Modelling Factors that Affect Nutritional Status of Toddler in Coastal Area Surabaya East Java Indonesia

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Abstract: Many factors influence nutritional status in coastal area. This research aimed to analyse factors which have influence on nutritional status of children in coastal area.This research was use cross-sectional design with 104 child-mothers pairs in coastal area Surabaya taken by simple random sampling technique. FFQ questionnaire was used to measure selection of daily food consumption. Factors of food hygiene, feeding frequency, parents education, parent income and frequency of illness taken by questionnaire. Nutritional status measured by comparison of body weight and height of toddler. The result shows that food hygiene and food consumption has strong influence to nutritional status. Analyse was used ordinal regression with sig. 0,012 (food hygiene) and sig 0,010 (food consumption). The selection of daily food consumption and food hygiene were very important to improve nutritional status of toddler in coastal area. Recommendation of this research was empowering community in nutritional status of toddler by improving hygiene and management selection of daily food consumption.

1 BACKGROUND

Coastal areas have a characteristic and unique natural resources. As a fish-producing region, coastal areas have potential in improving health status, especially nutrition problems. Nutritional content in fish if managed properly should be able to improve nutritional status of children. Several problem in child nutrition still founded in coastal area of Surabaya. Nutritional status varied in range severely wasting till fat.

Nuritional problem in coastal area influenced by socioeconomic status. The previous study, (Hien & KamS, 2008) found that maternal, socioeconomic and environment factor have influenced in nutritional status of children under 5-years old in Vietnam.

The coastal region of Surabaya has a diverse community character. Its population consists of various tribes and occupations. In addition, the lifestyle of coastal communities Surabaya much influenced urban lifestyle so that the dissemination of information and technology is very fast. In addition, the level of education in coastal communities also varied from basic education to higher education that affect the attitude, the pattern of thinking and behavior of the community in nutrition management in children.

The income level of coastal population surabaya also varied. This may also affect the ability of the family in selecting the daily food menu for their children so that there are varied nutritional status ranging from undernutrition to overnutrition children. This is different from other coastal areas in Indonesia which are far from urban areas. With these various potentials, Surabaya coastal areas should be more able to overcome the problem of nutrition than other coastal areas in Indonesia (Kurniawan, Muslimatun, Endang, & Sastromidjojo, 2006), found that adolescent in peri-urban coastal area of Indonesia has anaemia and iron deficiency.

Based on the results of field observations, environmental factors in coastal areas Surabaya still cause many problems. Many found waste discharged to the coast in coastal areas, fish populations are decreased so that fishermen are looking for fish in the territorial waters farther from the coast. Community hygiene is also disrupted where there are still residents who do not have toilets. This has been overcome by the government by building public latrines, but some are still far from the reach of residents. Some residents defecate directly to the beach, whereas the beach is still a source of water for

other residents. The incidence of diarrhoea and skin diseases are still widely encountered. Therefore it is necessary to analyze the model related factors that affect the nutritional status of coastal areas Surabaya. This study aims to determine the model of the factors that can affect the nutritional status of children under five in the coastal area of Surabaya.

2 METHODS

This research was used cross-sectional design. The samples were 104 child-mother pairs in coastal area of Surabaya were selected by simple random sampling. Age of children between 1-3 years old in 3 Posyandu (subunit of community health care center) in Kejeran Urban Village Surabaya. This research was conducted in March and April 2017.

The data collecting of this research was questionnaire to measure nutritional status and 6 factors that affect nutritional pattern of children. The National Center of Health Statistics (NCHS) was used to measure nutritional status of toddler. We only use weight-for-height to make assessment the whole of nutritional status. We not consider acute nutritional problem (weight-for-age) and history nutrition problem in the past (height-for-age) (Indonesian Ministry of Health, 2011).

Factors that have influence on nutritional status measured by questionaire wich are contain 6 factor. We take data by questionaire for 5 factors, food hygiene, frequency of eating, educational status of parent, parent income and frequency of toddler illness (febris, diarrhea and respiratory disease). That are considered as a factor that affect management on feeding in toddler. It also influence on kognitif, affectif and psychomotor of parent who take care their children.

