SEAMEO-Tropmed Community Nutrition Programme

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NUTRITIONAL STATUS AMONG PRESCHOOLERS AND THEIR MOTHERS FROM SELECTED VILLAGES IN ALOR, NUSA TENGGARA TIMUR, INDONESIA

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Ibu Anik
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Bapak Azis
Ibu Nur
Bapak Adam
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Last but not least we would like to express our special thanks to all mothers who came with their children to the POSYANDU or house of the head of the village. They had to walk and to wait sometimes for a long period to be measured. All of them waited patiently.
Terima kasih banyak!

Jakarta, June 1999 Erika Wasito Anne-Madeleine Bau

Summary

As it is proposed that SEAMEO TROPMED RCCN will execute nutrition project in eastern part of Indonesia, the magnitude and factors associated with nutritional status and health situation should be analyzed. A cross-sectional survey was conducted for this purpose in Sumba (November 1998) and Alor (March 1999), East Nusa Tenggara. In Alor, the survey was carried out in 16 villages from 4 sub-districts. Twelve villages were the project villages of the NT-Project "Self-help promotion for low income communities in the critical areas of NTT and NTB". The other 4 villages were chosen as non-project villages to get an impression of the current situation in project villages in comparison with non-project villages and to provide data for a comparison in a follow-up survey at the end of the project activities. The main target group was children under 5 years with their mothers. A total of 532 households were assessed, which consisted of 398 households in 12 project villages and 134 households in 4 non-project villages. One child, age less than 5 years was assessed from each selected household.

Typical households both in project and non-project villages were extended family with average household size of 5 persons. The main religion in Alor was Christian (Protestant). Significantly more mothers in non-project villages (85.8%) came from their present village resident, compared to project villages (77.6%). The education level of the parents, either in project or non-project villages was low (65-85% had education level less than 6 years), but the percentage of head of the households who attended school more than 6 years was higher compared to mother's. The main occupation of the head of the HH as well as for the mother both in project and non-project villages was farmer (86 – 92%) and more than half had no additional occupation. However, significantly more heads of the households and mothers in non-project villages had additional occupation (husbandry, fishery, craftsman or handcrafter).

Radio was the main selected commodity possessed by the households in project (22.6%) and non-project villages (33.6%). The possession of selected goods was higher in non-project villages and it was significantly higher for radio, bicycle and generator electricity, which indicated better socio-economic status.

In project villages the majority of the households obtained drinking water from spring (40%), followed by river, canal or hole near the river (38%) and well (19%). In non-project villages the main water source was well (40%), followed by river, canal or hole near the river (30%).
In accordance to the main water source, the distance to obtain water was significantly further in project villages than in non-project villages. More than 20% of the households in project villages had to walk more than one kilometer to reach the water source. Water shortages, which reached the peak on September and October, were equally experienced by almost 50% of the households in project and non-project village, and mostly with duration of 1-2 months.

Almost 90% of the households claimed that they defecated in latrine. However, the latrine condition was unfavorable due to unavailable water and mostly without septic tank. Housing construction in project villages was similar to non-project villages. The material mostly used for house construction was leaves or tile for the roof, bamboo wall and mud floor.

The agricultural activities in project and non-project villages had the same pattern. The land size was relatively small (more than 50% of the household had land size less than 1.0 ha) and land leasing was not common. Corn was the main crop, which was cultivated by almost the entire households. Rice, cassava, vegetable and cash crop were more frequently cultivated in non-project villages than in project. Most of the crops were used for own consumption, except

cash crops that were used for both, own consumption and selling. Chickens followed by pigs were the main animals raised in project as well as in non-project villages for own consumption and selling. The percentage of households that raised these animals were significantly higher in non-project villages than in project villages.

The main daily staple food in project village was corn (82%) and rice (75%) in non-project villages. Due to the expensive price of rice, consumption of rice was significantly more often in non-project villages. This might indicate better socio-economic condition in non-project villages. Legumes, fresh fish, eggs, and dried fish were the main sources of plant and animal protein, which were consumed on weekly basis. Green leafy vegetables were consumed daily by 83 – 87% of the household, but the consumption of fruits, other than banana and papaya, was less common. More households in non-project villages consumed oil on daily basis, which might indicate a better condition in non-project villages.

Food shortage, which reached the peak on January and February was experienced by 70% of the households in project and 50 % in non-project villages. The average duration of food shortages among those who experienced it, was two months. The reasons of the shortages were pest and diseases and lack of rain/water that were also the main problem in agriculture faced by the households. The main strategies of households to cope with food shortages were selling of assets (28 –30%), changing of eating pattern (20 –29%) and borrow from friends or relatives (10-13%).

Compared to project villages, significantly more households in non-project villages joined POKMAS and felt the improvement in family situation. Type of aid received by the households was mainly food aids and significantly more households in non-project villages got credits. Less than half of the households got training while aid in agricultural equipment was not common.

Expenditure on several items was used to predict the income of the households, which also indicated the socio-economic status of the households. In general there was no significant different found in the average amount of money being spent by the households between project and non-project villages. The majority spent money on food, followed by health, education, social activities and on agriculture.

There were not much different between mother pregnancy history between the project and non-project villages. Either stillbirth or miscarriages were experienced by 11 – 20% of the women, which is double as high as in East Sumba. The Mortality rate of children under 5 was 21% in non-project to 23% in project villages

Frequency of antenatal care and iron supplementation during pregnancy was significantly lower in project than non-project villages. Frequency of mother's participation in family planning also showed the same trend. Most of the mothers in project and non-project villages claimed no difficulties to reach the health center, but more mothers in project villages said the distance was too far. From observation, most of the mothers either in project or non-project villages had to walk for hours to reach the health center. Regardless the distance, health center was the main place that they would go to if they had health problems.

In both project and non-project villages, growth monitoring was the main POSYANDU activity known by the mothers (57-65%), followed by immunisation and feeding program. The percentage of mothers who knew more than 3 activities was 25 – 28%. In the last year, almost

two-third of the children had never been weighed or did not come to POSYANDU every month. Growth monitoring card (Kartu Menuju Sehat, KMS) was owned by half of the children. Half of the mothers claimed that they never got any nutrition extensions and midwife was the most demanded person to give the extension.

Significantly more mothers in non-project villages (30%) than in project villages (17%) who suffered from chronic energy deficiency indicated by BMI $\leq$ 18.5 kg/m^2. Percentage of visible goiter found in the project villages was 5% and in non-project villages 3%. Almost 50% of the households either in project or non-project villages did not use iodized salt. Prevalence of anemia was 59% in project and 55% in non-project villages and the prevalence of malaria was 83% and 78% in project and non-project villages respectively.

The prevalence of stunting, wasting and underweight in project villages was 46%, 7% and 41%, respectively while it was 33%, 12% and 40% respectively in non-project villages. In general, stunting prevalence tended to be higher in project villages than in non-project villages, but wasting prevalence was significantly higher in non-project villages. Based on the sex, the prevalence of malnutrition tended to be higher in boys than girls. The prevalence of malnutrition reached the peak at the age 24 months. The prevalence of anemia was significant higher (78%) in project than in non-project (57%) villages and significantly higher in younger children.

The pattern of feeding and breast feeding practice was similar in project and non-project village. Breast-feeding was common until the child age 18-24 months. However, half of the children did not receive colostrum and got supplementary food too early. Most of the children aged more than 24 month were fed more than 3 times per day. The food mainly consist of staple food (rice, corn) and vegetables. Plant and animal protein sources were significantly being consumed more in non-project villages than project villages. Fruits, oil and sugar consumption was low in both survey areas.

The highest prevalence of disease in project and non-project villages was malaria (71% and 63% in project and non-project villages respectively) followed by acute respiratory infection (ARI) (55% - 77%), skin diseases (20%-30%) and diarrhea (15%-26%). The prevalence of point (15-15%) and period (25-26%) diarrhea was similar in project and non-project villages. The prevalence of ARI was higher in non-project villages and significantly different for period ARI (66% in project and 77% in non-project villages). The prevalence of skin diseases was significant higher in project villages (33%) than non-project villages (20%).

In general, the immunization coverage was low. Records on immunization were available for 46% of children in project villages and 30% in non-project villages. There was significant difference in immunization coverage for DPT, Polio, hepatitis and measles between project and non-project villages. The coverage of those immunizations was more than 35% in project villages while it was less than 25% in non-project villages.

The micronutrient supplementation program was similar in project and non-project villages. Vitamin A supplementation was received by almost 65% of children, while iron syrup and iodine capsule was not received by most of the children.

Several factors that tended or significantly had positive influence on nutritional status were higher mother's education level (HAZ, WAZ), bigger land size (HAZ), cultivated coffee (WHZ), more frequent of fish consumption (HAZ), frequency of staple food consumption (WAZ, WHZ), mother as care taker (WAZ< WHZ), higher food expenditure, better nutritional status of mothers (WAZ).

Children, who live in poorer housing condition, are likely to have diarrhea as children in better housing condition as tile/tin roof, non-bamboo wall and cemented floor. Poorer housing condition indicates poorer hygienic situation in the family and lower economic status. In contrast, children in households with the highest food expenditures had a significant higher prevalence of diarrhea as those in households with low food expenditure. This indicates that the hygienic situation influenced more the prevalence of the diseases rather than the economic status. This was also supported by the fact that children in households, which obtained the water from the spring, had a higher prevalence of diarrhea as those children lived in household with well as water source, which was nearer to the houses.

Mother's anemia prevalence was significantly associated to child's anemia prevalence. The prevalence of child's anaemia was higher if the mother was anaemic.

It is concluded that only few associations between nutritional status on the one hand and socio-economic, agricultural and environmental factors as well as mother and child health are and feeding habits of children under-five, have been found. This might be due to the fact that the survey population is quite homogeneous with regard to most of the factors studied.

Alor district

East Nusa Tenggara consists of 12 districts. Alor district is one of these districts and consists of 9 islands with a total area of 2865 km^2, a population of 154.360 (31.633 HH) and an average density of 54 persons per km^2. Alor is divided into 6 sub-districts: Pembantu Pantar, Alor Barat Daya, Alor Selatan, Pembantu Alor Timur, Pembantu Alor Barat Laut, Teluk Mutiara. Alor is mountainous area with forest and has tropical climate with 2 seasons, dry season lasts from May to September (5-6 months) and rainy season from October to April (6-7 months). Average rainfall is 61.47 mm per year with an average temperature of 27^0C.

The health care delivery system of Alor district consists of one hospital in Kalabahi, 17 PUSKESMAS, 40 Sub-PUSKESMAS and 354 POSYANDU. POSYANDU is an integrated health post, which is present in almost all of the sub-villages and villages and responsible for the Primary Health Care activities in the villages: Maternal and Child Care, Nutrition, Family Planning, Immunization, ORS (oral rehydration solution) and Diarrhea Non-project Programs. The main diseases in Alor are Malaria (26.3%) and ARI (20.4%) (Alor Statistics Office 1997).

1. Methodology

1.1 Survey area and sample size

The survey was carried out in 16 villages from 4 sub-districts. Twelve villages belong to the project villages of the NT- “Self-help promotion for low income communities in the critical areas of NTT and NTB” Project and 4 villages were chosen as non-project villages. Non-project villages were similar in terms of number of population and landsite, but not located in the same sub-district as the project villages. They were included in the survey to get an impression of the current situation in project villages in comparison with non-project villages and to provide data for a comparison in a follow-up survey at the end of the project activities.

The design of this study was cross-sectional to collect information on nutrition and health conditions. The main target group of the study was children under 5 years and their mothers. In almost all of the surveyed villages, the list of children under five and their mothers was not available. All children and their mothers were measured and afterwards a list of mothers with children was created. From this list, 30-35 mothers were randomly chosen. Among these selected respondents 10 children and 10 mothers per villages were randomly selected for hemoglobin test. A total of 532 households were assessed, which consisted of 398 households in 12 project villages and 134 households in 4 non-project villages. Only one child per household was assessed. The following table presents the village names with village area, population number and number of surveyed households per village.

