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NUTRITION ASSESSMENT 2002
D.P.R. Korea

In 2002, the Government of the D.P.R. Korea, in co-operation with the United Nations Children's Fund (UNICEF) and the World Food Programme (WFP), carried out a nutrition assessment in seven provinces and three cities. Fieldwork for the assessment was completed in October 2002. The aim of the assessment was to determine the nutritional status of children less than seven years of age and of their mothers, and to analyse the importance of possible causal factors.

The report of the Central Bureau of Statistics, enclosed, presents the situation of the "youngest child of 6,000 selected households" as well as findings related to causal factors. The estimated malnutrition rates for children less than seven years in each of the provinces and cities surveyed is given in the enclosed table.

Enclosed:

1. Nutrition Assessment Report, Central Bureau of Statistics
2. Three summary tables of estimated malnutrition rates

Pyongyang
February 2003

Report on the DPRK Nutrition Assessment 2002

Central Bureau of Statistics, DPRK

November 20 Juche 91 (2002)

FOREWORD

The Democratic People's Republic of Korea is pleased to have successfully completed the implementation of the Nutrition Assessment in collaboration with the United Nations Children's Fund(UNICEF) and the World Food Programme(WFP).

With representative of our government, the Central Bureau of Statistics (CBS) carried out the survey in collaboration with the Institute of Child Nutrition (ICN). UNICEF and WFP provided financial and logistical support and the Institute of Child Health, London and Thailand Health Foundation, Bangkok provided technical advice. CBS was directly responsible for preparation of questionnaire, identification of survey target households, enlistment and training of survey team members, organization and monitoring of field survey activities, review of questionnaires and data collection, data analysis and report write-up.

CBS extends its sincere gratitude to the National Co-ordinating committee for UNICEF, DPRK and all the statistics and medical staff concerned for the invaluable assistance provided in the realization of survey. We also express our thanks to UNICEF and WFP and their staff for the logistical and technical support provided during the survey.

Central Bureau of Statistics, DPRK

November 20 Juche 91 (2002)

EXECUTIVE SUMMARY

The Nutrition Assessment (NA), carried out by CBS in collaboration with ICN with financial and logistical support of UNICEF and WFP, was successfully concluded on schedule in October, as planned and agreed in a joint protocol signed in July 2002. The NA aims to serve as a baseline reference to evaluate the future programmes and expenditure of the Government, UNICEF and WFP that are directed at improving the nutrition situation of women and children in DPRK. A second aim of the NA is to improve the capacity of CBS and ICN in carrying out such surveys. The objective of the NA is to assess the nutritional status of a representative sample of children from birth to six complete years of age and of their mothers in seven provinces and three cities.

The survey was carried out in 200 randomly selected Ri and Dong from seven province sand three cities of DPRK. Three different teams with members from both central and provincial level carried out the NA involving over one hundred professionals of CBS, ICN, WFP and UNICEF. Twenty teams of five persons from the central level carried out data collection. They were assisted by provincial level logistics teams that arranged for local preparations and support in the Ri and Dong, and by a provincial level data entry and quality control team.

The survey sample includes 6,000 randomly selected households located in 200 randomly selected Ri and Dong of seven provinces and three cities. The selected households were those that had children aged under seven years of age. In each such household selected, the youngest child was weighed and measured and information collected on household food. In those households that the child was under two years of age, the mother was also interviewed concerning maternal and child health care practices, infant feeding practices, and maternal feeding practices. The mothers of children under two years old children were also weighed and measured, and invited to have a haemoglobin examination.

The survey data was verified and analyzed by CBS with technical assistance from ICH and THF in the third week of November 2002. The data collected and the measurements made are of a high quality and reflects well the great efforts put into ensuring the standardization and data quality checking by the staff of CBS and ICN. Using standard computerised statistical analysis packages, the frequency, rate, cross tabulation and correlation were tabulated and calculated. Fleiss quadratic 95% confidence interval for cluster sampling proportion, relative risk estimated by rate ratio and its

95% confidence interval, and incidence density rates, and adjusted prevalence proportionate to population size were also calculated.

The results of the NA suggest that the nutritional situation of children in DPR of Korea has improved considerably since the first survey was carried out in 1998, and are supportive of the results of the second survey carried out in 2000. The prevalence of child underweight in the surveyed sample of 6000 children is 20.15%, and of stunting is 39.22%, and of wasting is 8.12%. The overall prevalence of severe wasting, defined as less than 3 z-score weight for age, is 2.7%.

The nutrition situation has certainly improved dramatically since 1998, and the results of 2002 assessment are consistent with the improvement observed by the 2000 survey. Although these three surveys are not strictly comparable, they are still all very large surveys, each covering great majority of the national population. Careful interpretation of the results suggests that real improvements have occurred and continue to do so. These improvements are much more for underweight than they are for stunting . The fall in underweight across three surveys from 60% to 28% to 20% shows a consistent trend.

However, the rates of child underweight and stunting are still high and require continued efforts on this part. There is evidence that maternal nutrition is from being optimal with a third of mothers who are measured less than 22.5 cm for MUAC. For future, we will do our best to improve maternal nutrition in order to solve the problem of children malnutrition.

Whilst the food situation surveyed in seven provinces and three cities appears to be good from a quantitative perspective, it must be improved qualitatively. The majority of households reported that they had some food in store, and the presence in the food store of the main starchy staple was universal. The mothers reported that they had all eaten the day before and the great majority had eaten three meals. The consumption of the main food energy sources was almost universal. The consumption of protein rich food like meat, fish, eggs and pulses, and of fruits was not universal and showed provincial variation.

The child feeding practices are good from many aspects. The overall rate of exclusive breastfeeding of infant aged less than 6 months in seven provinces and three cities of DPRK is quite good, with almost 70% of mothers of children aged less than six months giving only breastmilk. The diarrhoea rates is 19.1% and the feeding practices during illness could be improved. The

coverage of Vitamin A supplementation to young children is very high at 98.6% and the coverage of post-partum Vitamin A supplementation is 33%.

The food and nutrition situation is not the same across seven provinces and three cities surveyed. The nutrition assessment did not investigate all possible causes of child growth and a more in depth analysis of the possible causes at each provincial level is certainly merited. Results from this survey already suggest however, that in those provinces and cities where foetal and infant growth failure is most common future efforts should consider looking at ways to improve the diet of the mothers before pregnancy, during pregnancy and during lactation.

INTRODUCTION

The design of the protocol and the realization of the Nutrition Assessment in DPRK (2002) was the result of series of discussions and collaborations between the consultant team (CICH and THF), UNICEF and representatives of the National Coordinating Committee for UNICEF,DPRK, the Central Bureau of Statistics (CBS) and the Institute of Child Nutrition (ICN).
The results presented in this report are those of the surveyed children only i.e. the youngest child in each of 6,000 selected households.

BACKGROUND

The Government of the Democratic People's Republic of Korea has carried out the Multiple Indicator Cluster Survey in 1998 and 2000, and based on the result of these surveys the Government has continued to provide assistance to the population of DPRK in the best interests of their health and development.

With the welcome assistance of UNICEF and WFP the Government is committed to continue to try and improve the welfare of women and children. Because of these shared aims and in recognition of these common interests, a protocol was signed committing the various parties to jointly realize the Nutrition Assessment.

AIMS AND OBJECTIVE OF NUTRITION ASSESSMENT

Aim

The first aim of the Nutrition Assessment is to serve as a baseline reference to evaluate the future programmes and expenditure of the Government, UNICEF and WFP that are directed at improving the nutrition situation of women and children in DPRK. The second aim is to improve the capacity of CBS and ICN in carrying out such surveys.

Objective

The objective of the NA 2002 is to assess the nutritional status of a representative sample of children from birth to six complete years of age and of their mothers in seven provinces and three cities.

SURVEY METHODOLOGY

Timing.

The survey for the Nutrition Assessment 2002 was conducted during the month of October 2002, between 7th and 25th of October. The allotted time for the survey was 10 working days per province plus travel time. Twenty teams worked in seven provinces and three cities; two teams per province and each team completed one PSU per day, with each team completing 10 PSUs.

Sample Design

The DPR of Korea consists of 9 provinces and 3 municipal cities. There are 206 counties in the country. Each county further divided into small administrative units called Ri in rural area and Dong in Urban area. Total population of the DPRK is about 23 million.

The sample of the NA 2002 survey represents the universe of 7 provinces and 3 municipal cities. All Dong or Ri of these provinces/cities served as the sampling frame to randomly select 20 of them, which formed the Primary Sampling Unit (PSU). This selection was performed according to the urban-rural proportion. The total of 20x10= 200 PSU was selected from seven provinces and three cities. The selection was used by program (RAMDOM-DONG-RI-V4-24-7-2002XIS) on Excel. If a Dong or a Ri was selected that fell into a county that was non-accessible then the next number became the selected number until an accessible Dong or Ri was chosen. In each PSU one nursery was randomly selected and two children from the list of those enrolled was be randomly selected and their families became the index household. These households together with 14 households with children under seven years of age closest to them formed the Secondary Sampling Unit (SSU). Thus 30 households were selected for each PSU, and a total number of 6,000 households to be surveyed in SSUs of seven provinces and three cities. In cases of 2-3 children in each house, the last child was chosen. A total number of 600 households were surveyed in each province.

Therefore a total number of 6,000 mothers and children aged under 7 were respectively surveyed in seven provinces and three cities.

The Different Teams

There were 4 different teams, namely central commander team, data collection team, data entry and quality control team and local logistic team. The central commander team was consisting of CBS/ICN responsible members. The members of the 20 data collection teams were provided from the central level in Pyongyang. Each team consists of one CBS staff, one ICN staff, one international officer from UNICEF or WFP, one national from UNICEF / WFP and a driver.

The data entry and quality control teams and logistics teams were from CBS provincial level. The lists of collection teams, data entry and quality teams are shown in Appendix.

Training

Training for the members was given in 5 phases. 1st training (TOT, training of trainers) was done by consultants to the staff of headquarters and the data checking staff from each province, from Sep.26th to Sep.28th.The training included theory and practise. The 2nd, 3rd and 4th training for the data collection teams were carried out by CBS and ICN trainers as three batches of about forty participants. The participants received the questionnaires in Korean and English, and guidelines of nutritional assessment in English were distributed to the international staff. TOT trainers gave these trainings in accordance with the same contents and procedures as that given in the TOT from Sep.29th to Oct.4th. The 5th training (Oct.2nd-Oct.3rd) was given to the provincial data entry and logistic teams. The former 4 trainings took place at Grand People's Study House and the last 5th training at CBS.

Survey instruments

The questionnaire, the main instrument of survey, was composed of 4 parts; household questions, maternal and newborn health questions, child anthropometry and maternal anthropometry. Considering the requests of UNICEF/WFP, the questionnaire was based on the standard MICS questionnaire of UNICEF with parts not directly related to Nutrition removed. Additional questions related to food source and intake was included. Maternal and newborn health questionnaire was asked only to mothers with a child under 2, and consists of 6 modules, namely: maternal and newborn health; Vitamin A coverage, breastfeeding; care of illness; immunization; and maternal food frequency questions. Child anthropometry module subdivided into anthropometry (child under 7), anthropometry and haemoglobin (mother with children aged less than 2) modules. Maternal anthropometry module contained the MUAC and haemoglobin test.

