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Feeding pattern and nutritional status of infants in Belu District, East Nusa Tenggara

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Abstract

Background The reduction of high rates of malnutrition will require greater attention to specific aspects of child feeding. Although much attention has been devoted recently to promoting appropriate breastfeeding practices, little effort has been directed to enhance complementary feeding.

Objectives To assess feeding pattern among infants in Belu District Nusa Tenggara Timur, related to nutritional status of children.

Methods Cross-sectional study was conducted in Belu District, East Nusa Tenggara using a two stage cluster sampling method to select a sample of representative households. All infants were assessed for current feeding practices and anthropometric.

Results Among 87.8% infants are still breastfed, and 80.2% were given colostrum. The mother gave the baby plain water (27.4%), or sugar water (15.6%), or other liquid (31.7%) before giving the first breast milk. Timely first suckling was practiced 10.1% infants, timely first complementary feeding was achieved 90.3%, as well as high rate of early introduction of semi-solid food in infants less than 4 months. Introduction of solid food was progressively increased (3% in the newborn period to 72% in 3 months infant). Exclusive breastfeeding among infants < 4 months was decreasing (90% in newborn period to 28% in 3 months infants). The proportion of infants fed solid foods was progressively increased (4% in infants <1 month to 72% in 3 months infant). The high prevalence of wasting reached 27.8% (CI 95%: 24,6-31,3). The prevalence of children below -2 SD Z-scores was 10% (CI 95%: 8-12.5), was classified as serious condition.

Conclusions This study showed that high percentage of exclusive breastfeeding rate otherwise rate of continued breastfeeding (one year) is low. A sufficient high rate on complementary feeding is established as well as early introduction of semi-solid foods. The prevalence of underweight is high and classified as serious wasting. **[Paediatr Indones 2007;47:283-289]**.

Keywords: *feeding pattern, nutritional status, children*

Current recommendations of the Indonesian Government for programs to reduce nutrient deficiency in children include fortification of foods with nutrients and improvement in dietary intake. The reduction of the high rates of malnutrition will require greater attention to specific aspects of child feeding. Although much attention has been devoted recently to promoting appropriate breastfeeding practices, little effort has been directed to enhance complementary feeding.[1]

Current infant recommendations are to initiate breastfeeding as soon as possible after birth and to avoid use of any foods or fluids other than breast milk for the first 4-6 months.[1] Although exclusive breastfeeding is particularly critical during the newborn period, there are many reasons to recommend that this practice continue thereafter. Because of the strong relationship between infant demand and maternal milk production, continued avoidance of other foods and fluid is essential to optimal breast milk intake. By 4-6 months of age, infants are physiologically and developmentally mature

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enough to cope with foods other than breast milk. Early weaning of infants in developing countries is a potent risk factor for malnutrition and mortality. The food formulas for under-five children as well as nursing mother and pregnant women were developed. The appropriate technology as matter of fact was more successful than the modern technology in making food formula, especially when the raw material is local and the food cost is low.[2]

From the result of longitudinal growth studies and nutritional surveillance activities both indicate that growth stunting occurs within a fairly narrow "age window" from several months after birth to about two years of age, coinciding with the time when foods other than breast milk are generally introduced into the diet. Thus targeting interventions to this age group may be more cost-effective than traditional programs that include a broader age range of pre-school children. The results of recent research suggest specific ways in which nutrition programs may intervene to improve complementary feeding.[2]

These problems indicate that we need to study about complementary feeding pattern and behavior among infants in each area, related to nutritional status or growth of children and pattern of morbidity among infants, to give intervention for improving those nutritional problems by assessing the adequacy of infant feeding practices in the community of Belu Distric Nusa Tenggara Timur, one of remote area that malnourished are prevalence. Study on infant feeding practices was established by assessing pattern of breastfeeding practices and pattern of complementary feeding in infant.

Methods

The community health and nutritional research laboratory are placed in the District of Belu, East Nusa Tenggara. This district comprises of 12 sub-district ("kecamatan") and 82 villages ("kelurahan").

The sampling frame was based on standard methods developed by the Central Bureau of Statistics that had been specifically designed to support population survey needs during the 1990's census. A two stage cluster sampling method was used to select a sample of household representative of the district. The first stage was selected with probability proportional to the number of listing units in the cluster (probability proportionate to estimate size sampling). The clusters used were the standard statistical enumeration areas or "wilcah" developed by the Central Bureau of Statistics for the 1990 census. The District of Belu consists of 12 sub-districts, 82 villages and 183 "wilcah". The frame for the first stage consisted of 20 percent sample of the "wilcah" in the district selected was 38. These "wilcah" consisted of 2 from urban areas and 36 from rural areas. In the second stage, the same numbers of households were systematically sampled from each "wilcah". The sample size required to obtain stable estimation of key health and nutritional status indicators was approximately 5,000 households. The number to be selected was 132 households. If the "wilcah had less than 133 households then all were included.

