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Research Article

Nutritional Status of Infants 0-23 Months of Age and its Relationship with Socioeconomic Factors in Pangkep

¹Veni Hadju, ²Rabina Yunus, ¹Andi Imam Arundhana, ³Andi Ummu Salmah and ⁴Atjo Wahyu

¹Department of Nutrition, School of Public Health,

²Department of Sociology, School of Social and Political Science,

³Department of Biostatistics, School of Public Health,

⁴Department of Occupational Health and Safety, School of Public Health, Hasanuddin University, Makassar, Indonesia

Abstract

Background and Objective: Nutritional status of infants during a thousand 1st day of life has been used to monitor the achievement of the program. Obviously, nutritional status affected by several factors including the socio-economic of the family. This study specifically asked a question the relationship between nutritional status and socio-economic factors in urban areas of district of Pangkep.

Materials and Methods: This was a cross-sectional study whereas, subjects were selected from four areas, closed to capital city of Pangkep district. Most of children under two were visited and measured by field workers. A pre-tested questionnaires was used and anthropometric measurements as well as weight, length were measured by trained field workers. Data was analyzed using SPSS, nutritional status was determined by using WHO anthro program. **Results:** Results showed that prevalence of undernutrition, stunting and wasting were 23.6, 17.8 and 23.0%, respectively. According to sex, the prevalence were higher in boys compare to girls (32.6 vs.14.2%, 25.9 vs. 9.4% and 27.0 vs. 18.0%, respectively for undernutrition, stunting and wasting. The variation of nutritional status was seen also through villages whereas higher in Bontolangkasa and Biraeng and lower in Kabba and Bonto Kio. Bivariate analysis showed no relationship between socio-economic variables and all nutritional status indices except for relationship mother's education. In addition, after controlling for recent breastfeeding status, the underweight and stunting was significantly related to protein intake ($p = 0.036$ and $p = 0.044$, respectively).

Conclusion: Finally, it could be concluded that the problem of malnutrition in the study was acute malnutrition and it related to mother's education. Protein intake should be an important nutrient to prevent underweight and stunting.

Key words: Nutritional status, stunting, child feeding, maternal health, socio-economic

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Corresponding Author: Andi Imam Arundhana, Department of Nutrition, School of Public Health, Hasanuddin University, Makassar, Indonesia

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Nutritional status of children in Indonesia has been recorded regularly in Indonesia. It was found that there was so little change of prevalence of malnutrition in children according to Indonesia Basic Health Survey in 2007, 2010 and 2013. The prevalence of undernutrition was 18.4, 17.9 and 19.6%, respectively in 2007, 2010 and 2013. In addition, the prevalence of stunting was 36.8, 35.6 and 37.2%, respectively in 2007, 2010 and 2013. Prevalence of wasting was 13.6, 13.3 and 12.1%, respectively in 2007, 2010 and 2013. It showed at the period of 7 years, no significant reduction in all three indicators of nutritional status of children. The variation among provinces was found highly different. Stunting, for example, the highest prevalence was found in NTT (51%) and the lowest prevalence was found in Kepulauan Riau (27%). However, only five provinces were found the prevalence below 30%. It was realized that problem of stunting is big throughout Indonesia while the prevalence of severe stunting was still remarkable (18.8, 18.5 and 18.0%, respectively in 2007, 2010 and 2013).

In regard to problem of stunting, it was found increasing together with age. The higher incidence of stunting was found usually after 2 years of age. It has been realized that the problem of stunting was subject to the chronic malnutrition. It means that the problem deals with mother during pregnancy or even prior to pregnancy. Nutritional status of mother before pregnancy and how mothers took their food during pregnancy until in the lactating period are the main factor of stunting¹⁻³. Studies on different geographical areas, based on rural and urban areas have shown different determinant factors^{4,5}. In rural areas it showed that stunting was associated with father occupation as farmer and the presence of family network for child care. In addition, it found that the greatest protective effect was in children care for exclusively by their mother. However, risk factor for stunting in urban areas was father with unstable job and low presence of small social networks as well as breast-feeding longer than six months⁴. In addition, children who are stunted are more likely to be wasted and underweight⁶.