Weight was measured to the nearest 0.1kg using the UNISCALE in accordance with manufacturer's instructions. All children aged less than two years of age weighed in arms of their mother. Height/ length were measured using a wooden board especially developed and adapted locally to measure to the nearest 1.0mm. All children under two years were measured lying down, and those over two standing up. Mid Upper Arm Circumference (MUAC) was measured to the nearest 1.0 mm on the mothers of children under two using a plastic insertion tape provided by UNICEF. The mothers of children under two were only measured MUAC. Among mothers of children under two who agreed to have a test, Haemoglobin was measured in the field using the Haemocue method.

Roles and responsibilities of data collection team member

The roles of the data collection team members were very complementary and equally important, such that good teamwork was essential for the success of the survey. The division of responsibilities across the members of the team was as follows; The CBS staff was the principle person responsible for all interviews. The ICN staff was the principal person responsible for the anthropometrical and clinical examinations. The national UN officer in close collaboration with the international UN officer was the main person responsible for doing the random selection of nurseries, and identifying the index child through house to house seeking, identifying and referring of mothers to the central location. Five officers from UNICEF and 15 officers from WFP took part in this survey. The survey was carried out with the interviews and clinical examinations by every collection team.

Anthropometry standardization

Before fieldwork began, the anthropometrists from ICN performed a standartzation protocol, especially developed based on a model obtained from WHO Geneva that measured their precision and accuracy. Based on a first standardization test, the accuracy of seven anthropometrists was improved by correcting their measurement technique. The result of the second improved anthropometry standardization procedure on all 20 anthropometrists was available for inspection.

Organization of the fieldwork

The Survey teams were based in the provincial capital and where feasible travelled from there to each selected Ri/Dong and returned again at the end of the day. On arrival in the province the two data collection teams met with the provincial survey coordinator and his logistics and data entry team chiefs. The provincial logistics team prepared the lists of nurseries in each of the selected Ri and Dong available for the data collection teams in order to allow the random selection of two nurseries by them for each Ri and Dong. The logistics team advised the local committees where the

chosen nurseries are located so that the families surrounding the nurseries could remain in their houses in the morning the data collection teams were scheduled to visit their area.

In each PSU the provincial logistics team had drawn rudimentary maps showing where all the houses of the children in the elected nurseries and prepared the local communities to be at home on the day of the visit by the data collection team. When the data collection team arrived in a PSU, they visited the nursery and randomly selected two children from the register. From the data collection team, the national UN officer in close collaboration with the international UN officer did the systematic search and selection of the 30 households.

The randomisation was carried out as follows: First two children were randomly selected from the register and noted down the names and address. Then from the houses of these children, through a process of "oiling" the 28 households around these two index children's houses where have children aged under seven. In case the mother with a child refused to participate in the survey, the team went to the next household until they found a mother agreed to participate. If the mother said "Yes" to participate, she was given a referral slip and a ribbon tied around her wrist and the wrist of the child, so that they could be identified as part of the selected population sample when they arrived in the central location for examination.

The process of identifying the 30 mothers and their children under seven was completed before mid-day, such that in the afternoon the national officer could also help the CBS person with interviews in the central location. At end of the day the whole team reviewed together the procedures of the day and checked the questionnaires. The team supervisor took the set of 30 questionnaires and handed over to the data entry team leader when they got back to the provincial headquarters.

Data Entry and data quality checking

The data compiled by each collection team was handed over to the provincial data entry/quality checking team on the same day of each fieldwork, and entered to the computer next day. In the province the error checking was done whilst still in the field to guarantee the consistency and the quality of nutritional assessment data. The data entry/checking program, prepared by consultants from Epi Info according to the contents of questionnaire was used to do the data entry. If an error was detected, it was immediately informed to the data collection team supervisor and corrected whilst still in the field by the data collection team.

Data analysis

Data analysis was performed by the staff of CBS together with the consultants from Nov.18th to Nov.25th 2002.

Two clusters in each province and two sample households in each cluster were randomly selected for data entry verification. Each data item from 40 sample households was thoroughly checked both in the data collection forms and in the data files. Of more than 2,000 data items, 6 data item entry mistakes (approximately less than 0.3%) were found, all in non-anthropometrical and haemoglobin data fields. Then, a single database for data analysis totalled 6,000 records was prepared by vertically (combine data from all clusters together) and then horizontally (combined all variables from different forms) merging 4 data files together.

Data processing and data analysis were done by using SPSSPC version 10.5 for Windows and Epi Info 6 version 6.04d. Frequency, rate, cross tabulation and correlation were tabulated and calculated initially by SPSSPC. Fleiss quadratic 95% confidence interval for cluster sampling proportion, relative risk estimated by rate ratio and its 95% confidence interval, and incidence density rate were carried out later from SPSSPC output files using Epi Info 6. Adjusted prevalence proportionate to population size was also done using Excel Spreadsheet.

THE DATA SET AND THE SURVEY POPULATION

Table 1. Response Rate for Data Modules

	Objective number	Missing number	Missing Rate(%)
Module for household information	6,000	0	0
Module for household food	6,000	0	0
Newborn health and Children	2,795	0	0
Vitamin A module	1,563	0	0
Breastfeeding Module	2,795	0	0
Care of illness Module	2,795	0	0
Immunization Module	2,795	0	0
Maternal food frequency Module	2795	0	0
Anthropemetry module	6,000	0	0
MUAC for mother	2,795	2	0.07
Hemogolbin test for mother	2,795	2,189	78.32

The data set is reasonably complete, and with every indication that the data is good quality. The missing values seem to be relatively few, especially in important fields and few outliers exist. This attributes to the value of specially programmed data entry software with range checks and defined formats for data entry, that didn't allow entry of illogical data. In Table 1, the number of missing data modules is shown by component of the questionnaire. The data quality was also checked by looking for number preferences and clumping of values, but no consistent patterns were observed.

Table 2. The standard deviation of the mean of the Z-score of anthropometrical measurements by survey team.

Team	Height for Age	Weight for age	Weight for height
1	1.11	0.971	0.996
2	1.01	0.877	0.956
3	0.828	0.708	0.999
4	0.796	0.650	0.954
5	1.132	0.748	0.840
6	0.915	0.652	0.772
7	0.870	0.768	0.944
8	0.854	0.657	0.977
9	1.111	0.828	1.054
10	1.120	1.002	1.017
11	0.808	0.717	1.032
12	0.855	0.790	1.042
13	0.945	0.895	1.082
14	1.116	0.914	1.182
15	0.877	0.734	0.905
16	0.790	0.730	1.081
17	1.107	1.085	1.146
18	0.946	0.837	0.899
19	1.070	0.857	0.916
20	1.078	1.022	0.974
All	0.99	0.86	1.01

The quality of the anthropometrical data was checked by examining the standard deviation of the mean value of the z-score for height for age, weight for age and weight for height. The values obtained are very acceptable, being 0.99 for the height for age measurements, 0.86 for the weight for age measurements, and 1.01 for the weight for height measurements. These values are all within those accepted internationally and accredit to the quality of the anthropometrical measurements. The standard deviation of the mean z-score of each survey team is shown in Table 2.

Table 3. Number of Household, Women, Children and Completeness

	Urban (number)	Rural (number)	Total(number)
Sample survey number of household	3,480	2,520	6,000
Surveyed number of household	3,480	2,520	6,000
Completeness of household(%)	100	100	100
Sample survey number of women	1,619	1,176	2,795
Surveyed number of women	1,619	1,176	2,795
Completeness of women	100	100	100
Sample number of children under 2	1,619	1,176	2,795
Surveyed number of children under 2	1,619	1,176	2,795
Completeness of children under 2	100	100	100
Sample survey number of children over 2-7	1,861	1,344	3,205
Surveyed number of children over 2-7	1,861	1,344	3,205
Completeness of children over 2-7	100	100	100

The survey sample is derived from 6,000 families, randomly selected from the populations of 20 randomly chosen Ri and Dong in each of 7 provinces 3 cities. Table 3 describes how the 6,000 households are distributed by rural/ urban setting, the response rate, and the number of mothers and children interviewed and examined and completeness.

Table 4. The number of households and the number of persons reported to be in each household in the population survey sample of seven provinces and three cities in DPRK

Number of family members	Household (number)	Rate (%)	Valid percent	Cumulative percent
3 persons	1588	26.5	26.5	26.5
4 "	3232	53.9	53.9	80.3
5 "	1006	16.8	16.8	97.1
6 "	141	2.4	2.4	99.4
7 "	23	o.4	0.4	99.8
8 "	9	0.2	0.2	100.0
9 "	1	0.0	0.0	100.0
Total	6000	100.0	100.0	

As shown in Table 4, about a quarter of the households included in the survey had three members and a half had four members. From each of these families the mother and the last child under seven years of age accepted the invitation to answer the survey questions and to be examined.

As shown in table 5, of the children included in the survey the proportion in the first and second years is almost the same, and the subsequent years have increasingly less representation. This is because if there was more than one child under seven in the household, only the younger child was invited to be included in the survey.

Table 5. The distribution of children included in the surveyed sample of seven provinces and three cities in DPRK, by year of age.

Age in year

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 1	1417	23.5	23.7	23.7
	1 to less than 2	1446	24.1	24.1	47.8
	2 to less than 3	1092	18.2	18.2	66.0
	3 to less than 4	718	12.0	12.0	78.0
	4 to less than 5	590	9.8	9.8	87.8
	5 to less than 6	428	7.1	7.1	95.0
	6 an over	300	5.0	5.0	100.0
	Total	5991	99.9	100.0	
Missing	System	9	0.2		
Total		6000	100.0		

Table 6. The Rate of children who had under two, included in the surveyed sample of seven provinces and three cities in DPRK

The distribution of children under two years of age to children over two years of age was almost equal, being 46.6% to 53.4% respectively overall for children surveyed in seven provinces and three cities. This proportion was maintained fairly evenly across all seven provinces and three cities as shown in Table 6.

PROV * Children under 2 Crosstabulation

			Children under 2			
			yes	no	4	Total
PROV	Kaesong	Count	264	335	1	600
		% within PROV	44.0%	55.8%	.2%	100.0%
	Nampo	Count	290	310		600
		% within PROV	48.3%	51.7%		100.0%
	North Hamgyong	Count	276	324		600
		% within PROV	46.0%	54.0%		100.0%
	North Hwanghae	Count	272	328		600
		% within PROV	45.3%	54.7%		100.0%
	North Phyongan	Count	300	300		600
		% within PROV	50.0%	50.0%		100.0%
	Pyongyang	Count	281	319		600
		% within PROV	46.8%	53.2%		100.0%
	Ryanggang	Count	261	339		600
		% within PROV	43.5%	56.5%		100.0%
	South Hamgyong	Count	285	315		600
		% within PROV	47.5%	52.5%		100.0%
	South Hwanghae	Count	267	333		600
		% within PROV	44.5%	55.5%		100.0%
	South Phyongan	Count	299	301		600
		% within PROV	49.8%	50.2%		100.0%
Total		Count	2795	3204	1	6000
		% within PROV	46.6%	53.4%	.0%	100.0%

As is shown in Table 7 2,252 households had one children, 3,256 households had 2 children under seven, 491 household had three children under seven, and one household had four children under seven years of age.

