Jurnal Gizi dan Dietetik Indonesia
(Indonesian Journal of Nutrition and Dietetics)
Vol 12, Issue 2, 2024: 59-79

Available online at: https://ejournal.almaata.ac.id/index.php/IJND
p-ISSN 2303-3045 e-ISSN 2503-183X
DOI: https://dx.doi.org/10.21927/ijnd.2024.12(2).59-79

Nutrimenu: nutrition education program to increase knowledge, attitude, and practices on the Indonesian balanced nutrition

Dodik Briawan[1], Elma Alfiah[2*], Pramita Ariawati Putri[3]

[1]Department of Nutrition, IPB University, Kampus IPB, Jalan Raya Dramaga, Babakan, Kec. Dramaga, Kabupaten Bogor, Jawa Barat 16680, Indonesia
[2]Nutrition Study Program, Faculty of Science and Technology, Universitas Al-Azhar Indonesia, Jalan Sisingamangaraja, Kebayoran Baru, Jakarta Selatan 12110, Indonesia
[3]Nutrition Study Program, Faculty of Health Science, Universitas Ibn Khaldun Bogor, Jalan K. H. Sholeh Iskandar Km. 2 Kedung Badak Tanah Sareal, Bogor, Indonesia

**Corresponding author*: elma.alfiah@uai.ac.id

ABSTRAK

Latar Belakang: *Saat ini, Indonesia masih menghadapi permasalahan stunting yang cukup tinggi dibandingkan dengan negara lain, termasuk di Asia Tenggara. Oleh karena itu, pemerintah melakukan program percepatan penurunan stunting melalui program spesifik dan sensitif yang melibatkan banyak sektor. Berbagai strategi disusun dengan sasaran prioritas pada kelompok ibu hamil dan anak usia 0-2 tahun dalam gerakan 1.000 HPK (Hari Pertama Kehidupan). Salah satu penyebab langsung stunting adalah rendahnya kualitas konsumsi makanan, yang dimulai sejak ibu hamil sampai anak usia dua tahun.*
Tujuan: *Penelitian ini secara umum bertujuan untuk menganalisis efektivitas program Nutrimenu terhadap pengetahuan, sikap, dan praktik ibu-ibu.*
Metode: *Desain penelitian ini adalah pre-post intervention study yang secara khusus menganalisis perubahan pengetahuan, sikap, praktik sebelum dan setelah program Nutrimenu. Program tersebut berupa edukasi gizi yang diberikan kepada ibu-ibu yang mempunyai anak batita/balita/usia sekolah, ibu hamil, ibu menyusui, dan calon pengantin. Sebanyak 517 ibu-ibu dipilih dari 12.000 sasaran program yang berasal dari 4 kabupaten.*
Hasil: *Terdapat 53% ibu-ibu peserta program yang mengalami peningkatan skor pengetahuan tentang gizi seimbang. Sebagian besar ibu-ibu (54%) mengalami peningkatan nilai skor sikap positif tentang gizi seimbang. Terdapat peningkatan yang signifikan jumlah ibu-ibu yang dapat mempraktikkan konsumsi pangan harian sesuai pedoman isi piringku, yaitu dari 13% menjadi 20% setelah program ($p<0.05$).*
Kesimpulan: *Secara umum program Nutrimenu berhasil meningkatan pengetahuan, sikap, dan praktik gizi seimbang pada ibu-ibu peserta. Peningkatan ini berpotensi menjadi langkah preventif yang penting dalam pencegahan stunting.*

