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Feeding Patterns, Nutrient Intake and Nutritional Status among Children 0-23 Months of Age in Indramayu, West Java, 1997

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INTRODUCTION

Malnutrition-Infections Syndrome has been and continues to be the cause of high mortality and morbidity among infants and young children in developing countries. The syndrome is associated with poverty, poor environmental conditions, illiteracy and ignorance, and many other risks ranging from improper practices of breastfeeding to nutritional deficiencies arising from mixed or alternative feeding (Grieco, 1991; Wray, 1991). Throughout infancy, the weaning period is particularly critical., At the same time as breast milk with its nutritional and immunological properties gradually diminishes with age of the child, the weaning food is generally inadequate in poor societies. The main concerns with weaning food lie not only in its nutritional quality, but also in the risk of contamination and its effect on the household budget (King & Ashworth, 1991).

Because of the many growth and developmental processes occurring during childhood, feeding during childhood determines many aspects of later life. Feeding directly affects child growth and development in three ways: (1) through the feeding method and its preparation, feeding exposes the child to pathogens; (2) through the provision of active immunizing substances, most notably from breastmilk, feeding determines the child's immune status; and (3) through the shaping of physical and biochemical characteristics, independent of the effects of genetics or infectious diseases, feeding determines the child's nutritional status (Popkin *et al*., 1986).

To address the relation between feeding and nutritional status among young children, a multi-center study was conducted in Indonesia in the latter part of 1997 under the coordination and guidance from the Ministry of Health Directorate of Community Nutrition, UNICEF, and the University of California at Davis. The study covered six different sites: Indramayu (West Java), Bogor (West Java), Purworejo (Central Java), Belu (East Nusa Tenggara), Jombang (East Java), and Barm (South Sulawesi). The study in Indramayu, West Java, from which this report is based, was implemented by the Center for Health Research University of Indonesia. It is important to note here that the study was conducted in time when the economic turmoil was just about to begin in the country.

Objectives of the study

The study was conducted with the following objectives: to assess early feeding, breastfeeding, and complementary feeding practices; to assess variation and frequency of foods given to infants

and young children; and to examine the adequacy of nutrient intake and the relation among nutrient intake, morbidity, and nutritional status of infants and young children.

METHODOLOGY

Study design and coverage

The study employed a cross-sectional survey design, in which information on feeding patterns, food variation and frequency, nutrient intake, and nutritional status of infants and young children were gathered. The study population consisted of children aged less than two years of age in 20 villages of two rural sub-districts, Gabus Wetan and Sliyeg, in Indramayu, West Java. These two sub-districts were selected since locally trained field workers with long field experience in collecting nutrition-related data including anthropometric measurements, were available in the sites. The University of Indonesia, the implementing institution of this study, had worked in the sites from 1989 to 1994, to conduct a longitudinal study addressing the health of women and children.

Indramayu Regency is situated in the northeastern corner of West Java Province. Geographically, Indramayu Regency is a low, flat area of 1,971 square kilometers. Of the total area, 61% is rice growing land or paddy fields (as per 1989 data), 36% is dry land, and 3% is swampy land (IndramayuRegency Statistics, 1990). Indramayu's climate is relatively hot and humid; the average temperature during the day is 30º. Like other coastal areas in Java, lndramayu has two seasons: rainy from October to March and dry from April to August. Many areas in lndramayu are often flooded during the rainy season, but experience drought during the dry season.

According to 1989 statistics (Indramayu Regency Statistics, 1990) Indramayu Regency has a population of 1,371,044 persons. The average size of the population per village is 4,423 persons; the population density is 697 persons/km^2; the average number of persons per household is 3.99; the average annual population growth rate from 1985 to 1989 was 2.0%. Of the total population, about 13% are under five years of age. Most Indramayu people have little or no education, with males, generally, having higher educational levels than females. Indramayu people are almost entirely Muslim, but with varying amounts of influence of traditional (non-Islamic) beliefs and attitudes. Thus, the Indramayu population exhibits no diversity in ethnicity and religion.

About 80% of Indramayu people live in rural areas. Of the population aged 15 years and over, 73% are engaged in agricultural activities as land owners, farmers, or farm laborers, especially in the rice production sectors (Indramayu Regency Statistics, 1990). Those who live along the coastal area are also engaged in fishery activities. Of those engaged in agricultural activities, 24% are landowners, 21% are land owning farmers, 18% are land-less farmers, and the remainder, 36%, are landless farm laborers. Thus, more than 50% of those working in agricultural sectors are landless. Other major occupations include fishermen, traders, home industrial laborers, and government employees. Most Indramayu people, especially those living in rural areas, are engaged in subsistence level of economic activity (Soepono *et al*., 1992).

Rice is the main agricultural product of the Indramayu Regency. Because of irrigation, rice harvesting in many areas is twice a year, but the harvest is sometimes not totally successful because of frequent green-leaf-hopper infestations, flooding, or drought. Other less major agricultural products include corn, cassava, sweet potatoes, peanuts, soybeans, green beans, and coconuts. *Melinjo,* cotton, cloves, *minyak kayzi putih* and cashew nuts are produced in some areas. Locally produced vegetables include snake bean, egg plant, cucumber, *kangkung,* spinach, *oyong* and tomatoes. Seasonal fruits, particularly mangoes, oranges, and watermelons are produced in some areas. Other tropical fruits produced are pineapples, seed guava, *sawo,* bananas, and *papaya.* A few goats are domestically bred in some households. Chickens and ducks are also domestically bred by some households, but mostly for eggs. Sea fish are caught in the coastal areas, and freshwater fish in some areas.

Sampling

A rapid census of households covering 20 villages in Gabus Wetan and Sliyeg Sub-districts was conducted by the interviewers to identify and list all children under two years of age. The following information were obtained about the children: name, sex, age in months, and village and household identification. A sampling frame of children was prepared for each of 140 cells resulting from the cross of 20 selected villages and 7 monthly age groups. For each cell, a sample of 5 children were randomly selected to yield a sample of 700 children. Thus, there was a random sample of 35 children per village or a sample of 100 children per age group.

Data collected

Data collected by the survey included those of early feeding, breastfeeding, and complementary feeding practices; food variation and frequency in the last three months, food intake in the last 24 hours; morbidity in the past week; anthropometric measures (child weight and length and mother's mid-upper arm circumference). Except for the anthropometric measures, most of the data were collected through an interview with the mother or the child's caretaker, using a structured questionnaire. Data on mother's demographic and socioeconomic characteristics were also collected through interview and observation. For a sub-sample of 100 children aged 6 months and above, a repeat recall to obtain food intake data in the last 24 hours were conducted about two days later to assess the reliability of the food intake recall method applied in the study. These subsample of 100 children were randomly selected in such a way that 25 children were equally distributed in the following four monthly age groups: 6-8, 9-11, 12-17, and 18-23 months.