Table 7. Number of households with one, two, three and four children under seven, of which only the youngest was included in the survey

PROV * NOCHU7 Crosstabulation

Count

		NOCHU7				
		1	2	3	4	Total
PROV	Kaesong	237	310	53		600
	Nampo	239	343	18		600
	North Hamgyong	224	334	42		600
	North Hwanghae	214	350	36		600
	North Phyongan	197	363	40		600
	Pyongyang	228	312	59	1	600
	Ryanggang	245	288	67		600
	South Hamgyong	219	327	54		600
	South Hwanghae	240	293	67		600
	South Phyongan	209	336	55		600
Total		2252	3256	491	1	6000

As shown in table 8, in the sample as a whole, 39% of the mothers were aged 20 to 29 years, 58.6% were 30 to 39 years, and only 2.4% were over 40 years of age. The proportion of older mothers ranged from 2.2% in Nampo to 2.8% in Kaesong, and the proportion of younger mothers ranged from 42% in Nampo to 36.3% in South Hwanghae.

Table 8. The age distribution of the mothers of the children included in the surveyed sample, by province.

PROV * MOAGEGR Crosstabulation

			MOAGEGR			
			20-29 years	30-39 years	40 years or more	Total
PROV	Kaesong	Count	224	359	17	600
		% within PROV	37.3%	59.8%	2.8%	100.0%
	Nampo	Count	252	335	13	600
		% within PROV	42.0%	55.8%	2.2%	100.0%
	North Hamgyong	Count	233	352	15	600
		% within PROV	38.8%	58.7%	2.5%	100.0%
	North Hwanghae	Count	239	346	15	600
		% within PROV	39.8%	57.7%	2.5%	100.0%
	North Phyongan	Count	244	342	14	600
		% within PROV	40.7%	57.0%	2.3%	100.0%
	Pyongyang	Count	232	354	14	600
		% within PROV	38.7%	59.0%	2.3%	100.0%
	Ryanggang	Count	221	364	15	600
		% within PROV	36.8%	60.7%	2.5%	100.0%
	South Hamgyong	Count	237	348	15	600
		% within PROV	39.5%	58.0%	2.5%	100.0%
	South Hwanghae	Count	218	367	15	600
		% within PROV	36.3%	61.2%	2.5%	100.0%
	South Phyongan	Count	239	348	13	600
		% within PROV	39.8%	58.0%	2.2%	100.0%
Total		Count	2339	3515	146	6000
		% within PROV	39.0%	58.6%	2.4%	100.0%

The educational level of the mothers included in the survey was equally high in all of seven provinces and three cities as shown in Table 9.

Table 9. Educational level of mothers of children under seven years of age included in the surveyed sample by province in DPRK

PROV* Mother Education Crosstabulation

PROV		Mother Education		
		Secondary school	Higher education	Total
Kaesong	Count	425	175	600
	%within PROV	70.8%	29.2%	100.0%
Nampo Count		475	125	600
	%within PROV	79.2%	20.8%	100.0%
North Hamgyong	Count	480	120	600
	%within PROV	80.0%	20.0%	100.0%
North Hwanghae	Count	455	145	600
	%within PROV	75.8%	24.2%	100.0%
North Pyongan	Count	485	115	600
	%within PROV	80.8%	19.2%	100.0%
Pyongyang	Count	415	185	600
	%within PROV	69.2%	30.8%	100.0%
Ryangang	Count	404	196	600
	%within PROV	67.3%	32.7%	100.0%
South Hamgyong	Count	473	127	600
	%within PROV	78.8%	21.2%	100.0%
South Hwanghae	Count	470	130	600
	%within PROV	78.8%	21.7%	100.0%
South Pyongan	Count	482	127	600
	%within PROV	80.3%	19.7%	100.0%
Total	Count	4564	1436	6000
	%	76.1%	23.9%	100.0%

THE RESULT

Child Malnutrition

The prevalence rates of child malnutrition in seven provinces and three cities, as expressed by the adequacy of height for age (stunting), weight for age (underweight) and weight for height (wasting) are shown in Tables 10, 11 and 12.

Table 10. Child malnutrition in the surveyed samples as expressed by height for age in seven provinces and three cities of DPRK

Province		Height for age		Sample	95% CI for Prevalence*
		normal	< -2 z		
Kaesong	Count	333	266	599	
	%	55.59	44.41	100.00	(38.72 - 50.24)
Nampo	Count	459	139	598	
	%	76.76	23.24	100.00	(18.66 - 28.53)
North Hamgyong	Count	343	257	600	
	%	57.17	42.83	100.00	(37.20 - 48.66)
North Hwanghae	Count	363	236	599	
	%	60.60	39.40	100.00	(33.87 - 45.20)
North Pyongan	Count	345	254	599	
	%	57.60	42.40	100.00	(36.78 - 48.23)
Pyongyang	Count	438	162	600	
	%	73.00	27.00	100.00	(22.14 - 32.47)
Ryanggang	Count	320	280	600	
	%	53.33	46.67	100.00	(40.94 - 52.48)
South Hamgyong	Count	327	273	600	
	%	54.50	45.50	100.00	(39.79 - 51.32)
South Hwanghae	Count	368	231	599	
	%	61.44	38.56	100.00	(33.07 - 44.36)
South Pyongan	Count	347	253	600	
	%	57.83	42.17	100.00	(36.55 - 47.99)
	Count	3643	2351	5994	
Total	**%**	**60.78**	**39.22**	**100.00**	**(37.47 - 41.00)**

Table11. Child malnutrition in the surveyed samples as expressed by weight for age in seven provinces and three cities of DPRK

Province		Weight for age		Sample	95% CI for Prevalence*
		normal	< -2 z		
	Count	476	124	600	
Kaesong	%	79.33	20.67	100.00	(16.32 - 25.78)
	Count	512	88	600	
Nampo	%	85.33	14.67	100.00	(10.96 - 19.30)
	Count	460	140	600	
North Hamgyong	%	76.67	23.33	100.00	(18.75 - 28.61)
	Count	476	124	600	
North Hwanghae	%	79.33	20.67	100.00	(16.32 - 25.78)
	Count	493	107	600	
North Pyongan	%	82.17	17.83	100.00	(13.77 - 22.74)
	Count	511	89	600	
Pyongyang	%	85.17	14.83	100.00	(11.11 - 19.48)
	Count	441	159	600	
Ryanggang	%	73.50	26.50	100.00	(21.67 - 31.94)
	Count	455	145	600	
South Hamgyong	%	75.83	24.17	100.00	(19.52 - 29.49)
	Count	479	121	600	
South Hwanghae	%	79.83	20.17	100.00	(15.87 - 25.25)
	Count	488	112	600	
South Pyongan	%	81.33	18.67	100.00	(14.51 - 23.64)
	Count	4791	1209	6000	
Total	**%**	**79.85**	**20.15**	**100.00**	**(18.74 - 21.64)**

Table 12. Child malnutrition in the surveyed samples as expressed by weight for height in seven provinces and three cities of DPRK.

Province		Weight for Height		Sample	95% CI for Prevalence*
		normal	< -2 z		
Kaesong	Count	558	42	600	
	%	93.00	7.00	100.00	(4.49 - 10.66)
Nampo	Count	574	26	600	
	%	95.67	4.33	100.00	(2.43 - 7.48)
North Hamgyong	Count	535	64	599	
	%	89.32	10.68	100.00	(7.53 - 14.88)
North Hwanghae	Count	546	54	600	
	%	91.00	9.00	100.00	(6.12 - 12.97)
North Pyongan	Count	559	41	600	
	%	93.17	6.83	100.00	(4.36 - 10.46)
Pyongyang	Count	576	22	598	
	%	96.32	3.68	100.00	(1.95 - 6.68)
Ryanggang	Count	543	57	600	
	%	90.50	9.50	100.00	(6.54 - 13.54)
South Hamgyong	Count	527	72	599	
	%	87.98	12.02	100.00	(8.67 - 16.38)
South Hwanghae	Count	534	66	600	
	%	89.00	11.00	100.00	(7.80 - 15.23)
South Pyongan	Count	555	43	598	
	%	92.81	7.19	100.00	(4.64 - 10.89)
Total	Count	5507	487	5994	
	%	**91.88**	**8.12**	**100.00**	**(7.18 - 9.18)**

The overall mean prevalence of malnutrition of 6,000 surveyed children from seven provinces and three cities is as follows; Underweight: 20.15%. /5994 children

The prevalence of stunting is twice that of underweight, with a sample prevalence rate of 39.22%.

The prevalence of wasting, or low weight for attained height in the surveyed sample is 8.12%.

The prevalence of child malnutrition shows a two to three fold difference across the cities and provinces, with a better situation occurring in two of three cities than elsewhere. The stunting rate in Nampo (23.2%) is virtually half that found in the worst situated province of South Hamgyong (45.5%). The child underweight rates in Nampo (14.7%) and Pyongyang (14.8%) are almost half that found in the worst province Ryanggang (26.5%). The wasting rate in Pyongyang (3.7%) is a third of that found in the worst province South Hamgyong (12%).

Severe malnutrition as defined by a weight for height z-score of less than 3 still exists in the provinces/cities surveyed. The overall prevalence of severe wasting was 2.7%, varying from 4.0% in South Hamgyong to 1.2% in Nampo (provincial details not shown but available).

There were few or little differences in the prevalence of child malnutrition due either to the sex of the child or rural/urban location. The overall rates of stunting in boys (40%) were not significantly different than for girls (38.4%),and there were no significant differences in stunting rates or underweight rates amongst boys and girls in any of the provinces or cities (detail not shown but available). Overall, boys were significantly more wasted (9.1%) than girls (7.1%) (P=0.005), but this was the case in only three locations of seven provinces and three cities (South Hwanghae, Nampo, and Kaesong). There were no significant differences in the stunting rates of children in urban (38.8%) and rural locations (38.9%), and the same situation was observed in all provinces/cities except North Pyongan, where 37.2% of rural children were stunted against 46.7% in the urban area of that province (P=0.05).

The effects of age on the prevalence of child malnutrition is a strong one, and most of the growth failure that produces children that are small for their age occurs in the first two years of life. Table 13 shows the effect of age on stunting, wasting and underweight. Stunting rates increase steadily from 17.3% in the first semester to 41.6% in the second year of life, and then become pretty constant at around 47% from the third to the seventh year of age. Underweight rates increase from 7.6% in the first semester, reaching 25% by the second year of life and then stay at or around 20-25% through to the seventh year of age. The wasting rates increase from 5% in the first semester to 12% in the second year of life and then decline again to around 5% for the remaining years. The malnutrition rates amongst children over two years of age are largely a reflection of how good their growth was in the first two years of their lives, beginning in uterus.

The low birth weight rates were only recorded for children less than two years of age, and thus reflect the quite recent past, i.e. since the year 1999. The mean low birth weight rate of the survey children born in this period across all provinces/cities as reported by their mothers was 6.7%. As shown in Table 14, there was a two fold variation in the low birth weight rate across the provinces/cities, being 4.8% in Pyongyang as compared to 8.5% in North Hwanghae and Ryanggang 8.5% .

Table 13. The prevalence of child malnutrition in different age groups of children surveyed in seven provinces and three cities of DPRK.