Table 1: Villages and number of population included in the nutritional baseline survey carried out in the NT-Alor project area in Alor in 1999

Sub-district	Village	Village area km^2	Total No. of population in village	Surveyed HH	Village classification
Alor Barat Daya	Pintumas	48.4	1538	31	NT Project villages, Mountainous
	Kafelulang	30.0	760	35	Mountainous
	Mataru Timur	178.0	1113	33	Mountainous
	Mataru Utara	26.6	2143	31	Mountainous
	Morba	167.6	1504	40	Mountainous
	Wolwal	32.3	2854	35	Coastal
	Probur	29.2	2487	35	Mountainous
	Halerman	1000.0	1362	30	Mountainous
	Tribur		2826	34	Coastal
	Wakapsir	60.9	836	29	Coastal
	Mataru Selatan	-	1217	32	Coastal
	Lakatuli	32.1	729	33	Coastal
Alor Timur	Kolana Selatan	600.0	935	30	Non-project villages, coastal
	Kolana Utara	15.4	1660	35	coastal
Pembantu Alor Barat Laut	Welai Selatan	53.5	1020	30	Mountainous
Alor Barat Laut	Lawahing	20.8	1302	39	Mountainous
Total				532	

1.2 Structure and data assessment

The nutritional status of children under five years of age and their mothers was used as the indicator for the nutritional status of the whole population in the surveyed area. The questionnaire was designed to provide representative data on socio-economic condition, nutritional and health situation and feeding habits of children under five years of age. The indicators of these variables are presented in Table 2. The survey was carried out according to the guidelines described by Gross et.al. (1996).

Table 2: Selected indicators for nutritional status and health

Socio-economic condition	Demographic data Housing condition Agricultural activities Information about IDT-villages Hygiene Water shortages Household expenditure
Nutritional status:	Household food consumption Food shortages Anthropometry of mother and child Feeding habits (breast-feeding and complementary food)
Health status	Diseases Vaccination status Usage of health facilities Household health behaviour

1.3 Anthropometric measurement

Children aged 0-59 months and their mothers were weighed with an electronic digital scale (SECA model 770, Germany) with a precision of 0.1 kg. Children under 24 months were weighed in the arms of their mother or caretaker. This had the advantage that restless infants could be weighed easily. The body weight was calculated as the difference between the combined weight of mother and child, and the mother's individual weight.

Height of mothers and children aged more than 2 years old were measured using a microtoise to the nearest 0.1 cm. The height of children younger than 2 years old was measured with a length board (Gross et al. 1996). The weight and height values of the mothers were used to calculate Body Mass Index (BMI) according to the following formula:

BMI (kg/m^2)= weight/ $height^2$

MUAC of mother was measured using a flexible non-stretch tape. The measurement was taken at the midpoint of the upper left arm, between the acromion process and the tip of the olecranon. After locating the middle point, the left arm extended so that it was hanging loosely by the side with the palm facing inwards. The tape was wrapped gently but firmly around the arm at the midpoint (Gibson, 1990).

Hemoglobin concentrations were measured according to the cyanomethemoglobin method using a portable mini-photometer (Compur Minilab, Bayer Diagnostic GmbH, Muenchen, Germany). Capillary blood was obtained from the ring finger using an automatic skin puncturing device (Autoclix, Boehringer Mannhein, Mannheim, Germany). A blood sample was taken after a spontaneous flow of blood occurred.

Presence of iodine in salt was assessed using Iodida test supplied by UNICEF, Jakarta (Manufacturer). Mothers were asked to bring a spoon of salt available in house. Grades were given to the observable change of iodine presence in salt. The darkest colour (purple) indicated that there is 30 ppm iodine in salt, as instructed on the instruction of the test kit.

Table 3 presents the cut of points of the indicators used in this study to categorize nutritional status of the samples.

Table 3: Cut off points for anthropometric measures

Indicator	Category		Reference
Height for age	< -2	Stunting	WHO Technical Report Series 854, 1995
	-2 to 2	Normal	
Weight for age	< -2	Underweight	
	-2 to 2	Normal	
Weight for height	< -2	Wasting	
	-2 to 2	Normal	
MUAC of mother	# 22	CEC	Ferro-Luzzi et.al., 1992
	> 22	Normal	
BMI of mother	∃ 18.5 kg/m2	Normal	WHO Technical Report Series 854, 1995
	17.0 – 18.49	CED Grade I	
	16.0 – 16.99	CED Grade II	
	<16.0	CED Grade III	
Hemoglobin (children)	< 11.0 dl/l	Anemia	WHO (Catalogue of health indicators)
	∃11.0 dl/l	Normal	
Hemoglobin (women, reproductive age)	< 12.0 dl/l	Anemia	WHO (Catalogue of health indicators)
	∃12.0 dl/l	Normal	
Hemoglobin (pregnant women)	< 11.0 dl/l	Anemia	WHO (Catalogue of health indicators)
	∃11.0 dl/l	Normal	

1.4 Preparation of field work

The survey was carried out by MSc students (1998-2000) from SEAMEO-TROPMED Regional Center for Community Nutrition, who received a 10 day training (15. to 25.2.1999) in Jakarta. The training included the introduction to the survey methodology, randomization, interview with structured questionnaire, interview try out, and focus group discussion as well as measurement training. The prepared questionnaire has been adapted to local conditions by pretesting it in Kalabahi, Alor. 4 survey teams collected the data, each consist of 2 Indonesian-speaking enumerators and one foreigner, who was responsible for the measurement.

The fieldwork took place from 5. until 19.3.1999 (timetable in Appendix). Data collection lasted for 4 days in each village. The authors of this report visited and supervised them every day. Questionnaires were intensively checked on plausibility after each return of the enumerators.

Information was collected using combination of an interview with mothers using the structural questionnaire, observation and anthropometric measurements of mothers and their pre-school children. Before the interview all mothers were asked to attend the health centre or POSYANDU for anthropometric measurement. The enumerators measured the mothers and the children under the supervision of the authors.

1.5 Data analysis

Data analysis was performed with SPSS 7.5. Z-scores of height-for-age, weight-for-age and weight-for-height were calculated with EPI-INFO 6.04 using the National Centre for Health Statistics data from the United States (1985) as reference.

Analyses were done using frequency distribution, ANOVA test and chi-square test. Associations of children's nutritional status with selected possible determinants was done by multivariate and simple factorial analysis (ANOVA) and controlling for confounding factors, age (HAZ, WHZ, WAZ) and sex (WAZ). Standard distribution of continuos variable were tested by Kolmogorov Smirnov test.

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The fieldwork took place from 5. until 19.3.1999 (timetable in Appendix). Data collection lasted for 4 days in each village. The authors of this report visited and supervised them every day. Questionnaires were intensively checked on plausibility after each return of the enumerators.

Information was collected using combination of an interview with mothers using the structural questionnaire, observation and anthropometric measurements of mothers and their pre-school children. Before the interview all mothers were asked to attend the health centre or POSYANDU for anthropometric measurement. The enumerators measured the mothers and the children under the supervision of the authors.

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Analyses were done using frequency distribution, ANOVA test and chi-square test. Associations of children's nutritional status with selected possible determinants was done by multivariate and simple factorial analysis (ANOVA) and controlling for confounding factors, age (HAZ, WHZ, WAZ) and sex (WAZ). Standard distribution of continuos variable were tested by Kolmogorov Smirnov test.

2. Results of the Nutritional Baseline Survey Alor 1999

The tables are divided between NT Project Alor and non-project villages. On order to get an impression of the current situation in project villages in comparison with non-project villages. All villages are IDT villages.

2.1 Socio-economic and demographic data

There was not much difference between the project and non-project villages on the selected socioeconomic indicators (table 4). Most of the households in the surveyed area were extended families, where the families lived with grandparents and/or relatives. One third of the households in project villages had more than 3 children, but it did not reach significant difference in comparison to the non-project villages. It should be mentioned that almost all mothers in the surveyed areas earned money during the last 3 months.

Table 4: Selected socio-economic information about the households in project and non-project villages 1998

Characteristics	**NT Alor 1999**	**Non-project 1999**
Total surveyed households	398	134
Surveyed children <5 years	398	134
Female headed household (%)	2.3	2.2
Number of household members (mean ∀SD)	5.4 ∀ 1.8	5.1 ∀ 1.6
Number of children < 5 years (mean ∀SD)	1.5 ∀ 0.6	1.4 ∀ 0.5
Number of children (0 - 18 years) (mean ∀SD)	2.7 ∀ 1.7	2.4 ∀ 1.5
HH with more than 3 children (%)	28.1	19.4
Number of HH members earning money (mean ∀SD)	2.2 ∀ 0.8	2.3 ∀ 0.8
Mother earned money (%)	94.0	97.8

The main religion in Alor island was Christian (Protestant). There was significant difference in religion 6.5% in project villages (mainly in Wakapsir, Wolwal and Tribur) are Moslem in comparison to only 0.7% in non-project villages. Mother's origin also reached significant difference between project and non-project areas as more mothers in non-project villages (85.8%) came from their present village resident, compared to project villages (77.6%).

Table 5: Frequency distribution (%) of origin and religion of the mother

Characteristics	**NT Alor 1999** n=398	**Non-project 1999** n=134
Mothers religion*		
Protestant	92.5	96.3
Catholic	0.8	1.5
Merapu (local)	0.3	1.5
Muslim	6.5	0.7
Mothers origin*		
Same village	77.6	85.8
Other parts of island	19.6	14.2
Other parts of NTT	2.3	-
Other parts of NTB	0.5	-

*p <0.05 (chi square test)

The frequency distribution for the education level of the head of the HH was quite similar for both surveyed areas. Approximately more than half of the heads of the HH had 3-6 years of formal schooling. Even a fairly higher percentage of mothers (67 – 80%) attended school more than 3 years. However, more heads of the household had an education level more than 6 years compared to mothers. The illiteracy rate (less than 3 years of schooling) of mothers was lower than for head of HH in non-project villages. The frequency distribution of both sexes was between 5 and 13%.

Table 6: Frequency distribution (%) of education of head of the household (hh) and the mother

	NT Alor 1999 n=398		**Non-project 1999** n=134	
	Head of hh	**Mother**	**Head of hh**	**Mother**
Education level				
< 3 years	10.6	12.8	7.5	5.2
3-6 years	53.8	67.6	58.2	79.1
>6-9 years	20.1	14.6	15.7	10.4
>9-12 years	14.8	4.5	17.9	4.5
>12 years	0.8	0.5	0.7	0.7

Education level of head and mother of NT-project and non-project villages: p=>0.05 (chi-square test)

The most frequently mentioned primary occupation were farmer (86 – 92%) for head of the HH and mothers, and civil servant or teacher (6%) for the head of the HH in both surveyed areas. The frequency distribution of mother additional work was significantly different between project and non-project villages. The most frequently mentioned secondary occupation for mothers was handicraft (16.4%) in non-project villages and husbandry (8.5%) in project villages. Most mothers had no additional occupation, but the percentages were significantly higher in project (86.2) than in non-project villages (68.7%). The mostly mentioned additional work for the head of the household was husbandry (8-11%) and fisherman (6 –12%).

Table 7: Frequency distribution (%) of occupation of head of the household (HH) and the mother

	NT Alor 1999 n=398		**Non-project 1999** n=134	
	Head of HH	**Mother**	**Head of HH**	**Mother**
Main Occupation				
No	0.8	4.0	0.7	6.0
Farmers	86.2	91.2	87.3	88.1
Husbandry	0.8	0.8	-	-
Fisherman	2.0	-	-	-
Handicrafts	1.5	1.3	3.0	2.2
Civil servant/teacher	5.5	0.8	6.0	1.5
Other (daily wages, priv. employee, trader/seller)	3.3	2.0	2.9	2.2
Additional Occupation				
No	70.6	86.2	53.0	68.7
On daily wages	0.3	-	-	-
Farmers	6.0	1.3	7.5	3.7
Husbandry	8.8	8.5	10.4	9.0
Fisherman	6.3	-	11.2	-
Craftsman	4.0	-	9.7	-
Handicrafts	0.5	3.0	3.0	16.4
Dealer or salesman	1.0	1.0	2.2	2.2
Other	2.6	-	3.0	-

-mother has add. job, project vs non-project $p < 0.001$
-father has add. job, project vs non-project $p < 0.001$

Table 8 shows the frequency distribution of households who owned selected type of goods. Radio was the main selected commodity possessed by the households in project and non-project villages. In non-project villages significantly more households owned a radio. None of the HH owned a motor boat, but more HH in non-project villages (10%) owned a boat without motor compared to project villages (5%). Possession of bicycle and generator electricity was significantly higher in non-project villages.

Table 8: Frequency distribution (%) of selected indicators for socio-economic status

Household possession	**NTT Alor 1999** n=398	**Non-project 1999** n=134	**p-value**
Radio	22.6	33.6	0.016*
Bicycle	1.0	4.5	0.019*
TV	1.0	1.5	0.645
Motorboat	0.0	0.0	-
Boat	5.5	9.7	0.107
Motorcycle	0.8	-	0.576
Electricity (government)	4.0	0.7	0.085
Electricity (generator)	0.5	3.7	0.013*

* Project vs non-project village: significant difference (Chi-square test)

2.2 Hygiene, water sources and seasonal water shortages

In project villages the majority of the households obtained drinking water from spring (40%), followed by river, canal or hole near the river (38%) and well (19%). In non-project villages the main water source was well (40%), followed by river, canal or hole near the river (30%). Rainwater was the major source of drinking water in the village Lawahing – a mountainous village. The majority of the households (97-99%) were boiling the water for all household members.