Methods of data collection

A preliminary survey was conducted in August 1997 to assess variety of foods that are commonly consumed by infants and young children in the study site and to pre-test the appropriateness of the prepared draft survey questionnaire. The preliminary survey also assessed food ingredient composition and the various recipes of foods available.

The 24-hour recall of food intake used food models supplied by the UNICEF to help in estimating the quantity and types of food consumed by the child. Recipes were also sought for various prepared foods, including homemade and factory processed foods.

Recruitment and training of survey interviewers and anthropometry personnel, which were immediately followed by a rapid census of households to identify and list of eligible children, were conducted in September 1997. Data collection activities were conducted in October 1997. Excluding the visit for a repeat recall of food intake, each household with a recruited child was visited twice: the first by the interviewer to collect feeding related data and the second, conducted within a couple days after the first visit, by the anthropometry team to obtain anthropometric measures.

The anthropometry team was equipped with Seca scale, Salter scale, body length measurement, and MUAC tape. The procedures and instrumentation for measuring child weight and length and mother's mid-upper arm circumference followed strictly the manual of United Nations (United Nations, 1986). For the weight measures, a correction procedure was applied to account for any clothing worn by children during weighing.

Data analysis

The survey data entry software including the World Food 2 Program, developed, adapted, and supplied by the University of California at Davis and UNICEF, was used in data entry and in estimating the child nutrient intake. The software had been updated by the UC Davis by incorporating variation of foods and food recipes obtained at the preliminary survey. The 24 hour recall food intake data were manually converted from household measures to grams using a conversion standard locally developed on the basis of prepared food and volume models and the household measures commonly used for cooking and food preparation in the study area.

After being adjusted for clothes worn by the child, data of weight, height and sex and age were converted to weight-for-age, height-for-age, and weight-for-height Z-scores and percentage of median using a software, Epinut version 6.0. As suggested by the WHO (Dibley *et al*., 1987; Mora, 1989) the software employs the WHO-NCHS-CDC normalized reference curve in converting the measures.

In the analysis, data on early feeding, breastfeeding, and complementary feeding practices, food variation and frequency in the past three month, nutrient intake in the past 24 hours, and morbidity during the past week, and child nutritional status (based on growth measures) were treated as dependent variables. Mother's and household demographic and socioeconomic characteristics were treated as background variables. Descriptive statistics such as mean and standard deviation, median, proportion or percentage, were used in the analysis.

RESULTS

Background characteristics

Demographic characteristics

The age of the child's mother varied from below 20 years to above 40 years. The proportion of mothers below 20 years of age was 11%; while the proportion aged 35 years and above was 16%. Thus, one fourth of the mothers were either too young or too old for having young infants.

Most parents had little or no education, although fathers generally had higher educational levels than mothers. Substantial proportion of mothers (53%) and fathers (43%) had either no schooling or did not finished elementary school. Only 11% of mothers finished junior high school.

Nearly all houses had tiled roofs, but there was much diversity in floor materials, ranging from cement, brick and tiles, to plain earth. Most of the walls were made from concrete, brick and bamboo, thus most were of fairly solid construction. Nearly half of the households in the study area had an average floor area of less than 50 square meters, and another 43% between 50 and 100 square meters (Utomo, 1996).

Almost all houses had electricity (96%), but electricity was mostly used for lighting. Kerosene and wood remained the main source of cooking energy. The durables commonly owned by the households were: radio (71%), television (37%), electric fan (32%), motorcycle (12%), and trishaw (17%). Only 6% of households owned a sewing machine. Other household facilities such as refrigerator, telephone, or car owned by only less than 5% of households. The major private local transport was bicycle. Public transport, however, was no problem. The modes of public transport available included minibuses, motorcycles, and trishaws. During rainy seasons, however, some remote villages cannot be easily reached by public transport.

Livestock commonly bred were chickens, ducks, and geese; two-thirds of households own at least one of these birds. Goats were kept by 7% of households. The majority of households lived in their own house, but only one-third owned the rice field, and 17% owned dry-field (*kebun*).

Household sanitary facilities

The household sanitary facilities were relatively unsatisfactory. The common source of water was groundwater obtained through a hand pump or well. Clean water was generally difficult to obtain during dry season. In most cases, the quality of groundwater was under the standard of quality for acceptable drinking water. Processed piped water was used only by one-fourth of the households.

Drainage for wastewater was generally not sealed and available in only half of the households. For households with no drainage facilities, the wastewater was just lying around the house. Of those with drainage, only half had the drained water flowing freely, and in the other half the waterways were obstructed.
Many households shared a bathing place with neighbors, and only one-quarter owned their own bathroom. The majority of people used rivers or streams, rice fields, field, or ponds as the place of defecation. Water-sealed latrines were available in only 37% of the households.

Feeding pattern

Early feeding practices

Almost all mothers initiated breastfeeding, but the precise time of initiation varied. It was not common among mothers to breastfeed their newborns immediately or within 30 minutes of birth, as had been recommended by the program.[1] Only 17% of mothers initiated breastfeeding within 24 hours of birth and less than 10% initiated within 2 hours (Table 1).

The practice of discarding the first breast milk during the first three to four days after birth was asked in the study to identify the practice of discarding colostrum. The question did not specify how much, how long, and how many days the first breast milk was discarded The survey showed that 13% of the mothers reported discarding colostrum (Table 1). Various reasons were given by mothers for discarding their first breast milk, but the most common was related to the belief that the first breast milk is stale, dirty and 'watery'.

As in other parts of the country (Hall, 1985; Winikoff et al., - ; Manoff Group Inc., 1991) prelacteal feeding, which is defined as a feeding before the newborn is breastfed for the first time, is also commonly practiced in the study site. The survey showed that 72% of the breastfed children received prelacteal food (Table 1). The common prelacteal food included liquid, usually plain water or honey; fruit, usually banana; and milk, usually infant formula. As a prelacteal food, infant formula was given to 20% of the newborns, while honey was given to 38%.

Breast-feeding

In line with the results of national surveys (CBC, 1989; 1992; 1993) the near-universality of breastfeeding was obvious. Almost all children (98%) were breastfed by their mother (Table 1). Many mothers practiced extended breastfeeding, but other foods were already given at early ages even in the first few weeks of life. Among children aged 18 to 24 months, for example, 62% were still receiving breast milk. On the other hand, around 10% of young infants aged under 8 months were not receiving breast milk at the day preceding the survey (Table 2).

