of canning food has several advantages compared to other types of packaging, such as; avoid exposure to insects, microbes and foreign objects; the increase in water content can be maintained properly; and protect food from absorbing oxygen and odors. However, there are also disadvantages to can packaging, including; reduced freshness and taste of the food inside; there is a decrease in nutrient levels due to heating temperatures that are too high; and the emergence of bacteria which can be quite harmful to the body if not processed properly (15).

Fortified foods

Fortification is also referred to by nutrition policy experts as a new, “smarter” food product. Fortifying common foods with micronutrients is an effective strategy for reducing micronutrient deficiencies at a population level (16). Indonesia held a fortified food aid program in collaboration with UNICEF in 1997. The product that was developed for the world food program at that time was Vitadele as emergency aid. However, the results of the evaluation of the Vitadele product received a response that mothers did not like this product because this product had to be cooked with other food and took a lot of time and energy. Until 2004, food fortification products began to be developed again in collaboration with Danone and Indofood. One thing that Indofood has developed is baby food enriched with micronutrients. Then the Indonesian government also passed the first mandatory fortification law in Indonesia (17). The following is some research on food fortification;

In 2013, Arfiyanti conducted research on the fortification of beef cookies using beef flour, green bean flour, tempeh flour, and Ambon banana flour. The results of this research produced cookies with higher nutritional value than standard cookies. In accordance with Table 1, the values for protein, vitamin A, Vitamin B12, Phosphorus, Iron, Zinc and Iodine content in beef cookies have higher % RDA values than standard cookies, as depicted in **Table 1**. So the addition of meat flour to cookie formulations has potential value as a source of increased nutrition in food products (18).

In 2017, Setyaningrum, et.al conducted research on the fortification of guava jelly drink with organic iron from soybeans and green beans. This fortified product is intended to combat anemia. Researchers created several types of formulations that will be tested hedonically. Based on the hedonic test, it was found that the formulation preferred by the panelists was the guava jelly drink product with the addition of soybeans and green beans. In addition, fortified products have higher iron values than controls (19). For the same purpose, in 2021, Gunawan conducted research on Fe fortification of fermented red dragon fruit peel drinks to combat anemia. The result was that panelists who consumed dairy products for 3 weeks had their hemoglobin levels increase significantly (20). So both fortified products have the potential as special food for anemia sufferers.

In 2020, Ozbek conducted research on the benefits of Dried Tomato Pomace and Cold Pressed Oil. Tomato Pomace itself is the remainder or residue of tomatoes from the process of making juice, tomato sauce, soup in the form of tomato skin or seeds. Where both tomato skin and seeds are believed to contain high levels of protein, ash, polyphenolic fats, flavonoids and carotenoids. The hot air drying process at low temperatures is a suitable technique to protect pomace from undesirable changes in quality. Although currently the use of pomace is still limited to animal feed, ongoing research sees the value of using dried tomato pomace in other food products (21).

In 2023, Velayati will conduct research on making biscuits fortified with Moringa leaves as an alternative snack that provides vitamin A. One of the reasons for this research is seeing the potential for Moringa leaves to have a vitamin A content four times higher than carrots. The ingredients needed to make these biscuits are Moringa leaves, pandan leaves and suji leaves. Before the Moringa leaves are dried and ground into flour, the product is then named KUKAJI (Moringa, Pandan, Suji Leaf Biscuits). From the research results, KUKAJI biscuits (**Figure 5**) have quite complete nutritional content, both micro and macro, and contain quite high levels of vitamin A. So these biscuits can be used as an alternative snack that is rich in vitamin A (22).