Children less than one years of age were the focus of the study according to age group: 0-1, 2-3, 4-5, 6-8, and 9-11 months. About 100 infants were studied from each age group. An equal sample of children was selected from each "wilcah". Furthermore, from 38 "wilcah", 3 children in each age group were selected per cluster ("wilcah"), or total 21 children per cluster. The list and address of the target infants per group had been available from the previous survey. In case the amount infant is not sufficient, a household blow up belonging to the same existing "wilcah" or villages was conducted.

The interviewers were nutritionists. The field workers had undergone theoretical training, including specific training. The interviewers and anthropometric measurers were trained on the principle of active learning and participation, through discussion and field testing of the questionnaire and discussion of errors made.

All infants were assessed for current feeding practices (breastfeeding and other types' foods) with a 24-hour dietary recall history by using interview method. Data collection on complementary feeding and breastfeeding practices started in September 15, 1997 to December 19, 1997. The interviewer completed standardized questionnaire.

Anthropometric measurer weighed infants, nude or lightly clothed, by using Salter and Secca scale which was standardized using the WHO recommended procedure. Length/height was measured three times to the nearest 0.1 cm with a locally constructed length board.

Descriptive statistics were used to define breastfeeding practices and anthropometric assessments. Feeding practices were described by using

indicator for assessing breastfeeding practices as specified by the WHO. Two key parameters for breastfeeding as recommended were "exclusive breastfeeding rate", defined as the proportion of infants less than 4 months of age who receive only breast milk (plus vitamins or other medicines), "predominant breastfeeding rate" was infants under 4 months of age who receive breast milk plus non milk liquids. "Full breastfeeding" was defined as both of the above terms. Three indicators of breastfeeding for older infants and toddlers were "timely complementary feeding rate" which included infants 6-9 months of age who receive both breast milk and solid or semi solid foods. A final indicator is "bottle feeding rate" which was measured by the proportion of infants less than 12 months of age who receive any food or drink from a bottle.[3]

The anthropometric analyses were performed to determine nutritional status according to WHO-NCHS standard. Weight for Age, Height for Age and Weight for Height were converted to Z-score based on the NCHS Growth Curves recommended by WHO using Epinut program.[4]

Results

The 717 under 24 month infants/children were enrolled in the study. There were 6.4% with more than two children. Most of the mothers under study were 18-35 years of age (85.6%), had low education (31.4%) and as a housewives/unemployed (89.5%). Most households belonged to low economical status (28.8% poor and 67.7% moderate).

The pattern of breastfeeding (**Table 1**) showed that breastfeeding was common in Belu District with 99.1% of children have ever been breastfed, 87.8% is still breastfed until now, and 80.2% were given colostrum. The main reasons for not giving colostrum are because of dirty (64.9%) and they believed that not allowed to give it to the baby (17.2%). The mother gave the baby plain water (27.4%), or sugar water (15.6%), or other liquid (31.7%) before giving the first breast milk. It is reasonable to understand that timely first suckling (within 1 hour of birth) was practiced only 10.1% (**Table 2**). Most of the infants were breastfed more than 8 times within 24 hours (85.5%).

Table 2 shows indicators for assessing breastfeeding practice in Belu District. Exclusive breastfeeding was practiced with 62.2% of the infants aged less than 4 months. It's higher than the National figure 47% and 53%.[5] The previous study in Yogyakarta found that exclusive breastfeeding was practiced with 43.6% in urban and 58% in rural. Continued breastfeeding rate for 1 year was 78.3%, and progressively decreased to 32.3% under 2 year.

A high rate of timely first complementary feeding was achieved (90.3%), but it was influenced by a high rate of early introduction of semi-solid food in infants less than 4 months. It was higher as compared to Indonesian figure 76%.[5] This finding indicated that there was no late introduction of complementary feeding. Otherwise, introduction of solid food was progressively increased from 3% in the newborn period to 72% in infant 3 months of age. Despite this early introduction of solid

