HEALTH AND NUTRITIONAL STATUS OF CHILDREN UNDER FIVE YEARS IN POSYANDU NUTRITION PROGRAM

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ABSTRACT

The objectives of this research were to analyze health, nutritional status of children under five years and its influential factors. This research was carried out in two sub-districts of Bogor: Sub-District of Ciomas and Sub-District of Darmaga. As many as 16 posyandu nutrition program were obtained. A total number of 240 mothers had been divided into control and intervention groups. Baseline data were collected during the pre-study, while endline data were collected after conducting intervention (experiment). The experiment had been conducted for five months in the form of providing nutrition education once in two weeks and implementing home gardening. The data analysis included estimation of mean, standard deviation, minimum value, maximum value and proportion. Based on the General Linear Model (GLM) analysis, it was found that intervention had significant impact on the nutritional status (WAZ) of children under five years. Intervention did not have significant effects on the nutritional status according to HAZ and WHZ.

***Key words**: Health status, nutritional status, nutrition program, children under five years.*

INTRODUCTION

Nutritional status is a condition of someone health or a group of people because of consumption, absorption and utilization of nutrients. By evaluating someone nutritional status, we know how good or bad the nutritional status is (Riyadi, 1995). Accoring to Tarwojo and Soekirman (1987) nutritional status is an indication of a balance between nutrients intake and excretion. In other word, that nutritional status is a reflection of food consumption and its utilizing.

Children nutritional status is a reflection of nutritional status of the community (Suharjo & Riyadi, 1990), and according to Kardjati (1995) children need special attentions because they are sensitive to the nutrient deficiency and environment influences. Nutritional status can be evaluated by four way: food consumption, anthropometry, biochemistry, and clinical test (Riyadi, 2003). And then the method itself is depending on the stage of nutrients deficiency, time, cost, energy, and degree of research accurateness, and how many people will be evaluated.

Nutritional problems are due to not only the lack of nutrition intake, but also infectious diseases. Children who do not consume enough food, and often suffer from diarrhoea, Acute In- fection of Respiratory Tract (AIRT), and fever, will finally suffer from undernourishment. Children with low food intake will have a low immunity. In such condition, they are often vulnerable to infectious diseases, which in turn decrease their eating appetite, and finally make them suffer from undernourishment.

The critical period of childhood is the first five years after birth. If the growth and development in this period of childhood is optimal, then he would become a quality human being. Posyandu is Integrated Health and Nutrition Services in Indonesia. The targets of posyandu are children under five, pregnant women, and lactating mothers.

The objectives of this research were to analyze health and nutritional status of children under five years and its influential factors.

METHOD

Design, Time and Research Locations

This research started with a preliminary study as the first step and experimental design as the second step. The entire study was conducted for 12 month. The research was carried out in two sub-districts of Bogor: Sub-District of Ciomas and Sub-District of Darmaga.

Experimental Design

As many as 16 posyandu's were considered as experimental units. In every selected posyandu, all households who had children with nutritional status of -2<WAZ<-1 were listed in descending order by the score of willingness of mother to be the study participant, and then the first 15 households were chosen. Therefore, the total number of mothers were 240 persons. In the experiment, some mothers were given nutritional education and home gardening ("intervention group") and some got no intervention *("control group"*). The nutritional education had been conducted for five months with a frequency of twice a month.

Data and Method of Collection

The data of children covered name, age, sex, order in family, nutritional and health status include anthropometrics and morbidity. Baseline data were collected during the pre-study, while end-line data were collected after conducting nutritional education.

Data Processing and Analysis

Processing included entry, editing, combining sheets, and generating variables. For the purpose of analysis, the data in the form of sheets (using Excel) was imported from Statistical Analysis System (SAS), then became SAS files. This included estimation of mean, standard deviation, minimum value, maximum value and proportion.

General Linear Models (GLM) was used to analyze the effect of nutrition education including home gardening to the nutritional status of children under five. In this models, sub-district was considered as block, initial nutrition status, energy and protein adequacy level were considerd as covariates. Duncan was used to test the difference between control and treatment.

