DPRK 2004 Nutrition Assessment

Report of Survey Results

Prepared by

Central Bureau of Statistics

Institute of Child Nutrition

Democratic People's Republic of Korea

February 2005

Foreword

The government of DPRK, in collaboration with UNICEF and WFP, conducted the DPRK 2004 Nutrition Assessment in October 2004. This assessment was carried out by the Central Bureau of Statistics and Institute of Children Nutrition, with financial and technical support from UNICEF and WFP.

We extend our sincere gratitude to UNCEF, WFP, the National Co-ordination Committee of DPRK, the consultants, Dr. Michael John Dibley, University of Newcastle, Australia, and Mr. Tran Than Do, National Institute of Nutrition, Vietnam, who provided the invaluable assistance and support, and the survey team members.

Democratic People's Republic of Korea

Central Bureau of Statistics

November 2004

Contents

Tables

Figures

Summary of Survey Findings

SURVEY METHODOLOGY

The DPRK 2004 National Nutrition Assessment is the fourth national nutrition assessment with the previous surveys taking place in 1998, 2000 and 2002. It aimed to assess the nutritional status of children from birth to six years of age and of mothers with children less than 2 years of age, and to identify possible causal factors of malnutrition.

It was a cross sectional survey of a representative sample of children and women living in seven provinces and one municipal city, and was conducted in October 2004. Multi stage cluster sampling was used with provinces as strata and *dong* or *ri* within the provinces as clusters. An approximation of random sampling, based on the random selection of two index children from a nursery within the *dong* or *ri* was used to select the households and children for the survey within each cluster. Twenty clusters were selected in each province and 30 households within each cluster giving a total sample of 4800 children.

Three main questionnaires were used in the survey; the household questionnaire; the maternal and newborn health questionnaire; and the child and maternal anthropometric measurement form. Food availability was assessed by asking about the frequency of consumption of fourteen different food groups by the households and mothers in the six months prior to the survey. Anthropometry measurements of weight and height were collected from all children using standard methods. Anthropometry measurements of mid upper arm circumference and body weight, and haemoglobin were collected from women with a child less than two years of age. Anthropometry standardisation exercises were conducted prior to the data collection. All measurements were directly monitored for quality by the survey teams, which included staff from the supporting international organisations.

Maternal malnutrition was defined as a MUAC of<22.5 centimetres. For all indicators of child and maternal malnutrition 95% confidence intervals were estimated using SPSS (V. 13); the statistical program.

SURVEY POPULATION AND DATA QUALITY

Survey population

Data was collected in the survey from a total of 4800 households from 160 *dong* or *ri* clusters of which 97 were from urban areas and 63 from rural areas (Table 4). There was 2109 children aged less than two years (44% of children <6 years) and all the mothers of these children participated in the anthropometric measurements. However participation in the haemoglobin testing was lower with only 1253 women (59%) agreeing to be tested. of participation varied by province.

Data quality

Assessment of child age data revealed it was of good quality and had no patterns that could bias the calculation of anthropometric indices. The evaluation of the child anthropometric data found the WHO recommended quality indicators (standard deviations of indices) were within the usual range for all three indicators. Also there was a similar quality of the anthropometric data collected by the

survey teams. The data quality indicators for the 2002 and 2004 assessment were similar indicating the survey results could be validly compared.

CHILD NUTRITIONAL STATUS

Child malnutrition

The prevalence of stunted children (height-for-age < -2 Z-score) aged 0-71 months in 2004 was 37.0%. The prevalence of severe stunting (<-3 Z-score) was 12.2%. There was a progressive increase in the prevalence of stunting from birth through to 48-59 months. but a slight decline with the oldest age group. The prevalence of stunting was higher in boys (38.6%) than in girls (35.2%). The prevalence of stunting varied significantly by province. Two provinces, South Hamgyong, and Ryanggang, had a very high level of stunting.

The prevalence of underweight children (weight-for-age < -2 Z-score) aged 0-71 months in 2004 was 23.4%. The prevalence of severe underweight (<-3 Z-score) was 8.1%. There was a progressive increase in the prevalence of underweight from birth until 24-35 months and then a slight decline. Prevalence of underweight was similar in girls and boys. The prevalence of underweight children varied significantly by province. The highest prevalence were in South Hamgyong, North Hamgyong and Ryanggang provinces.

The prevalence of wasted children (weight-for-height <-2 Z-score) aged 0-71 months in 2004 was 7.0% which is a medium level based on WHO criteria. The prevalence of severely wasted (<-3 Z-score) children aged 0-71 months was 1.8%. There was a slight increase in the prevalence of wasting in children 12-23 months, and thereafter a slow decline with increasing age. Wasting levels were similar in girls and boys. The prevalence of wasted children varied significantly by province. Two provinces, South and North Hamgyong, had a high level of wasting (>10%). Other 4 provinces had a medium level(5-9%) based on WHO criteria.

Factors associated with child malnutrition

Maternal malnutrition was associated with an increased prevalence in stunting. Low birth size was associated with more stunting. The prevalence of stunting increased by 62% as reported birth size decreased from 19% in children who were very large at birth to 30.7% in children who were perceived to be very small at birth. Higher usual frequency of household consumption of rice and rice products, poultry or meat, red or yellow vegetables, and oils and fats were associated with reduced childhood malnutrition.