Well was the main source of water in the coastal areas, while the water from spring was the main source in mountainous areas (Appendix, main water source per village).

Table 9: Frequency distribution (%) of water sources for drinking water

Water source for drinking water*	**NTT Alor 1999** n=398	**Non-project 1999** n=134
Well	18.8	39.6
River/canal/hole near river	37.9	29.1
Government water supply	0.5	0.7
Spring	39.4	14.2
Other (rain water)	3.3	16.4 (mainly Lawahing)

* p<0.001 significantly different between project and non-project villages (chi square test)

The distance to the water source to obtain water is further in project villages than in non-project villages. More than 20% of the households in project villages have to walk more than one kilometer to reach the water source.

Table 10: Frequency distribution (%) of distance to collect drinking water

Distance to drinking water*	**NTT Alor 1999** n=398	**Non-project 1999** n=134
<100m	49.7	66.4
100-<500m	20.1	14.2
500-1000m	9.0	12.7
>1km	21.1	6.7

* significantly different between project and non-project villages (p< 0.001)

Water shortage is a very common problem in islands. The trends are clearly shown in figure 1. From the figure it is clearly seen that water shortages increases in line with the dry season and reach the peak in September and October. Around 15% of the households suffered all the year around from water scarcity.

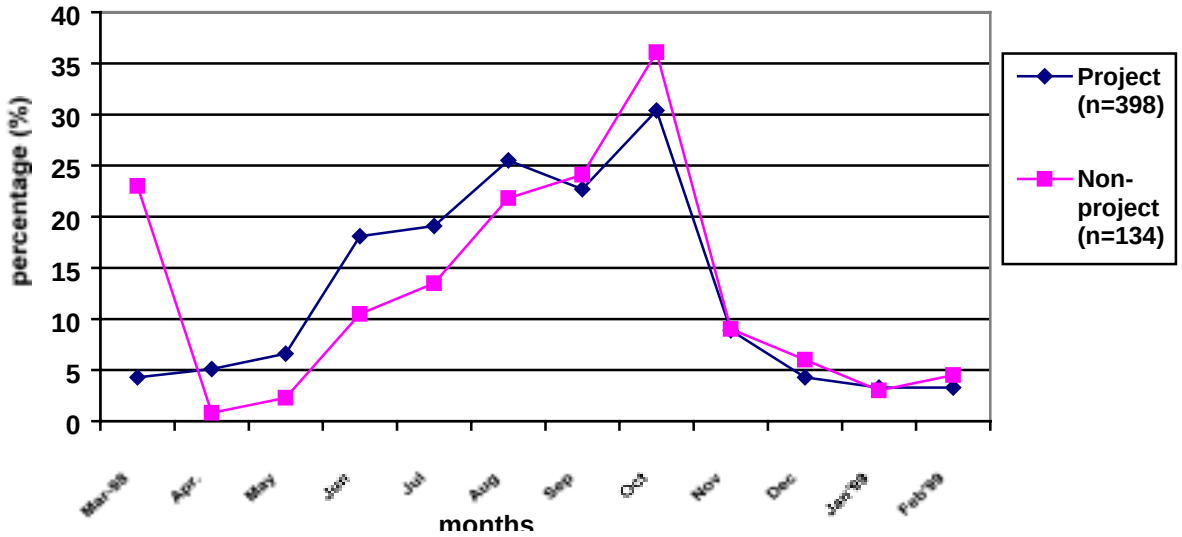

Figure 1: Percentage of households claiming to have insufficient water according to months of the year

As shown in table 11 less than half of the households suffered from water shortage. Almost one fourth of the households in project and non-project villages claimed that they suffered more than 3 months from water scarcity last year.

Table 11: Frequency distribution (%) of period of water shortage claiming by the households

Period of water shortage	**NTT Alor 1999** n=398	**Non-project 1999** n=134	**p-value**
0	54.3	51.9	0.123 (chi-square)
1 -2 months	21.9	23.3	
3 - 4 months	6.9	12.8	
> 4 months	16.8	12.0	
mean ∀ SD. (all)	2.93 ∀ 11.69	2.07 ∀ 8.62	0.936
mean ∀ SD. (among who experienced)	3.32 ∀ 2.34 (n=179)	2.78 ∀ 1.64 (n=64)	0.240

Most of the families defecated in private, public or neighbors latrines. Private latrine by observation was a place, which was close to the house and enclosed by coconut leaves, without a hole in the soil. Defecating there, as well as in the garden enables the dirt to be spread by flies and is very dangerous in spreading endemic diseases such as diarrhea. More appropriate were public toilets. Their construction prevented spread of dirtiness. These toilets were used by 20% of the households. The percentage of households, which defecated in the river was around 2%.

Table 12: Frequency distribution (%) of the place of defecation

Defecate place	**NTT Alor 1999** n=398	**Non-project 1999** n=134
Field/Garden/Forest	4.0	5.2
Beach/Sea	6.5	0.7
River/Stream	1.8	1.5
Private latrine	61.1	65.7
Public toilet	20.9	21.6
Other/ neighbors toilet	5.8	5.2

2.3 Housing condition

Materials used for house construction (roof, wall, and floor) were often used as wealth indicators to classify families into low, medium and high socioeconomic groups. The following table shows the difference between the project and non-project villages in terms of these indicators.

There was not much difference of material used for house construction between project and non-project villages. Leaves and tile were the materials most used for constructing the roof of the houses as shown in table 13. The walls of most houses were made from bamboo (60%), followed by bricks and semi-permanent (20%, combination of bricks and bamboo or bricks and pasteboard or pasteboard and bamboo). The floor was made from mud (80%). Some households (20%) used bricks or cement as floor material.

Table 13: Frequency distribution (%) of general characteristics of the house

Housing condition	NTT Alor 1999 n=398	Non-project 1999 n=134
Roof material		
Leave	57.0	57.5
Tile/ tin	43.0	42.5
Wall material		
Cemented/Brick	15.1	18.7
Bamboo	62.1	61.9
Pasteboard	1.3	3.0
Semi permanent	21.6	16.4
Floor material		
Mud	78.1	82.1
Cemented/Brick	21.9	17.9

2.4 Agricultural activities

There was no significant difference in the frequency distribution of land size between surveyed areas. The majority of the farmers (30 –39%) had a farm land size of 0.5 – 1 ha. Land leasing or share cropping was unusual in Alor. (The farm size as mentioned referred to estimation of the interviewed mothers and could not be considered as an exact measurement.)

Overall, 2.8% in project and 4.5% in non-project villages had no land at all. The main occupation of those who had no land was fisherman (36.4%), trader/seller (18.2%) and civil servant (9.1%). Regarding the land ownership most households (96.6% project, 97.6% non-project villages) cultivate all of their land.

Table 14: Frequency distribution (%) of own land or leased land

Land size	NTT Alor 1999 n=398		Non-project 1999 n=134	
	Own land	Leased, share cropping	Own land	Leased, share cropping
No	4.8	93.2	6.0	94.0
0.0 1-0.5 ha	20.6	0.8	25.4	1.5
0.51-1.0 ha	30.9	1.5	38.8	0.7
1.01-1.5 ha	14.6	1.3	7.5	-
1.51-2.0 ha	9.3	0.3	7.5	-
>2.0 ha	9.8	0.3	8.2	-
Do not know	10.1	2.8	6.7	3.7

The percentage of farmers producing selected crops and the usage of the crops are presented in table 15. Rice, cassava, vegetable and cash crop were more frequently cultivated in non-project villages than in project. Besides cash crop, such as banana, cashew, candle-nut and coconut, crops were mostly cultivated for own consumption. None of the crops listed in table 15 were exclusively cultivated for selling.

Table 15: Frequency distribution (%) of the cultivation and usage of crops by the surveyed households in project (n=387) and non-project villages (n=128)

	Cultivation and usage of crops*										
	Not cultivated		Own consump.		Sale		Both equal important		other/ new plants		p-value
	Project	Non-project	Project	Non-project	Project	Non-project	Project	Non-project	Project	Non-project	
Corn	2.6	1.6	87.1	79.1	-	-	10.3	18.8	-	-	0.038*
Rice	40.3	31.3	53.5	56.3	-	-	6.2	12.5	-	-	0.028*
Cassava	21.4	6.3	69.8	75.8	0.5	1.6	8.3	16.4	-	-	0.000*
Tubers	18.9	16.4	73.4	69.5	-	-	7.8	14.1	-	-	0.099
Legumes	41.6	35.2	52.7	54.7	-	0.8	5.7	9.4	-	-	0.108
Cabbage	91.2	82.0	7.8	14.1	-	0.8	1.0	3.1	-	-	0.013*
Spinach	66.9	61.7	29.5	26.6	0.3	0.8	3.4	10.9	-	-	0.008*
Water spinach	80.9	82.8	16.3	10.2	0.3	0.8	2.6	6.3	-	-	0.076
Banana	8.3	10.2	53.7	34.4	2.3	1.6	35.7	40.2	-	-	0.001*
Cashew	41.3	27.3	16.5	8.6	17.1	24.2	21.4	28.9	3.6	10.9	0.000*
Candle nut	19.4	22.7	7.0	6.3	45.2	40.6	27.9	30.5	0.5	-	0.749
Coconut	25.1	39.1	28.7	10.2	11.4	9.4	33.3	41.4	1.6	-	0.000*
Coffee	50.4	55.5	21.2	9.4	9.3	12.5	18.6	21.9	0.5	0.8	0.051

Chickens were the main raised livestock in project as well as in non-project villages, but it was raised more in non-project villages. Almost all households raised chicken for own consumption (28 – 36%) or for both consumption and sale (45 – 59%). The second most frequent raised animals were pigs. Significantly more households in non-project villages raised pigs (92%) in comparison to project (77%). Around 25% HH used pigs for own consumption and (37 – 45%) for both consumption and sale. Sheep or goats were raised by one fourth of the households. Cows and horses were less important in Alor.

Table 16: Frequency distribution (%) of possession and usage of livestock

	NT Alor 1999 n=398	Non-project 1999 n=134	p-value
Pigs			
Not raised	22.4	7.5	0.001*
Own consumption	26.9	25.4	
For sale	11.8	20.1	
Both of equal importance	36.7	44.8	
Other	2.3	2.2	
Sheep/goats			
Not raised	77.6	69.4	0.117
Own consumption	5.3	8.2	
For sale	5.0	9.7	
Both of equal importance	12.1	12.7	
Other			
Cows			
Not raised	98.0	94.8	0.076
Own consumption	0.3	-	
For sale	0.8	0.7	
Both of equal importance	1.0	4.5	
Other			
Chicken			
Not raised	13.6	6.7	0.031*
Own consumption	35.2	28.4	
For sale	5.8	6.7	
Both of equal importance	45.5	58.2	
Other			
Horses			
Not raised	99.0	94.8	0.006*
Own consumption	0.5	0.7	
For sale	-	2.2	
Both of equal importance	-	-	
Other	-	2.2	
Dogs			
Not raised	68.9	62.7	0.727
Own consumption	2.8	3.0	
For sale	4.0	3.7	
Both of equal importance	3.5	3.7	
Other	21.1	26.9	

* significant difference between project and non-project villages

2.5 Household consumption and seasonal food shortages

The main daily staple food in project villages was corn (82%) which in non-project villages was rice (75%). There was a significant difference ($p<0.05$) in corn and rice consumption between the project and non-project villages, where the corn was consumed more on weekly and the rice more on daily basis. This indicates better condition in non-project villages. Further important daily staple food were cassava (56 –64%) and roots (52 – 58%) and on weekly basis noodles (44 –61%).

The frequent consumption of plant protein was less common in Alor. Legume consumption on weekly basis was 25 – 35%. Mainly tofu consumption followed by groundnut was uncommon.

The main consumed animal protein on weekly basis was fresh fish (43 –52%), followed by eggs (33 – 47%) and dried fish (32 – 35%). Consumption of chicken was on monthly basis. Animal raising was an income source for the households as well as the selling of eggs. However the consumption of meat was more or less equal distributed in project and non-project villages.

The daily frequent consumption of green vegetable was 83 – 87%. Consumption of fruits was less common. Bananas and Papaya consumption was consumed by more than 80% of the households in project and non-project villages on daily or weekly basis. Orange and jackfruit consumption was not important.

The main energy food consumption was coconut milk and oil. There was a significant difference ($p<0.001$) in coconut oil consumption between project and non-project villages, where oil was consumed more on daily basis (50%) in non-project villages. This might also indicate a better condition in non-project villages.