KATA KUNCI*:* *edukasi; gizi; isi piringku; perilaku; seimbang*

ABSTRACT

Background: *Currently, Indonesia is still facing a high stunting problem compared to other countries, including Southeast Asia. Therefore, the government is implementing a program to accelerate stunting reduction through specific and sensitive programs involving many sectors. Various strategies were prepared with priority targets for the group of pregnant women and children aged 0-2 years in the 1,000 HPK (first day of life) movement. One of the direct causes of stunting is low quality food consumption, which starts from pregnant women to children aged two years.*
Objectives: *This study generally aims to analyze the effectiveness of the Nutrimenu program on the knowledge, attitudes, and practices of women of mothers.*
Methods: *The research design is a pre-post intervention study which specifically analyzes changes in knowledge, attitudes, practices before and after the Nutrimenu program. The program takes the form of nutritional education provided to mothers who have toddlers/school age children, pregnant women, breastfeeding mothers, and prospective brides and grooms. A total of 517 mothers were selected from 12,000 program targets in 4 districts.*
Results: *There were 53% of mothers participating in the program who experienced an increase in knowledge cores about balanced nutrition. Most mothers (54%) experienced an increase in positive attitude scores regarding balanced nutrition. There was a significant increase in the number of mothers who were able to practice daily food consumption according to the contents of My Plate guidelines, namely from 13% to 20% after the program ($p<0.05$).*
Conclusions: *In general, the Nutrimenu has succeeded in increasing the knowledge, attitudes, and practices of balanced nutrition among participating mothers. This improvement potentially served as a crucial preventive measure against stunting.*

KEYWORD*:* *balanced-nutrition; behavior; education; my plate*

Article info:
Article submitted on December 2, 2023
Articles revised on December 18, 2023
Articles received on January 7, 2024

INTRODUCTION

In 2021, it was reported that stunting was still a significant problem in Indonesia, with a prevalence of 24.4%(1). Various efforts have been made by the government, private institutions, non-governmental organizations, and multiple parties to collaborate with the National Strategy for the Acceleration of Stunting Prevention 2018-2024. Various activities were arranged for vulnerable groups, such as pregnant women and children aged 0-2 years, called the First 1,000 Days of Life movement. Strategic interventions for stunting management were divided into 2 (two) types, namely specific nutritional interventions, such as supplementation and promotion of nutrition, and sensitive ones, such as access to sanitation and clean water (2). National strategies and policies were also handed down to regions, especially stunting loci, and implemented through various programs and approaches by multiple sectors.

Previous research showed that educational media through structured modules impacted increasing knowledge, attitudes, and procedures related to maternal and child health in mothers (3). The 2019 Nutrimenu program was previously carried out in Garut Regency, West Java. The program involved 5,000 mothers from 139 Posyandu in 12 districts. The result showed that the program could significantly change participants' knowledge, attitudes, and practices (4).

To support the success of the previous Nutrimenu program, monitoring and evaluation steps need to be sustainable and carried out synergistically with program development. Therefore, this research will determine the program's effectiveness in four other districts: Bangkalan, Bondowoso, Gunung Kidul, and Pekalongan. This study generally aimed to analyze the effectiveness of the Nutrimenu program on the knowledge, attitudes, and practices of balanced nutrition of the participants.

MATERIALS AND METHODS

Research Design

Developing nutrition cadres was the basic concept of the Nutrimenu program. Sixty cadres participated in the training of trainers (ToT). Then they educated about balanced nutrition to other women surrounding their home living areas. A total target of 12,000 women participated in this program: pregnant women, mothers of children under five years old, mothers with school-age children, and women of reproductive age. This education was carried out using an educational tool kit as a booklet containing balanced nutrition education and food menus recipe developed previously. After implementing the ToT, the cadres carried out the 21-Day Nutrimenu Movement by cooking dishes according to the choices from the recipe booklet.

The research design was a pre-post intervention study that observed differences in knowledge, attitudes, and behavior (KAP) among participants before and after the Nutrimenu program. This activity was carried out in 4 (four) districts from 3 (three) provinces, namely Pekalongan District in Central Java Province, Gunung Kidul District in the Special Region of Yogyakarta (DIY) Province, Bangkalan Regency, and Bondowoso Districts in East Java. This research has passed the ethics protocol assessment from the Commission of Ethics for Research Using Human Subjects at IPB University.

The questionnaire of this study consisted of knowledge, attitude, and practice sections carried out by Google Forms. The questionnaire was pre-tested in Bogor Regency. The trial mainly emphasized the mothers' understanding of the questions and the technical way of filling them out. This research was conducted from October 2022 – January 2023.