At present, activities in reducing the amount of stunting in some countries have been considered. The first life of a thousand days (1000 HPK) was initiated to minimize the problem. The program has been set up internationally and Indonesia was asked by some people to reduce the problem. There are three component could be achieve with the program including development of brain, body composition and metabolic status of each individual.

Several studies has been done to assess the relationship between nutritional status and socio-economic status and

other important variables including birth weight, exclusively breastfeeding, food quality index and mothers knowledge, attitude and practices. Most of the study showed significant relationship according to the specific population, geographical areas as well as local culture and condition. This study aimed to identify the association between nutritional status and socio-economic status in the family. This study was a baseline study of long-term intervention study in women in rural area to improve their family health and wealth status.

MATERIALS AND METHODS

Study design and area: This cross-sectional study was conducted from August-November, 2016 in Minasate'ne sub-districts. Minasate'ne was closed to capital city of Pangkep then it has been selected four villages including Bonto Langkasa, Biraeng, Bonto Kio and Kabba located adjacent to one another.

Research subject: The sample selected to the study was mothers who has children under 2 years old. The children included to this study were 0-23 months, without acute diseases and domiciled in the research areas. There were 174 infants in the study. Data was collected by well-trained field workers that trained and passed an evaluation exam. All field workers are post-graduate students at Department of Nutrition, School of Public health and Hasanuddin University. They stayed at the field during data collection.

Data collection and analysis: There were several assessment conducted to this study including socio-economic, anthropometric and food intake. Socio-economic was taken by using structured questionnaire while food intake by 24 h food recall form. Body weight was measured using balance scale which the small 0.1 kg while length was measured using length board which 0.1 cm. Mothers were interviewed by field workers using pre-tested questionnaire. Data was input using a computer program and then analyzed by using SPSS ver.18 (SPSS Inc.). Intake data was calculated by Nutrisurvey.

Ethical statement: The study obtained clearance from Institutional Ethics Committee, Medical Faculty of Hasanuddin University, Makassar. Informed consent was taken from each respondent.

RESULTS

Characteristic of household and infants in the study is shown at Table 1. It showed that most of the house were made by wood (39.5%) and most of the household had latrine

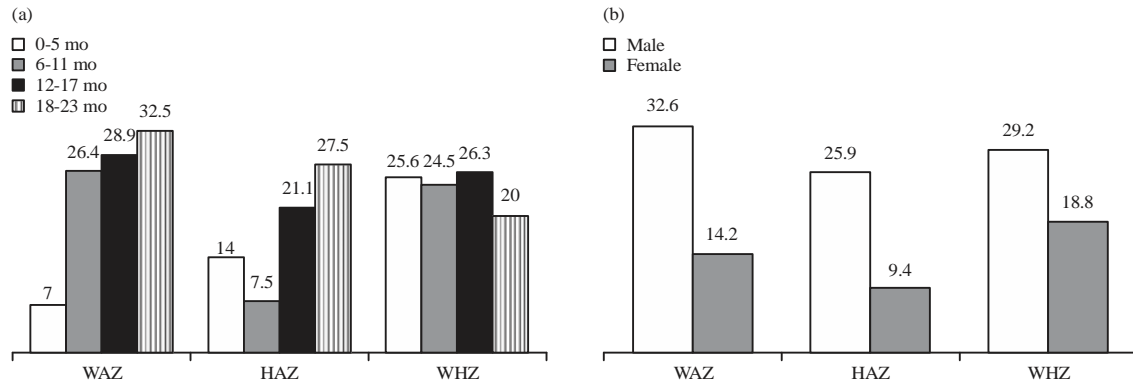


Fig. 1(a-b): Nutritional status of infants according to anthropometric indices by (a) Age group and (b) Sex. WAZ: Weight for age z-score, HAZ: Height for age z-score, WHZ: Weight for height z-score