Age Group (months)	0-5	6-11	12-23	24-35	36-47	48-59	59-71	72+	Total
Stunting (H/A)	17.3	22.8	41.6	45.6	47.6	47.5	44.2	46.7	39.2
Underweight (W/A)	7.6	12	24.9	25.5	20.2	21	19.6	21.7	20.2
Wasting (W/H)	5.3	6.7	11.9	8.4	7.4	6.3	5.6	6.7	8.1
Number of children	434	983	1440	1092	718	590	428	300	5985

 Missing data for 15 children attributes to the entry error.

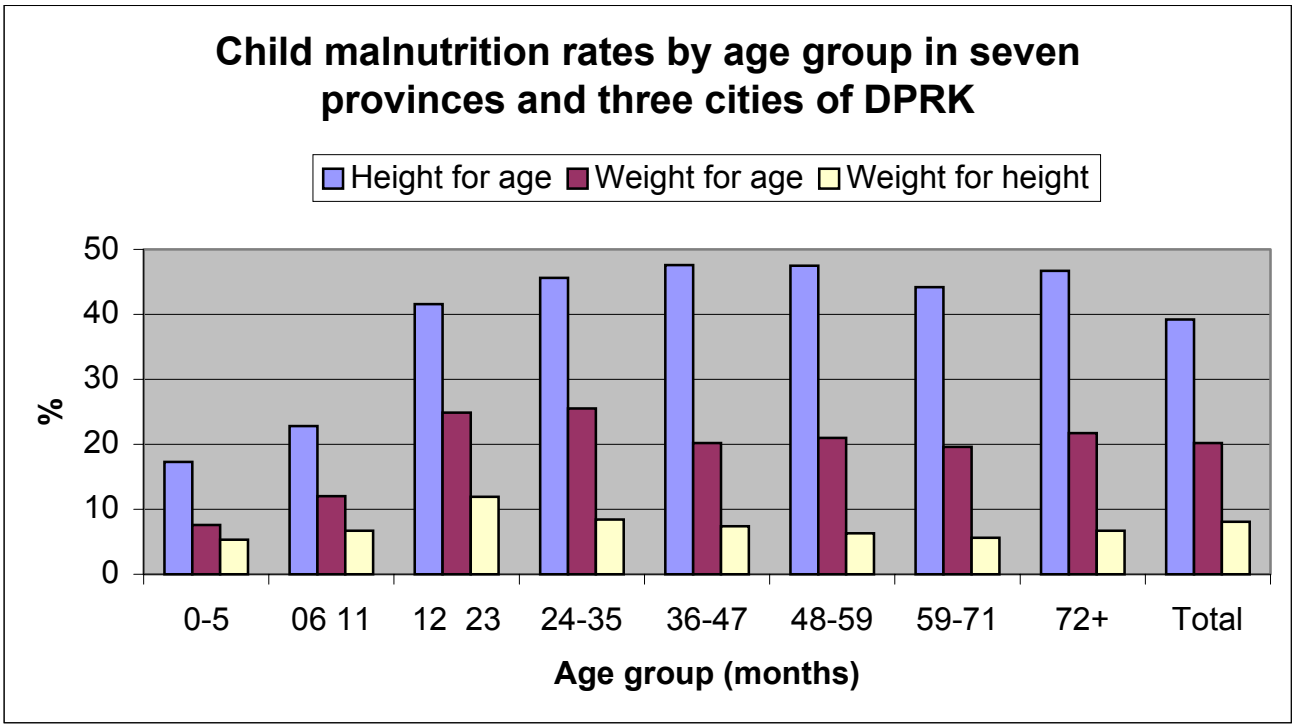

Table 14. Low birth weight rates in children under two in seven provinces and three cities of DPRK

Crosstab

			Low Birth Weight			
			Low Birth Weight	Normal	Big New Born	Total
PROV	Kaesong	Count	20	225	3	248
		% within PROV	8.1%	90.7%	1.2%	100.0%
	Nampo	Count	18	260	8	286
		% within PROV	6.3%	90.9%	2.8%	100.0%
	North Hamgyong	Count	22	253		275
		% within PROV	8.0%	92.0%		100.0%
	North Hwanghae	Count	19	197	7	223
		% within PROV	8.5%	88.3%	3.1%	100.0%
	North Phyongan	Count	15	210	2	227
		% within PROV	6.6%	92.5%	.9%	100.0%
	Pyongyang	Count	13	251	6	270
		% within PROV	4.8%	93.0%	2.2%	100.0%
	Ryanggang	Count	11	116	3	130
		% within PROV	8.5%	89.2%	2.3%	100.0%
	South Hamgyong	Count	18	262	2	282
		% within PROV	6.4%	92.9%	.7%	100.0%
	South Hwanghae	Count	15	243	7	265
		% within PROV	5.7%	91.7%	2.6%	100.0%
	South Phyongan	Count	17	281	2	300
		% within PROV	5.7%	93.7%	.7%	100.0%
Total		Count	168	2298	40	2506
		% within PROV	6.7%	91.7%	1.6%	100.0%

Maternal Nutritional status

The adequacy of the nutritional status of mothers is best assessed by measuring weight and height and calculating the body mass index (BMI), which is weight divided by height squared. A BMI of less than 18.5 is considered to be incompatible with leading a healthy life. In the Nutrition Assessment only weight was collected on those mothers of children aged two or less, thus not permitting the calculation of BMI. Weight alone can also be judged to assess the adequacy of nutritional status with regard to the success of pregnancy outcome, and a pre-pregnancy weight of less than 54kg has been shown to be associated with less than ideal pregnancy outcomes across a series of studies. For the purpose of this assessment, three grades were used to classify the weight of mothers included in the survey, namely up to 45kg, 45 to 50 and over 50kg. About 16.7% of mothers of children under two in the seven provinces and three cities weighed less than 45kg, as is shown in Table 15.

The best-situated provinces with regard to the prevalence of mothers weighing over 50kg are Nampo (53%) and North Pyongan (52%), and the worst situated provinces with less 50 % are South Pyongan (36.8%) and South Hwanghae (37.8%). With regard to very small women, weighing less than 45kg, overall the prevalence was 16.7%, and the highest prevalence was in North Hamgyong (23.6%) and South Hamgyong (22.6%).

The classification of women according to the adequacy of the mid-upper arm circumference (MUAC) is also linked to the occurrence of successful birth outcomes, and women with a MUAC of less than 22.5 are at high risk of having a low birth weight baby. There is also a correlation between MUAC and BMI and the 22.5 cut-off approximates a BMI of 18.5.

Based on the mid-upper arm circumference, of mothers of children aged under-two in seven provinces and three cities, a third are malnourished. The prevalence of maternal malnutrition based on MUAC shown in Table 16 reveals some small variation across the provinces/cities with the highest rates in North Hamgyong (37.1%) and Kaesong (36.5%) and the lowest rates in South Hwanghae (24.6%) and Nampo (26.6%).

Table 15. Distribution of maternal weight in mothers of children under two in seven provinces and three cities of DPRK

PROV * mother weight group Crosstabulation

			mother weight group			
			lowest to 44.99	45 -49.99	50 and over	Total
PROV	Kaesong	Count	47	90	130	267
		% within PROV	17.6%	33.7%	48.7%	100.0%
	Nampo	Count	33	102	155	290
		% within PROV	11.4%	35.2%	53.4%	100.0%
	North Hamgyong	Count	65	93	117	275
		% within PROV	23.6%	33.8%	42.5%	100.0%
	North Hwanghae	Count	53	106	114	273
		% within PROV	19.4%	38.8%	41.8%	100.0%
	North Phyongan	Count	43	102	157	302
		% within PROV	14.2%	33.8%	52.0%	100.0%
	Pyongyang	Count	46	111	124	281
		% within PROV	16.4%	39.5%	44.1%	100.0%
	Ryanggang	Count	48	109	113	270
		% within PROV	17.8%	40.4%	41.9%	100.0%
	South Hamgyong	Count	65	102	120	287
		% within PROV	22.6%	35.5%	41.8%	100.0%
	South Hwanghae	Count	14	150	100	264
		% within PROV	5.3%	56.8%	37.9%	100.0%
	South Phyongan	Count	57	135	112	304
		% within PROV	18.8%	44.4%	36.8%	100.0%
Total		Count	471	1100	1242	2813
		% within PROV	16.7%	39.1%	44.2%	100.0%

Table 16. Maternal nutritional status as measured by adequacy of mid-upper arm circumference (MUAC) in mothers of children under two surveyed in seven provinces and three cities of DPRK

Crosstab

			Prevalence of Maternal Malnutrition by MUAC		
			Malnourished	Normal	Total
PROV	Kaesong	Count	97	169	266
		% within PROV	36.5%	63.5%	100.0%
	Nampo	Count	77	212	289
		% within PROV	26.6%	73.4%	100.0%
	North Hamgyong	Count	102	173	275
		% within PROV	37.1%	62.9%	100.0%
	North Hwanghae	Count	85	187	272
		% within PROV	31.3%	68.8%	100.0%
	North Phyongan	Count	92	206	298
		% within PROV	30.9%	69.1%	100.0%
	Pyongyang	Count	96	185	281
		% within PROV	34.2%	65.8%	100.0%
	Ryanggang	Count	87	173	260
		% within PROV	33.5%	66.5%	100.0%
	South Hamgyong	Count	85	200	285
		% within PROV	29.8%	70.2%	100.0%
	South Hwanghae	Count	66	202	268
		% within PROV	24.6%	75.4%	100.0%
	South Phyongan	Count	107	192	299
		% within PROV	35.8%	64.2%	100.0%
Total		Count	894	1899	2793
		% within PROV	32.0%	68.0%	100.0%

The results of the assessment of anemia in mothers of children aged under-two years cannot be considered truly representative of the universe being studied, since only a quarter of mothers agreed to have the examination. The results obtained on those mothers examined, shown in Table 17, reveal that about a third of them were anemic. The worst anemia rates were amongst mothers from South Hamgyong (48.6%) and Pyongyang (46.5%). The best situated were North Pyongan (21%) and South Hwanghae (22%).

Table 17. Prevalence of anemia in mothers of children under two in seven provinces and three cities of DPRK.

Crosstab

			Prevalence of Maternal Anemia		
			Anemic	Normal	Total
PROV	Kaesong	Count	25	32	57
		% within PROV	43.9%	56.1%	100.0%
	Nampo	Count	20	48	68
		% within PROV	29.4%	70.6%	100.0%
	North Hamgyong	Count	10	23	33
		% within PROV	30.3%	69.7%	100.0%
	North Hwanghae	Count	14	26	40
		% within PROV	35.0%	65.0%	100.0%
	North Phyongan	Count	17	64	81
		% within PROV	21.0%	79.0%	100.0%
	Pyongyang	Count	47	54	101
		% within PROV	46.5%	53.5%	100.0%
	Ryanggang	Count	20	36	56
		% within PROV	35.7%	64.3%	100.0%
	South Hamgyong	Count	18	19	37
		% within PROV	48.6%	51.4%	100.0%
	South Hwanghae	Count	11	39	50
		% within PROV	22.0%	78.0%	100.0%
	South Phyongan	Count	22	63	85
		% within PROV	25.9%	74.1%	100.0%
Total		Count	204	404	608
		% within PROV	33.6%	66.4%	100.0%

Household food security

The type of food storage reported varied very little across the provinces/cities, with the most common form of storage in the households being a box, basket or sack (84.6%), and the next most common an earthenware pot (63.5%) and/or a cupboard (53.7%). Only 6.3% reported having a refrigerator. The vast majority of households (99.5%) reported as having food in the food store at the time of interview. Of those foods reported to be the main foods kept in the store, maize was the most common (43.2%) followed by rice (35.1%), wheat (10.4%) and potatoes (9%). The source of the main food was predominantly from the public distribution system (57.7%), the farmers' ration (34.6%), with only 7.3% reporting it as being the WFP rations.