Number of Participants

The population of this study was 12,000 beneficiaries of the Nutrimenu Program from four districts. The number of participants in this study was based on the assumption of an accuracy of 5% and a prevalence of 50% of mothers who practice balanced nutrition, and the level of confidence (α = 95%) obtained a minimum number of participants as many as 357 mothers. In this study, the number of participants involved was 517 program beneficiary women in 4 districts, with 120 participants in each community, with the following criteria:

1. Pregnant women, mothers of children under five years old, mothers with school-age children, and women of reproductive age who had received the Nutrimenu Program and were willing to participate in the research until the end;
2. She could read and type via mobile phone.
3. Understood how to fill out online forms using Google Forms.

Processing and analysis of data

Data collected through online questionnaires then be cleaned and analyzed with IBM SPSS Statistics. Participant's answers are processed by scoring each question and presenting it as a percentage, and categorized as "Good" if the score is correct/positive ≥90%, "Medium" if the score is correct/positive 71-89%, and "Bad" if the score is right/ positive <70%. Differences in knowledge scores, attitudes, and practices before and after the program were identified using the Wilcoxon test. Differences in the proportion of categories of knowledge, attitudes, and practices before and after the program was determined using the Friedman test. Differences in the percentage of participants who answered correctly/positively on knowledge, attitudes, and practices before and after the program were identified using the McNemar test

RESULTS AND DISCUSSION

Participants Characteristics

Participants characteristics consists of education level, jobs, money spent in one month, money spent for food in one day, family size, and people who cook at home (Table 1). Half of the participants (51.11%) had graduated from high school, and almost a quarter of the participants (22.8%) had graduated from junior high school. Most of the participants (69.0%) are housewives.

Money spent in one month in the ≤2,000,000 Rupiah group was greater, namely 81% compared to the >2,000,000 Rupiah group (18.8%). More than half of the participants (67.1%) spent ≤50,000 Rupiah on food in one day. The results of this study are in line with research in Garut (4), that the average food expenditure in one day is 33,223 rupiah.

The family members in the participants was balanced between the categories ≤4 people and >4 people, namely 48.2% and 51.8% respectively. Based on BPS data for 2019, the average number of family members in Central Java and East Java is 3.6 and 3.7 (5). Most of the participants cooked their own food served at home (77.8%), while nearly a quarter were cooked by their mother or grandmother (21.9%). Participants' backgrounds influence nutritional problems and a person's ability to understand new information related to nutrition (6).

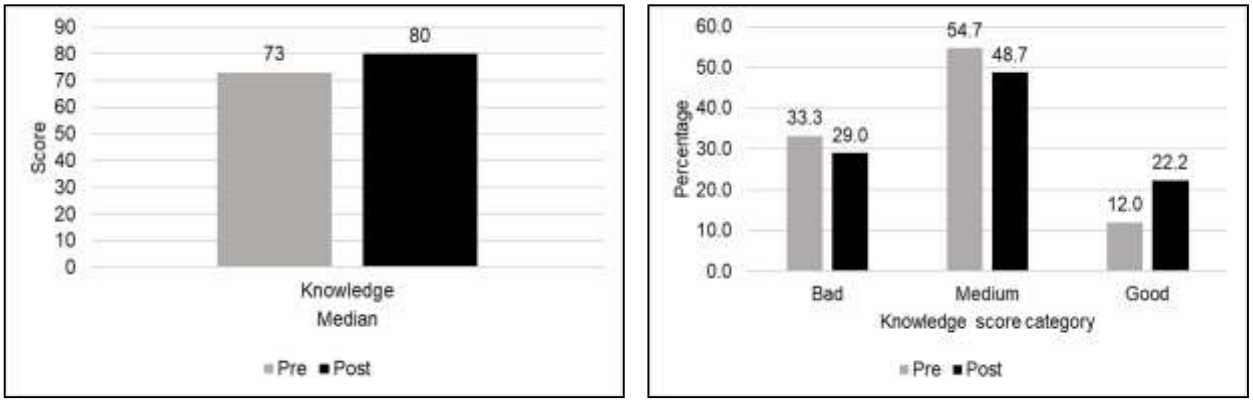
Table 1. Participants Characteristics

Participants Characteristics	n (%)
Education level	
Not graduated from elementary school	3 (0.6)
Elementary school	54 (10.4)
Junior high school	118 (22.8)
Senior high school	264 (51.1)
College	78 (15.1)
Jobs	
Housewives	357 (69.0)
Workers	160 (31.0)
Money spent in one month	
≤2,000,000 Rupiah	420 (81.2)
>2,000,000 Rupiah	97 (18.8)
Money spent for food in one day	
≤50,000 Rupiah	347 (67.1)
>50,000 Rupiah	170 (32.9)
Family size	
≤4 orang	249 (48.2)
>4 orang	268 (51.8)
People who cook at home	
Mother/grandmother	113 (21.9)
Another people	2 (0.4)
Herself	402 (77.8)