Table 17: Frequency distribution (%) of consumption of selected foods in surveyed households

	Food frequency Alor 1999									
	Never		Seldom		Monthly		Weekly		Daily	
	NTT	Non-project	NTT	Non-project	NTT	Non-project	NTT	Non-project	NTT	Non-project
Staple food										
Rice	2.0	-	-	-	4.3	-	41.0	25.4	52.8	74.6
Cassava	11.6	2.2	0.5	-	2.0	3.7	22.6	38.1	63.3	56.0
Corn	0.5	-	-	-	1.3	-	17.1	31.3	81.2	68.7
Roots	10.6	6.7	8.3	5.2	3.3	5.2	20.9	30.6	57.0	52.2
Bread	46.2	33.6	16.8	11.2	18.1	20.1	15.3	31.3	3.5	3.7
Noodles	14.8	5.2	7.3	6.0	29.1	25.4	44.5	60.4	4.3	3.0
Plant protein										
Legumes	39.4	36.6	4.0	6.0	15.1	7.5	25.9	34.3	15.6	15.7
Tofu	97.0	96.3	1.3	-	1.5	1.5	0.3	2.2	-	-
Groundnut	60.3	54.5	7.0	14.9	19.3	14.9	10.3	13.4	3.0	2.2
Soya beans	47.2	29.1	9.0	19.4	24.6	17.9	17.3	32.1	1.8	1.5
Animal protein										
Pig	14.6	3.0	74.4	76.9	10.6	17.2	0.5	2.2	-	0.7
Beef	90.7	79.1	8.5	18.7	-	1.5	0.8	0.7	-	-
Sheep	73.9	41.8	23.6	48.5	2.3	9.0	0.3	0.7	-	-
Chicken	4.3	2.2	36.7	22.4	47.0	53.7	11.6	20.1	0.5	1.5
Poultry	95.0	91.8	3.0	0.7	1.3	3.0	0.5	3.7	0.3	0.7
Egg	28.9	13.4	3.8	6.0	27.6	25.4	33.7	47.0	6.0	8.2
Fish, fresh	13.1	18.7	2.3	2.2	19.6	4.5	52.3	43.3	12.8	31.3
Fish dried	44.2	35.8	1.5	0.7	14.6	11.2	32.4	35.1	7.3	17.2
Vegetables										
Green vegetable	3.8	0.7	1.3	-	1.8	-	9.8	11.9	83.4	87.3
Other vegetable	37.4	34.3	0.8	2.2	2.0	6.0	16.8	16.4	43.0	41.0
Fruits										
Banana	4.0	1.5	2.3	0.7	8.5	10.4	44.7	49.3	40.5	38.1
Papaya	8.0	11.9	1.8	10.5	10.8	8.2	38.5	34.3	40.9	35.1
Orange	28.9	20.9	68.1	79.1	1.0	-	1.0	-	1.0	-
Jackfruit	23.4	15.7	73.6	82.8	0.8	-	1.5	1.5	0.8	-
Milk	81.9	78.4	5.3	9.0	7.5	6.7	4.3	2.2	1.0	3.7
Energy food										
Coconut milk	9.0	3.7	0.5	-	10.8	10.4	58.8	65.7	20.9	20.1
Coconut oil	11.6	3.0	0.3	1.5	10.1	6.0	46.0	40.3	32.2	49.3
Palm oil	94.5	98.5	0.3	0.7	1.5	0.7	2.3	-	1.5	-
Animal fat	97.2	94.8	1.3	1.5	0.3	3.7	1.0	-	0.3	-
Sugar	6.8	1.5	0.8	1.5	2.5	0.7	23.6	10.4	66.3	85.8

*Number of households in NTT project=398 and in Non-project =134

Seasonal food shortages and coping strategies

The distribution of food shortages is presented in figure 2. The pattern showed that shortages mainly happened during planting time (at the beginning of rainy season).

In project villages more than 70% claimed that they suffered from food shortage around the year with the peak of 30% in January and February. In non-project villages 50% of the households mentioned that they suffered during the last year from food shortage. Percentages of HH experiencing food shortage increased with the length of dry season.

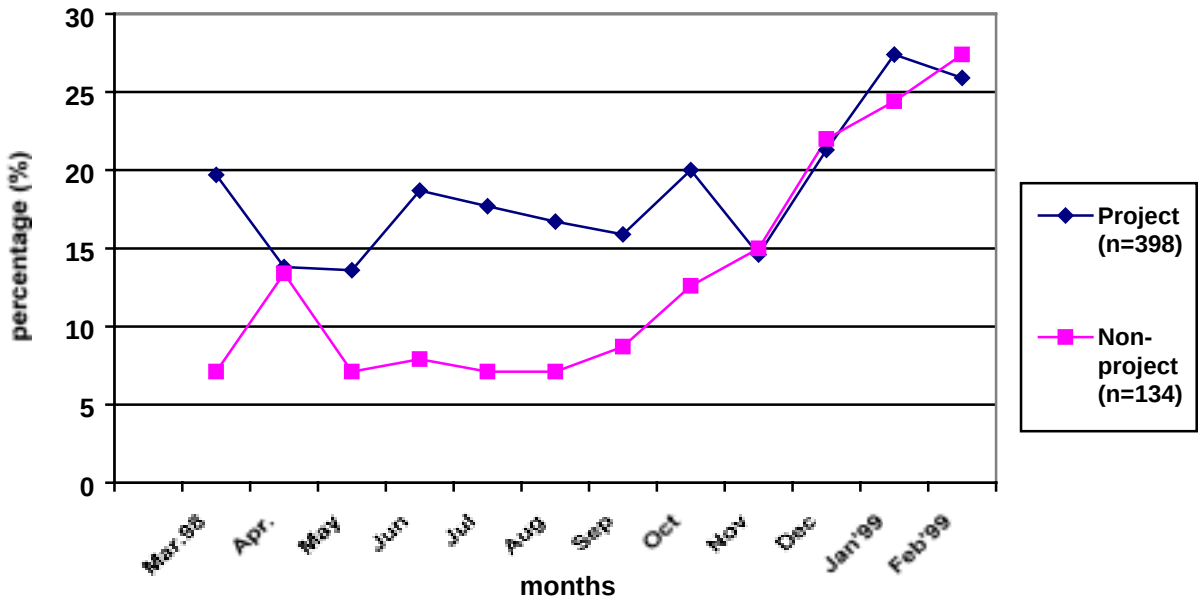

Figure 2: Percentage of households claiming to have food shortages according to months of the year

The average duration of food shortages among those who experienced it, was two months in project and non-project villages.

Table 18: Frequency distribution (%) of duration of food shortage

Months	**NTT Alor 1999** n=398	**Non-project 1999** n=134
0	28.1	41.8
1-2	41.0	35.1
3-4	14.1	11.2
>4	16.8	11.9
median (10 and 90 percentile) all	1 months (0-7)	1 months (0-8)
median (10 and 90 percentile) who suffered	2 months (1-7) n=278	2 months (1-5.8) n=71

The main reasons for suffering from food shortages were lack of rain (45%) and pest and diseases (28%) in project villages. In non-project villages the main reason was pest and diseases (43%) followed by lack of rain (26%). Planting time started at the beginning of rainy season because their farming depended on rain water. Prolonging dry season might affect the harvest and exaggerated the shortages.

Table 19: Frequency distribution (%) of reasons for food shortages

Reason*	**NTT Alor 1999** n=286	**Non-project 1999** n=78
Pest/diseases	27.3	42.3
Lack of rain	44.4	25.6
Irregular rain	4.2	7.7
Not enough harvest	7.0	5.1
Economic crisis	2.4	3.8
No food shortage	7.7	5.1
Other reason	1.7	2.6
DNK, no answer	5.2	7.7

*p=0.059

There was not much difference in the frequency distribution of coping strategies among household who suffered from food shortages between project and non-project villages. The main strategy of households to cope with food shortages were selling of assets (28 –30%), changing of eating pattern (20 –29%) and borrowing from fiends or relatives (10-13%).

Table 20: Frequency distribution (%) of coping strategies for food shortages

Coping strategies	**NTT Alor 1999 n=286**	**Non-project 1999 n=78**
Sell assets	30.8	28.2
Change eating pattern	28.7	20.5
Borrow from friend/relative	12.2	10.3
No food shortage	11.2	16.7
Ask from parents/relatives	6.6	9.0
Borrow from money lender	0.3	-
Get incentive	0.7	1.3
Other	1.4	3.8
Do not know	8.0	10.3

2.6 Household expenditure

Asking about the income directly is a problem all over the world. Therefore, the question of household's expenditure rather than income was used in this survey to get an impression of how high the average income of households were. The expenditure was classified into five main categories and the total expenditure was the total money spent on these categories in each household. The assumption was the more the total amount of money being spent, the higher the income of the household.

There was not much difference between the percentage of households, which spent money and the amount of money spent on selected items between project and non-project households. The majority spent money on food (96 – 98%), followed by expenditure for health (54 – 63%), education (30%), social activities (23 – 27%) and on agriculture (14 – 17%). The average amount spent by the households was slightly higher in non-project villages, but did not reach significant difference as found in the villages in East Sumba.

Table 21: Frequency distribution (%) of monthly expenditure (Rupiah) by surveyed households

Average money spent on*	NTT Alor 1999		Non-project 1999	
	n	% of households (median (10 and 90 percentile)	n	% of households (median (10 and 90 percentile)
Food	398	96.5	134	97.8
Average amount	380	20000 (5000/100000)	131	25000 (10000/100000)
Health	398	54.5	134	62.7
Average amount	216	7500 (1000/30000)	84	5000 (1000/30000)
Education	398	29.9	134	29.9
Average amount	117	10000 (1900/50000)	40	12750 (2100/73500)
Agriculture	398	14.8	134	16.4
Average amount	55	30000 (6800/66000)	22	19000 (5000/50000)
Social activities	398	26.6	134	23.4
Average amount	104	19000 (3500/75000)	38	12500 (5000/51000)

2.7 Problems experienced by households

Since farming is performed by all households, information about main problems in agriculture was collected. There was no difference in ranking of the claimed major problem in agriculture by project and non-project households. The majority claimed that pest and diseases (50 – 57%), followed by lack of water (10 – 13%) were the two main problems of the farmers. Lack of money did not seem to be a problem.

Table 22: Frequency distribution (%) of major problem in agriculture mentioned by households

Major problem in agriculture	NT Alor 1999 n=398	Non-project 1999 n=134
Pest and diseases	49.0	56.0
Lack of water	12.8	10.4
Lack of money	4.3	3.0
Lack of equipment	1.0	0.7
Knowledge in agriculture/ husbandry	1.0	2.2
Lack of manpower	0.8	0.7
Lack of animal food	0.5	-
Animal stealing	0.3	0.7
Lack of land	0.3	-
No problems	18.1	14.9
Others	2.8	3.0

p=0.926

2.8 Information about IDT-villages activities

The project “Self-help promotion for low income communities in the critical areas in NTT and NTB” is aiming at strengthening institutions at the villages and district level to perform support functions for villages self-help groups. The NT-Project works since July 1998 in the surveyed villages.

Several POKMAS-“Self-help” groups (Kelompok Masyarakat – Community group) were founded in each village. These groups are supposed to carry out small income generation projects by themselves through IDT financial support provided by PMD (Government of Indonesia).
Some information was collected about activities, which were carried out by the NT project as well as PMD. These data provide first information about activities.

According to table 23, significantly more POKMAS groups are founded in non-project villages in comparison to project villages. More than 50% in non-project villages mentioned that their situation has improved since they joined the POKMAS group. In project villages significantly fewer households agreed to this statement.

Table 23: Frequency distribution (%) of POKMAS participation

POKMAS participation*	**NTT Alor 1999** n=398	**Non-project 1999** n=134
Yes, situation improved	34.7	50.0
Yes, not improved	29.4	29.1
No	33.4	20.1
Do not know	1.8	0.7
No answer	0.8	-

*p=0.008 significant difference between project and non-project villages

To carry out the activities, the POKMAS members got training on certain topics or assistance to get credits. The following table 25 shows the type of training provided. In general the POKMAS group in the NT project villages got less training, credits and food aid than the non-project villages (NT-Alor project had not yet started their activities).