We measure data selection of daily food consumption by using Semi Quantitative-Food Frequency Questionnaire (FFQ). We use FFQ to assess the frequency of food consumed within the past month by adding an estimated number of servings consumed by toddlers. We make interview mother by use open question. The questionnaire contains questions about the composition of foods grouped into types of carbohydrate, protein, fat, vitamin and mineral composition. The answer given by the respondent is an answer that contains about how often to consume foods that have been grouped by type and how much is eaten in one meal. Based on respondents' answers, the researchers calculated the size of grams / day on each food. To determine the size of each gram, respondents are given a photo of

the food model in which each household size has been set amount in grams. After knowing the size of each food, the respondent's food menu calculated the number of calories by inputting the food menu on the nutri-survey computer program. In the program, will produce the number of calories, carbohydrates, proteins, fats, vitamins, and minerals consumed by respondents.

The value is classified according to the Indonesian Ministry of Health 1996 in (Anggraeni, 2012) above the need if the value is> 120%, normal if the value is 90-119%, the deficit is mild if the value is 80-89%, moderate deficit if the value is 70-79%, and a heavy deficit if the value is <70%. Previous research of FFQ found that FFQ was valid instrument to measure frequent habitual nutrient. FFQ was used to measure the frequency of habitual nutrient in Asian ethnic (Singapore, Chinese, Indian and Malay) (Neelakantan et al., 2016). FFQ also useful for assessing habitual dietary intake in collegiate athletes. Especially for calcium, vitamin C, vegetables, fruits, and milk and dairy products (Sunami et al., 2016). In more specific, FFQ also valid instrumen for measure valid rankings for intake of energy, nutrients, foods, and food groups in this sample of infants and toddlers (Palacios et al., 2017).

Data collection conducted by door to door to interview for questionnaire data. The measurement of nutritional status held in 3 Posyandu by measure body weight and height of children. After selection by simple random sampling we use ordinal regression statistical test to analyse model of factor that affect nutritional status.

3 RESULTS

Table 1 presented about nutritional status of toddler based on weight-for-height in coastal area Surabaya. The result showed that the most nutritional status of toddler in normal category (75 children, 71%). There are 14 children (13,3%) in category wasting and 9 children (8,6%) with severely wasting.

Table 2 showed about selection of daily consumption for toddler in coastal area in Surabaya. Most of toddler have a proper daily intake (61 toddler, 58,7%). But 10 toddler get nutrient more than needs. Its potentially become fat. Another children in severe deficit consumption in range mild (2 children, 1,9%), moderate (11 children, 10,6%) and severe (20 children, 19,2%).

Table 3 presented the food hygiene of toddler in coastal area mostly in good category (69 children, 66,3%). But we also see that 22 children (21,2%) in poor hygiene. Otherwise, 13 children (12,5%) very good in food hygiene.

Table 4 showed that most of toddler eat 3 times a day (73 children, 70,2 %). 24 children eat twice / day (23,1%) and 7 children eat more than 3 times / day (6,7%).

Table 5 showed that the most educational status of mother is high school (55 mother, 52,9%) and only 2 mother (1,9%) have educational status college / university. Another mother educational status in elementary school (18 mother 17,3%) and junior school (29 mother, 27,9%).

Table 6 showed that almost family income toddler in coastal area between Rp. 1000.000 till Rp. 3000.000. the amount of this family 97 families (93,3%). Only 7 families (6,7%) who have income low than 1000.000 rupiahs.

Table 7 showed that almost of toddler have experience illness once in one last month (75 children, 72,1%). The result showed that 24 children healthy and never have sick in one last month (24 children, 23,1%) and 5 children (4,8%) have sick more than once in one last month before data collection.

In Model Fitting Information -2log Likelihood explains that without entering the independent variable (intercept only) the value is 162.393. However, by entering an independent variable to the (final) model there is a decline in value to 126,465. This value change is a chi-square value of 35,928 and significant at 5% real level (sig.0.01).