Table 1. Breastfeeding patterns

Activity	N	(%)
Giving colostrum to the baby	575	80.2
Reason of not giving colostrum (n=134)		
Dirty	87	64.9
not allowed	23	17.2
dilute and unnatural colour	4	3.0
Smelled	1	0.7
Others	4	3.0
Type of prelacteal feeding		
Water	198	27.4
sugar water	111	15.6
formula milk	77	10.7
Tea	17	2.4
Honey	15	2.1
cooked rice water	2	0.3
Banana	2	0.3
fruit/vegetable juice	1	0.1
None	228	31.7
Still breastfed until now (717)	619	86.3
Frequency of breastfeeding in 24 hours (n=621)		
Night 3-5 times		56.3
Day 5-8 times		52.8
Total 24 hours: < 8 times	90	14.5
≥ 8 times	531	85.5

Table 2. Indicator of breastfeeding practices

Indicators	N	N	Percentage
Exclusive breastfeeding rate	206	129	62.6
Predominant breastfeeding rate	206	4	1.9
Full breastfeeding rate	206	133	64.6
Timely complementary feeding rate	144	130	90.3
Continued breastfeeding rate (1 year)	83	65	78.3
Bottle feeding rate (< 6 months)	301	14	4.6
Bottle feeding rate (< 12 months)	504	43	8.5
Ever breastfeeding rate	504	500	99.2
Timely first suckling rate	504	51	10.1

foods, mothers continued of breastfed their infants, with 78.3% of infants age 12-15 months being breast-fed and 32.2% at age 20 through 23 months.

Although exclusive breastfeeding rate was high, under 4 months infants who received breast milk only tend to decrease from 90% in newborn period to 28% in infants 3 months of age. On the other hand, the proportion of infants fed solid foods as complementary feeding progressively increased from 4% for infants less than 1 month of age to 72% for infant aged 3 months. Totally, the percentage of under-4 month infants who received solid foods was 35% (**Table 3**). It was higher than previous study in Yogyakarta 23.4%.[6] It means that there was a tendency to early introduction of solids foods in Belu district.

The type complementary feeding showed that the prevalence of porridge/semi-solid/solid feeding and water/tea was relatively high during the first 4 months with 33.5% and 10.2% respectively. It increased to 92.3% and 67.3% respectively for children aged 6-8 months. However, fish/egg/meat was also the most type of foods offered to the children aged 6-8 months (17.3%). This study found that vegetables/fruits were only offered to 2.1% of children aged 4-5 months, increase to 13.1% for children 9-11 months of age. It seems that these kinds of foods were disliked or difficult to find in Belu District may be due to of the type of soil.

We also analyzed the receipts of daily dietary by using 24 hours recall for estimating the energy and nutrient intakes. We found that mean of energy intake was less than requirements recommended by WHO for each age group, i.e., 6-8 months age group 264 kcal/day (less than 280 kcal/day), 9-11 months 439 kcal/day (less than 450 kcal/day) and 12-23 months 628-744 kcal/day (less than 750 kcal/day).[7-9]

Three commonly used anthropometric indices were derived by comparing height and weight measurements with reference curves: height for age, weight for age and weight for height. Although these indices were related, each has a specific meaning in terms of the process or outcome of growth impairment. Moreover, the ranges of the deficit of physical status based on each index vary significantly across populations. Deficits in one or more of the anthropometric indices are often regarded as evidence of malnutrition.[4]

Table 4 showed the proportions of nutritional status by age group according to height for age, weight for age and weight for height. The nutritional status for all age was moderate to over (27.8%, 33.2% and 26.8% respectively), whereas there was only 12.2% for under and poor nutritional status. The most children under nutrition were suffered children aged more than 9 months.[4]

Weight for age reflects body mass relative to chronological age. It was influenced by both the height and weight of child. The term underweight had been widely used to describe the condition in high prevalence areas, just as stunting and wasting are employed in the context of low height for age and low weight for height. The prevalence of underweight was only 8%, and those mostly found in children 9 months of age or above.

Table 3. Infant foods/liquids given in the last 24 hours

Age (months)	Breast milk only	Breast milk + non-milk liquids	Breast milk + solids	No breast milk
0 (No = 54)	49 (90.7%)	2 (3.7%)	2 (3.7%)	1 (1.9%)
1 (No = 50)	36 (72.0%)	1 (2.0%)	13 (26.0%)	0 (0.0%)
2 (No = 56)	31 (55.4%)	1 (1.8%)	24 (42.9%)	0 (0.0%)
3 (No = 46)	13 (28.3%)	0 (0.0%)	33 (71.7%)	0 (0.0%)
4-5 (N = 95)	10 (10.5%)	2 (2.1%)	80 (84.2%)	4 (4.2%)
6-9 (N = 144)	5 (3.5%)	5 (3.5%)	130 (90.3%)	4 (2.8%)
10-11 (N = 59)	0 (0.0%)	3 (5.1%)	53 89.8%)	3 (5.1%)