Table 24: Frequency distribution (%) of type and source of training and aids received by POKMAS members

Type of aid	NTT Alor 1999 n=265	Non-project 1999 n=107	p-value
Type of training			0.156
No	54.7	46.7	
On agriculture	19.6	20.5	
On administration	2.6	2.8	
Both	6.1	7.5	
Do not know	8.3	4.8	
Credits			0.000*
No	57.0	22.0	
Yes, from the government	35.5	76.6	
Yes, from NGO	6.8	0.9	
No answer	0.8	-	
Agriculture equipment			0.016*
No	95.8	88.8	
Yes, from government	1.9	9.3	
Yes, from NGO	0.8	1.9	
Do not know	1.5	-	
Food aid			0.058
No	26.4	17.8	
Yes, from government	57.7	73.8	
Yes, from NGO	14.7	8.3	
Do not know	1.2	-	
Other Aid			0.765
No	95.8	95.3	
Yes, from government	2.6	3.7	
Yes, from NGO	0.8	0.9	
Do not know	0.8	-	

*significant difference between project and non-project villages

2.9 Health care behavior of mothers

The nutritional status of women has an important influence on child development during pregnancy and lactation. Therefore information about pregnancy, birth, health care and knowledge was obtained during the survey.

There was not much difference between mother pregnancy history between the project and non-project villages. Either stillbirth or miscarriage were experienced by 11 – 20% of the women, which is twice that in East Sumba. The Mortality rate of children under 5 was 21% in non-project to 23% in project villages

Table 25: Frequency distribution (%) of mother's pregnancy history in project and non-project villages

	NTT Alor 1999 n=395	**Non-project 1999** n= 134
Age of the mother (mean+sd.)	27.7 ∀ 5.3	28.6 ∀ 6.4
Pregnancy		
Yes, < 3 months	1.5	-
Yes, 4-6 months	4.0	1.5
Yes, 6-9 months	4.3	1.5
no	89.9	97.0
No. of children died at < 5 years of age		
0	77.1	79.1
1	18.6	17.2
∃ 2	4.6	3.7
Experience of stillbirth	5.8	2.2
Experience of miscarriage	13.4	9.6

During the last pregnancy the majority attended antenatal care, but only 6-10% of the women did go for more than 4 times. In project villages 40% of the mothers never went for a check up to the health post, which is significantly higher than in non-project villages (10%).

The frequent distribution of iron supplementation during the last 3 months of pregnancy was also significantly higher in non-project villages than in project villages. Women in project villages, who did not go for antenatal care, also did not receive iron tablets.

Table 26: Use of health facilities for antenatal care during the last pregnancy

	NT Alor 1999 n=395	**Non-project 1999** n= 134
Frequency antenatal care*		
Once-twice	29.1	38.1
3-4 times	24.1	42.5
More than 4 times	6.5	9.7
Never	39.2	9.7
Do not know	1.0	-
Iron suppl. during last 3 months of pregnancy*		
Once per week	4.5	5.2
Twice per week	2.3	6.0
Every day	46.2	67.2
No service	39.2	15.7
Other	7.8	5.9

* significantly different between the project and non-project villages

According to table 27, 40% of women in non-project and 27% in project villages joined the family planning program. The most frequent used methods are the 3 months injection. Most of the reasons of not joining the program were they still think that the family size is too small (17 – 20%), no service were available (6 – 14%) and the mother was pregnant at this time (3 - 9%).

Table 27: Frequency distribution (%) of participation of family planning methods

Family planning participation*	**NT Alor 1999** n=395	**Non-project 1999** n= 134
Usage of contraceptives	26.0	39.6
No participation in family planning	74.0	60.4

* significant difference between project and non-project village (p=0.025)

There was no difference in access to health facilities between the project and non-project villages. The majority ((62 – 74%) mentioned that they had no difficulties to reach the health center. 17 –25% of the women mentioned that the distance to the health post is to far. Women, who mentioned that the distance is too far lived in the villages Mataru Timur, Halerman, Kolana Utara, Kafelulang and Tribur, mountainous and coastal areas.

Table 28: Frequency distribution (%) of difficulties to reach the PUSKESMAS/PUSTU/POLINDES

Reason (p=0.132)	**NTT Alor 1999** n=395	**Non-project 1999** n=134
To far	24.9	17.2
No money	3.0	3.7
No vehicle for transportation	1.3	0.7
No difficulties	61.8	73.9
Do not know	9.1	4.4

Mothers knowledge about POSYANDU activities and health seeking behaviour

One of the methods to help improve the quality of health is by running preventive health posts called POSYANDU in Indonesia. The main activities of POSYANDUs which were mentioned by the mothers were growth monitoring (57 – 65%), followed by immunisation (27 – 41%), feeding program (20 –40%) and distribution of iron and Vit.A supplements (10 – 20%). The percentage of mothers who know more than 3 activities was 25 – 28%. There was significant difference found between project and non-project villages in terms of the knowledge and attendance to POSYANDU.

Table 29: Frequency distribution (%) of mother's knowledge of POSYANDU activities

Mother knows POSYANDU activities*	**NTT Alor 1999 n=395**	**Non-project 1999 n= 134**	p-value
Growth monitoring Program	57.8	64.2	0.002
Immunisation	40.5	27.6	0.001
Feeding program	20.4	39.6	0.001
Iron pills and Vit. A capsules distribution	19.3	10.4	0.003
Nutrition education	15.8	4.5	0.001
Mother and child care	12.6	9.7	0.004
ORS and Diarrhoea non-project	7.3	2.2	0.006
Family planning	4.8	5.2	0.046
Explanation about Growth monitoring	2.8	1.5	0.046
Number of correct answers			0.004
0	31.7	23.9	
1-2	39.4	50.7	
3-4	20.1	23.9	
>4	8.8	1.5	

* significant difference between project and non-project villages

Table 30 shows that around 50% of the children did not own a growth monitoring card (KMS). Significantly more children owned cards in project villages. The mean age of children, who had a card available (19.8 ∀ 12.8 in project and 21.6 ∀ 10.8 in non-project villages) was significant lower (p=0.028) than those who did not have card available (25.6 ∀ 14.1 in project and 20.5 ∀ 13.1 in non-project villages).

Table 30: Frequency distribution (%) of child owns a growth monitoring card (KMS) and activities

	NTT Alor 1999 n= 375	**Non-project 1999 n=130**
Child has a KMS (p=0.000)		
Available	46.4	30.0
Not available	15.5	30.8
No	38.1	39.2
Being weighed last year (p=0.006)		
never	4.8	2.3
1 to 4 times	18.9	12.3
5 to 8 times	7.7	6.2
> 8 times	17.3	9.2
No answer	51.2	70.0
Mother went to the POSYANDU during the last year		
Frequency (p=0.06)		
every month	38.9	32.1
Once	15.8	11.2
Twice	7.5	13.4
never	37.7	43.4

One of the tasks of POSYANDU kader is to give nutrition or health extension to the mothers. As shown in the table below there was not much difference between the nutrition extension source

and wishes to get extension from project and non-project villages. More than 50% of the women mentioned that they never got nutrition extension. Most of the women would like to get more information but if they had the choice they would like to get more information about nutrition and health from the midwife (50%) while those who wanted the information from the kaders was lower (6 – 12%).

Table 31: Frequency distribution (%) of got and wishes to get from nutrition extension

Nutrition extension source*	**NTT Alor 1999 n=395**		**Non-project 1999 n= 134**	
	Had from	**Want from**	**Had from**	Want from
Never/do not want get information	51.0	2.5	49.3	2.2
POSYANDU cadres	14.6	12.3	5.2	6.0
Health centre	7.5	9.5	15.7	17.9
TBA	21.9	0.8	0.7	0.7
Midwife	-	47.0	22.4	53.7
Other	1.5	4.8	2.2	6.7
D o not know/ No answer	3.6	23.1	4.5	12.7

* significantly different between the project and non-project villages

The main decision-maker of medication for children was parents, especially mothers (73 – 78%). PUSKESMAS was still playing a major role in the community health care. As shown in table 32, most of the mothers (71%) preferred to go to PUSKESMAS for consultation on medication. POSYANDU was the second important health facility (13%).

Table 32: Frequency distribution (%) of health seeking behaviour of households

	NTT Alor 1999 n=398	**Non-project 1999** n=134
Who decides to seek medication		
Father	15.6	23.1
Mother	77.4	73.1
Grandparents	1.8	1.5
Others	5.4	2.2
Place or person to consult* ($p<0.001$)		
Grandmother/grandfather	0.3	-
Private health service	0.5	0.7
Traditional healer/dukun	-	1.5
Self-treatment	11.1	3.0
POSYANDU	13.1	12.7
PUSKESMAS	70.1	70.7
Others	5.0	11.1

2.10 Nutritional status of mothers

Body mass index (BMI) indicates the relationship between an individual weight and height where most healthy adults have a value between 20 – 25 kg/m^2. Gets the BMI values get below 18.5

kg/m^2; it shows that the energy intake was too low in relation to the requirements. There were 17% of mothers in project and 30% of mothers in non-project villages had BMI below 18.5 kg/m^2, which shows a significant difference between project and non-project villages. Percentage of visible goiter found in the project villages was 5% and in non-project villages 3%. Almost 50% of the households either in project or non-project villages did not use iodized salt, that was more expensive (Price of iodized salt was 1000 Rupiah per kilogram while the price of normal salt was only 500 Rupiah per kilogram.)

Table 33: Frequency distribution (%) of nutritional status of the mothers by surveyed area

	NTT Alor 1999 n=395	**Non-project 1999** n=134
BMI*(pregnant women excluded) (kg/m^2)		
< 18.5	17.2	29.9
18.5 – 25	81.2	66.4
> 25	1.3	3.7
BMI (mean ∀ SD) kg/m^2	20.1 ∀ 1.9	19.9 ∀ 2.6
Mean height	149.7 ∀ 5.1	149.5 ∀ 5.0
Mid upper arm circumference		
< 22 cm	51.0	50.0
Mean ∀ SD, cm	22.2 ∀ 1.9	22.7 ∀ 2.5
Percentage of goiter in mothers	5.4	3.0
Presence of iodine in salt	53.1	56.7

Cut of points for women nutritional status: BMI < 18.5, MUAC <22 cm
* significantly different between project and non-project villages p<0.05

Mother micronutrient status

A further parameter of the mother's nutritional status taken into account was hemoglobin. More than half of the mothers in project (59%) and non-project (55%) villages suffered from anemia. The mean level of hemoglobin was 11. 4 ∀ 1.6 in project and 11.6 ∀ 1.9 in non-project villages. According to the statistical information malaria is the most prevalent disease in Alor. This was supported by the result of the survey that based on mother's statement, the prevalence of malaria was 83% in project and 78% in non-project villages.

Table 34: Mothers hemoglobin value and frequency distribution of anemia

	n	NTT Alor 1999	n	Non-project 1999
Mothers age (mean ∀ SD, years)	119	28.0 ∀ 5.2	46	29.1 ∀ 6.9
Hemoglobin level (mean ∀ SD, g/dl)				
Total	121	11.4 ∀ 1.6	46	11.6 ∀ 1.9
Non-pregnant	104	11.7 ∀ 1.5	45	11.7 ∀ 1.8
Pregnant	17	9.8 ∀ 1.1	1	7.5
Percentage of anemic mothers	121	58.7	46	54.4
Mother suffered from Malaria	395	82.4	134	77.6

Cut of points for anemia: Pregnant women 11.0g/dl
Not pregnant women 12.0g/dl

2.11 Nutritional status of children under five years

The total sample size of children was 398 children in project and 134 children in non-project villages. Because of extreme values and/or unreliable data a selection of (HAZ <2.6 & WHZ <2.1 and HAZ>-5.0 & WHZ >-3.0) was done for further analysis.

The percentage of boys and girls, who were surveyed, was equally distributed in project and non-project villages. The age distribution of the children in the sample was not as expected. In a random sample, one would expect each of the ten six-month age categories (table in appendix) of under-fives to contain approximately 10% of the children. Compared to this, the children aged from 6 to 24 months are over-represented, and those aged more than 36 months are under-represented. Therefore children older than 36 months are combined in one age group. The following table shows the age distribution.

Table 35: Sex and age distribution (%) for children under five years

	NTT Alor 1999 (n=375)	**Non-project 1999** (n=130)
Sex		
Boys	50.4	51.5
Girls	49.6	48.5
Agegroup		
< 6 months	12.5	16.2
6 < 12 months	16.3	22.3
12 < 18 months	18.1	16.2
18 < 24 months	15.7	17.7
24 < 36 months	20.8	16.2
> 36 months	16.5	11.5

Data on nutritional status are presented in table 36. The percentage of stunted, underweight and wasted children were high. The prevalence of stunting in project and non-project villages was 46% and 33% respectively and wasting was 7% and 13% respectively. There was a significant difference found in stunting prevalence between the project and non-project villages. The mean z-scores showed only significant difference in WHZ between project and non-project villages. The high prevalence of wasting was especially worrying in view of the fact that the survey was conducted in the beginning of harvest period, when food should be readily available and people usually were better fed than in the lean seasons.
The prevalence of HAZ, WAZ and WHZ between boys and girls in project villages showed also significant difference. Boys mean z-scores were significantly lower.