Table 18. Foods groups reported as being present in the food store of the household, by mothers of children aged under-seven, in seven provinces and three cities of DPRK.

Food Group	Provinces/cities										
	Kaesong	Nampo	North Hamgyong	North Hwanghae	North Pyongan	Pyongyang	Ryanggan	South Hamgyong	South Hwanghae	South Pyongan	All
Starchy and alternatives	100	99.7	99.6	98.9	98	100	99.6	100	99.6	99.7	99.5
Pulses	78.8	80.3	63	67.3	76.3	69.4	37.9	40.7	86.1	39.8	69.5
Meat/egg/fish	63.6	78.6	45.7	49.6	70.7	66.9	32.2	32.6	26.6	29.4	
Vegetables	99.3	96.3	96.8	97.5	100	98	99.8	98.7	98.5	93	97.8
Fruits	36.2	39.2	15.3	27.7	30.7	39.2	5.3	37	14.2	10.3	25.5
WFP Fortified foods	0.3	1.3	21.3	2.3	8.7	2.2	8.5	7.2	0.2	2.8	5.5

The frequency of other food groups being reported as also being present in the food store is shown in Table 18 by provinces/cities. There was little variation across provinces/cities for the presence of starchy foods in the store, being almost universally present (99.5%). The presence of meat/egg/fishy foods did show variation, with the provinces reporting least frequency being South Hwanghae (26.6%), South Pyongan (29.4%), Ryanggang (32.2%) and South Hamgyong (32.65). The presence of pulses was also varied, with least presence being reported in South Pyongan (39.8%), Ryanggang (37.9%) and South Hamgyong (40.7%). Vegetables were present in almost all household stores (97.8%), but fruits were (25.5%) and showed provincial variation with South Pyongan (10.3%) and South Hwanghae (14.2%) Ryangang (5.3%) reporting the lowest presence.

Maternal Feeding Patterns

Most of the mothers that were interviewed (62.3%), reported that they had eaten at least three times the day before and 37.4% had eaten four meals or more. Mothers reported on what they had eaten in the meals eaten the day before and these responses were classified by food groups. The results show considerable variation across the provinces/cities as is shown in Table 19.

Table 19. Food groups reported as being eaten the day before by mothers of children aged under-two years in seven provinces and three cities of DPRK.

Food Group	Provinces										
	Kaesong	Nampo	North Hamgyong	North Hwanghae	North Pyongan	Pyongyang	Ryanggang	South Hamgyong	South Hwanghae	South Pyongan	All
Starchy and alternatives	100	99.7	99.6	98.9	98	100	99.6	100	99.6	99.7	99.5
Pulses	78.8	80.3	63	67.3	76.3	69.4	37.9	40.7	86.1	39.8	63.9
Meat/egg/fish	63.6	78.6	45.7	49.6	70.7	66.9	32.7	32.6	26.6	29.4	49.8
Dairy foods and fats	99.2	99	69.9	99.3	98.3	99.6	93.5	87.4	95.5	96.7	93.9
Fruits and Vegetables	99.6	99	90.9	99.3	97.9	97.5	99.6	98.9	98.5	99.3	98
Sweets and drinks	70.8	78.6	40.6	51.1	78.3	67.6	34.5	43.2	28.1	27.1	52.3
Fortified foods and supplements	15.9	22.8	45.3	32.4	16.7	26	31	15.8	10.1	30.8	24.7

. The starchy and alternative foods were almost universally reported as being consumed the day before by mothers of all provinces/cities (99.5%), as were the dairy and fat foods (93.9%) and the fruit and vegetable foods (98%). The differences in foods consumed across provinces/cities appeared to be more in the consumption of meat, eggs, fish (49.8%), pulses (63.9%), sweets and drinks (52.3%) and fortified foods and supplements (24.7%). The highest frequency of reporting of meat,eggs,fish consumption the day before was in Nampo (78.6%) and the lowest in South Hwanghae (26.6%), South Pyongan (29.4%), Ryanggang (32.7%) and South Hamgyong (32.6%). For pulses the highest reported frequency of consumption the day before was Nampo (80.3%) and the lowest was in Ryanggang (37.9%) and South Pyongan (39.8%).

A more detailed description of the frequency of consumption of individual food within the food groups is shown in Table 20.

Table 20. The frequency of eating individual foods (%) within the food groups reported as being eaten the day before, by mothers of children under-two years of age in seven provinces and three cities of DPRK.

Starchy and alternative		Pulses		Meat and eggs		Dairy and fat		Fruit and vegetables		Sweets and drinks		Fortified foods and supplements	
Rice	89.8	Beans	69.5	Meat	46.5	Milk	6.3	Fruit	33.9	Sweets	74.5	Fortified foods	38.3
Maize	68.2	Peas	7.7	Fish	39.8	Cheese	0.6	Other Fruit	9.8	Cake	57.4	Supplement	70.1
Other cereals	29.2	Bean products	49.0	Egg	55.6	Yogurt	0.9	Vegetable	98.5	Alcoholic drink	1.8		
Potato	46.7			Others	2.4	Fat	99.8	Other vegetable	29.6	Other drink	8.9		
Noodle	52.4							Wild fruit	14.3	Others	4.3		
Others	12												
Alternative	0.0												

Among the starchy and alternative food rice (89.8%) was the most commonly cited as having been eaten the day before, followed by maize (68.2%) and noodles (52.4%). The consumption of pulses comprised mostly of eating beans (69.5%) and bean products (49%) and the consumption of peas was not very frequent (7.7%). In the "meat, egg, fish" food group, egg (55.6%) was the most commonly reported as having been eaten, followed by meat (46.5%) and fish (39.8%). In the dairy food and fat food group the consumption was mostly accounted for fat (99.8%) with little or no consumption of milk (6.3%), cheese (0.6%) or yogurt (0.9%). Amongst the fruit and vegetable foods, the consumption of vegetables was most common (98.5%) and 29.6% reporting having also consumed a second sort of vegetable. Fruit consumption was less common (33.9%). The consumption of sweets and cakes was dominated by sweets (74.5%) and cake consumption (57.4%) with almost no consumption of alcoholic drinks (1.8) or other drinks (8.9%) reported. The consumption of fortified foods was reported by 38.3% of mothers and 70% reported having consumed some sort of nutrient supplement.

Child Feeding patterns

As shown in Table 21, the overall rate of exclusive breastfeeding of infant aged less than 6 months in these seven provinces and three cities of DPRK is quite good (69.6%).

However there is still a lot of room for improvement, and in Pyongyang (43.1%), Nampo (46.9%) and North Pyongan (47.1) for example, the prevalence rates are low. Exclusively breastfeeding in rural (74.4%) is slightly higher than in urban area (66.4%) but not statistically significant (p=0.088).

Table 21. Prevalence of exclusive breastfeeding in infants less than six months age in seven provinces and three cities of DPRK.

Crosstab

			Exclusive Breastfeeding		
			yes	no	Total
PROV	Kaesong	Count	38	6	44
		% within PROV	86.4%	13.6%	100.0%
	Nampo	Count	23	26	49
		% within PROV	46.9%	53.1%	100.0%
	North Hamgyong	Count	35	7	42
		% within PROV	83.3%	16.7%	100.0%
	North Hwanghae	Count	37	11	48
		% within PROV	77.1%	22.9%	100.0%
	North Phyongan	Count	16	18	34
		% within PROV	47.1%	52.9%	100.0%
	Pyongyang	Count	22	29	51
		% within PROV	43.1%	56.9%	100.0%
	Ryanggang	Count	40	10	50
		% within PROV	80.0%	20.0%	100.0%
	South Hamgyong	Count	24	9	33
		% within PROV	72.7%	27.3%	100.0%
	South Hwanghae	Count	26	5	31
		% within PROV	83.9%	16.1%	100.0%
	South Phyongan	Count	41	11	52
		% within PROV	78.8%	21.2%	100.0%
Total		Count	302	132	434
		% within PROV	69.6%	30.4%	100.0%

Table 22 Continued breastfeeding rates among children under two as reported by their mothers in seven provinces and three cities of DPRK

			Still breastfeeding		Total
			yes	no	
Age Group	less than 6 months	Count	414	15	429
		%	95.4	3.5	
	6 months to less than 1 year	Count	898	62	960
		%	92.1	6.4	
	1 to less than 2 years	Count	842	470	1312
		%	61.9	34.6	
Total		Count	2154	547	2701
		%	79.7	20.3	

As shown in Table 22, continued breastfeeding beyond one year is very common. Almost all children aged less than one are breastfeed (95.4% in 0-5 months and 92.1% in 6-11 months). Moreover, 61.9% of children aged 1-2 years are still breastfeed. There are no significant differences in these rates in urban and rural area (95.4%, 91.5% and 57.1% versus 95.3%, 92.9% and 68.6% respectively).

Maternal and Child Health Care

The majority of mothers of children under-two reported having had more than three antenatal contacts in the previous pregnancy. 38.0% of mother (38.8% in urban and 36.8% in rural) reported that they had 4-6 times antenatal care visits in the most recent pregnancy. Child deliveries were mostly assisted by a medical professional (38.5% by doctors, 58.4% midwives or nurses, and 3.1% by friend, relative or unassisted). Urban areas (42.3% by doctors and 54.7 by midwives or nurses) had more doctor assisted deliveries than rural area (33.2% and 63.6% respectively).

Table 23. The coverage of postpartum Vitamin A capsules in mothers of children under two years of age in seven provinces and three cities of DPRK

PROVINCE	Postpartum vitamin A			Total
		yes	no	
Kaesong	Count	87	171	258
	%	33.7	66.3	
Nampo	Count	103	186	289
	%	35.6	64.4	
North Hamgyong	Count	69	206	275
	%	25.1	74.9	
North Hwanghae	Count	70	201	271
	%	25.8	74.2	
North Phyongan	Count	95	200	295
	%	32.2	67.8	
Pyongyang	Count	143	137	280
	%	51.1	48.9	
Ryanggang	Count	75	180	255
	%	29.4	70.6	
South Hamgyong	Count	89	196	285
	%	31.2	68.8	
South Hwanghae	Count	79	185	264
	%	29.9	70.1	
South Phyongan	Count	106	193	299
	%	35.5	64.5	
Total	Count	916	1855	2771
	%	33.1	66.9	

As shown in Table 23, the overall postpartum Vitamin A supplementation among mothers is 33.1%, with the highest coverage in Pyongyang at 51.1% and lowest in North Hamgyong and North Hwanghae (25.1% and 25.8% respectively). Coverage of post-partum Vitamin A supplementation in the rural areas (24.0%) is significantly lower than in the urban areas (39.4%).

Immunization

Immunization data was collected from mothers recall and not verified by health cards in clinics. BCG immunization rate in the children is universal 88.3%, and the highest reporting is Pyongyang (95.02%). Immunisation rate are (98.5%) of POLIO, (95.28%) of Measles ,and (68.06%) of DPT. The tables for these are shown in 24, 25, 26, 27.