Table 4. Proportion of nutritional status (Median standard WHO-NCHS) by age group

Age group (month)	Obese	Good	Moderate	Under	Poor	Total
	height for age					
	(%)	(%)	(%)	(%)	(%)	(n)
<4	59.0	22.9	11.7	4.4	2.0	205
4 - 5	25.3	46.3	24.2	3.2	1.1	95
6 - 8	21.2	45.2	26.9	4.8	1.9	104
9 - 11	14.3	44.9	28.6	8.2	4.1	98
Total	26.8	33.2	27.8	9.8	2.4	712
	weight for age					
<4	20.0	75.1	3.9	1.0	0.0	205
4 – 5	3.2	86.3	7.4	2.1	1.1	95
6 – 8	2.9	78.9	16.4	2.0	0.0	104
9 – 11	0.0	54.1	37.8	4.1	4.1	98
Total	6.6	63.6	21.8	6.6	1.4	712
	weight for height					
<4	62.2	27.0	7.6	1.1	2.2	185
4 - 5	56.8	31.6	9.5	2.1	0.0	95
6 - 8	36.5	36.5	23.1	2.9	1.0	104
9 - 11	17.4	44.9	31.6	5.1	1.0	98
Total	35.1	33.4	25.3	4.8	1.5	692

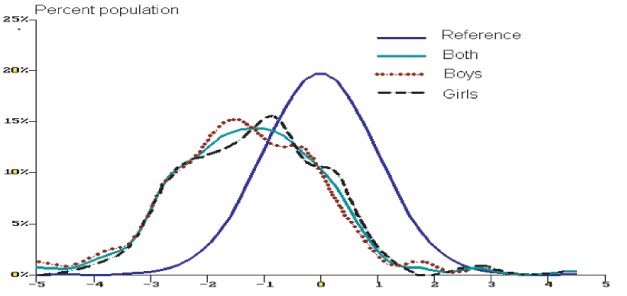
Weight for height reflects body weight relative to height. Its use carried the advantage of requiring no knowledge of age (which may be difficult to assess in less developed areas). Low weight for height (wasting) is widely used to describe a recent and severe process that has led to significant weight loss, usually as a consequence of acute starvation and/or severe disease.[4] The proportion of wasting was only 6.3%.

An alternative to the prevalence-based approach for expressing of anthropometric deficits or under nutrition is the calculation summary statistics of the z-scores, including mean and standard deviation. The mean z-score has the advantage of describing the nutritional status of the entire population directly.[4]

Figure 1 shows a shift of height for age Z-score distribution -1 SD, relative to the reference. The prevalence of children below -2 SD Z-scores was 28.1% (CI 95%: 24.8-31.6), mean of shift was –1.22 SD (CI 95%: -1.32; -1.12) and median of shift was 1.23 SD. This finding indicated that the prevalence of stunting in the study population was medium.[4]

Figure 2 shows the dramatic downward shift -2 SD of weight for age distribution, relative to the reference. The prevalence of wasting reached 27.8% (CI 95%: 24,6-31,3), mean of shift was –1.2 SD (CI 95%: -1.3; -1.11) and median of shift was 1.25 SD. This finding indicated that prevalence of underweight in the study population was high.[4]

Figure 3 shows shift of weight for height Z-score distribution -1 SD, relative to the reference. The prevalence of children below -2 SD Z-scores was 10% (CI 95%: 8-12.5), mean of shift was –0.51 SD (CI 95%: -0.6; -0.43) and median of shift was –0.46 SD. This finding indicated that the prevalence of wasting was classified as serious.[4]



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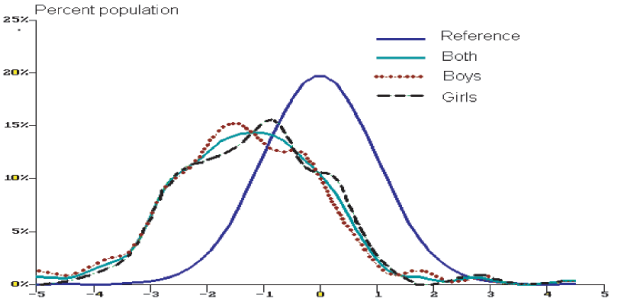

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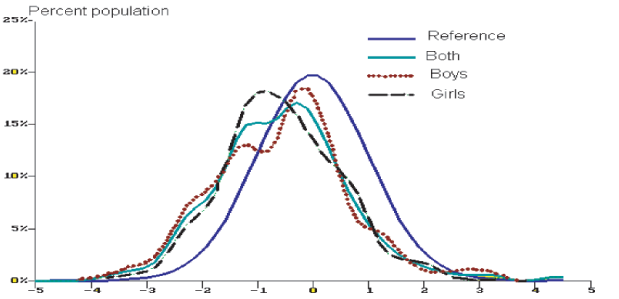