Nutritional Knowledge

Nutritional knowledge can influence a person's actions (7,8). Based on Picture 1 (left), there was a significant increase in knowledge ($p < 0.05$ using the Wilcoxon test) before and after the program from a median score of 73 to 80, and there was 53% of participants who experienced an increase in knowledge score. These results were in line with the nutritional education intervention research using the Focus Group Discussion (FGD) method conducted on pregnant women in Bogor, where there was an increase in the knowledge score from 54.9 to 85.0.

The key determinants of food preference were environment, biological status, gender, and socio-economic factor, included mother's education background (9–11). Providing education by involving stakeholders, cadres, or local health workers and paying attention to the mother's background is necessary so that the education provided follows the mother's ability to understand education. Using appropriate and interactive methods could increase nutrition knowledge, attitudes, and practices (12). The education provision in the Nutrimenu program involved cadres so that nutrition education became effective



Picture 1 The Difference of balanced nutrition knowledge before and after the Nutrimenu program

In **Picture** 1 (right), participants' knowledge in the bad/worse category decreased from 33% to 29%, and the medium category from 55% to 49% after the program ($p<0.05$). Participants in the good knowledge category increased after the program, from 12% to 22% ($p<0.05$)). The results of this study followed the previous program in Garut, namely that there was an increase in the number in the good knowledge category from 1.6% to 6%, with the duration of providing nutrition education the same as Nutrimenu, namely for 21 days (4). Another study in Ethiopia on mothers with children aged two years had the same results: an increase in the good knowledge category from 59% to 96%. The study lasted four months of nutrition intervention, and delivering nutrition messages was conducted every two weeks for two hours at each meeting with media in the form of posters, brochures attractive demonstrations (13).

A total of 15 questions were asked to assess the balanced nutrition knowledge of the participants (Table 2). Participants who answered correctly about food consumption and its relation to being overweight (obesity) increased significantly by 6% ($p<0.05$). It showed that the information regarding obesity - explicitly contained in the booklet – could be transferred well by the cadres. According to Permatasari et al. (2021), cadres could deliver nutrition education interactively as health workers who work in the community (12). The inner community approach method could make participants feel more comfortable receiving and paying attention to the information. There was a slight decrease in knowledge regarding water consumption and washing

hands suggestions (72.0% to 67.5%). This decrease could be due to the delivery of cadres during transferring education only focused on essential balanced nutrition topics, but not others. The principle of balanced nutrition based on the Ministry of Health of the Republic of Indonesia in 2014 did not only about food consumption but must be accompanied by other principles such as drinking water and washing hands to achieve good nutritional status (14).

There was an increase of 4.1% in participants who answered correctly on food groups in My Plate knowledge ($p<0.05$). The information about the four food groups in My Plate was stated explicitly in the booklet used by the cadres and was supported by an interesting visualization. Visual media usage in nutrition education provided many benefits, and using more images than writing attracted the audience's attention and made it easier to remember (15). Another study, namely nutrition education for pregnant women, used posters, brochures, flipcharts, and blackboards also had similar results as this study; there was an increase in participants who answered correctly about balanced nutrition from 34.8% to 95.7% (16).

Participants who had correct answers increased on knowledge of micronutrients, namely by 7.1% ($p<0.05$). The information provided in the booklet also discussed the function of micronutrients in detail. Functions and examples of vegetables that contain micronutrients were also listed on each page in the menu booklet given to participants, accompanied by pictures of sources of food ingredients that contain these micronutrients. Other studies had similar results, namely that there was an increase in participants who answered questions correctly about sources of micronutrients from 31.9% to 100% in the group that was given nutrition education (16).