RESULTS

Health Status

Environmental health problems and health service are important determinants in the field of health. The environmental changes will influence the condition of community health. The environmental problems tending to becoming crucial issues nowadays are, among others, climate change and decreasing natural resources, and environmental pollution (polluted water and air).The types of disease that are closely related to the environmental health are AIRT, diarrhoea, flu, fever and smallpox.

In the control village the number of children under five years suffering from an acute respiratory infection in the last two weeks reached 36.7%, less than that in the intervention village (42.0%). Meanwhile, children experiencing diarrhoea were relatively fewer. Children stricken by fever in the last two weeks were 44.2% in the control regions, and 58.7% in the intervention areas. However, children who had flu in both sub districts for the last two weeks were quite in a large number. The control sub districts had 65.0% of the children having flu in the last two weeks, while in the intervention sub district there were 77.3% of children. Further there were only few children under five years who developed smallpox in the last two weeks (Table 1).

The average duration of children in the control sub districts who suffered from diseases varied between 4 and 15 days. The diseases with the shortest duration were diarrhoea and fever (4 days on the average). The disease relatively suffered long was smallpox, namely up to 15 days. Both in the control and intervention sub districts smallpox was suffered the longest on children, that is, 11 days in the intervention sub district and 15 days in the control subdistrict, while the shortest duration was for diarrhoea (3.5 days in the intervention sub district) (Table 2).

Table 1. Distribution of Children Under Five Years According to the Types of Disease in the Last Two Weeks

Types of Diseases	Control		Intervention	
	n	%	n	%
Acute Respiratory Tract Infection	44	36.7	50	42.0
Diarrhoea	10	8.3	22	18.5
Fever	53	44.2	68	56.7
Flu	78	65.0	92	77.3
Smallpox	1	0.8	4	3.4

Table 2. Statistics of Disease Duration (Days) Suffered by Children Under Five Years in the Last Two Weeks

Types of Diseases	Mean ± sd	
	Control	Intervention
Acute Respiratory Tract Infection	6.5 ± 5.4	8.8 ± 24.9
Diarrhoea	4.3 ± 2.1	3.5 ± 1.7
Fever	4.3 ± 4.3	4.1 ± 2.4
Flu	5.0 ± 4.1	5.2 ± 2.8
Smallpox	15.0 ± 0.0	11.0 ± 5.2

Most children under five years (more than 90%) had got many kinds of immunization. The types of immunization given to children under five years were BCG (anti tuberculosis), DPT (anti dyphteri), measles, and polio. The percentage of children who had got TT immunization (anti tetanus) was 44.2% in the control subdistricts and 37.5% in the intervention one (Table 3).

Table 3. Distribution of Types of Immunization Given to Children Under Five Years

Types of Immunization	Control		Intervention	
	n	%	n	%
BCG	115	95.8	114	95.0
DPT	114	95.0	115	95.8
Measles	109	90.8	101	84.2
TT	53	44.2	45	37.5
Polio	116	96.7	115	95.8
Others	70	58.3	71	59.2

Nutritional Status

Undernutrition problem

Nutritional status discussed in this article was based on the results of body weight measurement and body height measurement, so that the nutritional status would be analyzed using the indices of body weight for age (WAZ), body height for age (HAZ) and body weight for body height (WHZ).

Underweight, stunting and wasting prevalence is presented in Table 4. At baseline, the prevalence of underweight in the control and intervention sub districts village was 13.6% and 19.3% respectively. The stunting prevalence of each was 64.5% and 46.5% respectively, whereas the wasting prevalence was 2.7% and 2.6%.

Based on the malnutrition prevalence, it is clear that the malnutrition problem in the community for this research was a chronic malnutrition. This can be seen from the stunting prevalence that was very high, namely more than 40%. Problems of such chronic malnutrition was usually caused by the low socioeconomy condition.