Mothers generally know that breast milk is essential for the child's health and growth, and consider that breast milk is better than formula milk. Those who practiced extended breastfeeding believe that an infant should be breastfed for about two years in accordance with the Islamic teaching. Practice of exclusive breastfeeding was not common. Only 33% of infants aged 0-1 month and 15% of those aged 2-3 months received only breast milk at the day preceding the survey (Table 2). When exclusive breastfeeding is defined to include partial exclusive breastfeeding, the percentage of mothers practicing exclusive breastfeeding increased to 39% for infants aged 0-1 month and 24% for infants aged 2-3 months.

Giving the infants and young children other foods in addition to breast milk was a common practice. A previous study in the same site indicated that the practice of early complementary feeding was related to the concern of mothers or people regarding the adequacy of breast milk

[1] See MOH (1992) for the recommendations of the breastfeeding promotion program

supply and quality (Utomo, 1996). For example, many people worried whether giving only breast milk will be enough to nourish the child; it was commonly believed that giving other food

Table 1. Early feeding practices by sex of child

	Sex		*Total*
	Boys (N=339)	*Girls (N=361)*	*(N=700)*
Ever breastfeeding	97.9	98.1	98.0
Timing of initiating breastfeeding (hours)[1]			
0	5.9	4.3	5.0
1	3.1	2.3	2.7
2-23	10.5	8.2	9.3
24-47	12.7	14.8	13.8
48+	67.9	70.5	69.2
Received prelacteal food[2]	69.3	75.1	72.3
Types of prelacteal food (multiple responses)			
Liquid			
Plain water	39.2	42.9	41.1
Tea	1.5	1.1	1.3
Sugar solution	3.5	5.5	4.6
Rice water	0.0	0.3	0.1
Honey[3]	38.1	39.1	38.6
Fruit			
Banana	19.2	22.7	21.0
Milk			
Sweetened condensed milk	0.9	1.4	1.1
Infant formula	23.0	23.8	23.4
Others[4]	6.2	6.9	6.6
Discarding colostrum'	14.2	11.6	12.9
Reasons for discarding colostrum			
Colostrum is liquid and colored	12.5	4.8	8.9
Colostrum has unpleasant odor	2.1	0.0	1.1
Colostrum is dirty	25.0	19.0	22.2
Not allowed	14.6	16.7	15.6
Others[5]	45.8	59.5	52.2

[1] Exclude children who never breastfeeding and no answer
[2] Exclude children who never breastfeeding
[3] Honey swallowed
[4] Other food and liquid: soft steamed rice *(nasi tim),* compressed steamed rice *(lontong),* commercially available biscuit and other foods, turmeric water, coconut water, drugs
[5] Other reasons: no explanation in the database

in addition to breast milk will make the baby stronger and grow faster. Because of this belief, foods believed to give strength, such as those made from rice (*lontong*[2], mashed rice, or steamed

Infants were generally breastfed on demand during the day as well as at night. For some mothers, breastfeeding may be stopped when the child is sick. The average frequency of breastfeeding seemed not to vary between child's ages and was 7 to 8 times during the day and 5 to 6 times at

[2] Steamed rice wrapped in banana leaf

night with the standard deviation of 2 to 3 times. The previous study indicated that duration of each breastfeeding session could be short or long depending on the infant's need, but it ranged from five to 15 minutes (Utomo, 1996).

Table 2. Feeding pattern on the day preceding the survey

Age (months)	*Feeding Pattern*				N
	Only breastfeeding	*Partial exclusive breastfeeding*[1]	*Mixed breastfeeding*[2]	*No breastfeeding*	
0-1	33.0	6.0	51.0	10.0	100
2-3	15.3	8.2	67.3	9.2	98
4-5	1.0	4.2	85.4	9.4	96
6-8	1.0	10.6	79.8	8.7	104
9-11	0.0	8.9	76.2	14.9	101
12-17	0.0	6.1	82.8	11.1	99
18-24	1.0	0.0	61.8	37.3	102
Total	7.3	6.3	72.0	14.4	700

[1] Receive water, juice, and other liquids
[2] Receive soft/solid food and/or other milk

Complementary feeding

Food type and frequency

As previously mentioned, other foods in addition to breast milk were already given to infants at early ages. A variety of foods were already given to infants and young children, and the variety and frequency of these foods increased with the increasing age.

Besides banana, rice-based foods, such as mashed rice, rice porridge, and soft steamed rice were given to infants and children almost every day, even at early ages. Of the very young infants aged 0-1 month, almost all of them received breast milk everyday; about 20% to 27% received processed foods (factory foods) or fruits, mostly banana, almost every day; and about 12% received infant formula almost every day. About 6% of these young infants were reported to never receive breast milk. The percentage of infants receiving breast milk almost every day gradually reduced with increasing age. Of the children aged 18 to 24 months, only 62% were reported to receive breast milk almost every day.

Among infants aged 0 to 11 months, about 10% received infant formula almost every day. The percentage of those receiving infant formula almost every day declined after 12 months of age; for example, only 7% of children aged 12-17 months and 3% of those aged 18-24 months were reported to received infant formula every day. Infant formula was also given to infants on occasional basis, not every day, but only among a very small proportion of infants across ages.

As with infant formula, processed foods (Cerelak®, Promina®), if given, were usually given to infants aged below 12 months. The proportion of infants receiving processed food almost every day by age was in the range of 24% to 33%, and this proportion decreased with increasing age; for example, the percentage of those receiving processed food almost every day was only 12% of

those aged 6-8 months and none of those aged 9 to 24 months. Giving other milk (other than infant formula) to infants and children was not common.

Cow, buffalo, goat, or poultry meat or fish was rarely given to infants and young children even to those above 6 months. Meat or fish was generally not given to young infants. There was a large proportion of infants and children aged 6 to 24 months that were reported to have never received meat or fish in the past month. More infants and young children received poultry meat than those who received cow, buffalo, goat meat, or fish. The proportion of infants and children who did not receive cow, buffalo, or goat meat in the past month was 97% of those aged 6-8 months, 90% of those aged 9-11 months, 76% of those aged 12-17 months, and 71% of those aged 18-24 months. On the other hand, the proportion of those who did not receive poultry meat or fish, especially for those aged 12 to 24 months, were much smaller. It is important to note, however, that among the infants and young children who were reported to have received meat or fish, only a small proportion received meat or fish almost every day. The majority of these children received meat or fish only occasionally, one to three times a month, once or twice a week, or three to five times a week. The data clearly showed that the proportion of children receiving meat or fish as well as the frequency of receiving these foods increased with the increasing age.

Unlike meat and fish, eggs and chicken liver seemed to be more commonly given to young children. The proportion of children aged above 6 months who received eggs was quite substantial: 21% for infants aged 6-8 months, 54% for infants aged 9-11 months, 76% for infants aged 12-17 months, and 88% for infants aged 18-24 months. The proportion of children who received chicken liver was smaller, for example, 42% for children aged 12-17 months and 54% for children aged 18-24 months. Eggs were frequently given to young children after 12 months of age; for example, the proportion of children who received eggs with the frequency of three to five times a week or almost every day increased from 42% for children aged 12-17 months to 48% for children aged 18-24 months.