Table 24 BCG Immunization Rate in children aged over 1 week by seven 7 Provinces and three cities of DPRK

		BCG			Total
		yes	no	DK	
Kaesong	Count	237	25	2	264
	%	89.77	9.47	0.76	100
Nampo	Count	250	39	1	290
	%	86.21	13.45	0.34	100
North Hamgyong	Count	246	27	3	276
	%	89.13	9.78	1.09	100
North Hwanghae	Count	240	26	6	272
	%	88.24	9.56	2.21	100
North Pyongan	Count	257	38	5	300
	%	85.67	12.67	1.67	100
Pyongyang	Count	267	13	1	281
	%	95.02	4.63	0.36	100
Ryanggang	Count	226	34	1	261
	%	86.59	13.03	0.38	100
South Hamgyong	Count	249	36		285
	%	87.37	12.63		100
South Hwanghae	Count	236	30	1	267
	%	88.39	11.24	0.37	100
South Pyongan	Count	260	38	1	299
	%	86.96	12.71	0.33	100
Rural	Count	1038	125	13	1176
	%	88.27	10.63	1.11	100
Urban	Count	1430	181	8	1619
	%	88.33	11.18	0.49	100
Total	Count	2468	306	21	2795
	%	88.30	10.95	0.75	100

Table 25 Polio Immunization Rate in children aged 5 months over by seven provinces and three cities of DPRK

Prov/Urban.Rural		Polio			Total	Number of dose Polio			Total
		yes	no	DK		1	2	3	
Kaesong	Count	232	4		236	3	2	227	232
	%	98.31	1.69		100	1.29	0.86	97.84	100
Nampo	Count	246	5	1	252	2	5	239	246
	%	97.62	1.98	0.40	100	0.81	2.03	97.15	100
North Hamgyong	Count	242	2	1	245	1	1	239	241
	%	98.78	0.82	0.41	100	0.41	0.41	99.17	100
North Hwanghae	Count	235	2	1	238	3	1	232	236
	%	98.74	0.84	0.42	100	1.27	0.42	98.31	100
North Pyongan	Count	267	3	5	275	1	1	265	267
	%	97.09	1.09	1.82	100	0.37	0.37	99.25	100
Pyongyang	Count	246	3		249	2	9	235	246
	%	98.80	1.20		100	0.81	3.66	95.53	100
Ryanggang	Count	221	1	1	223		1	220	221
	%	99.10	0.45	0.45	100		0.45	99.55	100
South Hamgyong	Count	261	1		262	1		260	261
	%	99.62	0.38		100	0.38		99.62	100
South Hwanghae	Count	241	3	1	245	1	1	239	241
	%	98.37	1.22	0.41	100	0.41	0.41	99.17	100
South Pyongan	Count	261	3		264	4	2	255	261
	%	98.86	1.14		100	1.53	0.77	97.70	100
Rural	Count	1031	16	6	1053	12	9	1010	1031
	%	97.91	1.52	0.57	100	1.16	0.87	97.96	100
Urban	Count	1421	11	4	1436	6	14	1401	1421
	%	98.96	0.77	0.28	100	0.42	0.99	98.59	100
Total	Count	2452	27	10	2489	18	23	2411	2452
	%	98.51	1.08	0.40	100	0.73	0.94	98.33	100

Table 26 DPT Immunization Rate in Children aged 5 months over by seven provinces and three cities of DPRK

	DPT				Total	Number of DPT dose			Total
	unit	yes	no	DK	SM		1	2	3	
Kaesong	Count	162	74			236	2	3	157	162
	%	68.64	31.36			100	1.23	1.85	96.91	100
Nampo	Count	172	79		1	252	6	25	142	173
	%	68.25	31.35		0.40	100	3.47	14.45	82.08	100
North Hamgyong	Count	169	75		1	245			173	173
	%	68.98	30.61		0.41	100			100	100
North Hwanghae	Count	160	77		1	238	1	1	158	160
	%	67.23	32.35		0.42	100	0.63	0.63	98.75	100
North Phyongan	Count	180	90		5	275	1		183	184
	%	65.45	32.73		1.82	100	0.54		99.46	100
Pyongyang	Count	166	83			249		8	158	166
	%	66.67	33.33			100		4.82	95.18	100
Ryanggang	Count	157	65		1	223		1	155	156
	%	70.40	29.15		0.45	100		0.64	99.36	100
South Hamgyong	Count	184	78			262			185	185
	%	70.23	29.77			100			100	100
South Hwanghae	Count	165	79		1	245		1	164	165
	%	67.35	32.24		0.41	100		0.61	99.39	100
South Pyongan	Count	179	83	2		264	5	4	175	184
	%	67.80	31.44	0.76		100	2.72	2.17	95.11	100
Urban	Count	654	393		6	1053	8	12	643	663
	%	62.11	37.32		0.57	100	1.21	1.81	96.98	100
Rural	Count	1040	390	2	4	1436	7	31	1007	1045
	%	72.42	27.16	0.14	0.28	100	0.67	2.97	96.36	100
Total	Count	1694	783	2	10	2489	15	43	1650	1708
	%	68.06	31.46	0.08	0.40	100	0.88	2.52	96.60	100

Table 27. Measles Immunisation Rate in children aged 10months over by seven provinces and three cities of DPRK

		Measles			Total
		yes	no	SM	
Kaesong	Count	152	2		154
	%	98.70	1.30		100
Nampo	Count	168	5	1	174
	%	96.55	2.87	0.57	100
North Hamgyong	Count	168	3	1	172
	%	97.67	1.74	0.58	100
North Hwanghae	Count	156	3		159
	%	98.11	1.89		100
North Pyongan	Count	162	22	4	188
	%	86.17	11.70	2.13	100
Pyongyang	Count	147	19		166
	%	88.55	11.45		100
Ryanggang	Count	146	5	1	152
	%	96.05	3.29	0.66	100
South Hamgyong	Count	180	4		184
	%	97.83	2.17		100
South Hwanghae	Count	164	3	1	168
	%	97.62	1.79	0.60	100
South Pyongan	Count	172	6		178
	%	96.63	3.37		100
Rural	Count	687	32	6	725
	%	94.76	4.41	0.83	100
Urban	Count	928	40	2	970
	%	95.67	4.12	0.21	100
Total	Count	1615	72	8	1695
	%	95.28	4.25	0.47	100

The coverage of Vitamin A supplementation in eligible children under 2 years is 98.6%.

There are 2 rounds of Vitamin A supplementation each year for children aged over 6 months, one in May and the second one at one of the 2nd National Immunisation Days.

As shown in Table 29, 98.6% of children aged more than 11 months in seven provinces and three cities who were over 6 month and eligible for supplementation in the last round in May, were reported by their mothers to have swallowed a supplement at least once.

Table 28. The coverage of Vitamin A supplementation in eligible children under 2 years of age in seven provinces and three cities of DPRK.

PROVINCE		Vitamin A coverage in children aged more than 6 month		
		yes	no	Total
Kaesong	Count	135	3	138
	%	97.8	2.2	
Nampo	Count	158	3	161
	%	98.1	1.9	
North Hamgyong	Count	154	1	155
	%	99.4	0.6	
North Hwanghae	Count	144	1	145
	%	99.3	0.7	
North Phyongan	Count	171	1	172
	%	99.4	0.6	
Pyongyang	Count	146	5	151
	%	96.7	3.3	
Ryanggang	Count	139	2	141
	%	98.6	1.4	
South Hamgyong	Count	161	2	163
	%	98.8	1.2	
South Hwanghae	Count	148	1	149
	%	99.3	0.7	
South Phyongan	Count	164	3	167
	%	98.2	1.8	
Total	Count	1520	22	1542
	%	98.6	1.4	

* Coverage of eligible children for vitamin A supplementation aged more than 6 months during the last round of vitamin A supplementation in May 2002.

There is no significant difference between urban (98.5%) and rural areas (98.3%). It should be noted that for those children who are less than 6 months old, they have to wait until next year or next National Immunization Day, which means that some unfortunate children have to wait until they are 11 months old before they receive the first dose of Vitamin A supplementation. As long as their mothers received a postpartum Vitamin A capsule and they are still breastfed, they will still be protected however, as the supplements is stored and passed on the child through the breastmilk.

Table 29. Incidence of diarrhea in children under two in seven provinces and three cities of DPRK, based on 2 week recall by the mothers

PROVINCE	Diarrhoea in last 2 weeks		
		yes	Total
Kaesong	Count	42	275
	%	15.3	
Nampo	Count	58	303
	%	19.1	
North Hamgyong	Count	61	286
	%	21.3	
North Hwanghae	Count	56	276
	%	20.3	
North Pyongan	Count	55	305
	%	18.0	
Pyongyang	Count	41	286
	%	14.3	
Ryanggang	Count	48	267
	%	18.0	
South Hamgyong	Count	66	293
	%	22.5	
South Hwanghae	Count	59	271
	%	21.8	
South Pyongan	Count	63	308
	%	20.5	
Urban	Count	348	1668
	%	20.9	
Rural	Count	201	1202
	%	16.7	
Total	**Count**	**549**	**2870**
	%	**19.1**	

As shown in Table 30, for those children that had diarrhoea, 86.7% ate/drank nothing during the illness. It should be noted that in Kaesong (48.9%), South Hwanghae (71.9%) and North Hwanghae (72.7%), children who got diarrhoea were lower than other areas to eat/drink nothing. Overall ORS utilization among diarrhoea cases is 55.7% and is slightly more in rural (59.7%) than in urban area (53.4%) but not statistically different.

Table 30. The percentage of children with diarrhea that are not given either food or fluid during the illnesses reported by the mother in seven provinces and three cities of DPRK

PROVINCE		Eat/ Drink	Nothing (NPO)	Total
		Yes	No	
Kaesong	Count	23	22	45
	%	51.1	48.9	
Nampo	Count	3	55	58
	%	5.2	94.8	
North Hamgyong	Count	0	61	61
	%	0	100	
North Hwanghae	Count	15	40	55
	%	27.3	72.7	
North Pyongan	Count	0	54	54
	%	0	100	
Pyongyang	Count	5	34	39
	%	12.8	87.2	
Ryanggang	Count	5	40	45
	%	11.1	88.9	
South Hamgyong	Count	0	66	66
	%	0	100	
South Hwanghae	Count	16	41	57
	%	28.1	71.9	
South Pyongan	Count	2	36	38
	%	5.3	94.7	
Total	Count	69	449	518
	%	13.3	86.7	

DISCUSSION

The prevalence of child malnutrition comparing across 3 surveys in DPRK

The levels of child malnutrition found by the Nutrition Assessment in seven provinces and three cities show an improvement on the levels found in past surveys, suggesting that the food and situation in DPRK has definitely improved considerably since 1998

Table 31. Stunting and Wasting in Children in DPRK (%) based on different population based surveys.