Trends in childhood malnutrition

The reliable indicator to assess trends in children malnutrition prevalence is low height-for-age or stunting. This indicator changes slowly and is not influenced by recent acute shortages of food or of illness in the children. Trends in child malnutrition were examined by comparing the unweighted prevalence of stunting in the two surveys.

The prevalence of stunting in children 0-71 months in DPRK has fallen by 2.9% from 38.8% in 2002 to 35.9% in 2004. This is an average decline of stunting prevalence of 1.45% per year. The decline was greater for girls (4%) than for boys (2.1%). There was a significant decline in the prevalence of severe stunting between the two surveys, from 14.4% in 2002 to 11.8% in 2004.

The age specific trends in stunting also revealed the following.

Firstly, there was no change in the stunting rates between the surveys for children 0-11 months. Stunting in this age group is largely influenced by foetal growth and maternal malnutrition. The observed association between small birth size and stunting indicates that more efforts to improve maternal nutritional status will be required to rapidly reduce the prevalence of stunting in infants.

Secondly, the stunting rate in children 12 to 35 months has fallen sharply and was approximately 30% lower than 2002. If this progress in reducing stunting continues the overall prevalence of stunting will fall by a substantial amount in future surveys.

Thirdly, the stunting rate in the children 36 to 71 months did not change between the surveys. Children usually do not exhibit catch up growth beyond three years of age even if their diets improve. So it is critically important to provide interventions that have an impact on the growth of very young children.

The prevalence of stunting decreased in all provinces and on average the decline was from 2% to 3% in each province. These findings indicate improvements occurred uniformly across the country.

MATERNAL NUTRITIONAL AND HAEMOGLOBIN STATUS

Maternal malnutrition

Thirty two percent of the women with a child less than 24 months were malnourished as indicated by a mid upper arm circumference (MUAC) less than 22.5 centimetres. The prevalence of low MUAC demonstrated a U shaped relationship with age where by both younger and older women had higher levels. The prevalence of maternal malnutrition was similar in all provinces except for South Hwanghae, which was lower than the national average.

Similar patterns were observed for low maternal body weight. Low intakes of rice and rice products, poultry and meat, and green leafy vegetables had a weak relationship with higher prevalence of maternal body weight < 45 kg

Trends in maternal malnutrition were examined by comparing the prevalence of MUAC in the two surveys. There were some improvements in maternal nutritional status between the 2002 and 2004 assessments mainly for women 25 to 29 and 30 to 34 years and these improvements were observed in some provinces.

Maternal anaemia

There was an improved participation in the haemoglobin assessment with 59% of women with a child less than two years agreeing to the test. Overall, 34.7% of the women had anaemia (Hb < 12.0 g/DL), but only 0.5% had moderate to severe anaemia (Hb < 9.0 g/DL). Anaemia tended to be higher in the youngest and oldest age groups and was slightly lower in women who had completed tertiary education. There was a variation in the prevalence of anaemia by province. The highest prevalence of anaemia was found in South Phyongan (61.3%) followed by North Phyongan (47.8%).

The prevalence of anaemia in 2002 (33.6%) was very similar to the level found 2004.

FOOD AVAILABILITY

Household food availability was assessed in the survey by asking the women respondents about the usual frequency of consumption of fourteen different food groups during the six months prior to interview. Usual household consumption of rice was lowest in Ryanggang and North Hwanghae, but these provinces had high daily consumption of other cereals and potatoes. The usual consumption of poultry or meat and fish was about half that of beans and bean products across most provinces. The consumption of poultry or meat and fish was very low in Ryanggang. Green leafy vegetables and non-coloured vegetables were consumed with a similar high frequency across all provinces. There was more variation by province in the consumption of red/yellow vegetables with the highest levels in Ryanggang and North Hamgyong. Overall the average consumption of red/yellow vegetables was much lower than for the other vegetables. Oils and fats were consumed least frequently in the Ryanggang and more frequently in lowland southern provinces. The frequency of consumption of fortified foods was high in the northern provinces.

The most common source of staple foods was the PDC rations or Farmers rations, but a quarter of the households reported WFP foods as a source of their staple food. The most common sources of beans were farmer's rations, self production, markets, kin support and WFP foods. The sources of fruits and vegetables were state shops, markets, self production and farmer's rations. WFP foods were not a source of these foods.

MATERNAL AND CHILD CARE

Child feeding patterns

At <6 months, 6-9 months, 12-13 months and 22-23 months 98.5%, 86.1%, 71.2% and 38.9% of the children respectively were still breastfed. Based on 24 hour recall prior to interview, 65% of children less than six months of age were exclusively breastfed. About 22% of the children less than six months were receiving both breast feeds and other water based liquids. A smaller percentage was being given other milks. Amongst the breastfed children 31% were receiving at least some complimentary food at 6-9 months.

Use of micronutrients

The coverage of Vitamin A supplementation in the six months prior to the survey was uniformly very high for age eligible children across all provinces. The majority of children who received vitamin A obtained it from local nurseries.

Overall, 33.5% of women received vitamin A postpartum. The coverage of maternal postpartum vitamin A supplementation varied considerably by province with the highest levels in Pyongyang. Six percent of women reported night blindness during their last pregnancy.