Table 2 Participants Who answered the knowledge questions correctly before and after the program

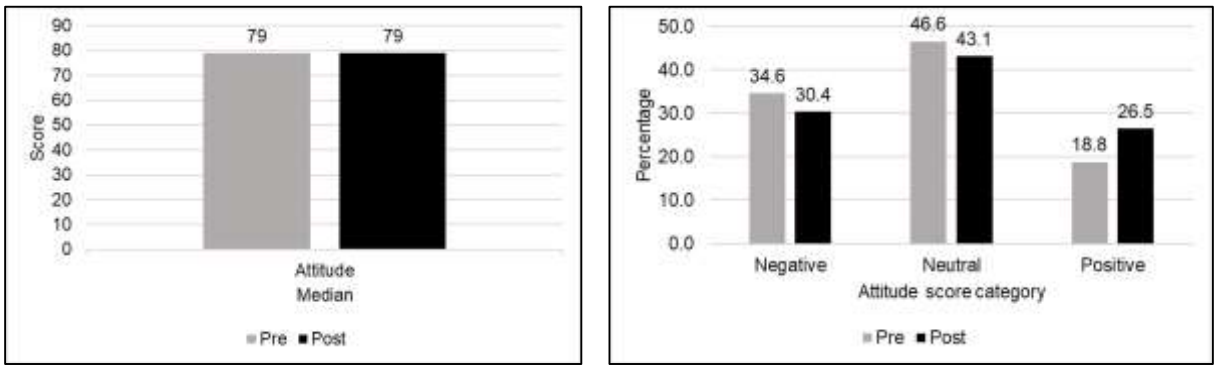
Knowledge questions	Correct answered		P value
	Before	After	
Impact of nutrition deficiency	66.2%	69.8%	0.166
Food consumption and obesity	65.4%	71.4%	0.018*
Balanced nutrition in pregnancy	78.5%	77.8%	0.764
Physical activity and obesity	63.6%	67.7%	0.124
Stunting and child growth	80.5%	82.6%	0.305
Non communicable disease & imbalanced nutrition	84.7%	86.8%	0.329
Water consumption, hygiene	72.0%	67.5%	0.032*
Food groups in My Plate	94.2%	98.3%	0.001*
The example of food groups in My Plate	97.7%	98.1%	0.824
Proportion of My Plate	65.4%	70.0%	0.072
Macronutrient function	78.5%	82.4%	0.103
Micronutrient function	77.6%	84.7%	0.001*
Nutrition problem solution	95.6%	97.1%	0.230
Portion size of carbohydrate group in My Plate	52.2%	57.3%	0.060
Vegetable and fruit sufficiency	53.4%	53.2%	1.00

Note: *significantly different

Attitude on Balanced Nutrition

The median attitude score before and after the program showed 79, with a minimum score of participants before the program being positive was 7% and increasing at the end of the program, which was 16%.

Even though there was a similarity in the median values, the results of the Wilcoxon differential test show that there was a statistically significant difference ($p<0.05$) between the scores of positive attitudes before and after program implementation (**Picture 2**).



Picture 2.The Difference of Balanced Nutrition Attitude Before and After the Nutrimenu program

Most participants (54%) experienced increased positive attitude scores after the program. Picture 2 showed a significant increase in participants with a positive attitude category after the program ($p <0.05$). The results of research by Permatasari et al. (2021) in Bogor with 194 pregnant women also showed an increase in positive attitudes regarding balanced nutrition after providing nutrition education (12). Nutrition education was given periodically for three months every two weeks. The increase in positive attitude scores in this study was as much as 9%. This research also found positive changes in the participants' balanced nutrition practices at the end of the activity.

A total of 14 (fourteen) question points related to a balanced nutritional attitude were posed to participants. The results in Table 3 showed that there was a significant increase ($p<0.05$) in the number of participants (6.7%) with a positive attitude after the program. A positive attitude was shown in the statement components regarding food consumption and its relation to obesity. Explicitly, information about the imbalance of nutritional intake and obesity was available in the booklet media. It was stated that obesity could cause diabetes as an adult, decrease intelligence in children, and increase the risk of heart and blood vessel disease as an adult. With the help of educational explanations from cadres, this information changed the participants' attitudes to be positive at the end of the activity.