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The Goodness of Fit table shows the model conformity test with the data. Pearson value equal to 216,697 with significance 0,018 (> 0,05) and Deviance equal to 111,431 with significance 1,000 (> 0,05). This means the model corresponds to empirical data or a model is worth using.

The Pseudo R-Square table shows how much of the independent variables are able to explain the independent variables. This value is like the coefficient of determination on regression. The value of Cox and Snell is 0.292 (29.2%) and Nagelkerke is 0.349 (34.9%). Nagelkerke coefficient of 34.9% means independent variable food hygiene and food

consumption affect the normal nutritional status of 34.9% whereas 65.1% is influenced by other factors not included in the test model.

Estimate Parameters Table , note the Wald values and their significance values. Food Hygiene variable is -2.147 with sig. 0,012 (<0,05) and Food

Table 1: Nutritional status based on weight-for-height of toddler.

Nutritional status	Frequency (f)	Percentage (%)
Severe wasting	9	8,6
Wasting	14	13,3
Normal	75	71,4
Fat	7	6,7
Total	105	100

Table 2: Selection of daily food consumption for toddler feeding.

Selection of daily food consumption	Frequency (f)	Percentage (%)
More than needs	10	9.6
Normal	61	58.7
Mild Deficit	2	1.9
Moderate Deficit	11	10.6
Severe Deficit	20	19.2
Total	104	100

Table 3: Food hygiene in daily consumption of toddler.

Food Hygiene	Frequency (f)	Percentage (%)
Poor	22	21.2
Good	69	66.3
Very good	13	12.5
Total	104	100

Table 4 : Frequency of eating in toddler.

Frequency of Eating	Frequency (f)	Percentage (%)
2x/day	24	23.1
3x/day	73	70.2
> 3x / day	7	6.7
Total	104	100

Table 5 : Mother's education level of toddler.

Mother's Education Level	Frequency (f)	Percentage (%)
Elementary	18	17.3
Junior School	29	27.9
High School	55	52.9
College/ university	2	1.9
Total	104	100

Table 6 : Family income of toddler.

Family income	Frequency (f)	Percentage (%)
<1.000.000	7	6.7
1.000.000 - 3.000.000	97	93.3
Total	104	100

Table 7: Frequency of toddler illness.

Frequency of Toddler Illness	Frequency (f)	Percentage (%)
Never sick	24	23.1
1x / month	75	72.1
>1x / month	5	4.8
Total	104	100

Table 8: Model fit information.

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	162.393			
Final	126.465	35.928	14	0.001

Table 9: Goodness-of-fit.

	Chi-Square	Df	Sig.
Pearson	216.697	175	.018
Deviance	111.431	175	1.000

Table 10: Pseudo R-square.

Cox and Snell	0.292
Nagelkerke	0.349
McFadden	0.191

Consumption 1,537 with sig 0,010 (<0,05). This value factors of Food Hygiene and Food Consumption affect the Nutrition Status.

From the above output the ordinal regression equation is generated as follows

$$lnP(Y\leq0/P(Y>0))=-4.105-2,147+1,537 \quad (1)$$

From the model it is said that Food Hygiene which has less tend to of smaller have normal nutrient status, with coefficient of variable 2,147 which have tend to 8,55 ($e^{2,147}$) to have normal nutrient status. And Food Consumtion is less tend to of smaller have normal nutritional status, with coefficient of variable 1,537 which have tend to 2,96 ($e^{1,537}$)to have normal nutrient status.

4 DISCUSSION

Poor daily food consumption of children, tend to difficult to achieve normal nutritional status. It has correlation in nutrition less than needs. Toddler has various physical activity and need nutrition for their growth and development. If their daily food consumption less than their needs, they tend to more thin and difficult to gain their weight. The incident of anemia, worsen than condition. Kurniawan, found that thinnes children have higher anemia and iron deficiency in coastal area in Indonesia (Kurniawan et al., 2006)

The good nutrient need for growth and development of toddler. The variety of food is important factor. Sometimes mother don't have good knowledge about proper food for their children.A few Mother in coastal area of Surabaya, give junk food or another food with contain of high carbohydrate than protein or fiber (fruit and vegetable). Good knowledge and attitude of mother is important factor, as they have to manage nutritional feeding for their children.