Indicator		Stunting			Wasting		
Survey Year		1998*	2000**	2002***	1998*	2000**	2002***
Age Groups (months)	<6	----	21.9	17.3	----	7.8	5.3
	6-11	14.5	31.9	22.7	17.6	10.4	6.7
	12-23	48.5	50.2	41.6	30.9	11.9	11.9
	24-35	62.2	47.5	45.6	20.5	9.7	8.4
	36-47	75.1	58.6	47.6	13.4	10.2	7.4
	48-59	77.5	60.3	47.5	8.9	11.9	6.3
	60-84	74.8	----	44.2	7.8	---	5.6

Although the Nutrition Assessment is not strictly comparable with the previous two national surveys, as they are derived from different population samples and represent different clusters, they are still all very large surveys that were representative of the great majority of the national population. It must be surveyed nutritional status for each age in order to compare the malnutrition across 3 surveys. Malnutrition is largely generated before two years of age, and malnutrition rates of children aged three years and over are a reflection of what conditions were like during the first two years of their lives..

In Table 31 the malnutrition rates found in the three large-scale populations based surveys. The stunting rates have improved over time for nearly all age groupings since 1998, suggesting continued improvements by the government and international agencies. In the 1998 survey the children aged over three were more than 70% stunted, a reflection of the famine conditions that prevailed in 1995-6 when they were in their foetal and infant growth phase. In 2002 the stunting

rate is down to 46% in over three-year-old children, representing a drop of 40% in malnutrition rates in these older children over the four-year period. It is more difficult to compare the changes in younger age group children because the 1998 survey excluded children aged less than 6 months. However there is evidence of improvement across the children under 7, with rates lower in 2002 than they were in 2000. In the older aged group children the wasting rates are much lower in both 2000 and 2002 than in 1998.

Comparative data on child malnutrition in selected East Asian countries

When compared to the child malnutrition rates in other countries of East Asia, DPRK appears to be in a better situation now than many other countries in the region. As shown in Table32 child underweight prevalence rate is better in seven provinces and three cities of DPRK than in the Philippines, Indonesia, Myanmar, Lao, Cambodia. Prevalence of stunting is similar.

Table 32: Comparative data on child malnutrition in selected East Asian countries*

Country	Stunting (height for age) %	Underweight (weight for age)%	Wasting (weight for height)%
Cambodia	56	52	13
China	15	8	1
DPRK (7prov/3 cities)	39	21	8
Indonesia	42	34	13
Philippines	30	28	6
Lao PDR	47	40	11
Myanmar	-	39	-

The relationship between stunting and underweight seems to be rather different in DPRK than that observed in Cambodia, Lao, and Philippines.

Only in China and DPRK the underweight rate is half that of stunting.

There are some bases to improve the nutrition situation in the DPRK. First of all, our party and the government published the important policy to improve the people's health and welfare though there had been several difficulties. And there are continued supports from all agencies concerned.

Although there has been considerable improvement and continued support from all agencies concerned, the nutritional situation in DPRK still warrants a lot of concern The prevalence rates encountered in seven provinces and three cities are still considered to be very high based on the weight for age and height for age or stunting classification of malnutrition according to WHO criteria. Furthermore the continued existence of severe wasting (<3 z-score W/H) is a sign that the situation is still of great concern.

We shall focus on trying to improve the underweight rate, comparing with WHO criteria in seven provinces and three cities.. Future efforts to further improve the nutritional status of the population should focus on trying to improve the stunting rates and wasting.

Nutrition situation is much improved for age groups, especially in the Stunting. Stunting is thought to be heavily influenced by maternal nutritional status and the effects of this on foetal growth in early pregnancy so that the maternal malnutrition must be more improved and reduced the number of maternal anemia.

The birth weights reported by the mothers are impressively good. The overall rate of only 6.7% is better than that of 7.7% reported for England and Wales in 1996, and the rate reported for Pyongyang of 4.8% puts it on a part with Denmark, for example, with one of the best low birth weight rates reported by any nation. The correlation between the birth weight reported by the mother and the weight for age z-score of the infants in the first six months of life is reasonably strong and highly significant.

The maternal malnutrition rates are difficult to properly evaluate, because of the lack of international standards for anything other than Body Mass Index. 32% of maternal malnutrition based on MUAC is shown in the survey. The levels of underweight with 16% of women weighing less than 45kg also point to the need to improve the maternal nutrition.

The results of the household food security and food frequency analysis although very encouraging suggest there is still some room for improvement. Based on mothers' report, almost all households surveyed had staple foods stored in the house and all mothers had eaten the majority three times for a day. Thus although the diet seems to be quantitatively adequate across 7 provinces and 3 cities, there is still some room to improve the quality of the diet.

For the future work of the agencies concerned with the food and nutrition situation of women and children in DPRK, the results of the provincial analysis provide useful insights. The provinces of South Hamgyong and Ryanggang for instance, have the highest stunting and wasting rates in children, and also show the highest rates of diarrhoeal disease incidence in children. These provinces also have the highest prevalence rates of small weight mothers, and the lowest frequency of consumption of pulses and meats/fish/eggs by mothers in the previous twenty-four hours. There are statistically significant associations between the frequency of consumption of these protein foods in mothers and the occurrence of malnutrition in their children. This is but a glimpse of what could be learned from a more in depth analysis of the rich data set that has been collected and assembled. But even without such an in-depth analysis, there is already valuable information in this report that requires more immediate action.

CONCLUSIONS AND RECOMMENDATIONS

The nutrition situation has certainly improved dramatically since 1998, and the results of the 2002 assessment are consistent with the improvement observed by the 2000 survey. Careful interpretation of the results suggests that real improvements have occurred and continue to do so. These improvements are much more for underweight than they are for stunting however, which is a cause for concern. The fall in underweight across the three surveys, from 60% to 28% to 20% shows a consistent trend. The rates of child underweight and stunting require continued efforts on the part of those concerned to maintain the efforts so far invested. Furthermore there is still a worryingly high prevalence of severely malnourished children. Further efforts to resolve the problem of child malnutrition need to give greater attention to improving maternal nutritional status.

Whilst the food situation in seven provinces and three cities surveyed appears to be good from a quantitative perspective, it could still be improved qualitatively. The majority of households reported that they had some food in store, and the presence in the food store of the main starchy staple was universal. The consumption by the mothers of protein rich food like meat, fish, eggs and pulses, and of fruits was not universal and showed great provincial variations.

The food and nutrition situation is not the same across seven provinces and three cities surveyed, and there is already information in this preliminary analysis, which suggests that some provinces require more differentiated attention in the future. The nutrition assessment did not investigate all possible causes of poor child growth and a more in depth analysis of the possible causes of these differences at the provincial level is certainly merited. Results from this survey already suggest

however, that in the provinces where foetal and infant growth failure is most common, future efforts should consider looking at ways to improve the diet of the mother before pregnancy, during pregnancy and during lactation.

Appendix Team list by Province

No	Province			WFP/UNICEF			Logistic Teams	Data Entry Teams	Data Control Team
		Central Bureau of Statistics	**Institute of Child Nutrition**	**International PO**	**National PO**	**Driver**	**Provincial Bureau of Statistics**	**Provincial Bureau of Statistics**	**Provincial Bureau of Statistics**
1	**Pyongyang**	Kim Gi Chong, Director	Rim Hi Yong, Head of Section	Fabiola Paluzzi	Jon Hye Yong	Pak Yun Do #19	Ri Gi Yong, Section Head of Pop and Lab	Yu Rie Hwa, Clerk	Kim Sang Chol, Programmer
		Ri Myong Je, Vice Director	Pak Kyong Suk, Specialist	Samarendra Ghose	***Yang Gon Suk***	Ri Gyong Won - #05	Han Gwang Su, Officer	Ri Un Sun, Clerk	
2	**N. Pyongan**	Yang Myong Suk,Senior Officer	Kim Kyong Chol, Specialist	Heera Shrestha	Hyon Gyang Song	Pak Tae San #43	Kim Jong Chol, Section Head of Pop and Lab	Kang Gyong Sun, Clerk	Jong Myong Kum, Programmer
		Kim Jong Su, Senior Officer	Ko Yong Hwa, Specialist	Fe Guevara	Li Yong Nam	Kim Il Nam #42	An Gwang Chol, Officer	Yang Myong Sun, Clerk	
3	**S. Pyongan**	Kim Kyong Sun, Senior Officer	Kil Chang Ryol, Specialist	Samar Elia	Li Yon Hui	Ro Song Chol #48	Ryang Hui Jon, Section Head of Pop and Lab	Ri In Ae, Clerk	Kim Hui Chol, Programmer
		Choe Song, Senior Officer	Sin byong Chil, Specialist	***Danielle Deboutte***	Kim Yong Hak	Ri Sang Kum - #03	Kim Kang, Officer	Kim Jin Sim, Clerk	
4	**Nampo**	Pak Hyk Chan, Staff	Kim Su Hwan, Head of Section	Hasana Shakya	Hwang Myong Sim	Kim Yong Sik #20	Ri Yong Su, Section Head of Pop and Lab	Kim Myong Sun, Clerk	Jo Song Ho, Programmer
		Li Ran Ok, Senior Officer	Sim Byong Chol, Specialist	***Abdulai Kaikai***	***Sim Dong Guk***	***Kim Chun Sun-#03***	Kim Yong Gun, Officer	Pak Sung Hui, Clerk	
5	**N. Huanghae**	Hong Yong Ae, Senior Officer	Go In Gon, Specialist	Wolfram Herfurth	Hong Ryul	Song Dong Hak #24	Kuon Sok San, Section Head of Pop and Lab	Kim Hyon Son, Clerk	Ri Gum Chol, Programmer
		Li Hung Yong, Director	Min Kyong Hyon, Head of Section	***Ingrid KH***	***Ri Chong Gyong***	***Jong Tae Yong-#05***	Han Song Jin, Officer	Choi Gwang Ran,Clerk	
6	**S. Huanghae**	Ryu Chyol Hwan, Vice Director	Pak Hyon Su, Specialist	Miriam Sebit	Sonu Yong Sik	Pak Chol - #13	Kim Gwang Sik, Section Head of Pop and Lab	Kim Song Suk, Clerk	Kin Hyon Gil, Programmer
		Jo Chang Su, Officer	Pak Hak Chol, Head of Section	Ndeley Agbaw	Pak Gyong Chol	Ri Chon Gil #11	Ri Jun Ho, Senior Officer	Kim Myong Hui, Clerk	
7	**Kaesong**	Pak Yong, Senior Officer	Kim Ho Yong, Specialist	Sungval Tunsiri	Kim Bong Chol	Ri Gyong Sop - #06	Han Sang Guk, Section Head of Pop and Lab	Ri Yon Ok, Clerk	Pak Chol U, Programmer
		Kim Hung Sik, Vice Director	Song Gi Jom, Specialist	Francis Abansi	So Gwang Yong	Kim Pil Hon - #21	Kangf Myong Chol, Officer	Kim Ok, Clerk	
8	**S. Hamgyong**	Jong On Sun, Senior Officer	Jong Un Sun, Specialist	Joy Georges	Jong Chun Gil	Ri Chon Sik #40	Im Dong Bin, Section Head of Pop and Lab	Kim Song Suk, Clerk	Pak Gwang Chol, Programmer