Table 1: Characteristic of household and subject of the study

Variables	Total (n = 210)
Household	
Type of house, wood (%)	39.5*
Source of water, cisterns (%)	11.9*
Household with latrines (%)	84.3*
Family member smoking in the home (%)	62.4
Income, IDR	1.899.952
Expenditure, IDR	1.467.142
Meal frequency (<3 times (%))	9.5
Family	
Mother's age, than	28.73±5.70
Father's age, than	32.05±6.16
Mother's education (≥Senior high school) (%)	50.5
Father's education (≥Senior high school) (%)	49.3*
Mother's occupation (Farmer (%))	1.9
Father's occupation (Farmer (%))	16.2
Infants	
Age, month	11.34±6.80
Age 0-5 month (%)	24.7
Age 6-11 month (%)	30.5
Age 12-17 month (%)	21.8
Age 18-23 month (%)	23.0
Birth weight	3067±435
Birth length	46.7±9.4
Nutritional status	
Underweight	23.6
Stunting	17.8
Wasting	24.1

*p = 0.05, IDR: Indonesian rupiah (currency)

(84.3%). However, around one third of household having at least one family member was smoker at home (64.2%). It showed also that income of household in general, in average almost 2 million rupiah and the expenditure in average less than income. Besides, most of household ate three times or above daily (90.5%). In addition, most of the mother and father education similar or above senior high school (50.5 and 49.3%, respectively). Father occupation as farmer is only 16.2%. The

age of infants was around 1 year and it distributed fairly according to age group. The average of birth weight and birth length was above 3 kg and below 48 cm, respectively. Based on four villages, there were some variables showed significantly different.

Nutritional status according to undernutrition, stunting and wasting by age group and sex are presented in Fig. 1. Underweight and stunting were increased according to increasing of age (p<0.05). The highest underweight and stunting were 32.5 and 27.5%, respectively at 18-23 old of age. The prevalence of wasting was almost similar in all age-group around 25% and the lowest was in 20% at 18-23 old of age. According to sex, it was consistently showed that the prevalence of all nutritional status indices were higher in male than female (p<0.05).

Table 2 shows bivariate analysis between anthropometric indices and some socio-economic variables. As seen, age-group and sex were significantly different among age-group and sex in almost all indices. Stunting was different among villages whereas the lowest was in Bonto Kio and the highest was in Bonto Langkasa. Underweight was significantly different among mother education (p = 0.028) whereas, better in those with low education. However, it did not significant for stunting and wasting. Other variables were no difference (p>0.05).

Table 3 shows bivariate analysis between nutritional status and food intake. In general, there was no difference between nutritional parameters and macronutrient intake. After controlling for breastfeeding intake, this study found that protein intake was related with underweight and stunting (p = 0.036 and p = 0.044, respectively) while fat intake was borderline significant with underweight (p = 0.087).

Table 2: Bivariate analysis of nutritional status according to anthropometric indices by some variables

Variables	n-value	WAZ Mean±SD	p-value	HAZ Mean±SD	p-value	WHZ Mean±SD	p-value
Age group							
0-5 mo	43	0.21±1.51	0.000	0.07±2.21	0.004	-0.91±1.64	0.693
6-11 mo	53	-1.17±1.18		-0.41±1.77		-1.14±1.46	
12-17 mo	38	-1.20±1.19		-1.06±1.12		-0.98±1.40	
18-23 mo	40	-1.10±1.42		-1.21±1.73		-0.77±1.59	
Sex							
Male	89	-1.05±1.50	0.030	-0.91±1.83	0.031	-1.16±1.58	0.077
Female	85	-0.58±1.35		-0.31±1.77		-0.76±1.43	
Village							
Bt.Langkasa	46	-1.18±1.23	0.107	-1.41±1.21	0.002	-1.23±1.58	0.473
Biraeng	47	-0.92±1.39		-0.34±2.26		-1.00±1.60	
Kabba	40	-0.60±1.51		-0.67±1.27		-0.78±1.53	
Bonto Kio	41	-0.50±1.58		0.01±2.02		-0.80±1.33	
Mothers education							
High	118	-0.65±1.47	0.028	-0.50±1.66	0.215	-0.96±1.46	
Low	56	-1.16±1.33		-0.87±2.12		-0.96±1.63	1.000
Income							
High	97	-0.73±1.34	0,363	-0.60±1.74	0.869	-0.90±1.52	
Low	77	-0.93±1.56		-0.64±1.94		-1.05±1.51	0.513
Prelacteal							
No	74	-1.30±1.15	0.121	-0.86±1.73	0.846	-1.11±1.32	0.242
Yes	58	-0.96±1.35		-0.81±1.47		-0.80±1.66	
Complementary feeding							
≥6 mo	106	-1.08±1.29	0.210	-0.86±1.70	0.836	-0.88±1.48	0.153
<6 mo	26	-1.43±1.04		-0.78±1.23		-1.35±1.43	
Birth weight							
Normal	160	-0.79±1.42	0.924	-0.58±1.72	0.790	-0.92±1.53	0.114
LBW	11	-0.75±1.76		-0.43±2.80		-1.67±1.36	