Forty percent of households were using iodised salt. There was less consumption of iodised salt in the northern mountainous provinces.

Immunisations of children

There was a uniformly high coverage of all childhood immunisations.

Childhood illnesses

About one in five children had diarrhoea in the two weeks prior to the survey. The prevalence of diarrhoea was lower in Pyongyang than other provinces. No relationship was seen between the type of toilet or water source and diarrhoea. This might be expected given the high level of appropriate methods of disposal of the children's stools. Overall 83% of the mothers gave ORS or other acceptable fluids during the diarrhoea episode. Also 62% of the mothers appropriately continued to breastfed. However 30% of mothers did report reducing food intake during the diarrhoea episode and 20% reported giving fewer fluids.

Twelve percent of the children had ARI symptoms, 20% had a fever and 85% had both ARI and fever in the two weeks prior to the survey. Children 6 to 17 months were more likely to have ARI and ARI with fever. The vast majority of children with ARI were taken for treatment.

Pregnancy care

There was a very high level of antenatal care during pregnancy with approximately 60% of women attending ten or more antenatal care checks during their last pregnancy. The coverage of antenatal care was uniformly high across all provinces. Similarly, there was a uniformly high level of care during delivery from medically trained birth attendants.

WATER AND SANITATION

Overall 82% of the households in DPRK have water piped into the dwelling even in the remote northern provinces. Approximately 57% of households have flush toilet system and 43% have pit toilets. There was similar pattern found in all provinces. Overall 80% of mothers with a young child 0-3 years disposed of their children's stools using a method that contained the stools.

1 Introduction

2004 Nutrition Assessment Health Survey in DPRK was carried out by the questionnaire and methodology on which were agreed with CBS, ICN, NCC, UNICEF, WFP and consultants according to the Protocol.

DPRK government carried out Nutrition Surveys in 1998, 2000(MICS) and 2002. The data collected from these surveys greatly assisted in improving the nutrition status of mothers and children, and also progressed survey methods and analysing capacity of the country. For the further improvement of nutrition, the government conducted nutrition assessment survey in October 2004, in collaboration with UNICEF and WFP.

2 Aims

The goal of the National Nutritional Assessment was to collect data for monitoring the National Programme of Action for the Well-being of Children (2001-2010) of DPRK and to identify strategies for better targeting of future programmes and expenditures of the Government, and international agencies such as UNICEF and WFP, directed at improving the nutrition of women and children. The assessment also sought to develop the capacity of the Central Bureau of Statistics (CBS) and the Institute of Child Nutrition (ICN) to carry out such nutrition assessments in the future.

The aim of the survey was to assess, in each of seven provinces and one municipal city, the nutritional status of children from birth to six years of age and of mothers with children less than 2 years of age, and to identify possible causal factors of malnutrition.

The survey specifically aimed to assess the following in each of the seven provinces and one municipal city, and at a national level:

- To assess the prevalence of underweight, stunting, and wasting in children less than 72 months of age
- To assess the prevalence of low mid upper arm circumference in women with children less than two years
- To assess the prevalence of anaemia in women with children less than two years
- To analyse factors associated with malnutrition in children and women
- To analyse patterns of infant feeding, including breastfeeding patterns.
- To assess the frequency of consumption of groups of foods at the household level and by the women with children less than two years
- To analyse the sources of main staple foods, beans and bean products, and fruits and vegetables for households.
- To assess the coverage of vitamin A supplementation for children less than two years in the six months prior to the survey
- To assess the coverage of vitamin A supplementation and the level of night blindness of women with children less than two years during their last pregnancy
- To assess the level of usage of iodised salt by households
- To assess the coverage of BCG, Polio, DTP and measles vaccinations in children less than two years of age
- To assess the access to water and sanitation facilities available to households with children less than six years of age

.

3 Survey Methodology

3.1 Design

The DPRK 2004 Nutrition Assessment was a cross sectional survey of a representative sample of children less than six years and women with children less than two years living in seven provinces and one municipal city. The data collection was completed over a ten day period from 4 to 14 October 2004.

3.2 Sampling design

In the absence of a national household sampling frame, multi stage cluster sampling was used with provinces as strata and *dong* or *ri* within the provinces as clusters or primary sampling units (PSU). An approximation of random sampling, based on the random selection of two index children from a nursery within the *dong* or *ri* was used to select the households and children for the survey within each primary sampling unit. The multi-stage cluster sampling design is summarised in the Table 1.

Table 1 Design of multistage cluster sampling

List Used	Sampling Method
Provinces	Stratification
Dong and *ri* from stage 1	20 clusters by random sampling with *dong* and *ri* selected proportionate to urban and rural population in province.
Nurseries ini clusters from stage 2	Randomly select one nurseries
List of children in nursery	Randomly select two index children
Households in selected Dong or Ri	30 households starting with randomly selected index households and remainder selected by next-nearest-house method. Women present with child aged <6 years and resident in the household

The sample of this nutrition assessment represents the universe of seven provinces and one municipal city. The sample frame was all the *dong* or *ri* in both the accessible and non-accessible counties of these provinces and city. A random number generator was used to select twenty dong and or ri, proportionate to the size of the urban and rural population within the province, as the clusters for the survey. If a randomly selected *dong* or *ri* was located in a non-accessible county, then the next accessible *dong* or *ri* was chosen.