Toddler have difficulties of feeding. Toddler chooses instant noddle or another junk food which contain more carbohydrate than vegetable or protein. Characteristic some mother in coastal area Surabaya show that they don't make strong effort to give nutrition if their children difficult to eat. Mother should make various pursuade to make their children want to eat their food. If they don't, the children only eat in small amount of food.

The other factors, economic status of family also bring influence to management of nutrition in toddler. The family income in coastal area varied in less than Rp.1000.000 till more than Rp. 2.000.000. The most family in this research have family income in range Rp. 1.500.000 – 2.000.000. It will affect in daily food consumption. The variation of food will limited by family income. Good mother have to make innovation to make a good selection of daily food.

The previous study found that the prevalence of early childhood stunting and the number of people living in absolute poverty have closely associated with poor cognitive and educational performance in children and use them to estimate that (Grantham-McGregor et al., 2007). These disadvantaged children are likely to do poorly in school and subsequently have low incomes, high fertility, and provide poor care for their children, thus contributing to the intergenerational transmission of poverty.

Table 11: Parameter estimates.

Parameter Estimates		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[NutrionalStatus = 1]	-4.105	2.285	3.229	1	0.072	-8.583	.373
	[NutrionalStatus = 2]	-2.689	2.262	1.413	1	0.235	-7.123	1.744
	[NutrionalStatus = 3]	2.431	2.244	1.174	1	0.279	-1.967	6.829
Location	[MothersEducation=2]	-0.035	1.724	0.000	1	0.984	-3.414	3.345
	[MothersEducation =3]	2.087	1.735	1.448	1	0.229	-1.312	5.487
	[MothersEducation =4]	1.942	1.700	1.305	1	0.253	-1.389	5.273
	[MothersEducation =5]	0[a]	.	.	0	.	.	.
	[FamilyIncome=1]	-0.595	0.907	0.431	1	0.511	-2.372	1.182
	[FamilyIncome =2]	0[a]	.	.	0	.	.	.
	[FrekuensiOfIllness=0]	-1.601	1.210	1.750	1	0.186	-3.972	0.771
	[FrekuensiOfIllness =1]	-1.355	1.154	1.380	1	0.240	-3.616	0.906
	FrekuensiOfIllness =2]	0[a]	.	.	0	.	.	.
	[FoodHygiene=1]	-2.122	0.941	5.088	1	0.024	-3.967	-0.278
	[FoodHygiene =2]	-2.147	0.850	6.386	1	0.012	-3.812	-0.482
	[FoodHygiene =3]	0[a]	.	.	0	.	.	.
	[FeedingFrekuensi=1]	-1.021	1.062	0.923	1	0.337	-3.103	1.062
	[FeedingFrekuensi =2]	-0.603	0.976	0.382	1	0.537	-2.515	1.310
	[FeedingFrekuensi =3]	0[a]	.	.	0	.	.	.
	[FoodConsumtion=1]	3.491	1.023	11.655	1	0.001	1.487	5.495
	[FoodConsumtion =2]	1.537	0.597	6.635	1	0.010	0.368	2.707
	[FoodConsumtion =3]	1.084	1.882	0.332	1	0.565	-2.604	4.772
	[FoodConsumtion =4]	0.612	0.837	0.534	1	0.465	-1.029	2.253
	[FoodConsumtion =5]	0[a]	.	.	0	.	.	.

Otherwise, some children have more nutrient than their needs. Almost mother give additional milk (not breast milk) for their children although their children have normal nutritional status and fat. Almost children with fat, still have formula milk in their diet. Mother believes that children have to eat more, this situation will bring their children become overweight and obese.

Olivares, found that food consumption in school-age children has influence in nutritional status. Daily food consumption has a stronger than daily activity (such as TV time). Although they have TV time, intake of food with dense energy and vegetable or fruit only a risk factor of obesity. But intake of milk has strong influence in obesity of children in Chili (Olivares et al., 2004).