IV. CONCLUSIONS AND NEWNESS

Canned and fortified foods, these innovations are great and have the potential to address the unmet micronutrient needs of vulnerable populations in Palestine. Canned food packaging provides protection and extends shelf life, with studies showing that canned foods can retain nutritional value. Traditional foods like rice, gudeg, kapurung, and tuna fish have been successfully canned to increase their longevity. Fortified foods are an effective strategy for reducing micronutrient deficiencies, with research focusing on various products such as beef cookies, guava jelly drink, fermented red dragon fruit peel drinks, dried tomato pomace, and Moringa leaf biscuits. Both canned food products and fortified foods such as biscuits and other

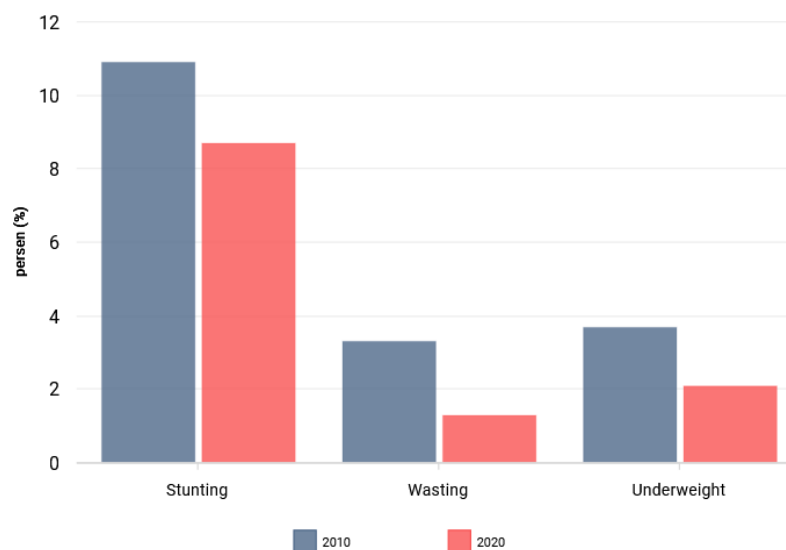
food products have high nutritional value, especially a longer shelf life when compared to fresh products. Further research is needed for ongoing evaluation regarding the development of canned and fortified food packaging products in order to explore more potential for other foods in achieving zero hunger. Of course, there are other factors needed to support achieving zero hunger, such as implementing policies, improving infrastructure in the Palestinian territories, and increasing food security.

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TABLES AND FIGURES



Source : Databoks (2023)

Figure 1 Prevalence of Stunting, Wasting and Underweight children under 5 years old in Palestine (2010 and 2020)

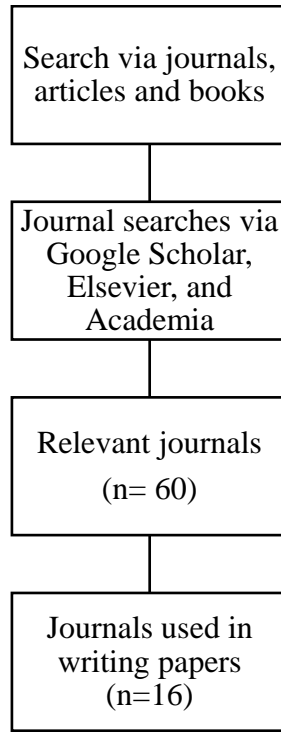


Figure 2 Paper writing flow chart



Source : Instagram @gudegbutjitro1925 (2023)

Figure 3 Bu Tjitro's Gudeg



Source : Nurhikmat (2020)

Figure 4 Kapurung Canned

Table 1 Energy and Nutrient Content of Beef Cookies

Nutrients	Beef Cookies	Standart Cookies (% RDA)
Energy (Kcal)	487	440
Protein (g)	25,6	13,4
Vitamin A (UI)	470	160
Vitamin B12 (ug)	1,241	0,52
Folic Acid (ug)	67×10^3	120
Vitamin C (mg)	0,81	17
Calsium (mg)	191	190
Phosfor (mg)	382	120
Iron (mg)	4,01	7
Zinc (mg)	4,38	2,7
Iodine (ug)	213,62	40
Cuprum (Cu)	1,22	

Source : Arfiyanti (2013)



Source : Velayati (2023)

Figure 5 KUKAJI (Biskuit Daun Kelor, Pandan, Suji)