WAZ: Weight for age z-score, HAZ: Height for age z-score, WHZ: Weight for height z-score, mo: Month

Table 3: Bivariate analysis of nutritional status according to anthropometric indices by food intake, both un-controlling (upper) and controlling for breastfeeding (below)

Variables	n-value	WAZ Mean±SD	p-value	HAZ Mean±SD	p-value	WHZ Mean±SD	p-value
Energy intake							
≥80	86	-0.90±1.47	0.428	-0.62±1.66	0.968	-0.87±1.37	0.411
<80%	88	-0.73±1.42		-0.61±1.98		-1.06±1.65	
Protein intake							
≥80	93	-1.25±1.25	0.159	-0.99±1.40	0.098	-1.06±1.46	0.370
<80%	38	-0.91±1.23		-0.47±2.05		-0.80±1.54	
Fat intake							
≥50	99	-1.10±1.22	0.411	-0.80±1.55	0.600	-0.96±1.42	0.800
<50%	32	-1.31±1.34		-0.97±1.85		-1.04±1.66	
Controlling for breastfeeding							
Energy intake							
≥80	62	-1.21±1.13	0.497	-0.81±1.35	0.610	-1.11±1.39	0.917
<80%	41	-1.38±1.31		-0.97±1.99		-1.14±1.56	
Protein intake							
≥80	69	-1.45±1.15	0.036	-1.10±1.28	0.044	-1.26±1.44	0.162
<80%	34	-0.92±1.25		-0.41±2.13		-0.83±1.45	
Fat intake							
≥50	77	-1.16±1.16	0.087	-0.81±1.50	0.515	-1.03±1.40	0.280
<50%	26	-1.63±1.27		-1.05±1.99		-1.39±1.59	

DISCUSSION

The study showed that nutritional status of infants 0-23 month in the four villages were 23.6, 17.8 and 23%, respectively for underweight, stunting and wasting. The

average z-score of nutritional status was significantly different for age-group and sex. In addition, there was significant difference among village and mother education. In addition, protein and fat intakes was also significantly differently between some parameters of nutritional status.

This study was conducted in urban areas with middle social-economic status. Most parents are educated with almost half and above graduated from senior high school. It is why the prevalence of nutritional status in the study could not compare with other data available. However, lower prevalence of underweight and stunting in this population could refer to the social-economic condition of family in the study. Study in Jenepono showed in sub-districts Bontoramba showed that the prevalence of infants below 2 year old were 31.9, 58.5 and 21.7%, respectively for underweight, stunting and wasting. The difference for underweight and stunting seen in this study was remarkable. Besides, the higher prevalence of stunting in 0-23 month of age (43.1%). On the other hand, study in Iran¹ showed that the prevalence of under 2 year infants were 11.7, 11.5 and 0.7%, respectively for underweight, stunting and wasting.

In this study, appeared significantly the different between boys and girls. The amount of boys who were underweight and stunted is more than twice as girls. Some studies have shown that male sex was predictors for having stunted children^{7,8}. The general explanation was male need more energy as well as any other nutrients for sufficient growth compared to girls. Therefore, the amount of feeding and any other related food availability and accessibility were higher to male infants compared to boy's infants. Different results are shown in a study conducted in India where the undernourished, both stunting and wasting was higher in female than in male. This result might be due to the presence of gender inequality. Gender inequality is the determinant factor of discrimination that affected feeding practice in family⁹.