Five months after intervention it appeared that the stunting prevalence became worse in both groups, while the underweight prevalence was a little bit lower in the intervention group, but in the control group is the opposite. Meanwhile, the wasting prevalence is still normal (acceptable). This shows that the intervention/nutrition education and home gardening had a tendency of preventing the worsening rate in the nutritional status with the increasing age of children.

Table 5 presents the indicators of nutritional status (Z-score) for children under five years on the baseline and endline. Based on the average Z-score of various nutritional status indexes in Table 5, it can be seen that in general the nutritional status of children under five years of age was considered normal both in baseline and in endline, except in body height/age index that belongs to stunting (Z-score is nearly -2). This shows that these children suffered from chronic malnutrition.

Table 4. Prevalence of Underweight, Stunting, And Wasting

Treatment	Index of Nutritional Status	Baseline	Endline	Delta
Control	W/A	13.6	19.1	5.5
	H/A	64.5	78.1	13.6
	W/H	2.7	0.9	-1.8
Intervention	W/A	19.3	16.7	-2.6
	H/A	46.5	62.3	15.8
	W/H	2.6	3.5	0.9

Table 5. Changes of Nutritional Status of Children After Intervention (Z-score)

Treatment	Index of Nutritional Status	Baseline		Endline		Delta	
		Mean	Sd	Mean	Sd	Mean	Sd
Control	W/A	-0.95	0.97	-1.05	0.98	-0.10	0.70
	H/A	-1.91	1.21	-2.13	1.11	-0.22	0.64
	W/H	0.11	1.07	0.14	1.19	-0.03	0.95
	BMI/A	0.37	1.16	0.45	1.32	-0.07	1.01
Intervention	W/A	-1.10	1.00	-1.12	0.92	-0.02	0.70
	H/A	-1.61	1.13	-1.85	1.14	-0.25	0.96
	W/H	-0.30	0.97	-0.15	1.07	0.15	0.86
	BMI/A	-0.12	0.98	0.08	1.16	0.20	0.96

An interesting phenomenon that can be seen in the table is a tendency of better index of W/H and BMI/A (Body Mass Index for Age) in the intervention group with an improved Z-score, respectively 0.15 and 0.20 points of deviation standard (Sd). The phenomenon of the nutritional status getting worse with the increasing children's age is often found in developing countries (WHO, 2006). The data show that there was a tendency that nutrition extension and home gardening conducted for five months could improve the nutritional status, although not significant statistically.

Overnutrition problem

In this research the indicator used to identify overnutrition problems is body mass index for age (BMI/A). Based on the analysis results of the whole data on the baseline it was found that the overweight prevalence (Z-score BMI for age > +2) was 6.3% with a ratio of 4.3% (boys): 8.4% (girls). At the end of the research (endline) on the whole it was found that the overweight prevalence was 8.5%, with the ratio of 12.9% (boys): 3.7% (girls) (See Figure 1).

The analysis of the effects of nutritional extension and home gardening on the overweight prevalence is presented in Figure 2. It can be seen that on the baseline the control group (8.2%) had higher prevalence than the intervention group (4.4%). After five-month intervention both groups showed an increase in overweight prevalence. In the control group the increase of overweight prevalence was 1.9%, while in the intervention group the increase of overweight prevalence was a little bit higher, namely 3.3%.