A significant increase in attitude ($p<0.05$) also occurred in 6.4% of participants regarding fulfilling the four food groups in My Plate and 9.3% regarding examples of food groups in My Plate. Education regarding My Plate was explicitly written in the booklet. With the help of explanations from cadres, the picture of My Plate in the booklet changed the participants' attitudes towards this information.

Participants with a positive attitude regarding the adequacy of intake of vegetables and fruit as a source of fiber also increased significantly after the program's implementation ($p<0.05$). In addition to education related to My Plate contents, the booklet explicitly provided an alternative vegetable consumption with the potential for health quality, namely Moringa leaf.

With the help of explanations from cadres, this information changed participants' attitudes towards ideal food portions and the adequacy of vegetable and fruit intake.

There was a significant decrease in the number of participants with a positive attitude towards the ideal proportion of the consumption that needs to be consumed (5.6%). The proportion of the My Plate is essential to the core message in My Plate guideline. Limited delivery/education methods by cadres might be one reason for this. Training related to conveying information on portion proportions in My Plate contents needed to be intensively increased using other educational media besides visual media (booklet), such as stickers or audio (songs).

Another study conducted on 40 mothers with toddlers showed a significant increase in attitude scores after providing education related to nutrition. The positive attitude score increased by 8.75% compared to before the education was delivered. Education was delivered through mobile applications and regular health services (17). In this study, nutrition education was delivered by cadres directly around the location where the participants lived. Furthermore, participants took pre and post-tests using online questionnaires accessed directly by participants, while cadres assisted others.

The ultimate goal of changing one's attitude was to be followed by changes in food consumption practices. Nonetheless, changing attitudes alone, without changing food consumption practices, was quite good progress (18). In this study, an increase in the participants' positive attitude was also followed by changes in the participants' food consumption practices, which will be discussed in the next sub-chapter.

Table 3. Participants Who Answered Positively the Attitude Questions, Before and After the Program

Attitude questions	Positive answered		P Value
	Before	After	
Impact of nutrition deficiency	66.5%	67.3%	0.800
Food consumption and obesity	66.0%	72.7%	0.007*
Balanced nutrition in pregnancy	79.7%	80.1%	0.927
Physical activity and obesity	76.4%	77.9%	0.492
Stunting and child growth	76.8%	77.8%	0.729
Non communicable disease & imbalanced nutrition	72.9%	74.9%	0.444
Water consumption, hygiene	93.6%	93.4%	1.000
Nutrition problem solution	81.6%	81.8%	1.000
Food groups in My Plate	71.4%	77.8%	0.004*
The example of food groups in My Plate	51.8%	61.1%	0.000*
Vegetable and fruit sufficiency	70.2%	76.2%	0.010*
Micronutrient function	79.9%	82.6%	0.239
Proportion of My Plate	62.3%	56.7%	0.040*
Macronutrient function	75.8%	77.6%	0.448

Note: *significantly different

Balanced Nutrition Practice

Part of the Nutrimenu Program included cooking 21 different healthy menus in 21 days for participants. After program implementation, the frequency of mothers preparing complete family meals increased. However, the provision of fruits served by participants still needed to be higher; only about 30% of

participants provided fruits daily (Table 4). The 21-Day Movement food menu consisted of main meals and side dishes, which were developed considering each menu's variety, nutritional content, and affordability.

Through the 21-Day Movement, participants were expected to be able to form good habits in providing balanced nutrition for children and families. A person's habit could be formed if the same activity occurred in approximately 21 days. One of the success factors for changing habits was inseparable from participants' commitment to building habits (19). Interventions focused on changing behavior and habits were an effective strategy to improve children's nutritional status. Other research showed that nutrition education for mothers could significantly change the habits of physical activity and children's consumption of vegetables, fruit, and animal side dishes (20,21).