Tempe (fermented soybean cake) and tofu (soybean based cake), which are known as protein-rich food, were commonly given to children as side dishes. About 10% of the infants aged 4-5 months were reported to have received *tempe* or tofu. The proportion of children receiving *tempe* or tofu as well as the frequency of receiving this food increased with increasing age. The proportion of children receiving *tempe* or tofu three to five times a week or almost every day, for instance, was 76% for children aged 12-17 months, and 81% for children aged 18-24 months. After 18 months of age, every child was reported to have received *tempe* or tofu.

Among the infants aged 4-8 months, more than 50% received a variety of fruits and vegetables, but only one-fourth of them received them every day. The proportion of children receiving green vegetables, beans, and nuts also increased with the increasing age.

In sum, the study concluded that among the infants under 6 months of age the food variety and frequency seemed to be similar between ages; but, as expected, the breast milk consumption decreased and the variety and frequency of complementary foods increased with increasing age. Infant formula was consumed by only a small proportion of young infants. Egg and *tempe* or tofu were the most common sources of protein, while meat and fish were rarely consumed by young children (Table 3).

Table 3. Percentage of children aged 0-24 months who never received particular foods in the past month by age group and type of food

Type of Liquid and Food	*Age group (months)*						
	0-1	*2-3*	*4-5*	*6-8*	*9-11*	*12-17*	*18-24*
Breastmilk	6.0	7.1	9.3	8.7	14.9	11.1	373
Infant formula	76.0	87.8	85.4	85.6	85.1	90.0	94.1
Processed food	73.0	71.4	66.7	856	99.0	100.0	100.0
Othermilk[1]	99.0	99.0	96.9	97.1	89.1	83.8	71.6
Meat (cow/goat/etc.)	100.0	100.0	100.0	971	931	75.8	70.6
Fish meat	100.0	100.0	100.0	97.1	83.2	61.6	30.4
Poultry meat	99.0	100.0	100.0	90.4	90.4	35.4	16.7
Liver of chicken/cow	99.0	100.0	97.9	85.6	68.3	57.6	46.1
Eggs	99.0	100.0	92.7	78.8	46.5	24.2	11.8
Tempe/tofti	99.0	100.0	89.6	53.8	20.8	9.1	3.9
Mung bean/peanut	99.0	100.0	83.3	62.5	42.6	21.2	25.5
Green vegetables	99.0	95.9	71.9	38.5	11.9	12.1	3.9
Red/yellow vegetables	98.0	100.0	84.4	53.8	38.6	12.1	34.3
Red/yellow fruits	99.0	99.0	63.5	31.7	10.9	6.1	5.9
Other fruits	74.0	99.0	45.8	35.6	21.8	19.2	13.7
Fruit juice	100.0	99.0	95.8	99.0	94.1	97.0	99.0

[1] Sweet condensed milk, fresh milk

Food preparation and feeding methods

Many foods consumed by infants and young children were bought from small food vendors in the neighborhood such as the ready-made foods or *jajanan* (cooked food sold by the food vendors). The study documented at least 87 different recipes of foods available locally, showing the large variety of *jajanan*. The survey showed that 54% of the foods consumed by children were bought from the food vendors, and the percentage of children consuming *jajanan* increased with increasing age.

In terms of food viscosity, the percentage of children receiving soft food decreased and solid food increased with the increasing age. Feeding method varied between ages, though bottle and spoon were commonly used for feeding the young. While bottle-feeding decreased substantially, hand feeding gradually appeared with the increasing age, especially after 4 months of age. Bottle-feeding was practiced by 15% to 25% of mothers of the infants under 6 months of age. Among the mothers of infants above 6 months of age, hand feeding was done by 15% to 20%. After 9 months of age the proportion of children who were let by their mothers to feed themselves increased from 22% at age 9-11 months to 45% at age 18-24 months..

Nutrient Intake

Information concerning the intake of nutrients (energy, protein, fat, vitamins, and minerals) was estimated from the 24-hour recall of food intake. The resulting information, however, should not be regarded as representing the true nutrient intake, especially among the younger children, as the information excluded the nutrients from breast milk since no data from breast milk was

available. In evaluating the adequacy of nutrient intake, therefore, the nutrient intake of breast-fed children was differentiated from that of non-breastfed children, and then compared with the RDA (Recommended Dietary Allowance) as recommended by the National Workshop on Food and Nutrition 1993. While the nutrient intake of the breast-fed children were certainly much lower than their true nutrient intake, we do not know whether or not the true nutrient intake of these children were adequate to meet the RDA. Nevertheless, the survey data clearly indicated that the average intake of many nutrients especially energy and micronutrients for the non-breastfed children at all ages were much below the RDA (Table 4). All the nutrients from foods other than breast milk increased with increasing age, much lower among the breastfed than among the non-breastfed children, even after 12 months of age, when the nutritional contribution

Table 4. Mean and standard deviation of daily nutrient intake, based on the food intake of 24 hour recall compared with RDA by age group and breastfeeding status

	Age Group								
	0-6 months Mean (SD)			*7-12 months Mean (SD)*			*1-3 years Mean (SD)*		
Nutrient intake	*Breastfg*	*Not Breastfg*	*RDA*[1]	*Breastfg*	*Not Breastfg*	*RDA*	*Breastfg*	*Not Breastfg*	*RDA*
Energy (kcal)	116 (93)	489 (271)	560	273 (207)	601 (386)	800	484 (299)	703 (346)	1250
Protein (g)	2.7 (2.8)	11.6 (7.0)	12	6.6 (6.0)	17.4 (10.6)	15	12.5 (9.0)	19.0 (11.0)	23
Vitamin A (RE)	23.9 (56)	305 (202)	350	148 (429)	548 (1596)	350	171 (309)	274 (302)	350
Thiamin (mg)	0.04 (0.04)	0.2 (0.09)	0.3	0.07 (0.07)	0.2 (0.2)	0.4	0.1 (01)	0.2 (0.2)	0.5
Riboflavin (mg)	0.06 (0.07)	0.3 (0.2)	0.3	0.1 (0.2)	0.5 (0.5)	0.5	0.2 (0.2)	0.3 (0.2)	0.6
Niacin (mg)	0.4 (0.5)	1.9 (1.2)	2.5	1.2 (1.2)	3.0 (2.6)	3.8	2.2 (1.7)	3.2 (2.0)	8
Vitamin B_{12} (µg)	0.07 (0.1)	0.5 (0.3)	0.1	0.4 (1.9)	1.8 (6.6)	0.1	0.3 (0.4)	0.4 (0.5)	0.7
Folate (µg)	7.1 (7.1)	28.9 (19.3)	22	35.4 (56.6)	75.8 (133.2)	32	56.7 (70.2)	75.0 (69.6)	60
Vitamin C (mg)	3.3 (5.7)	38.2 (26.5)	30	12.0 (17.8)	22.7 (25.0)	35	16.8 (20.8)	31.2 (40.2)	45
Calcium (mg)	40.0 (85.1)	344 (229)	600	50.8 (107)	388 (317)	400	83.6 (138)	187 (232)	500
Phosphorous (mg)	53.8 (66.6)	296 (185)	200	98.6 (83.5)	386 (239)	250	172 (118)	298 (196)	350
Magnesium (mg)	14.4 (11.3)	47.4 (24.1)	35	36.1 (35.5)	79 (48.9)	55	62.7 (48.3)	86.6 (61.1)	110
Iron (mg)	0.5 (0.9)	4.7 (3.0)	3	1.8 (6.3)	6.1 (9.3)	5	3.0 (7.5)	3.3 (2.9)	9
Zinc (mg)	0.4 (0.4)	1.9 (1.1)	3	0.9 (0.8)	2.7 (1.7)	5	1.6 (1.2)	2.4 (1.5)	10
	220	23		166	23		147	48	