Table 36: Anthropometric characteristics

	NTT Alor 1999			Non-project 1999		
	Boys n= 189	**Girls n=186**	**Total n=375**	**Boys n=67**	**Girls n=63**	**Total n=130**
Age (months)	21.1 ∀ 13.1	21.3 ∀ 13.8	21.3 ∀ 13.4	16.4 ∀ 13.1	20.2 ∀ 12.8	18.2 ∀ 13.0
HAZ	-1.89 ∀ 1.36	-1.62 ∀ 1.30	-1.76 ∀ 1.34	-1.53 ∀ 1.24	-1.53 ∀ 1.26	-1.53 ∀ 1.24
WHZ	-0.77 ∀ 0.94	-0.54 ∀ 0.91	-0.66 ∀ 0.93	-0.92 ∀ 1.03	-0.99 ∀ 0.78	-0.96 ∀ 0.92
WAZ	-1.75 ∀ 1.14	-1.46 ∀ 1.11	-1.60 ∀ 1.14	-1.67 ∀ 1.08	-1.74 ∀ 1.03	-1.70 ∀ 1.05
Stunting	49.2	41.4	45.3	29.9	34.9	32.3
Wasting	9.5	4.3	6.9	16.4	7.9	12.3
Underweight	46.0	36.6	41.3	35.8	44.4	40.0

HAZ (height for age), WAZ (weight for age), WHZ (weight for height)
Stunting (HAZ <-2), Underweight (WAZ <-2), Wasting (WHZ <-2)

Difference by sex:
Project: HAZ p=0.030, WAZ p=0.008, WHZ p=0.017 (multivariate anova, covariate age)
stunting p=0.147, underweight p= 0.075, wasting p=0.066 (Fisher exact test)
Non-project: HAZ p=0.738, WAZ p=0.051, WHZ p=0.108 (multivariate anova, covariate age)
stunting p=0.577, underweight p= 0.372, wasting p=0.184 (Fisher exact test)

Difference by survey area:
stunting p=0.010, underweight p= 0.836, wasting p=0.065 (chi-square test)
HAZ p=0.353, WHZ p=0.001, (multivariate anova, covariate age)
WAZ p=0.100, (multivariate anova, covariate age and sex)

Mean height for age, weight for age and weight for height showed a similar pattern of change with age according to table 37. A decrease (worsening nutritional status) until approximately 24 months, then stabilization or slight increase (improvement of nutritional status) and then again a decrease for HAZ and WAZ. Only WHZ improved among children aged 36 months or older.
In the first 6 months of life, the mean z-scores were still normal. However, the nutritional status was worsening until approximately the age of 24 months and then became stable or slightly improving at the age of 24-36 months. Except WHZ, the HAZ and WAZ decreased after 36 months that again indicated worsening status.

Table 37: Mean values of anthropometrical indicators by age category

	NT Alor 1999 n=375	**Non-project 1999** n=130
< 6 months		
N	47	21
HAZ	-0.74 ∀ 1.19	-0.42 ∀ 0.81
WAZ	-0.27 ∀ 1.02	-0.50 ∀ 0.83
WHZ	0.35 ∀ 0.69	-0.24 ∀ 0.80
6 -11.9 months		
N	61	29
HAZ	-1.26 ∀ 1.33	-1.05 ∀ 0.96
WAZ	-1.50 ∀ 1.05	-1.58 ∀ 0.89
WHZ	-0.68 ∀ 0.87	-0.98 ∀ 0.87
12 -17.9 months		
N	68	21
HAZ	-1.73 ∀ 1.38	-1.82 ∀ 1.25
WAZ	-1.75 ∀ 1.17	-2.04 ∀ 1.16
WHZ	-0.83 ∀ 0.90	-1.16 ∀ 1.03
18 - 23.9 months		
N	59	23
HAZ	-2.15 ∀ 1.15	-2.03 ∀ 1.19
WAZ	-1.96 ∀ 0.97	-2.08 ∀ 0.80
WHZ	-1.12 ∀ 0.85	-1.38 ∀ 0.59
24 – 36 months		
N	78	21
HAZ	-1.84 ∀ 1.21	-1.93 ∀ 1.30
WAZ	-1.77 ∀ 1.02	-2.25 ∀ 0.83
WHZ	-0.76 ∀ 0.83	-1.22 ∀ 0.84
> 36 months		
N	62	15
HAZ	-2.59 ∀ 1.02	-2.24 ∀ 0.96
WAZ	-2.01 ∀ 0.78	-1.83 ∀ 0.83
WHZ	-0.64 ∀ 0.85	-0.63 ∀ 0.94

Figures 3-5 show the frequency distribution of malnutrition prevalence per age group. The prevalence of stunting increases with the age of the child. Stunting is not reversible and reaches the peak at 70% prevalence among children aged 36 months and older. This figure is very high and should be alarming.

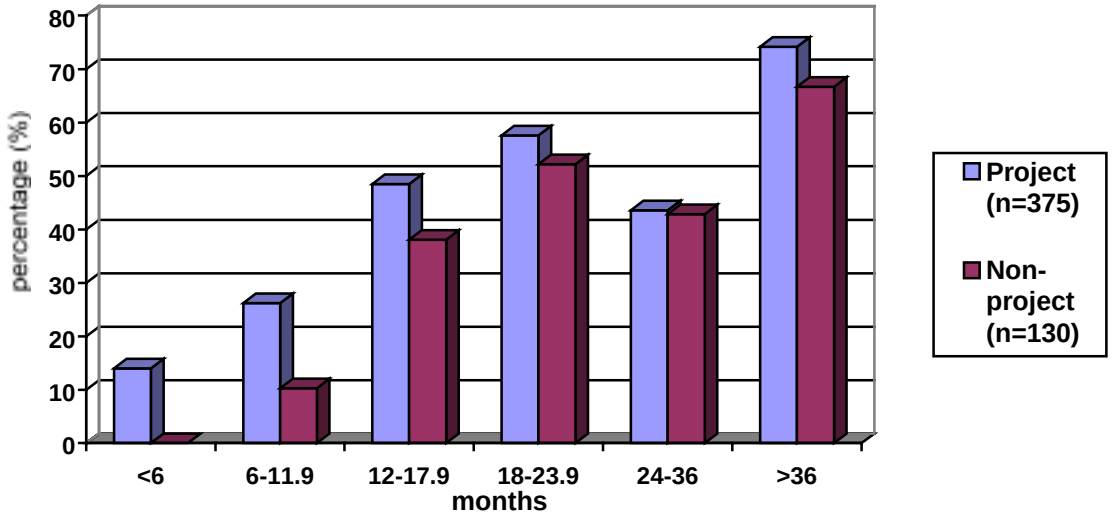

Figure 3: Prevalence of stunting based on age group in project and non-project villages

The survey was conducted in March, already the time of the first harvest. Underweight was very high already with the age of 6-12 months and stayed high in all age group. Children between 12 and 36 months had the highest prevalence of underweight.

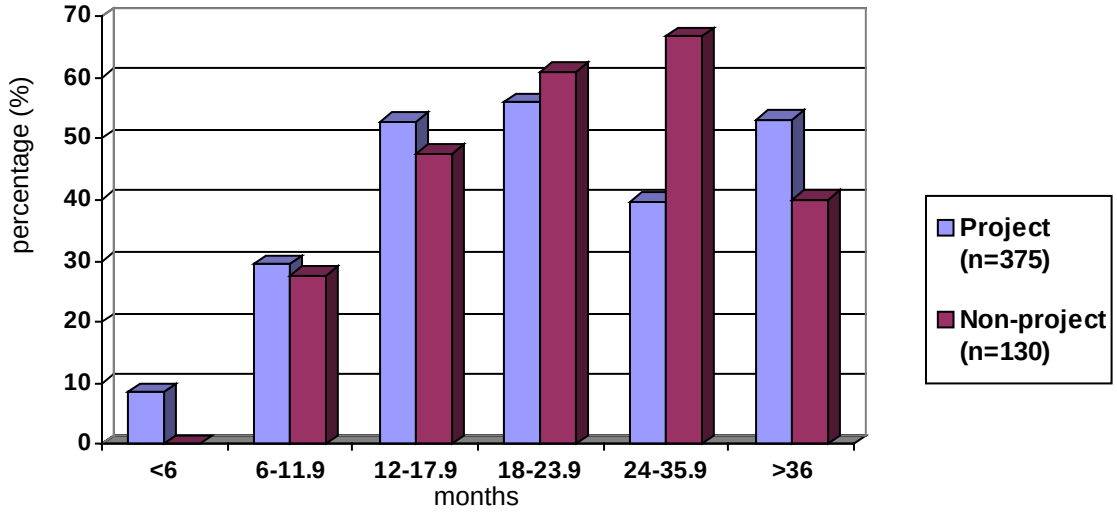

Figure 4: Prevalence of underweight based on age group in project and non-project villages

Acute malnutrition, wasting was very high in non-project villages between 12-18 months age group. In project villages the highest prevalence was found within the age group of 18-24 months with 12%. The survey was conducted in March, which was the end of rain season and time of the first harvest. During rainy season children are more often ill and the food availability is low, especially for children between 12 and 24 months.

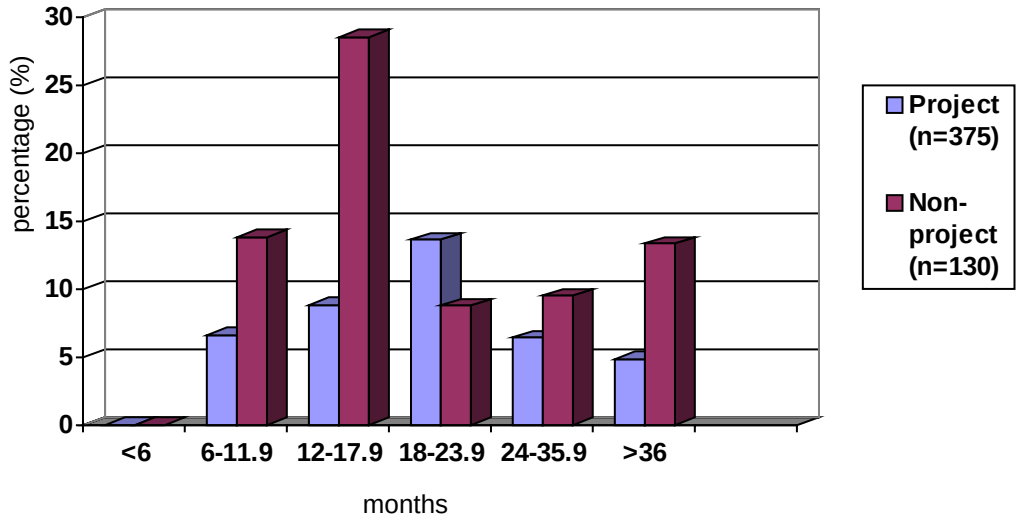

Figure 5: Prevalence of wasting based on age group in project and non-project villages

The prevalence of malnutrition in the different villages is shown in table 38. In Mataru Utara the range of stunting (68%), wasting (16%) and underweight (49%) was high, followed by the villages Mataru Timur and Wakapsir. The location of these villages is in mountainous and coastal areas. Kafelulang is situated in the most remote area, but the prevalence of malnutrition was not as high as in other villages. The geographical condition did not seem to be associated with the grade of malnutrition.

Table 38: Prevalence (%) of malnutrition expressed by stunting, underweight and wasting per village.

Sub-district	Village	Surveyed children	stunting	wasting	under-weight	Village classification
Alor Barat Daya	Pintumas	29	41.1	10.3	37.9	NT Project villages, mountainous
NT Project	Kafelulang	30	43.3	0.0	20.0	Mountainous
	Mataru Timur	31	58.1	3.2	38.7	Mountainous
	Mataru Utara	31	67.7	16.1	48.4	Mountainous
	Morba	39	38.5	7.7	41.0	Mountainous
	Wolwal,	32	43.8	3.1	43.8	Coastal
	Probur	33	33.3	9.1	39.4	mountainous
	Halerman	28	42.9	0.0	39.3	Mountainous
	Tribur	31	29.0	12.9	35.5	Coastal
	Wakapsir	28	57.1	7.1	57.1	Coastal
	Mataru Selatan	31	45.2	6.5	45.2	Coastal
	Lakatuli	32	46.9	6.3	50.0	Coastal
Alor Timur	Kolana Selatan	30	46.7	6.7	43.3	Non-project, coastal
	Kolana Utara	35	17.1	14.3	31.4	Non-project, coastal
Pembantu Alor Barat Laut	Welai Selatan	28	46.4	17.9	53.6	Non-project, mountainous
Alor Barat Laut	Lawahing	37	24.3	10.8	35.1	Non-project, mountainous

2.12 Infant and child nutrition

A common cause of nutritional deficiencies in small children can be attributed to inadequate infant nutrition. Improper feeding practices during the first two years of life can lead to many functional disorders and irreversible stunting.