In each cluster, one nursery and two children from the list of those enrolled in the nursery were randomly selected, and their families became index households for the survey. A further 14 households with children under six surrounding the index households were selected using the "next-nearest-house" method (MICS 2004). Thus, 30 households or secondary sampling units (SSU) were selected within each PSU. The youngest child and mother in the selected 30 households were asked to come to the central area for data collection and measurements.

The population of the *dong* and *ri* were assumed to be sufficiently similar within each province not to result in any major sampling bias, and no sampling weights for PSU were used when calculating province levels estimates. However, a fixed sample size was collected from each province even though the province population size varied. Thus sampling weights were used when calculating national level estimates of survey parameters, and these are discussed in more detail in section 0 3.8 Data analysis below.

3.3 Survey measurements

3.3.1 Questionnaires

Three main questionnaires or forms were used in the survey; the household questionnaire; the maternal and newborn health questionnaire; and the child and maternal nutritional status form. The details of the information recorded on these forms are described below.

The household questionnaire consisted of the following modules:

- *Household information module*: This module recorded basic socio-demographic information and the results of the interview.
- *Salt iodization module*: This module recorded the results of the salt test for iodine content.
- *Water and sanitation module*: This module recorded information about the water supply and sanitation facilities in the household.
- *Household food availability module*: This module recorded information about the average consumption of groups of foods over the 6 months prior to the survey as an indicator household food availability.

The maternal and newborn health questionnaire consisted of the following modules:

- *Maternal and newborn health module*: This module recorded the history care in pregnancy and at delivery and the birth weight or perceived birth size of children aged less than 2 years.
- *Vitamin A module*: This module recorded if vitamin A supplements were received by children less than 2 years of age in the six months prior to interview.
- *Infant feeding module*: This module recorded current infant feeding practices for children less than two years of age.
- *Care of illness module*: This module recorded common childhood morbidity and the response of caregivers to these illnesses.
- *Immunisation module*: This module recorded the type and number of childhood immunisations.
- *Maternal food frequency module*: This module recorded the average frequency of consumption of food groups over the last 6 months of mothers with children less than 2 years.

The child and maternal nutritional status form consisted of the following modules:

- *Child anthropometry module*: This module was used to record the child anthropometry, the child's sex and date of birth and the date of measurement.
- *Maternal anthropometry and haemoglobin module*: This module was used to record the maternal anthropometry and haemoglobin measurement.

3.3.2 Anthropometry

The anthropometry measurements were taken by trained staff of the Institute of Child Nutrition and recorded in child and maternal nutritional status form. All measurements were taken by two

trained survey team staff. The measurements were taken in a warm environment with adequate light.

The weight of the mother and child were measured using an electronic scale (Uniscale) measuring up to a maximum of 120 kg with increments of 100 gram. An automatic tarring facility of the scale allowed the child to be held by the mother but with the child's weight displayed. Weight measurements were taken with the mother or child in light clothing. Pre-weighed blankets were provided to keep the children warm when necessary during measurement. It was recorded if the child was measured with clothing or shoes.

Standing height was measured for children 2 years of age or older using a portable height measuring board, made of wood using a standard design with moveable head piece and tape to nearest millimetre. Supine length was measured for children less than 2 years of age using the same portable height measuring board described above. Two survey team members took the height or length measurements ensuring that the child's legs were fully extended and that the child's head touched the vertical headboard.

Mid upper arm circumference (MUAC) was measured for all women with a child less than 2 years of age using a non-stretch insertion tape to the nearest millimetre. The mid point between elbow and shoulder on the left arm was marked and used as the site for the measurement.

3.3.3 Haemoglobin

The mothers of all children less than two years of age were invited to have a haemoglobin examination, using a capillary blood sample tested with a Hemocue portable hemoglobinometer. A standard protocol was used to collect the blood sample and take the haemoglobin reading. Verbal consent of the women for the haemoglobin test was recorded. Women with haemoglobin <12.0 g/dL were referred to the local health authority.

3.3.4 Measurement of salt iodination

Salt iodization was measured using a colour-change kit which detected if there was no iodine (no colour), from 1 to 14 ppm of iodine (weak colour change) and 15 ppm or more (strong colour change). In the analysis only any colour change was used to indicate the salt had some iodine. The salt was brought to the survey site by the mother for testing by the staff of the Institute of Child Nutrition at the time of interview.

3.4 Survey factors and outcome indicators

3.4.1 Anthropometric indicators in children

All the anthropometric indicators of child nutritional status used in the survey were expressed as Z-scores, namely the deviation of the individual anthropometric measurement from the median value of the WHO growth reference for that child's height or age divided by the standard deviation for the reference population (WHO 1995).

Weight for-age is an indicator of body mass relative to chronological age. It is influenced by both the height of the child, and the weight of the child relative to height thus making its interpretation complex. Low weight-for-age indicates insufficient weight gain relative to age or weight loss (underweight). While high weight-for-age indicates an excess gain of weight relative to age

(overweight). Two categories of low weight-for-age were used in the survey tables: moderate and severe underweight if Z-score <-2; and severe underweight if Z-score <-3.