Given limited sample size, the current study showed the relationship between mother education and underweight. However, it was shown the lower education of mother in line with low nutritional status except Weight for Height Z-score (WHZ). Since the data could be elaborated more in multivariate analysis, then the food intake could be referred especially for protein. The mother who was not in high education will stay at home and provide more protein and fat to their children. However, this should discuss further with high enough sample size. Similar result was found in study in Mexico⁴ that stunting were related with care for exclusively by their mothers. Also, study in Nepal¹⁰ in children 0-59 months showed that stunting was associated with children.

It was proud to say that the study showed that the breastfeeding activities were important for nutritional status of the infants. Since controlling for breastfeeding status then

it was clear that the underweight and stunting was different for those who are provided protein differently. However, similar to education status of mothers, it was found those with low intake of protein intake (<80% of RDA), give better nutritional status compare to high intake of protein. Maybe, those who has mother with higher education provide more food from animal resources such as milk, meat and fish. The other variables such as caring and infectious diseases were not controlled in the study. Study in Malawi¹¹ showed that diarrhea and fever is associated with growth faltering in rural Malawian children aged 6-18 months.

Stunting is not as high as problem of nutritional status in the study as expected. Since the study was done at urban areas (compared to Bonto Marannu in a rural area). As reported by Islam and Biswas⁵ in Bangladesh, according to Bangladesh Health and Demography Surveys from 2004, 2007 and 2011, the prevalence of stunting was much higher in rural areas compared to urban areas. They found the prevalence was six time higher in rural compared to urban areas. Mother education was also a predictor in Bangladesh, whereas, in the study should explore more after controlling for other variables. This result is also in line with a study¹² that found the prevalence of stunting significantly higher in rural compared to urban area of Nigeria.

Another finding from the present study was the high prevalence of wasting. Even though there were no significant, it could be seen that the worse wasting (BB/PB z-score) in those who gave the complementary feeding less than 6 month compare to those at 6 month or above (-1.67 ± 1.36 vs. -0.92 ± 1.53 , respectively, $p = 0.153$). In addition, wasting are more in those who were low birth weight compared to normal weight (-1.67 ± 1.36 vs. -0.92 ± 1.53), respectively, $p = 0.114$). According to a study showed that the risk factor of wasting were low birth weight and young motherhood as well¹³. Review done by Martorell and Young¹⁴ showed that condition of women would be the high risk factor for wasting as well as poor dietary quality.

The risk factor of stunting and wasting differs between areas, urban and rural. Socio-economic might be as the main factor of stunting and wasting in rural area whereas, special condition in urban area such biological factor¹². Stunting has been considered as the most sensitive indicator of malnutrition in children under 5 lived in developing countries than wasting¹³. In other studies investigated that stunting as an indicator of long term nutritional deficiency even for micronutrient deficiency so-called hidden hunger¹⁵. Once a child is stunted, it is difficult to revise it in late childhood⁶.

CONCLUSION

It can be concluded that (1) The mother's education might be important to determine nutritional status of the children in case of giving best practice of child care, (2) There were differences in the results of anthropometry indices which shown better in female than in male and (3) Sub-urban areas have implicated low stunting prevalence but high in underweight and wasting. It is suggested for the further study to develop appropriate intervention program relates to community empowerment that let them generate their own income.

SIGNIFICANT STATEMENT

Socio-economic factor become one of the most important factor determined the nutritional status of the children. In conceptual framework of UNICEF regarding to nutritional status, good motherhood care will provide best feeding practice for the child. In this study, some socio-economic variables were found significantly related to nutritional status especially height-for-age indices (HAZ). These promising that good education of the mother, as well as other socio-economic factors, encourage of the mother to give better care for the child. This study will be used to be a baseline information to come up with best intervention properly to increase the quality of children health status.

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