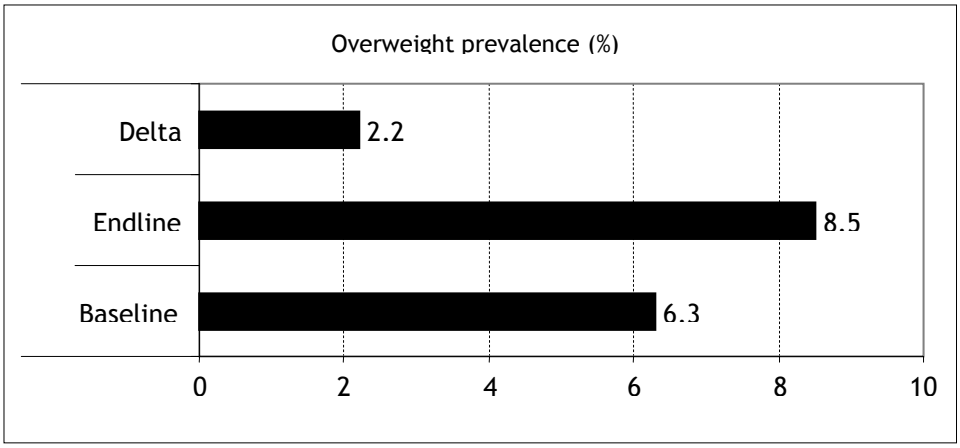

Figure 1. Overweight Prevalence of Children Under Five Years

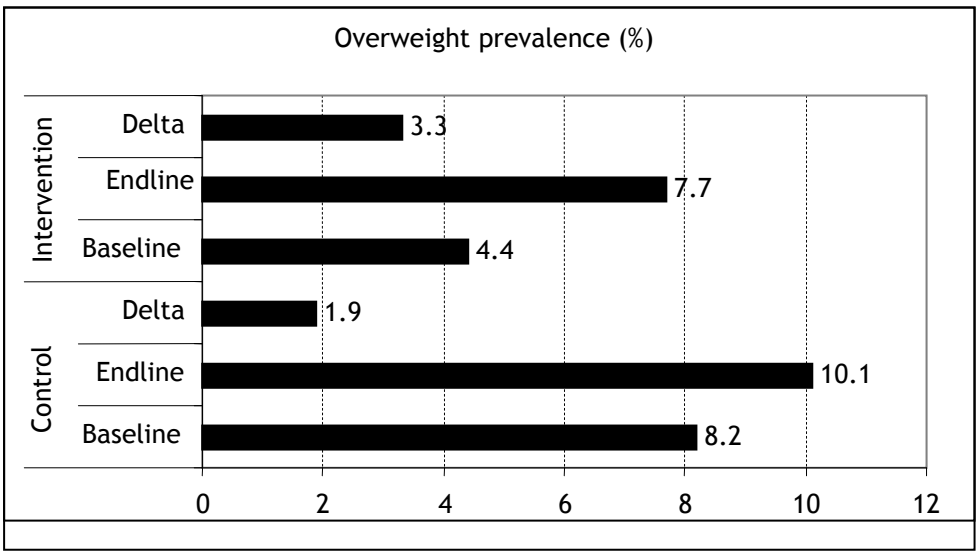

Figure 2. Overweight Prevalence According to Treatment Group

The description of the analysis results of overweight prevalence shows that: 1) overweight prevalence of children under five years in villages was quite high; 2) there was a tendency of increasing overweight prevalence during the five-month intervention; 3) children under five years in villages faced double nutritional burdens; they suffer not only from undernutrition problem, but also from overnutrition problem.

This condition requires more serious attention. Without better and more serious efforts, the problems of nutrition in children under five years will become more complex, and finally they will have big effects on the morbidity and mortality as well as the quality of human resources in the future.

Factors Affecting Nutritional Status

Based on the analysis of General Linear Model (GLM), as can be seen in Table 6, it was found that intervention had significant impact on the nutritional status of children under five years based on WAZ. Another factor as a constraint and influential variable was WAZ before the intervention. Meanwhile, initial energy and protein sufficiency level before the intervention (113.0 kal and 151.4 gr) did not have significant effects. Similarly, the district location as a block did not show any distinction in the nutritional status according to WAZ.

Intervention did not have significant effects on the nutritional status according to HAZ or WHZ. This is possible because the five-month intervention was not yet enough to improve the nutritional status. The nutritional status of HAZ was an effect of a longterm food consumption and the five-month intervention was not enough to improve it. This also applies to energy and protein sufficiency level, which did not show significant effect on the two nutritional statuses. Location as a block or sub district did not show differences in nutritional status either. This means that nutritional status according to body height/age and body weight/age in Dramaga and Ciomas Sub Districts were not so much different.