The contain of formula milk, have more than their need (such as lipid). Some children also have allergy, this incident higher in children with formula milk, it can cause some disease just like diarrhoea and cough.The incident of disease will bring decrease of body weight.

The coastal community in Surabaya is very complex. From the environmental perspective it is found that water pollution are still happening. Many found trash on the beach area. This disturbed sanitation can trigger the emergence of various diseases, especially in toddlers. Food hygiene can be contaminated with poor sanitation.

The result showed that bad sanitation of food has influence in nutritional status. Sanitation in processing food will affect the nutrient containt. Good sanitation will keep nutrient and reduce nutrient while process of cooking. Good material and good management to wash the material of food also important thing. It affected by the water that used to wash the food. If the mother use polluted water, they also have risk of diarrhoea.

D'Agnes found that food security in coastal area of Philippines will be achieved more quickly if there is together implementation between coastal resources management and reproductive health (D'Agnes, Castro, D'Agnes, & Montebon, 2005).

5 CONCLUSIONS

Based on this research, we assume that the selection of daily food consumption and food hygiene have strong influence to nutritional status. Good selection of daily food will influence on the proper nutrient for toddler to achieve normal nutritional status. Food

hygiene will bring a good sanitation of the environment and food processed in feeding management. Recommendation of this research was empowering community in nutritional status of toddler by improving hygiene and management selection of daily food consumption and food sanitation.

REFERENCES

Anggraeni, A. C. (2012). *AsuhanGizi; Nutritional Care Process*. Yogyakarta: Graha Ilmu.

D'Agnes, H., Castro, J., D'Agnes, L., & Montebon, R. (2005). Gender Issues within the Population-Environment Nexus in Philippine Coastal Areas. *Coastal Management*, *33*(4), 447–458. https://doi.org/10.1080/08920750500217989

Grantham-McGregor, S., Cheung, Y. B., Cueto, S., Glewwe, P., Richter, L., & Strupp, B. (2007). Developmental potential in the first 5 years for children in developing countries. *Lancet*. https://doi.org/10.1016/S0140-6736(07)60032-4

Hien, N. N., & KamS. (2008). Nutritional Status and the Characteristics Related to Malnutrition in Children Under Five Years of Age inNghean, Vietnam. Retrieved from https://www.jpmph.org/upload/pdf/jpmph-41-232.pdf

Indonesian Ministry of Health. (2011). *Direktorat Jenderal Bina Gizi dan kesehatan ibu dan anak.* Retrieved from http://gizi.depkes.go.id/wp-content/uploads/2011/11/buku-sk-antropometri-2010.pdf

Kurniawan, Y., Muslimatun, Endang, & Sastromidjojo. (2006). Anaemia and iron deficiency anaemia among youg adolescent girls from peri urban coastal area of Indonesia. Asia Pacific. *Journal of Clinical Nutrition*, *15*(3), 350–6. Retrieved from https://search.proquest.com/openview/0518a3e0f96eff19c5fa6c487c7a67d4/1?pq-origsite=gscholar&cbl=45812

Neelakantan, Whitton, Seah, Koh, S.A, R., & J.Y, L. (2016). Development of a Semi-Quantitative Food Frequency Questionnaire to Assess the Dietary Intake of a Multi-Ethnic Urban Asian Population. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5037515/pdf/nutrients-08-00528.pdf

Olivares, S., Kain, J., Lera, L., Pizarro, F., Vio, F., & Morón, C. (2004). Nutritional status, food consumption and physical activity among Chilean school children: A descriptive study. *European Journal of Clinical Nutrition*, *58*(9), 1278–1285. https://doi.org/10.1038/sj.ejcn.1601962

Palacios, C., S, R.-T., EJ, S.-R., O, S., EM, R., & M, C. (2017). A Semi-Quantitative Food Frequency Questionnaire Validated in Hispanic Infants and Toddlers Aged 0 to 24 Months.

Sunami, A., K., S., SuzukiY., N., O., J., I., A., N., & Al., E. (2016). Validity of a Semi-Quantitative Food Frequency Questionnairefor Collegiate Athletes. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4884896/pdf/je-26-284.pdf.