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Discussion

Socio-cultural and economical status are two of major factors that can influence breastfeeding.[5] Low socio-economic condition will affect the mother to work outside the house for income generating effort. This premise does not occur in Belu district. Though most households belong to low economic status, most mothers do not work outside the house. This informs partly the high achievement of exclusive breastfeeding rate. Other factors might be in favor to this achievement is number of under-5 children in households, age of the others and relatively better environmental condition.

The national campaign of breastfeeding promotion aimed to increase exclusive breastfeeding rate from 47% in 1994 to 54 in the end of the fifth five years development plan and to 94% in the end of the seventh five years development plan. Belu district has not been declared as a baby friendly district yet, but the exclusive breastfeeding rate of 62.2% was quite high, so was the complementary feeding rate (90%) with low bottle feeding rate. The frequency of breastfeeding was 8 times or more per day. We found that most of children in Belu received colostrum during the first week of their life, but early feeding rate was low. It was the opposite finding in Asia by Dixon, which was most of Asian children had no colostrum, therefore the early feeding rate was low.[10]

The complementary feeding was influenced by many factors, such as socio-cultural, economic, custom and community perceptions. Many complementary feeding studies has been done in many countries with various findings, therefore the intervention should be based on the study result from its area specifically. The early complementary feeding should be taken into consideration due to reason on mother's feeling of insufficient breastmilk production.[1,6,11] In this study, we found that the rate of complementary feeding was high, and the exclusive breastfeeding was also high. It is needed special intervention given the low rate of continued breastfeeding up to one year of age or even lower rate for continued breastfeeding up to two years.

Optimal complementary feeding practices allow children to attain normal growth curve and prevent them to be stunted on their age of 6-24 months. The good complementary feeding practice is by giving various foods while still breastfed, since breastmilk is the essential source of energy, protein, and micro nutrients.[12] In Belu district the continued breast-feeding rate either for 1- year or 2 -year is not in a high percentage. On the other side the caloric and nutrient intake is not sufficient to meet the estimated requirement in children for their age group. This condition is due to less frequency and low density of complementary foods.

Intervention is needed to improve children feeding pattern included the improvement of frequency of breastfeeding, frequency of food feeding, food portion, and always providing high calorie food for the children. Diversification of fruits, vegetables, and fortification food or giving supplements could be done to increase the micronutrient intake.

Nutritional status of the children is commonly best assessed by anthropometric measurements, especially for detection of chronic protein-energy malnutrition in the population. Anthropometric index can be applied either in a single (weight-for-age, height-for-age) or in combination (weight-for-height). Although the indices are related they showed specific interpretation of growth process or its failure. [4,13] Regular weight monitoring is the best indicator for predicting adequate energy intake, whereas height is the indicator of condition which influence nutrient and protein intake during the youth. Height could be influenced by genetic factor.

A high percentage of infants in Belu district belong to undernourished, wasted type to critical criteria. Improper infant feeding practices of breastfeeding and/or complementary foods influence this condition. This study showed that:

1. High percentage of exclusive breastfeeding rate is not followed by high rate of continued breastfeeding (one year). Delayed in first suckling and occurrence of pre-lacteal feeding are common findings.
2. A sufficient high rate on complementary feeding is established but there was also a high percentage on early introduction of semi-solid foods.
3. Frequency of feeding complementary foods was low as in addition to inadequate energy density of the foods so that nutrients and energy intake in each age groups of children was less than the energy requirements.

4. A nutritional intervention should be conducted in this area due to high prevalence of undernourished in the younger age group.
5. Acute disease is common in children under two years of age.

Considering the nutritional problems and conditions in Belu district intensive and inter-sector intervention approach to improve infant and child feeding practices is critical. Some approaches include:

1. Early detection of undernourished children through routine growth monitoring in Health Centre or Integrated Health Post should be intensified. A case management algorithm should be provided based on an integrated and holistic approach of the problem.
2. Community promotion and education on improving infant feeding practices comprises breastfeeding support, improving complementary feeding practices (home available, optimal frequency, energy density, micronutrients).
3. Development of method how to optimize the usage of available food resources in order to support the appropriate nutrient intake of infants.
4. To find a tool for nutritional status monitoring targeted at risk group in the community, which is simple with appropriate validity and can be analyzed locally. This tool can be applied in a wide range area through the result of a multicentre study.

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