Breast-feeding is still the prevailing practice in many communities. It is known that there is no more suitable source of nutrients for an infant up to four months of age than exclusive breast-milk. Early weaning of babies drastically increases the risk of contracting infectious diseases. The following tables give information about the breast-feeding practice in the surveyed villages.

It is very important that children are put to the breast as soon as possible after birth. One reason for this is to make sure that the children receive colostrum, the specific milk excreted after birth. Colostrum has a different fat, protein and vitamin composition compared to the later on produced white-colored milk, and has anti-infective properties, which is especially important for infant's health. According to table 39, 16% of the mothers reported to have started breast-feeding immediately after birth, and another 38% started 1-4 hours after births. Starting early is considered important because it increases the chance that colostrum is given, strengthens the bond between mother and child and has a positive effect on breast milk production. Half of the mother started later than 4 hours and did not give colostrum, but gave pre-lactal feeding to the child.

Table 39: Frequency distribution (%) of time of breast-feeding duration and pre-lactal feeding

	NT Alor 1999 (n=375)	**Non-project 1999 (n=130)**	p-value
Breastfeeding practice	66.9	77.7	0.026
Time child breast-fed after delivery			
Immediately	16.3	16.2	0.792
1-4 hours	37.4	37.7	
5-12 hours	6.1	3.8	
After 12 hours	40.1	42.3	
Colostrum feeding rate			
all	47.5	45.4	0.564
Infants <12 months	52.8 (n=57)	56.0 (n=28)	0.605
Child received pre lactal feeding	43.7	46.9	0.640

At the time of the survey 67% of the children in project and 78% in non-project villages were breast-fed. According to table 40 most of the children (82%) were breast-fed for 2 years. It is recommended that children younger than 4-6 months only be fed with breast milk, especially when the living environment is unhygienic. However 60% of the children in project and non-project villages already received other foods besides breast milk.

Table 40: Frequency distribution (%) of children who received breast milk and additional food in the past 24 hours according to age categories in project and non-project villages

	NT Alor 1999				Non-project 1999			
Age group	**n**	**Breastfed (%) past 24 hour**	**n**	**Received additional food(%) past 24 hour***	**n**	**Breastfed (%) past 24 hour**	**n**	**Received additional food(%) past 24 hour***
< 4 months	29	100.0	29	44.8	13	100.0	13	38.5
4-6 months	18	100.0	18	61.1	8	100.0	8	62.5
> 6-12 months	61	98.4	60	91.7	29	100.0	29	96.6
> 12-18 months	68	82.4	56	92.9	21	90.5	19	100.0
> 18 - 24 months	60	85.0	50	98.0	23	82.6	19	100.0
> 24	139	26.6	37	100.0	36	36.1	13	100.0

No significantly difference between project and non-project villages
* who are still breastfed

Table 41 shows that around 50% of the children under 6 months of age were exclusively breast fed and the other half already got additional fluids besides breast milk.

Table 41: Frequency distribution (%) exclusively breast fed children under 6 months of age by surveyed area

	NT Alor 1999 n= 47	**Non-project 1999** n=21
Children < 6 months		
Exclusively breast fed	48.9	52.4
Not breast fed anymore	0.0	0.0
Breast fed and other food/fluids	51.1	47.6

The risk that children get too late additional food besides breast milk did not seem a problem in the surveyed area. Almost all children older than 6 months already got additional food in project villages. In non-project villages 14% of the children received additional food when they were older than 6 months of age.

Table 42: Frequency distribution (%) of time complementary food is given to the child

Complementary feeding practices	**NT Alor1999** n= 375	**Non-project 1999** n=130
Age of the first introduction of solid food*		
< 4 months	65.6	54.6
4-6 months	23.7	24.6
> 6 months	6.1	13.8
Not yet	4.5	6.9

Chi-square p=0.018

Young children need to be fed more than 3 times per day, due to the small size of their stomach they can not eat enough food to cover for their nutrient requirements when they are fed less than 3 times per day. The following table shows the food frequency of children older than 12 months by certain food groups. Staple food was the main meal per day. Almost all children received it more than 2 times per day. Vegetable was the second important food source. Around 70%of the subjects in the surveyed villages consumed vegetable at least once during the last 24 hours. 50% of the children ate fruits during the last day, but oil consumption was too low, considering the fact that some vitamins need fat for absorption. There were 60% in the non-project villages but only 30% in project villages who consumed animal protein at least once per day. Around half of the children older than 12 months still received breast milk more than 3 times per day.

Table 43: Food frequency (%) of children older than 12 months last 24 hours prior to the survey

	Food consumption frequency Alor 1999							
	Never		**1-2 times**		**3 times**		**>3 times**	
	Project	**non-project**	**Project**	**non-project**	**Project**	**non-project**	**Project**	**non-project**
Breast milk	46.1	36.3	1.9	1.3	9.4	-	42.7	62.5
Staple food	1.9	3.8	14.2	20.0	49.8	57.5	34.1	18.8
Plant protein source	94.0	81.3	5.2	16.3	0.7	2.5	-	-
Animal protein source	68.2	37.5	23.2	37.5	7.1	18.8	1.5	6.3
Vegetable	27.7	22.5	41.2	50.0	26.2	23.8	4.9	3.8
Fruits	42.3	47.5	44.2	41.3	11.6	10.0	1.9	1.3
Oil/fat	89.9	93.8	8.2	1.3	1.1	5.0	0.7	-
Sugar	54.7	56.3	38.2	38.8	5.2	5.0	1.9	-
Snacks	95.5	88.8	3.7	8.8	0.4	1.3	0.4	1.3

NT project villages (n=267), non-project villages (n=80)
Significantly difference (p=0.05) between project and non-project villages were found for breast milk, animal protein, plant protein, oil consumption

2.13 Child health

Infectious diseases can be responsible for poor nutritional status. The most prevalent diseases in this area are acute respiratory infections and diarrhea diseases. In some regions measles or other infectious diseases such as malaria are endemic and can negatively influence the nutritional status.

The nutrient intake of a child drops off sharply during periods of diarrhea because of loss of appetite and /or vomiting. In addition absorption of nutrients from the digestive tract can decrease as much as 70%. According to table 44, 25% of the children suffered from diarrhea during the last week prior the survey. Significant difference between project and non-project villages was found in prevalence of ARI. Almost 80% of the children in non-project villages suffered from ARI in the last 7 days. Several studies have demonstrated a link between under-nutrition and acute respiratory infection (ARI). The prevalence of skin diseases was significantly higher in project villages with 33%. Around 70% of the children in project and non-project villages had suffered for malaria at least once up to the time of the survey.

Table 44: Prevalence (%) of diseases

Diseases	**NT Alor 1999** (n= 375)	**Non-project 1999** (n=130)	**p value** (chi-square test)
Point diarrhea	16.3	15.4	0.890
Period diarrhea+	25.9	24.6	0.816
Point ARI	55.5	62.3	0.183
Period ARI+	65.9	76.9	0.021*
Skin diseases	32.3	20.0	0.010*
Malaria (suffered once)	70.7	63.1	0.215

* significantly difference between project and non-project village,
+Diarrhea, ARI in the period one week prior to the survey

Based on government program, a child must get 5 types of immunisation (BCG, DPT, polio, measles and hepatitis) completed before the age of 12 months. Each immunisation is given at certain age during the first year of life. Under this condition, the assessment of immunisation coverage was done for the children who already reached the certain immunisation age. The BCG coverage was assessed for children aged 1month and older; DPT, Polio and hepatitis coverage were assessed for children age more or equal to 4 months; measles coverage was assessed for children age more or equal to 9 months.

In the surveyed villages, the health staff of the health center did the immunisation for pre-schooler's in integrated health. The immunisation received by each child was recorded in the growth chart (KMS, “Kartu Menuju Sehat”) or the health centre in the village called Pustu or “Puskesmas Pembantu” (Assisted Health Center) or Polindes ”Pondok Bersalin Desa (village clinic for delivery).

The data, which are presented in table 45, were obtained from KMS (“Kartu Menuju Sehat”). The KMS was not available among 68.8% of the children in project and 31.0% in non-project villages. Not all children were included in analyzing the immunization coverage, because 53.6% of the children in project and 70% in non-project villages had no available KMS or other immunization records, while the mother did not know nor aware of the frequency and type of immunization given.

The immunization coverage was low in both project and non-project villages, However, there was a big significant difference in immunization coverage between non-project and project villages. The coverage for Measles, DPT and Polio vaccinations were significantly lower in non-project areas than in project areas.

Table 45: Frequency distribution (%) of children vaccination coverage

Vaccination Coverage	NTT Alor 1999				Non-project 1999			
	n	Never	Insufficient**	complete	n	Never	Insufficient**	complete
BCG	173	37.6	-	62.4	39	38.5	-	61.5
DPT *	162	26.5	27.8	45.7	39	41.0	41.0	17.9
POLIO*	162	19.1	25.3	55.6	39	33.3	41.0	25.6
HEPATITIS*	162	52.5	8.0	39.5	39	84.6	7.7	7.7
MEASLES	132	65.2	-	34.8	35	77.1	-	22.9

*p<0.05, chi-square test (project vs non-project villages)
**means that the child did not get the immunization according to the age, (BCG∃ 1 month, DPT, POLIO, Hepatitis ∃ 4 months, Measles ∃ 9 months)
do not know and no answers are being included in percentages

The most common vitamin deficiency is vitamin A. This deficiency could be responsible for stunted growth, greater risk of infection, various skin and eye diseases and can also lead to blindness. Another far more widespread micronutrient deficiency is iodine deficiency. It can lead to retarded mental development and cretinism. Anemia leads to a reduced degree of physical activity in an individual and increases the vulnerability to infections.

Therefore, as a preventive primary health care activity according to the Indonesian health policy, vitamin A capsules should be distributed to children every 6 months, iodine tablet once a year and iron syrup during a certain period of 1-2 months per year.
According to table 40, almost all children received Vitamin A capsules, but iron syrup and iodine tablets were not commonly distributed through POSYANDUS or in the post for primary health care services.

Table 46: Frequency distribution (%) of children older than 12 months that never received micronutrient supplementation during the last year

Type of supplementation	NTT Alor 1999 (n= 267)	Non-project 1999 (n=80)	p-value
Vit.A capsule	37.1	33.8	0.267
Iron syrup	76.8	93.8	0.008
Iodine tablet	83.1	90.0	0.287

The prevalence of anemia was significant higher (78%) in project than in non-project (57%) villages. There was not a much difference between the prevalence of anemia among boys and girls per surveyed area. The mean hemoglobin level was 9.9 ∀ 1.7g/l in project, which is lower than the cut off point of 11.0 g/l for determination of anemia. The prevalence of anemia is significantly higher among younger children (table 48).

Table 47: Children's micronutrient status

	NT Alor 1999		Non-project 1999		Total	
	n	mean ∀SD	n	Mean ∀ SD	n	Mean ∀ SD
Child age (months) M-W=0.067	123	24.4 ∀ 13.7	46	23.7 ∀ 13.8	169	24.2 ∀ 13.7
Hemoglobin level (g/L)	123	9.9 ∀ 1.7	46	10.3 ∀ 1.7	169	10.0 ∀ 1.7
Anemia prevalence* By sex (%)						
Male	65	78.5	29	55.2	94	71.3 (p=0.028)
Female	58	77.6	17	58.8	75	73.3 (p=0.21)
Total	123	78.0	46	56.5	169	72.2 (p=0.007)

*cut of points: Hb < 11g/dl
chi-square test

Table 48: Child's mean age of children who suffered and not suffered from anemia

Anemia status	NT Alor 1999		Non-project 1999		Total*	
	n	mean ∀ SD	N	mean ∀ SD	n	mean ∀SD
Anemic (Hb < 11g/dl)	96	23.1 ∀ 14.2	26	21.8 ∀ 15.9	122	22.8 ∀ 14.6
Normal (Hb > 11g/dl)	27	28.9 ∀ 10.3	20	26.3 ∀ 10.3	47	27.8 ∀ 10.3

*significant difference p<0.05

Indicators on which significant differences between project and non-project villages were found

Socio-economic indicators

Mothers religion
Mothers origin
Mothers and father has additional job
Possession of radio, bicycle and electricity (generator)
Source of drinking water
Distance to drinking water
Cultivation and usage of crops
Possession and usage of livestock
POKMAS participation

Mothers nutritional status and health care

Frequency of antenatal care
Iron supplementation
Family planning participation
Mothers knowledge about POSYANDU
Possession of KMS
Nutrition extension course
Person or place to consult for health cares
BMI of mother

Child nutrition and health care

Nutritional status by sex
Stunting per survey area
Age of first introduction of solid food
Food consumption
Prevalence of period ARI
Prevalence of skin diseases
Coverage of DPT, Polio and Hepatitis vaccination coverage
Prevalence of anemia

3. Determinants of children's nutritional status for NT Alor Project villages

The association of children's nutritional status with selected possible determinants was calculated only for NT- Project villages, Alor. This analysis was carried out to investigate whether there were sub-groups in the surveyed villages who lived under more difficult circumstances than the rest of the population. Furthermore, specific possible causes of malnutrition among children were investigated.