Height-for-age reflects achieved linear growth and its deficits indicate long-term, cumulative inadequacies of health or nutrition (WHO 1995). Low height-for-age or stunting indicates a pathological process that has impaired linear growth. However some children with low height-for-age are genetically short. Where the prevalence of low height-for-age is very high then it is reasonable to assume that the majority of these children are stunted. Two categories of low height-for-age were used in the survey tables: moderate and severe stunting if Z-score <-2; and severe stunting if Z-score <-3.

Weight-for-height reflects body weight relative to height. Low weight-for-height or wasting indicates an insufficient weight gain relative to height or recent lose of weight. Wasting implies a recent severe process that has lead to weight loss such as acute illness or acute starvation. Some children with low weight-for-height are normally thin but if the prevalence of low weight-for-height is high it may be assumed that most of these children are wasted. High weight-for-height or overweight indicates an excess weight gain relative to height, or an insufficient gain in height relative to weight. Two categories of low weight-for-height were used in the survey tables: moderate and severe wasting if Z-score <-2; and severe wasting if Z-score <-3.

Table 2 presents the prevalence groups used to describe the survey results for different indicators. These criteria were modified from the recommendations of a WHO Expert Committee that reported on the use and interpretation of anthropometry (WHO 1995).

Table 2 Classification of prevalence levels for child anthropometric indicators

Prevalence group	Prevalence ranges (% of children <- 2 Z-scores)		
	Low weight-for-age	Low height-for-age	Low weight-for-height
Low	< 10	< 20	< 5
Medium	10 - 19	20 -29	5 - 9
High	20 - 29	30 -39	10 - 14
Very high	> 30	> 40	> 15

3.4.2 Anthropometric indicators in women

Two anthropometric measurements collected (body weight and MUAC) can be used to assess nutritional status of women. Furthermore, the relationship between MUAC and BMI has been described allowing an approximate estimate of the level of low BMI in the population (WHO 1995).

MUAC is the circumference of the left upper arm measured in centimetres. This indicator is useful for assessing acute adult malnutrition and for assessing the prevalence of malnutrition at the population level.

Maternal body weight alone can also be used a predictive factor in non-pregnant women for future risk of low birth weight delivery. Women with pre-pregnant body weight<45 kg have been reported to have an 80 to 90% increased risk of delivering a low birth weight baby (WHO 1995). As in the 2002 survey three body weight categories were used; < 45 kg, 45 to 50 kg and > 50 kg.

3.4.3 Measurement of infant feeding practices

To measure infant feeding practices questions about the current feeding practices for children less than 24 months of age were asked of the mother in the survey. The current breastfeeding status of the infant was recorded as well as the consumption of a series of food items or groups such as water, fruit juice and rice soup in the 24 hours prior to interview. The use of bottle feeds was also specifically noted.

Definitions of breast feeding patterns: Standard indicators of breastfeeding patterns (WHO 1991) were used in the survey and were defined as follows.

Exclusive breastfeeding rate: The proportion of infants less than six months (180 days) of age who were only fed breast milk and no other fluids or solids.

Predominate breastfeeding rate: The proportion of infants less than six months (180 days) of age who were breastfeed but also received other fluids, excluding formula feeds, and no solids.

Timely complementary feeding rate: The proportion of infants six to nine months (180 - 299 days) of age who received solid foods and other fluids as well as breast milk in the 24 hours prior to interview.

Continued breastfeeding rate at 1 year: The proportion of children 12 to 15 months of age who were breastfed during the 24 hours prior to the interview.

Continued breastfeeding rate at 2 years: The proportion of children 20 to 23 months of age who were breast fed during the 24 hours prior to interview.

Bottle feeding rate: The proportion of infants less than 12 months of age who were bottle-fed during the 24 hours prior to interview.

3.5 Survey organisation

Three types of teams conducted the survey in each province: the logistics teams; the data collection teams; and the data entry and quality control teams. Each province was visited by two data collection teams from the central level, and each data collection team covered 10 clusters each and completed the data collection in 10 days, i.e. one cluster a day.

The provincial logistics teams were responsible for organising the basic support needed for the data collection teams during the time that they were in the province. This included contacting the local authorities in each cluster, briefing the community, and arranging accommodation as required. The provincial logistics team also identified the central location in each PSU where all the interviews and examinations were carried out.

The two data collection teams that came from the central level to each province/city comprised a Central bureau of Statistics staff member, an Institute of Child Nutrition staff member, an international UNICEF/WFP staff member, a national officer from UNICEF/WFP, and a UNICEF/WFP driver. The data collection teams identified the population sample and carried out the interviews and examinations[1].

[1] Ten survey teams had a permanent presence by international staff and six teams had random presence.

The data entry and quality control teams came from provincial Statistics Office and included both a team leader for data quality checking and data entry clerks as necessary. Data entry was carried out the day after the questionnaires were collected in the field.

3.6 Training

Training of the survey team was conducted in two phases. In the first phase the project consultants conducted a training of trainers for six CBS staff and six ICN staff. This training took place over 2 days and covered the questionnaire, interviewing techniques, anthropometric measurements, how to standardise anthropometric measurements, haemoglobin examination, sample selection procedures in the field and approach to training survey team.

In the second phase the trainers conducted a three day training of the survey team. This training covered interviewing, anthropometry, haemoglobin examination, salt examination, data entry, field editing and form management. The survey was introduced on the first morning to all trainees. Then the trainees were divided into three groups; interviewers, anthropometrists and data entry staff. Each of these groups was provided with intensive training in the data collection for which they were responsible. Pre-tests of the questionnaires were also part of the training. The full team met again at the end to finalise logistics and work plans and to receive equipment. The training employed an active learning approach and stressed achieving the skills needed to successfully conduct the data collection.