[1] RDA: Widyakarya Pangan dan Gizi 1993

of breast milk was decreasing. As information of nutrient intake from breast milk was not available, the much lower nutrient intake from other foods among the breast-fed children after 12 months of age could have serious consequences. For the undernourished children at these ages, it was possible that nutrient intake from the complementary food was simply not adequate to meet the child's requirements for optimum growth. Analysis in the next section confirmed this proposition.

It was not easy to collect accurate recall data on nutrient intakes. A reliability test in the form of a repeat recall of 24-hour food intake conducted a week later among a sample of 100 children aged 6-24 months showed 'tolerable' differences and consistent pattern of nutrient intake at all age categories between the two recalls. This suggests that the recall method provided nutrient intake data that are acceptable for analysis.

Child morbidity

Information on child illnesses (limited to cough, diarrhea, fever, and colds) during the past week was collected. Rather than diseases, the survey collected information on the child's symptoms as perceived by the child's mother. A confusion in differentiating between fever and colds was apparent not only among respondents but also among the interviewers as well. Overall, 36% of the children were reported to suffer from illness during the past week. The proportion of sick children among the different age groups fluctuated, making interpretation difficult.

It was clear that fever, colds, and cough were the common illnesses among the infants and young children. Around 10% of infants and young children were reported to suffer from diarrhea in the past week. In regard to the duration of illness, the survey showed averages of 3 to 5 days with 2 days standard deviation. The above figures suggest that the morbidity of children were dominated by respiratory and gastrointestinal tract infections.

Nutritional status of children

Reduced prevalence of undernutrition among infants and young children

As an anthropometric survey with a similar methodology was conducted five years ago in 1992, it is possible to compare the prevalence of undernutrition between the two surveys (Table 5). It was clear that the prevalence of undernutrition among infants and young children reduced dramatically from 1992 to 1997, though still at the relatively high level. However, it is likely that such a reduced prevalence might increase in the coming years due to the long period of economic crisis after 1997.

By sex

Previous studies conducted in Indonesia are inconsistent on the sex distribution of undernutrition. A study in Madura (Laurier, 1997).and a national survey (Jus'at, 1991) noted that male children had lower nutritional status than female children. However, two studies, one in rural and urban areas of Indonesia by Hull and Hull (1992) and another in Central Java by Satoto

(1990) found the opposite. On the other hand, the Indramayu data showed unclear sex differential in child nutritional status throughout the different age groups (Tables 5 and 6).

Table 5 Prevalence of undernutrition among children aged 0-24 months based on various anthropometric measures, Indramayu, 1992 and 1997

Anthropometric measures	*Age of Children (months)*							
	0-5		*6-11*		*12-17*		*18-24*	
	1992	*1997*	*1992*	*1997*	*1992*	*1997*	*1992*	*1997*
Weight-for-Age Z-Score								
<-2 SD Both sexes	8.2	0.7	39.1	15.0	67.6	37.6	69.9	53.7
Boys	7.6	0.0	42.5	18.0	60.4	42.6	71.2	60.4
Girls	8.8	1.5	35.5	12.3	76.5	33.3	68.3	47.3
<-3 SD Both sexes	4.4	0.4	8.0	1.4	25.0	8.9	22.7	8.3
Boys	3.8	0.0	8.4	3.0	25.1	12.8	20.8	11.3
Girls	5.1	0.7	7.7	0.0	24.8	5.6	24.9	5.5
Weight-for-Age % of Median								
< 80% Both sexes	28.7	5.5	54.3	22.4	75.0	42.6	71.8	55.6
Boys	26.8	7.4	55.9	22.0	71.7	42.6	67.7	62.3
Girls	30.9	3.6	52.7	22.8	79.1	42.6	76.7	49.1
< 70% Both sexes	10.9	0.7	15.8	2.8	29.7	10.9	28.2	11.1
Boys	12.7	0.0	12.8	3.0	25.1	12.8	27.0	13.2
Girls	8.8	1.5	18.9	2.6	35.3	9.3	29.6	9.1
Height-for-Age Z-Score								
<-2 SD Both sexes	6.5	2.2	11.8	8.4	34.1	23.8	44.3	41.7
Boys	5.1	1.5	13.4	14.0	39.0	29.8	44.7	39.6
Girls	8.1	2.9	10.1	3.5	28.1	18.5	43.9	43.6
<-3 SD Both sexes	1.0	0.4	2.6	0.9	5.9	8.9	9.9	8.3
Boys	0.6	0.0	4.5	1.0	6.4	10.6	10.6	11.3
Girls	1.5	0.7	0.6	0.9	5.2	7.4	9.0	5.5
Height-for-Age % of Median								
< 80% Both sexes	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Boys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Girls	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
< 70% Both sexes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Boys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Girls	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Weight-for-Height Z-Score								
<-2 SD Both sexes	7.5	0.4	27.9	4.2	42.1	11.9	46.3	20.4
Boys	4.5	0.7	33.5	4.0	41.7	17.0	46.5	24.5
Girls	11.0	0.0	21.9	4.4	42.5	7.4	46.0	16.4
<-3 SD Both sexes	0.3	0.0	2.9	0.0	9.1	1.0	5.1	3.7
Boys	0.6	0.0	4.5	0.0	11.2	2.1	4.9	5.7
Girls	0.0	0.0	1.2	0.0	6.5	0.0	5.3	1.8
Weight-for-Height % of Median								
< 80% Both sexes	12.3	0.7	23.6	3.3	30.0	6.9	26.7	12.0
Boys	10.2	0.0	25.7	2.0	28.3	8.5	23.0	15.1
Girls	14.7	1.5	21.3	4.4	32.0	5.6	31.2	9.1
< 70% Both sexes	0.7	0.0	1.4	0.0	1.5	0.0	1.4	0.0
Boys	0.6	0.0	1.1	0.0	0.5	0.0	1.3	0.0
Girls	0.7	0.0	1.8	0.0	2.6	0.0	1.6	0.0
Number of cases	293	273	348	214	340	101	415	108