Table 6. Analysis of Variance For Nutritional Status of Children According to WAZ

Source of Variation	DF	Sum of Square	Mean of Square	Computed F	Probability
WAZ (baseline)	1	0.5653	0.5653	11.41	0.0070
Energy sufficiency level (baseline)	1	0.0599	0.0599	1.21	0.2972
Protein sufficiency level (baseline)	1	0.0046	0.0046	0.09	0.7663
Block	1	0.0689	0.0689	1.39	0.2655
Intervention	1	0.3322	0.3322	6.71	0.0270
Error	10	0.4954	0.0495		
Total	15	1.3604			
	R^2	0.635851			

Table 7. Duncan Grouping For Nutritional Status of Children Under Five Years According to WAZ

Model Component	Level	n	Mean	Duncan Grouping
Location (Block)	Dramaga	8	-1.2575	A
	Ciomas	8	-1.4938	A
Treatment	Intervention	8	-1.3088	A
	Control	8	-1.4425	A

Table 8. Analysis of variance for nutritional status of children under five years according to HAZ

Source of Variation	DF	Sum of Square	Mean of Square	Computed F	Probability
HAZ (baseline)	1	0.3425	0.34246098	7.75	0.0193
Energy sufficiency Rate (baseline)	1	0.0052	0.00518008	0.12	0.7391
Protein sufficiency Rate (baseline)	1	0.0103	0.01030705	0.23	0.6394
Block	1	0.1166	0.11662251	2.64	0.1352
Intervention	1	0.0392	0.03916348	0.89	0.368
Error	10	0.4417	0.04416864		
Total	15	1.3051			
	R^2	0.661580			

Table 9. Duncan grouping for nutritional status of children under five years of age according to HAZ

Model Component	Level	n	Mean	Duncan Grouping
Location (Block)	Dramaga	8	-1.6637	A
	Ciomas	8	-1.7825	A
Treatment	Intervention	8	-1.6738	A
	Control	8	-1.7725	A

Table 10. Analysis of variance for nutritional status of children under five years according to WHZ

Source of Variation	DF	Sum of Square	Mean of Square	Computed F	Probability
Z-Score of BH/A (baseline)	1	0.68575875	0.68575875	5.16	0.0465
Energy sufficiency Rate (baseline)	1	0.03066615	0.03066615	0.23	0.6413
Protein sufficiency Rate (baseline)	1	0.09810891	0.09810891	0.74	0.4104
Block	1	0.02086752	0.02086752	0.16	0.7003
Intervention	1	0.05367528	0.05367528	0.40	0.5394
Error	10	1.32913642	0.13291364		
Total	15	2.48890000			
	R^2	0.465974			

Table 11. Duncan grouping for nutritional status of children according to WHZ

Model Component	Level	n	Mean	Duncan Grouping
Location (Block)	Dramaga	8	-0.1013	A
	Ciomas	8	-0.1038	A
Treatment	Intervention	8	0.0213	A
	Control	8	-0.2263	A

CONCLUSION

At baseline, the prevalence of underweight in the control and intervention sub districts village was 16.7% and 19.3% respectively. The stunting prevalence of each was 64.5% and 46.5% respectively, whereas the wasting prevalence was 2.7% and 2.6%. According to the WHO criteria (1995) about the category of how serious the problem of health in community is, underweight is categorized into medium (between 10-19%); stunting is categorized as very high (more than 40%); and wasting is considered acceptable (less than 5%).

Based on the malnutrition prevalence, it is clear that the malnutrition problem in the community for this research is a chronic malnutrition. This can be seen from the stunting prevalence that is very high, namely more than 40%. Problems of such chronic malnutrition are usually caused by the low socio-economy condition.

Five months after intervention it appeared that nutrition education and home gardening had a tendency of preventing the worsening rate in the nutritional status with the increasing age of children.

Based on the analysis of General Linear Model (GLM), it was found that intervention had significant impact on the nutritional status of children under five years based on the Z-score of body weight/age. Intervention did not have significant effects on the nutritional status according to Z-score of height for age or Z-score of weight for height. This is possible because the five-month intervention was not yet enough to improve the nutritional status.

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