3.7 Data processing

All forms were organised and packaged according to cluster and had a cluster control form was attached when questionnaires were dispatched to the data entry team or to the survey office in Pyongyang. This organisation of the forms was maintained for data entry and cleaning and for archiving of the forms. To facilitate field editing, checklists were prepared to guide the interviewers and field team leaders as to how to edit the forms. These daily checks aimed to detect missing values, range errors, invalid values, errors with skips and internal inconsistencies.

Epi Info version 6.04 was used for data entry and editing. Data entry screens were prepared with error checks for valid data ranges and skip patterns. Batch data error check programs were run once the data entry had been completed, and again once the data from the provinces was combined. Data entry was completed by two staff of the provincial CBS office and usually completed the day after the data was collected.

Also, at data entry, a special purpose program calculated anthropometric indices for children using the WHO international growth reference. After data cleaning and correcting the anthropometric measurements and the child's age, these indices were recalculated. The data from the provinces was merged by staff of CBS in Pyongyang and further data cleaning completed based on an examination of distributions and checks for logical errors or improbable dates or values. The survey data was stored in a single file because only one record for each women and child was collected in sampled households.

3.8 Data analysis

The data were analysed using SPSS version 13. For the estimates of child and maternal malnutrition 95% confidence intervals were calculated after adjustment for the sampling design using the standard methods used in SPPS. These confidence intervals were used to assess if differences between estimates were of statistically significant. If the confidence intervals between

two estimates being compared did not overlap them the difference were assumed to be statistically significant.

Sampling or probability weights were needed for national level estimates of survey parameters because of the variability in population size of each province stratum[2]. If sampling weights were not used the point estimates for national level indicators could be biased. A further weighting factor was used to account for the children in the sampled households who were not measured because only the youngest child was measured. This weight was calculated as the ratio of the total number of children in the sampled households aged 2 to 6 years to the number of children aged 2 to 6 years who were measured. It was assumed that the unmeasured children were mostly two years of age or older. The weight for children less than two years was one, meaning no weighting factor was applied to these children. These two different weighting factors are presented in Table 3. The effect of these weights on the national and province level estimates of malnutrition was small increasing the percentages by one to two precent. The weights used are noted on each of the results tables. The estimates of malnutrition for children and women were compared between the DPRK National Nutrition Assessments conducted in 2002 and 2004. To simplify this comparison the unweighted prevalence from both surveys were used. The reasons for this decision included the small effect of the weights on national and province level estimates and the difficulty of calculating comparable all child factors for the surveys. The 2002 surveyed assessed children through to 84 months where as the 2002 survey only assessed children through to 72 months. The comparisons of the prevalence of child malnutrition used only the data for children less than 72 months in both surveys.

Table 3 Sampling weights

Province weights to take account of differences in province population size and all child factors and weights to provide estimates accounting for unmeasured children, DPRK National Nutrition Assessment 2004

Province	Province weight	Age of child in years	All child factor	All child weights combining all child factor and province weights
Pyongyang	1.2426	<2	1.0000	1.2426
	1.2426	2-6	1.6944	2.1054
South Phyongan	1.5903	<2	1.0000	1.5903
	1.5903	2-6	1.5744	2.5038
North Phyongan	1.0540	<2	1.0000	1.0540
	1.0540	2-6	1.6877	1.7788
South Hwanghae	0.8871	<2	1.0000	0.8871
	0.8871	2-6	1.8066	1.6026
North Hwanghae	0.8018	<2	1.0000	0.8018
	0.8018	2-6	1.7380	1.3935
South Hamgyong	1.2261	<2	1.0000	1.2260
	1.2261	2-6	1.7189	2.1075
North Hamgyong	0.9194	<2	1.0000	0.9193
	0.9194	2-6	1.7219	1.5830
Ryanggang	0.2790	<2	1.0000	0.2789
	0.2790	2-6	1.7771	0.4957

The food frequency data for both the household and the mother was converted to daily frequencies and then ranked. Two or three categories were formed but because of the close clustering of

[2] The population sampling weights were based on 2003 population statistics.

responses it was not always possible to form equal divisions of the data. When food frequency data was used in analyses of risk factors associated with child malnutrition the average intake described by each category was calculated and include as a footnote to the tables.

The graphs presented in the report were prepared in Excel based on SPSS output.

4 Results

4.1 Survey population

Data was collected in the survey from a total of 4800 households from 160 *dong* or *ri* clusters of which 97 were from urban areas and 63 from rural areas (Table 4). There was 2109 children aged less than two years (44% of children <6 years) and all the mothers of these children participated in the anthropometric measurements. However participation in the haemoglobin testing was lower with only 1253 women (59%) agreeing to be tested and the level of participation varied by province. Table 4 reveals that number of clusters, women and children interviewed and measured by province.