		Ri Song Sim, Director	Sim Un Yong, Specialist	Jean-P Mambounou	***Choe Tae Song***	**Kim Sung Chol #08**	Ri Bom Yong, Officer	Kim Myong Hui, Clerk	
9	**N. Hamgyong**	Ryang Jong Hyok, Senior Officer	Kim Sung Rim, Specialist	Evaline Dianga	Kim Jong Su	Ko Mun Song #46	Kim Chol Su, Section Head of Pop and Lab	Ri Sun Hwa, Clerk	Choi Kang Su, Programmer
		Jang Kyong Suk, Officer	Wang He Song, Specialist	***Andrew Morris***	***Kim Chol Ho***	***Kim Yong Il - #07***	O Su Nam, Officer	Kim Hyon Myong, Clerk	
10	**Ryanggang**	Kim Ryong Sun, Vice Director	Kim Rak Chol, Specialist	Michel Denis	Ryang Yong Ho	Pak Il Nam #41	Han Il U, Section Head of Pop and Lab	Kim Won Ok, Clerk	Ri Un Sok, Programmer
		Jo Sung Dong, Vice Director	Kim Yong Sok, Specialist	***Nagi Shafik***	***Yun Dae In***	***So Man Ho - # 02***	Pak Yong Bom, Officer	Jo Myong Ok, Clerk	

	Back-up Teams			
	WFP back-up			Mei Yue
	UNICEF back-up			Nada Kopac-Krvavica
	CBS back-up	Kim Ryu Kyong, Officer		
		Song Kum Sun, Officer		
	ICN back-up		Ri Chol, Specialist	
			Kim Song Jon, Specialist	

TABLE 1: ESTIMATED CHILD MALNUTRITION AS EXPRESSED BY HEIGHT FOR AGE IN 7 PROVINCES AND 3 CITIES OF DPRK

Province (PROV)		Height for age		Sample	95% CI for Prevalence*	Additional Children 2-7**	Prevalence of Malnutrition in 1+ to 7 year***	Expected Additional Malnourished Children	Total Expected Malnourished Children	Total Expected Sample	Estimated True Prevalence	95% CI for True Prevalence*	Population	Adjusting weight	Adjusted Prevalence Weight
		Normal	< -2 z												
Kaesong	Count	333	266	599		416		204	470	1015			363,163	0.0185	
	%	55.59	44.41	100.00	(38.72 - 50.24)		48.92				**46.26**	(41.91 - 50.75)			0.86
Nampo	Count	459	139	598		379		104	243	977			792,322	0.0404	
	%	76.76	23.24	100.00	(18.66 - 28.53)		27.46				**24.88**	(21.15 - 29.99)			1.00
North Hamgyong	Count	343	257	600		418		204	461	1018			2,221,290	0.1132	
	%	57.17	42.83	100.00	(37.20 - 48.66)		48.70				**45.24**	(40.92 - 49.73)			5.12
North Hwanghae	Count	363	236	599		422		193	429	1021			1,655,401	0.0843	
	%	60.60	39.40	100.00	(33.87 - 45.20)		45.85				**42.07**	(37.72 - 46.44)			3.55
North Phyongan	Count	345	254	599		443		222	476	1042			2,618,974	0.1334	
	%	57.60	42.40	100.00	(36.78 - 48.23)		50.11				**45.68**	(44.36 - 50.07)			6.10
Pyongyang	Count	438	162	600		433		136	298	1033			3,084,459	0.1572	
	%	73.00	27.00	100.00	(22.14 - 32.47)		31.44				**28.86**	(25.02 - 33.00)			4.54
Ryanggang	Count	320	280	600		422		221	501	1022			686,949	0.0350	
	%	53.33	46.67	100.00	(40.94 - 52.48)		52.34				**49.01**	(44.61 - 53.44)			1.72
South Hamgyong	Count	327	273	600		435		222	495	1035			2,929,841	0.1493	
	%	54.50	45.50	100.00	(39.79 - 51.32)		51.10				**47.85**	(43.46 - 52.23)			7.14
South Hwanghae	Count	368	231	599		427		189	420	1026			2,224,006	0.1133	
	%	61.44	38.56	100.00	(33.07 - 44.36)		44.25				**40.93**	(36.67 - 45.34)			4.64
South Pyongan	Count	347	253	600		446		213	466	1046			3,050,686	0.1554	
	%	57.83	42.17	100.00	(36.55 - 47.99)		47.65				**44.51**	(40.25 - 48.93)			6.92
TOTAL		3643	2351	5994		4241		1901	4252	10235			19,627,091		
Unadjusted Prevalence	%	**60.78**	**39.22**	**100.00**	**(37.47 - 41.00)**		**44.83**				**41.54**	**(40.19 - 42.91)**			
Adjusted Prevalence of Malnutrition by Height for Age (National, not including Chagang and Kangwon)															**41.57**

* Fleiss quadratic 95% confidence interval, design effect = 2

** Sum of children not measured in sample households because the household has more than one child

*** Prevalence of malnutrition of children aged 1 + to 7 years in the sample

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TABLE 2: ESTIMATED CHILD MALNUTRITION AS EXPRESSED BY WEIGHT FOR AGE IN 7 PROVINCES AND 3 CITIES OF DPRK

Province (PROV)		Weight for age		Sample	95% CI for Prevalence*	Additional Children 2-7**	Prevalence of Malnutrition in 1+ to 7 year***	Expected Additional Malnourished Children	Total Expected Malnourished Children	Total Expected Sample	Estimated True Prevalence	95% CI for True Prevalence*	Population	Adjusting weight	Adjusted Prevalence Weight
		Normal	< -2 z												
Kaesong	Count	476	124	600		416		97	221	1016			363,163	0.0185	
	%	79.33	20.67	100.00	(16.32 - 25.78)		23.28				**21.73**	(18.29 - 25.65)			0.40
Nampo	Count	512	88	600		379		63	151	979			792,322	0.0404	
	%	85.33	14.67	100.00	(10.96 - 19.30)		16.67				**15.44**	(12.40 - 19.00)			0.62
North Hamgyong	Count	460	140	600		418		110	250	1018			2,221,290	0.1132	
	%	76.67	23.33	100.00	(18.75 - 28.61)		26.41				**24.60**	(20.93 - 28.58)			2.78
North Hwanghae	Count	476	124	600		422		101	225	1022			1,655,401	0.0843	
	%	79.33	20.67	100.00	(16.32 - 25.78)		24.02				**22.05**	(18.55 - 25.91)			1.86
North Phyongan	Count	493	107	600		443		93	200	1043			2,618,974	0.1334	
	%	82.17	17.83	100.00	(13.77 - 22.74)		20.98				**19.17**	(15.94 - 22.88)			2.56
Pyongyang	Count	511	89	600		433		72	161	1033			3,084,459	0.1572	
	%	85.17	14.83	100.00	(11.11 - 19.48)		16.59				**15.57**	(12.62 - 19.07)			2.45
Ryanggang	Count	441	159	600		422		127	286	1022			686,949	0.0350	
	%	73.50	26.50	100.00	(21.67 - 31.94)		30.00				**27.95**	(24.17 - 32.13)			0.98
South Hamgyong	Count	455	145	600		435		124	269	1035			2,929,841	0.1493	
	%	75.83	24.17	100.00	(19.52 - 29.49)		28.51				**25.99**	(22.31 - 30.04)			3.88
South Hwanghae	Count	479	121	600		427		98	219	1027			2,224,006	0.1133	
	%	79.83	20.17	100.00	(15.87 - 25.25)		22.99				**21.34**	(17.91 - 25.18)			2.42
South Pyongan	Count	488	112	600		446		95	207	1046			3,050,686	0.1554	
	%	81.33	18.67	100.00	(14.51 - 23.64)		21.25				**19.77**	(16.51 - 23.52)			3.07
TOTAL		4791	1209	6000		4241		980	2189	10241			19,627,091		
Unadjusted Prevalence	**%**	**79.85**	**20.15**	**100.00**	**(18.74 - 21.64)**		**23.11**				**21.38**	**(20.26 - 22.53)**			
Adjusted Prevalence of Malnutrition by Weight for Age (National, not including Chagang and Kangwon)															**21.02**

* Fleiss quadratic 95% confidence interval, design effect = 2

** Sum of children not measured in sample households because the household has more than one child

*** Prevalence of malnutrition of children aged 1+ to 7 years in the sample

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TABLE 3: ESTIMATED CHILD MALNUTRITION AS EXPRESSED BY WEIGHT FOR HEIGHT IN 7 PROVINCES AND 3 CITIES OF DPRK.

Province (PROV)		Weight for Height		Sample	95% CI for Prevalence*	Additional Children 2-7**	Prevalence of Malnutrition in 1+ to 7 year***	Expected Additional Malnourished Children	Total Expected Malnourished Children	Total Expected Sample	Estimated True Prevalence	95% CI for True Prevalence*	Population	Adjusting weight	Adjusted Prevalence Weight
		Normal	< -2 z												
Kaesong	Count	558	42	600		416		30	72	1016			363,163	0.0185	
	%	93.00	7.00	100.00	(4.49 - 10.66)		7.112069				**7.05**	(5.08 - 9.77)			0.13
Nampo	Count	574	26	600		379		19	45	979			792,322	0.0404	
	%	95.67	4.33	100.00	(2.43 - 7.48)		4.8888889				**4.55**	(2.99 - 6.95)			0.18
North Hamgyong	Count	535	64	599		418		46	110	1017			2,221,290	0.1132	
	%	89.32	10.68	100.00	(7.53 - 14.88)		11.062907				**10.84**	(8.32 - 13.92)			1.23
North Hwanghae	Count	546	54	600		422		41	95	1022			1,655,401	0.0843	
	%	91.00	9.00	100.00	(6.12 - 12.97)		9.8253275				**9.34**	(6.99 - 12.23)			0.79
North Phyongan	Count	559	41	600		443		34	75	1043			2,618,974	0.1334	
	%	93.17	6.83	100.00	(4.36 - 10.46)		7.5892857				**7.15**	(5.19 - 9.84)			0.95
Pyongyang	Count	576	22	598		433		18	40	1031			3,084,459	0.1572	
	%	96.32	3.68	100.00	(1.95 - 6.68)		4.1666667				**3.88**	(2.45 - 6.03)			0.61
Ryanggang	Count	543	57	600		422		40	97	1022			686,949	0.0350	
	%	90.50	9.50	100.00	(6.54 - 13.54)		9.3617021				**9.44**	(7.16 - 12.45)			0.33
South Hamgyong	Count	527	72	599		435		55	127	1034			2,929,841	0.1493	
	%	87.98	12.02	100.00	(8.67 - 16.38)		12.747253				**12.33**	(9.64 - 15.50)			1.84
South Hwanghae	Count	534	66	600		427		52	118	1027			2,224,006	0.1133	
	%	89.00	11.00	100.00	(7.80 - 15.23)		12.147505				**11.48**	(8.93 - 14.65)			1.30
South Pyongan	Count	555	43	598		446		35	78	1044			3,050,686	0.1554	
	%	92.81	7.19	100.00	(4.64 - 10.89)		7.8651685				**7.48**	(5.43 - 10.16)			1.16
TOTAL		5507	487	5994		4241		369	856	10235			19,627,091		
Unadjusted Prevalence	%	**91.88**	**8.12**	**100.00**	**(7.18 - 9.18)**		**8.69**				**8.36**	**(7.63 - 9.16)**			
Adjusted Prevalence of Malnutrition by Weight for Height (National, not including Chagang and Kangwon)															**8.53**

* Fleiss quadratic 95% confidence interval, design effect = 2

** Sum of children not measured in sample households because the household has more than one child

*** Prevalence of malnutrition of children aged 1+ to 7 years in the sample

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