Association between educational level of the mother and nutritional status of children under five was measured by comparing 2 groups, 1-6 years of schooling (primary education) and more than 6 years schooling (secondary education). It was found that children of mothers with more than 6 years of education had better mean z-scores of height for age and weight for age.

Table 49: Association between children nutritional status and mother's education

Mother's education level	n	HAZ x ± sd	WAZ x ± sd	WHZ x ± sd
1 – 6 years	299	-1.81 ± 1.35	-1.65 ± 1.15	-0.68 ± 0.93
> 6 years	76	-1.58 ± 1.26	-1.43 ± 1.08	-0.57 ± 0.92
p-value*		0.065	0.062	0.258

*Multivariate anova, covariate age (HAZ, WAZ, WHZ) and sex (WAZ)

No significant association was found between the nutritional status of under-five children and family land size. However, there was a tendency that the height for age of children in households with 0-0.5 ha land were lower than of children in households with more than one hectare of land.

Table 50: Association between children nutritional status and family land size

Private land size (ha)	n	HAZ x ± sd	WAZ x ± sd	WHZ x ± sd
0 – 0.50	96	-1.90 ± 1.37	-1.68 ± 1.12	-0.63 ± 0.88
> 0.50 – 1.00	116	-1.76 ± 1.16	-1.61 ± 1.06	-0.66 ± 0.95
> 1.00	125	-1.55 ± 1.49	-1.46 ± 1.22	-0.67 ± 0.91
p-value*		0.062	0.184	0.951

*Multivariate anova, covariate age (HAZ, WAZ, WHZ) and sex (WAZ)

Alor is a very remote area and the population depends on their subsistence agriculture, which provide them with food and income by cultivation of cash crop.

One of the cash crops in Alor is coffee. The following table shows the association between cultivation of coffee and the mean z-scores. Significant association was found for weight for height mean z-scores. Children in households, which cultivated coffee, have a lower mean z-score. Cash crops can increase the income, which can be used in the time of food shortage.

Table 51: Association between children nutritional status and coffee cultivation

Coffee cultivation	n	HAZ x ± sd	WAZ x ± sd	WHZ x ± sd
Not cultivated	199	-1.73 ± 1.35	-1.66 ± 1.13	-0.75 ± 0.89
Cultivated	176	-1.80 ± 1.33	-1.54 ± 1.14	-0.55 ± 0.96
p-value*		0.428	0.476	0.044

*Multivariate anova, covariate age (HAZ, WAZ, WHZ) and sex (WAZ)

Fish is the main animal protein source in the surveyed area. Table 52 indicates the association between the frequency of fresh fish consumption and nutritional status of children. The consumption of animal protein in weekly or daily basis shows clearly a tendency to a better nutritional status. The mean z-score of height for age increases with the frequency of consumption. Children need animal protein for their growth.

Table 52: Association between children nutritional status and frequency of fresh fish consumption in the household

Frequency of consumption	n	HAZ x ± sd	WAZ x ± sd	WHZ x ± sd
Never/ less than monthly		-1.94 ± 1.17	-1.70 ± 1.00	-0.64 ± 0.88
Weekly		-1.63 ± 1.46	-1.52 ± 1.23	-0.68 ± 0.98
Daily		-1.78 ± 1.20	-1.66 ± 1.07	-0.65 ± 0.85
p-value*		0.064	0.321	0.900

*Multivariate anova, covariate age (HAZ, WAZ, WHZ) and sex (WAZ)

The frequency consumption of staple food of children older than 24 months was significantly associated with weight for age and weight for height. The means z-scores increased when the child was fed more than 3 times. This is a strong indicator for food availability and also for care capacity on household level. Growth retardation occurred within the age of 12-24 months among the surveyed children. But this does not seem to be significantly associated with the feeding frequency of the children. Frequent acute malnutrition among children can lead to stunting.

Table 53: Association between children nutritional status and staple food consumption of children age > 24 month

Frequency of consumption	n	HAZ x ± sd	WAZ x ± sd	WHZ x ± sd
<3 times	21	-2.53 ± 1.19	-2.30 ± 1.02	-1.03 ± 0.85
3 times	65	-2.08 ± 1.24	-1.68 ± 0.88	-0.54 ± 0.82
>3 times	53	-2.10 ± 1.09	-1.92 ± 0.87	-0.78 ± 0.81
p-value*		0.381	0.017	0.040

*Multivariate anova, covariate age (HAZ, WAZ, WHZ) and sex (WAZ)

The same tendency of increased malnutrition is shown in the next table. The mean z-scores of weight for age and height for age increase, when the caretaker was the mother. Studies has shown that mothers have the highest care capacity for their children and workload of the mother with i.e. agriculture leads to decrease of the attention for the child.

Table 54: Association between children nutritional status and caretaker of the children

Care taker	n	HAZ x ± sd	WAZ x ± sd	WHZ x ± sd
Mother	240	-1.69 ± 1.37	-1.50 ± 1.15	-0.58 ± 0.95
Others (father, grandparents, etc	135	-1.88 ± 1.28	-1.79 ± 1.09	-0.80 ± 0.88
p-value*		0.503	0.061	0.050

*Multivariate anova, covariate age (HAZ, WAZ, WHZ) and sex (WAZ)

Table 55 shows a significant association between food expenditure of the household and height for age mean z-scores. The higher the food expenditure the better the mean z-score. Food expenditure seems to be associated with food availability within the households.

Table 55: Association between children nutritional status and food expenditure in the last month

Expenditure Category (Rp)	n	HAZ x ± sd	WAZ x ± sd	WHZ x ± sd
< 10000	155	-1.79 ± 1.35	-1.63 ± 1.13	-0.69 ± 0.89
10000 – 50000	165	-1.84 ± 1.31	-1.63 ± 1.14	-0.62 ± 0.97
> 50000	51	-1.40 ± 1.34	-1.45 ± 1.11	-0.72 ± 0.90
p-value*		0.013	0.277	0.855

*Multivariate anova, covariate age (HAZ, WAZ, WHZ) and sex (WAZ)

A low BMI of the mothers showed a slight tendency to low mean z-scores of the children less than 5 years. Studies have shown, that mothers, who already suffered from underweight give birth to children with lower birthweight.

Table 56: Association between children nutritional status and mother's nutritional status

Mother's nutritional status	n	HAZ x ± sd	WAZ x ± sd	WHZ x ± sd
BMI < 18.5 kg/m^2	62	-1.96 ± 1.38	-1.86 ± 1.10	-0.85 ± 0.88
BMI ≥ 18.5 kg/m^2	304	-1.69 ± 1.33	-1.54 ± 1.14	-0.63 ± 0.94
p-value*		0.243	0.075	0.107

*Multivariate anova, covariate age (HAZ, WAZ, WHZ) and sex (WAZ)

Diseases

ARI and diarrhea are the major childhood diseases and there are strong associations with under-nutrition and child mortality in the world. In this survey however no difference was found in nutritional status between children who were ill at the time of the survey and those who were not.

The following table shows that there is a tendency that children, who live in poorer housing condition (leave roof, bamboo wall, earth floor) were likely to have diarrhea as children in better housing condition (tile/tin roof, non-bamboo wall and cemented floor). Poorer housing condition indicates poorer hygienic situation in the family and lower economic status.

Table 57: Association between child's diarrhea prevalence and housing materials

Housing materials	n	Prevalence (%) of	
		Point diarrhea	Period diarrhea
Leave roof, bamboo wall, earth floor	188	20.2	29.8
Tile/tin roof, non bamboo wall, cemented floor	67	16.4	28.4
Other combination	120	10.0	18.3
p-value (chi-square test)		0.060	0.072

A contradiction was found, because children in households with the highest food expenditures had a significantly higher prevalence of diarrhea as the households with lower food expenditures. This indicates that the hygienic situation is more a contributing factor for the diseases than the family income or wealth.

Table 58: Association between child's diarrhea prevalence and food expenditure last month

Expenditure category (Rp)	n	Prevalence (%) of	
		Point diarrhea	Period diarrhea
<10000	155	11.6	20.0
10000 – 50000	165	17.0	28.5
> 50000	51	29.4	37.3
p-value (chi-square test)		0.012	0.034

Significant difference was found between water source and prevalence of diarrhea. Children in households, which obtained water from the spring, had a higher prevalence of diarrhea than those, who obtained water from wells. Wells are usually close to the house and the water is more available within the household, the hygienic situation might be better in those households.

Table 59: Association between child's diarrhea prevalence and water sources

Water sources	n	Prevalence (%) of point diarrhea
Well	71	5.6
River/canal/hole near river	140	16.4
Spring	149	18.1
p-value (chi-square test)		0.044

Mother's anaemia prevalence is significantly associated with the prevalence of anaemia in children under 5 years. Almost 90% of the children, whose mother were anaemic, also suffered from anaemia, while if the mother was not anaemic the prevalence was significantly, lower (67%).

Table 60: Association between child's anemia prevalence and mother's anemia prevalence

Mother's status	Child's anemia prevalence	
	n	%
Anemic	63	88.9
Normal	33	66.7
p-value (chi-square test)		0.013

It is concluded that only few associations between nutritional status on the one hand and socio-economic, agricultural and environmental factors as well as mother and child health care and feeding habits of children under-five on the other hand, have been found. This might be due to the fact that the survey population is quite homogeneous with regard to most of the factors studied.

Conclusion

- In general, the household's condition in project and non-project village was similar in term of socio-demographic condition, agricultural pattern, general food pattern and food availability, monthly expenditure pattern, hygiene and sanitation, and water availability. The water source and the distance to water source were better in non-project villages than project villages.

- The economic condition were better in non-project villages, indicated by more percentage of households possessed selected household items, raising animals, cultivated plants, and consumed rice daily.

- Prevalence of mother's chronic energy deficiency was higher in non-project villages (30%) than project villages (17%). However, other indicators indicated that mother's health condition was similar between project and non-project villages. Prevalence of miscarriage (10-13%), stillbirth (2-6%) and children under-five (21-23%) mortality was high but not significantly different between project and non-project villages. The prevalence of anemia and malaria was high (respectively 59% and 83% in project villages and 55% and 78% in non-project village). Percentage of visible goiter was 5% in project villages and 3% in non-project villages.

- The prevalence of malnutrition among underfive was high. The prevalence of stunting, wasting and underweight in project villages was 46%, 7% and 41%, respectively while it was 33%, 12% and 40% in non-project villages. The prevalence was higher in project villages, boys or older children. The prevalence of anemia was significant higher in project (78%) than in non-project (57%) villages and significantly higher in younger children. The highest prevalence of disease in project and non-project villages was malaria (71% and 63% in project and non-project villages respectively) followed by acute respiratory infection (ARI) (55% - 77%), skin diseases (20%-30%) and diarrhea (15%-26%).

- Health center was the main place for health treatment either in project or non-project villages. Regardless the far distance, the community claimed no difficulties to reach the health center. However, the usage of health service facilities, including Posyandu, for preventive actions (family planning, antenatal care, supplementation for mothers and children underfive, growth monitoring, and immunization) was low. Nutrition extension was mainly demanded by midwife.

- Child feeding pattern/habits still need to be improved concerning colostrum feeding practice, time to give supplementary feeding, food diversity and frequency of feeding practice.

- Several factors that tended or significantly had association to children nutritional status were mother's education level, land size, coffee cultivation, frequency of fish consumption in the household, frequency of staple food consumption for the child, child's care taker, food expenditure, and mother's nutritional status.

- Factors that were associated with child's diarrhea were housing condition, food expenditure, and water sources. Child's anemia was related to mother's anemia status.

- In general the main problems that might associated to child's health and nutrition in the surveyed villages (project or non-project villages) were:
  - mother's health status and nutrition knowledge,
  - hygiene and sanitation,
  - access to health service and usage of preventive health service,
  - child's feeding pattern (practice of giving colostrum, too early supplementary food), and
  - variability of food.