Table 4 Number of clusters, women and children surveyed in each province
Number of clusters, number of women interviewed and measured, and number of children <6 years and <2 years by province and urban or rural residence, DPRK Nutrition Assessment 2004

Province	Number of clusters	Number of women interviewed	Number of women with anthropometry	Number of women with haemoglobin	Number of children < 6 years with anthropometry	Number of children < 2 years
Pyongyang	20	600	263	153	600	263
South Phyongan	20	600	260	204	600	260
North Phyongan	20	600	267	184	600	267
South Hwanghae	20	600	269	165	600	269
North Hwanghae	20	600	268	146	600	268
South Hamgyong	20	600	262	193	600	262
North Hamgyong	20	600	261	71	600	261
Ryanggang	20	600	259	137	600	259
Total Urban	97	2,910	1,286	753	2,910	1,286
Total Rural	63	1,890	823	500	1,890	823
Total	160	4,800	2,109	1,253	4,800	2,109

Table 5 reveals that 38% of the households surveyed had more than two children less than 6 years of age. Thus 1,920 children in the surveyed households were not measured because only the youngest child was selected for assessment. This finding confirms the need to use an "all child" weight, to adjust the prevalence of malnutrition to take into account the higher rates expected in these children. There were 3 to 4 members in 80% of the household surveyed and only 3% had 6 or more member.

Table 5 Number of household members and children < 6 years
Percentage distribution of number of household members and number of children < 6 years of age in surveyed households, DPRK Nutrition Assessment 2004

	N	Percentage
Number of household members		
3	1446	30.1
4	2394	49.9
5	799	16.6
6	143	3.0
7	17	0.4
8	1	0.0
Number of children < 6 years		
1	2969	61.9
2	1742	36.3
3	89	1.9

The age distribution of the children who were measured in the survey is reported in Table 6. The proportion of children in each one year age interval was similar for the three age intervals less than 36 months but then progressively declined. This age pattern is consistent with the selection of the youngest child in the surveyed households. The gender distribution was balanced with 49% of the children in the survey being girls. Gender was also balanced in the data collected in each of the provinces (data not shown)

Table 6 Age and sex distribution of children with anthropometric measurements
Percentage distribution o children with anthropometric measurements, by age in 12 month intervals and sex, DPRK Nutrition Assessment 2004

Age group (months)	Children measured					
	Boys		Girls		All children	
	N	%	N	%	N	%
0 - 11	525	21.4	513	21.8	1,038	21.6
12 - 23	524	21.4	547	23.3	1,071	22.3
24 - 35	504	20.6	488	20.7	992	20.7
36 - 47	359	14.7	346	14.7	705	14.7
48 - 59	287	11.7	253	10.8	540	11.3
60 - 71	249	10.2	205	8.7	454	9.5
Total	2,448	100.0	2,352	100.0	4,800	100.0

Table 7 shows age distribution of women with child< 2 years and percentage with anthropometric haemoglobin measurements. The majority of women with children less than two years who participated in the survey were young with over 50% aged 25 to 29 years. There were very few women older than 35 years who were sampled. All the women recruited participated in the anthropometric measurements but only 59% agreed to have the haemoglobin test. The highest level of participation in haemoglobin testing was in South Phyongan province (78%) and the lowest in North Hamgyong province (27%).

Table 7 Age distribution of women and percentage with nutrition measurements
Percentage distribution and number of women with child <2 years, and percentage with anthropometric and haemoglobin measurements according to 5 year age intervals, DPRK Nutrition Assessment 2004

Age group (years)	Percentage	Number of women with child <2 years	Percentage with anthropometry	Percentage with haemoglobin
20 – 24	10.9	229	100.0	62.0
25 – 29	52.6	1,109	100.0	58.6
30 – 34	31.7	669	100.0	58.7
35 – 39	4.6	97	100.0	67.0
40 – 44	0.2	5	100.0	60.0
Total	100.0	2,109	100.0	59.4

Table 8 reveals the women surveyed had a high level of education with 76% of the women having completed secondary school and a similar pattern was found in all provinces. The percentage of women who had completed tertiary education was lower in rural than in urban areas of the country.

Table 8 Education levels of surveyed mothers
Percentage distribution of the education levels of surveyed mothers, by province and urban or rural residence, DPRK 2004 National Nutrition Assessment