By age

Age of child seems to be the most consistent variable associated with undernutrition. The prevalence of undernutrition, whether based on weight-for-age, height-for-age, or weight-for-height, is lowest below six months, but increases dramatically at ages six to 11 months, and is highest at ages 12 to 24 months (Tables 6 and 7). This finding is consistent with the findings from the previous study in the same site (Utomo & Iskandar, 1989) and also the findings reported by the National Socio-Economic Surveys (CBC, 1993; Jus'at, 1991) and by all other studies conducted in other parts of Indonesia (Heering, 1990; Kardjati et al., 1994) Moreover, in regard to the growth of Indonesian children, the common features are acceptable growth during the first four to six months, a progressive faltering till about 24 months and a steady growth, parallel to reference curves but at a lower level, afterwards.

Different anthropometric indicators produce similar age pattern but different level of child undernutrition. These different indicators and their different cut-off points, would indicate different prevalence of undernutrition. For weight-for-age measures, for example, the percentage of median seems to produce higher level of underweight prevalence at early ages but lower prevalence at older ages than the Z-score measures. For instance, based on the percentage of median (below 80%), the prevalence of underweight among infants increased with increasing age from 3% to 8% at age below 6 months, 20% at age 6-l1 months, 32% at age 12-17 months, and 44% at age 18-24 months. On the other hand, based on Z-scores (<-2SD) the prevalence of underweight was only around 1% at age below 6 month, 12% at age 6-8 months, 20% at age 9-11 months, and dramatically increased to 40% at age 12-17 months and 54% at age 18-24 months (Tables 6 and 7).

The survey showed substantial proportion of young infants aged 0-8 months with weigh-for-age and weight-for-height percentage of median above 110%. The proportion was around 10% to 15% at the first few months of age but dramatically decreased to 5% at age 6-8 months and zero per cent afterward. It is interesting to note that no infant and child were reported to have height-for-age percentage of median above 110%.

Based on height-for-age percentage of median, the prevalence of stunting (under-height), which might reflect chronic malnutrition, was noted after 12 months of age, from 12% at age 12-17 months to 15% at age 18-24 months. Similar pattern of stunting was also shown using the height-for-age Z-score indicator.

Table 6 Prevalence of undernutrition among children (%) by age group and sex, based on the various cut-off points of weight-for-age % of median (WAM), height-for-age % of median (HAM), and weight-for-height % of median (WHM)

	Age Group (months)							
	0-1	*2-3*	*4-5*	*6-8*	*9-11*	*12-17*	*18-24*	*Total*
Both sexes								
WAM								
>110%	16.7	20.0	11.5	5.5	0.0	0.0	0.9	7.3
80-110%	73.6	76.2	84.4	74.3	75.2	57.4	43.5	68.8
70-79.9%	8.3	3.8	3.1	19.3	20.0	31.7	44.4	19.4

<70%	1.4	0.0	1.0	0.9	4.8	10.9	11.1	4.5
HAM								
>110%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90-110%	98.6	100.0	100.0	99.1	98.1	87.1	84.3	95.1
80-89.9%	1.4	0.0	0.0	0.9	1.9	12.9	15.7	4.9
<80%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WHM								
>110%	22.2	17.1	9.4	4.6	1.0	1.0	0.9	7.3
90-110%	68.1	77.1	78.1	78.9	66.7	49.5	26.9	63.2
85-89.9%	5.6	3.8	8.3	7.3	21.0	24.8	44.4	17.1
80-84.9%	2.8	1.9	3.1	6.4	7.6	17.8	15.7	8.2
<80%	1.4	0.0	1.0	2.8	3.8	6.9	12.0	4.2
N	**72**	**105**	**96**	**109**	**105**	**101**	**108**	**696**
Boys								
WAM								
>110%	15.6	10.7	8.3	4.1	0.0	0.0	1.9	5.4
80-110%	71.9	83.9	85.4	79.6	72.5	57.4	35.8	69.3
70-79.9%	12.5	5.4	6.3	16.3	21.6	29.8	49.1	20.5
<70%	0.0	0.0	0.0	0.0	5.9	12.8	13.2	4.8
HAM								
>110%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90-110%	100.0	100.0	100.0	98.0	98.0	87.2	83.0	95.0
80-89.9%	0.0	0.0	0.0	2.0	2.0	12.8	17.0	5.1
<80%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WHM								
>110%	12.5	16.1	6.3	6.1	2.0	0.0	1.9	6.3
90-110%	78.1	76.8	77.1	81.6	54.9	44.7	17.0	60.4
85-89.9%	9.4	5.4	10.4	6.1	31.4	29.8	52.8	21.4
80-84.9%	0.0	1.8	6.3	4.1	9.8	17.0	13.2	7.7
<80%	0.0	0.0	0.0	2.0	2.0	8.5	15.1	4.2
N	**32**	**56**	**48**	**49**	**51**	**47**	**53**	**336**
Girls								
WAM								
>110%	17.5	30.6	14.6	6.7	0.0	0.0	0.0	9.2
80-110%	75.0	67.3	83.3	70.0	77.8	57.4	50.9	68.3
70-79.9%	5.0	2.0	0.0	21.7	18.5	33.3	40.0	18.3
<70%	2.5	0.0	2.1	1.7	3.7	9.3	9.1	4.2
HAM								
>110%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90-110%	97.5	100.0	100.0	100.0	98.1	87.0	85.5	95.3
80-89.9%	2.5	0.0	0.0	0.0	1.9	13.0	14.5	4.7
<80%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WHM								
>110%	30.0	18.4	12.5	3.3	0.0	1.9	0.0	8.3
90-110%	60.0	77.6	79.2	76.7	77.8	53.7	36.4	65.8
85-89.9%	2.5	2.0	6.3	8.3	11.1	20.4	36.4	13.1
80-84.9%	5.0	2.0	0.0	8.3	5.6	18.5	18.2	8.6
<80%	2.5	2.0	2.1	3.3	5.6	5.6	9.1	4.2
N	**40**	**49**	**48**	**60**	**54**	**54**	**55**	**360**

Table 7. Prevalence of undernutrition among children (%) by age group and sex, based on the various cut-off points of Weight-for-Age Z-Score (WAZ), Height-for-Age Z-Score (HAZ) and Weight-for-Height Z-Score (WHZ)