Table 4. Percentage of Participants Who Practiced to Serve Food Groups as My Plate, Before and After the Program

Balanced nutrition practice	Practices		P Value
	Before	After	
Serving food groups every day			
Carbohydrate source/staple foods	51.3%	56.3%	0.033*
Protein source/side dishes	47.8%	56.9%	0.000*
Vegetables	41.6%	49.9%	0.001*
Fruits	19.7%	31.7%	0.000*
Consumed ideal portion	13.0%	19.7%	0.000*
Carbohydrate source/staple foods	48.5%	55.1%	0.021*
Protein source/side dishes	29.8%	39.5%	0.000*
Vegetables	40.8%	46.0%	0.068
Fruits	31.5%	43.9%	0.000*
Other healthy good practice			
Washing hand	40.8%	54.4%	0.000*
Water consumption	42.0%	53.4%	0.000*
Physical activity at least 30 minutes	21.1%	27.3%	0.004*

Note: *significantly different

Table 4 shows an increase in participants consuming food according to the My Plate guidelines from 13% to 20% after the program (53.8% increase). This suitability was based on the recommended number of servings and the type of food group in My Plate. The 21-Day Movement aimed to change participants' habits by providing a variety of healthy food at home. Educational activities in this program were able to change the practice of balanced nutrition in the community for better health.

There was a significant increase ($p<0.05$) in the number of participants who practiced consuming food according to the portion of My Plate in almost all food groups. The increase in the number of participants who consumed staple foods, side dishes, vegetables, and fruits according to the portion of My Plate was 13.6%; 32.6%; 12.7%; and 39.4%, respectively (Table 4). In particular, there was no statistically significant change in vegetable consumption ($p>0.05$). Based on the 2018 Riskesdas (Basic Health Research) results, most people in Indonesia's consumption of vegetables and fruit was still below the recommendation (22). Meanwhile, vegetable consumption was linked with higher fast-food consumption which associated with poor kind of diet (23,24). Lower liking for vegetables also associated with higher Body Mass Index (BMI) (25,26)

Research by Ine et al. (2022), conducted on mothers with children exposed to material related to balanced nutrition through media

counseling and demonstrations, showed significant improvements in mothers' practices (27). After counseling, mothers practice proper feeding practices by giving MP-ASI to children according to balanced nutrition guidelines. In the final stage of the study, toddlers from mothers who participated in education experienced an increase in body weight. The results of this study indicated that the provision of nutrition education had great potential to change a person's behavior (28,29).

Table 4 showed that other balanced nutrition practices related to washing hands, consuming sufficient amounts of water, and doing physical activity for at least 30 minutes also increased significantly at the end of the activity ($p<0.05$). The increase in the practice of washing hands, consuming water, and doing physical activity, respectively, was 33.6%; 27.1%; and 29.4% from the beginning of the program. Explicitly, recommendations related to these three things were also available in the booklet. With educational assistance from cadres, this information was able to change the practice of program beneficiaries.

The 2018 Riskesdas (Basic Health Research) showed that proper handwashing behavior was only practiced by some people in Indonesia aged ≥10 years. The same thing was also shown by the frequency of sufficient physical activity in residents aged ≥10 years, which showed that more than 30% of them were in the low-frequency category (22). Therefore, strategies to improve these behaviors still need to be developed to improve the quality of public health as a whole. Another research that was used Riskedas data also found that low physical activity was correlated with overweight and obesity among urban and rural people (30,31).

CONCLUSIONS AND RECOMMENDATIONS

The Nutrimenu program generally increased the balanced nutritional behavior of participating mothers and women of reproductive age. Improvement in each aspect is as follows:

1. 53% of program participant mothers experienced an increased in knowledge scores about balanced nutrition. The median value significantly increased from 73 to 80. Almost all knowledge questions experienced an increase, but the significant ones were about obesity, the four food groups in My Plate, and the function of micronutrients.
2. Most of the mothers (54%) experienced an increased score of a positive attitude about balanced nutrition. Even though the median score of attitudes before and after the program was the same (79), the proportion of positive attitudes in the "high" category increased from 19% to 26%.
3. According to my plate's guidelines, there was a significant increase in the number of mothers who could practice daily food consumption, from 13% to 20% after the program. Based on the food group consumed, at the end of the program, 46% of mothers consumed vegetables, and 39% of mothers consumed animal side dishes according to recommendations for balanced nutrition portions.

CONFLICT OF INTEREST

The Authors declare no conflict of interest.

ACKNOWLEDGMENT

The authors gratefully acknowledge the funding for this work from the P.T. Unilever Indonesia Tbk. We would also like to thank our partners in this work, The National Population and Family Planning Board of Indonesia (BKKBN).

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