	Age Group (months)							
	0-1	*2-3*	*4-5*	*6-8*	*9-11*	*12-17*	*18-24*	*Total*
Both sexes								
WAZ								
<-2SD[1]	1.4	0.0	1.0	11.9	18.1	33.3	46.3	16.9
<-3SD[2]	0.0	0.0	0.0	0.0	1.9	5.9	7.4	2.3
<-4SD[3]	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.1
HAZ								
<-2SD	4.2	0.0	2.1	7.3	7.6	14.7	33.3	10.3
<-3SD	1.4	0.0	0.0	0.0	1.9	7.8	6.5	2.6
<-4SD	0.0	0.0	0.0	0.0	0.0	1.0	1.9	0.4
WHZ								
<-2SD	0.0	0.0	0.0	3.7	4.8	14.7	16.7	6.0
<-3SD	0.0	0.0	0.0	0.0	0.0	1.0	3.7	0.7
N	**72**	**105**	**96**	**109**	**105**	**101**	**108**	**697**
Boys								
WAZ								
<-2SD	0.0	0.0	0.0	10.2	23.5	34.0	49.1	17.6
<-3SD	0.0	0.0	0.0	0.0	3.9	8.5	11.3	3.6
<-4SD	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.3
HAZ								
<-2SD	6.3	0.0	0.0	12.2	13.7	19.1	28.3	11.6
<-3SD	0.0	0.0	0.0	0.0	2.0	8.5	9.4	9.4
<-4SD	0.0	0.0	0.0	0.0	0.0	2.1	1.9	0.6
WHZ								
<-2SD	0.0	0.0	0.0	4.1	3.9	19.1	18.9	6.8
<-3SD	0.0	0.0	0.0	0.0	0.0	2.1	5.7	1.2
N	**32**	**56**	**48**	**49**	**51**	**47**	**53**	**336**
Girls								
WAZ								
<-2SD	2.5	0.0	2.1	13.3	13.0	32.7	43.6	16.3
<-3SD	0.0	0.0	0.0	0.0	0.0	3.6	3.6	1.1
HAZ								
<-2SD	2.5	0.0	4.2	3.3	1.9	10.9	38.2	9.1
<-3SD	2.5	0.0	0.0	0.0	1.9	7.3	3.6	2.2
<-4SD	0.0	0.0	0.0	0.0	0.0	1.8	1.8	0.3
WHZ								
<-2SD	0.0	0.0	0.0	3.3	5.6	10.9	14.5	5.3
<-3SD	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.3
N	40	49	48	60	54	55	55	361

[1] -3 SD < WAZ < -2 SD
[2] -4 SD < WAZ < -3 SD
[3] WAZ < -4 SD

Compared with the prevalence of stunting, the prevalence of wasting was smaller based on both the percentage of median and Z-scores. Based on weight-for-height percentage of median, the prevalence of wasting (below 80%) slightly appeared after 6 months but was obvious after 12

months of age, 7% at age 12-17 months, and 12% at age 18-24 months. Compared with the percentage of median, the Z-score indicators (<-2SD) showed higher prevalence of wasting: 16% at age 12-17 months and 20% at age 18-24 months.

With regard to the prevalence of moderate and severe undernutrition, the survey showed that these conditions appeared only among children aged above 6 months as expected. Based on the weight-for-age percentage of median under 70%, the prevalence of moderate and severe underweight was 5% at age 6-8 months and 11% at age 12-24 months; while the respective prevalence based on weight-for-age Z-score was 2% at age 6-8 months and 6 to 7% at age 12-24 months.

Nutrient intake and nutritional status

There is a need to examine the relationship between nutrient intake and the nutritional status for various reasons, including assessment of data reliability. If other associated factors of child nutritional status are controlled, children with lower nutrient intake should logically have lower nutritional status. Using WAZ as a measure of child nutritional status, the data presented in Table 8 indicate that in all the age groups, the undernourished children, whether breast-fed or not, have less intake of almost all the nutrients than the non-undernourished children. The exception occurred on the energy intake, but even then it occurs only for the non-breastfed children 12-24 months of age. Thus the overall analysis has demonstrated the relatively good quality of the data collected during the survey.

Mother's and Child's Nutritional Status

Results of this study support the notion that mother's nutritional status is positively associated with child's nutritional status. The prevalence of underweight children based on WAZ<-2SD was significantly higher among mothers with MUAC less than 23.5 cm than among mothers with MUAC 23.5 cm or more, though the difference is not clear if WAZ<-3SD is used as the cut-off point (Table 9). In regard to the relation between mother's and child's nutritional status, data from a previous study conducted in the same site showed similar findings. Mothers with left MUAC of less than 23.5 cm tended to bear lower weight-for-age, lower height-for-age, lower MUAC and lower weight-for-height children that mothers with left MUAC of 23.5 cm or more, and mothers with height less than 150 cm tended to bear lower weight-for-age, lower MUAC, and lower height-for-age, but not lower weight-for-height children, than mothers with height of 150 cm or more. These associations remained even after controlling for the effects of the timing of complementary feeding, child's health status at birth, and socioeconomic and demographic variables (Utomo & Iskandar, 1989).

Table 8. Mean and standard deviation of daily nutrient intake among nourished children (WAZ ≥ -2 SD) and malnourished children (WAZ < -2 SD) by age group and breastfeeding status, based on the 24 hour recall food intake preceding the survey

Nutrient intake	*Age groups*							
	7 – 12 months				*13-24 months*			
	BF <-2SD	*BF ≥-2 SD*	*Non-BF <-2SD*	*Non-BF ≥-2SD*	*BF <-2SD*	*BF ≥-2 SD*	*Non-BF <-2SD*	*Non-BF ≥-2SD*
Energy (kcal)	232 (160)	278 (213)	604 (454)	636 (462)	505 (333)	469 (272)	755 (399)	605 (255)
Protein (g)	5.4 (4.3)	6.8 (6.2)	18.5 (14.5)	17.0 (11.6)	12.7 (9.8)	12.6 (8.5)	19.1 (13.1)	18.9 (8.8)
Vitamin A (RE)	125 (263)	154 (458)	233 (235)	835 (2209)	154 (209)	187 (377)	190 (232)	375 (303)
Thiamin (mg)	0.06 (0.05)	0.08 (0.07)	0.2 (0.2)	0.2 (0.2)	0.1 (0.1)	0.1 (0.09)	0.2 (0.2)	0.2 (0.2)
Riboflavin (mg)	0.09 (0.1)	0.1 (0.2)	0.5 (0.4)	0.5 (0.7)	0,2 (0.2)	0.2 (0.2)	0.3 (0.2)	0.4 (0.2)
Niacin (mg)	0.8 (0.7)	1.2 (1.2)	2.7 (2.4)	3.2 (3.4)	2,2 (1.7)	2.3 (1.7)	3.1 (2.3)	3.4 (1.7)
Vitamin B_{12} (µg)	0.3 (1.2)	0.4 (2.1)	0.6 (0.5)	3.0 (9.2)	0.3 (0.4)	0.3 (0.5)	0.4 (0.5)	0.5 (0.5)
Folate (µg)	22.6 (25.5)	36.2 (57.3)	50.4 (47.6)	110 (178)	57.1 (56.5)	56.8 (80.8)	73.0 (64.9)	83.6 (81.0)
Vitamin C (mg)	7.9 (8.3)	12.7 (19.2)	21.2 (23.0)	23.7 (31.6)	16.1 (18.1)	17.6 (23.1)	19.2 (21.8)	42.8 (49.9)
Calcium (mg)	42.9 (74.3)	50.7 (112)	511 (439)	318 (308)	94.3 (142)	75.5 (137)	166 (208)	237 (278)
Phosphorous (mg)	85.0 (76.0)	100 (84.3)	460 (374)	349 (221)	181 (139)	165 (99.5)	296 (214)	314 (189)
Magnesium (mg)	29.5 (21.8)	36.1 (34.2)	75.2 (59.2)	86.2 (56.8)	61.4 (41.7)	64.6 (53.7)	87.4 (63.7)	86.7 (61.2)
Iron (mg)	1.1 (1.1)	1.9 (6.9)	4.9 (4,7)	7.1 (12.7)	3.2 (6.7)	2.9 (8.2)	3.2 (2.9)	3.9 (3.1)
Zinc (mg)	0.7 (0.6)	0.9 (0.8)	2.7 (2.3)	2.6 (1.9)	1.6 (1.2)	1.6 (1.2)	2.4 (1.7)	2.5 (1.3)
N	28	137	5	12	66	79	24	19

Table 9. Prevalence of under-weight (%) among children by age group and mother's MUAC, based on the various cut-off points of Weight-for-Age Z-Score (WAZ)

Age group (months)	*Mother's MUAC ≥ 23.5 cm*			*Mother's MUAC < 23.5 cm*		
	WAZ		*N*	*WAZ*		*N*
	<-2 SD	*<-3 SD*		*<-2 SD*	*<-3 SD*	
0-1	0.0	0.0	52	5.0	0.0	20
2-3	0.0	0.0	73	0.0	0.0	32
4-5	1.3	1.3	77	0.0	0.0	19
6-8	10.3	0.0	78	16.1	0.0	31
9-11	17.3	4.0	75	20.0	0.0	30
12-17	34.3	9.6	73	46.4	7.1	28
18-24	51.1	7.1	84	62.5	12.5	24
Total	17.6	3.3	215	21.7	2.71	84

DISCUSSION AND CONCLUSIONS

Information regarding feeding patterns, nutrient intake, and nutritional status among infants and young children from this study should in many cases be inferred only to populations having similar characteristics with the study population: lowly educated community of farmers and laborers with traditional beliefs and practices and poor household sanitary facilities.

Substantial proportion of mothers were shown to be adopting unfavorable traditional practices of child feeding practices such as delayed initiation of breastfeeding, prelacteal feeding, and discarding colostrum. Such unfavorable practices might reduce the many benefits of breast milk and breast-feeding. Studies have indicated that initiating breast-feeding immediately after birth is very important for many health, social, and psychological reasons, including early milk ejection and secretion (Huffman & Lamphere, 1984; Neville, 1989) and for promoting successful lactation (Huffman & Lamphere, 1984; Soetjiningseh & Suratmaja, 1988). The practice of discarding colostrum reduces the capacity of the newborn infants to face the hazards of early life (Huffman & Lamphere, 1984). Prelacteal feeding and early supplementary feeding of an infant with an immature alimentary tract is wasteful, if not dangerous; this early feeding exposes the infant to pathogenic organisms which are even more dangerous to an infant who does not receive colostrums (Popkin *et al*., 1986; Haaga, 1984).

Breastfeeding was nearly universal, and many mothers practice extended breastfeeding. However, exclusive breastfeeding during the first four to six months after birth was rarely practiced. Other foods particularly banana and mashed rice were already introduced at early ages even at the first few weeks of life. Infant formula and other factory processed foods were given to a few infants at infant age. Complementary feeding within the first three months, however, is considered too early since an adequate supply of human breast milk satisfies virtually all nutritional needs of an infant for the first four to six months of life (McCann *et al*., 1981). After four to six months, breastfeeding still contributes significant nutrients, but breastfeeding alone does not assure adequate nutrition (Scrimshaw & Underwood, 1980).

A variety of foods were given to young children, and the food variety and the frequency increased while breast milk consumption decreased with the increasing age. Cow, buffalo, goat, or poultry meat or fish was rarely given to children even after 6 months of age, but poultry meat, even rarely given, was more frequently given than other meat or fish. Unlike other meat and fish, eggs and chicken liver seemed to be common food for children. *Tempe* (fermented soybean cake) and tofu (soybean based cake) were also commonly given to children, after 6 months of age, as side dishes.

It was interesting to observe that many variety of foods consumed by infants and children were bought from the neighborhood small food vendors. Corresponding to the variety and frequency of food consumed, intakes of nutrients, excluding those from breast milk, increased with the increasing age. While the survey was not designed to assess the adequacy of nutrient intakes among the breastfed children, the nutrient intakes for the non-breastfed children were generally not adequate. Although it was not easy to collect accurate recall data on nutrient intakes, the quality of the nutrient intake data was relatively good as indicated by the results of the reliability test.

Substantial proportion of children was reported to suffer from illness during the past week preceding the survey, but such proportion fluctuated between ages making unclear age pattern of morbidity. Fever, cold, cough and diarrhea continued to be the common illnesses, suggesting that respiratory and gastrointestinal tract infections were still prevalent among children.

Comparing with the survey data obtained five years ago from the same site, the prevalence of undernutrition among children has substantially reduced, but the prevalence of undernutrition remained high; the percentage of those with Z-score below –2SD was 15%, 38%, and 54% for children aged 6-11, 12-17, and 18-24 months, respectively. Thus age of child was shown to be the most consistent variable associated with undernutrition. The data agree with the common observation regarding the growth of Indonesian children, that there is a relatively acceptable growth during the first four to six months, a progressive faltering till about 24 months, followed by a steady growth, parallel to reference curves but at a lower level afterwards. Substantial proportion of children with underweight, stunting, and/or wasting was particularly noted after 6 months of age. There was unclear evidence of sex differential in child nutritional status.

In all age groups, undernourished children received less nutrient intakes than nonundernourished children. As expected, the data showed that undernourished children in all the age groups, whether breast-fed or not, have less intakes of nutrients than those among the non-undernourished children. The study also supports the need to promote healthy mothers for healthy children, as the data show that mother's nutritional status is positively associated with child's nutritional status.

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