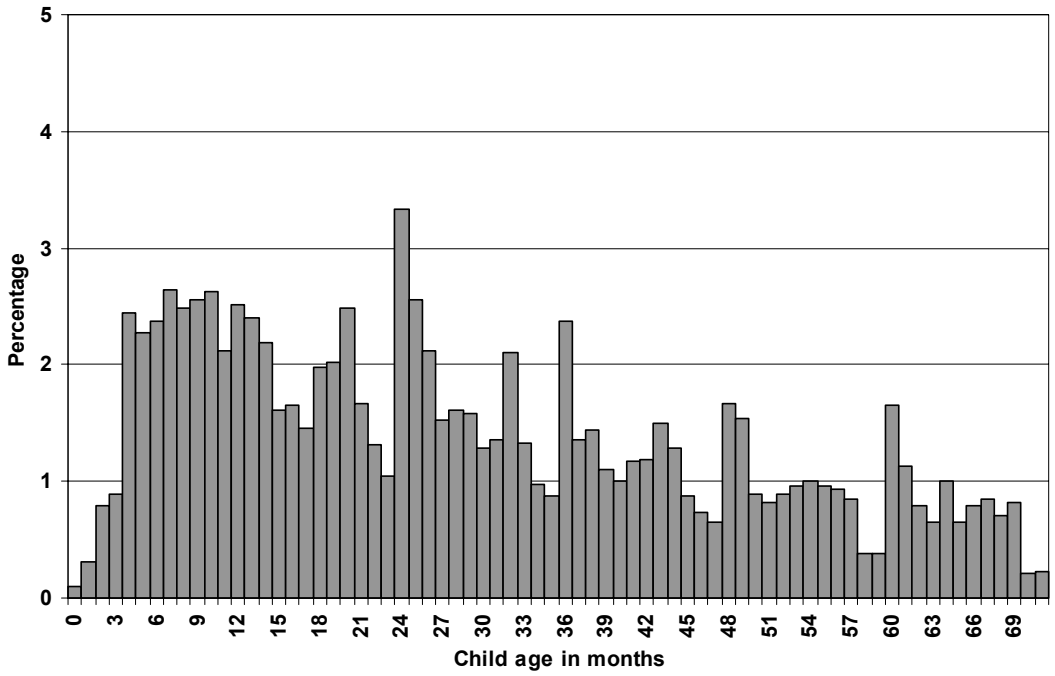
Province	Completed secondary school	Higher education	Number of women
	%	%	
Pyongyang	69.0	31.0	600
South Phyongan	78.3	21.7	600
North Phyongan	79.7	20.3	600
South Hwanghae	78.3	21.7	600
North Hwanghae	73.3	26.7	600
South Hamgyong	78.8	21.2	600
North Hamgyong	80.0	20.0	600
Ryanggang	69.3	30.7	600
Total Urban	70.7	29.3	2,910
Total Rural	83.8	16.2	1,890
Total	75.9	24.1	4,800

4.2 Assessment of data quality

4.2.1 Quality of age data

Figure 1 presents a bar graph of the frequency distribution of age in months of children in the survey and this graph can be used to visually assess the quality of the age data. As expected the frequency declined with older ages reflecting the sampling procedure of measuring the youngest child in the household. There was an under enumeration of the children less than 4 months of age. There was no age heaping at 6 or 12 months but very slight age heaping at 24, 36, 48 and 60 months. Overall the age data was of good quality and revealed no patterns that could bias the calculation of anthropometric indices.

Figure 1 Percentage of children by age in months



4.2.2 Quality of anthropometric measurements

The standard deviation of an anthropometric index reflects the intrinsic variability of the index in the population and the variability due to measurement error. The World Health Organisation has reported usual ranges for the standard deviations of anthropometric indices observed in a large number of surveys, which serve as a guide to assess the quality of anthropometric data (WHO 1995). This range of standard deviation values is 1.10 to 1.30 for height-for-age, 1.00 to 1.20 for weight-for-age, and 0.85 to 1.10 for weight-for-height. Survey data with standard deviation values higher than these values implies there may be errors with the age or anthropometric data. Values less than these imply a population with little intrinsic variation and no problems with age or anthropometric data.

The means and standard deviations of weight-for-age, height-for-age and weight-for-height by province and data collection team were examined to compare the quality of the data collected by the survey teams. Table 9 shows that for all the survey data the standard deviations were within the usual range for all three indicators. Also no survey team exceeded the usual range for weight-for-age, only one team was slightly higher for weight-for-height, and two teams were slightly higher for height-for-age. Overall these results indicate perfectly collected age and anthropometric data with little variation between the survey teams.

Table 9 Assessment of quality of anthropometric measurements by team
Mean and standard deviation of weight-for-age, height-for-age and weight-for-height by province and data collection team, DPRK 2004 National Nutrition Assessment

Province	Survey team number	Height-for-age Z score*		Weight-for-age Z score		Weight-for-height Z score	
		Mean	SD	Mean	SD	Mean	SD
Pyongyang	1	-1.18	1.25	-1.16	1.00	-0.54	0.86
	2	-1.04	1.04	-0.99	0.91	-0.39	0.96
South Phyongan	3	-1.27	1.21	-1.09	1.14	-0.35	1.25
	4	-1.28	0.98	-1.00	0.88	-0.25	0.87
North Phyongan	5	-1.58	0.99	-1.47	0.89	-0.60	0.91
	6	-1.56	1.15	-1.05	1.02	-0.06	0.93
South Hwanghae	7	-1.40	1.13	-1.32	1.01	-0.56	0.95
	8	-1.52	1.09	-1.24	1.04	-0.37	1.13
North Hwanghae	9	-1.62	1.25	-1.32	1.04	-0.39	1.04
	10	-1.29	1.21	-1.20	1.11	-0.45	0.98
South Hamgyong	11	-1.52	1.32	-1.58	1.07	-0.80	1.10
	12	-1.61	1.31	-1.31	1.16	-0.40	1.05
North Hamgyong	13	-1.50	1.11	-1.45	0.96	-0.61	1.07
	14	-1.69	1.09	-1.36	1.13	-0.39	1.30
Ryanggang	15	-1.72	0.84	-1.57	0.88	-0.62	0.88
	16	-1.73	1.17	-1.57	0.92	-0.62	1.08
All		-1.47	**1.15**	-1.29	**1.03**	-0.46	**1.04**

* Unweighted values used

The standard deviations of the distributions of the anthropometric indicator Z- scores for the DPRK Nutrition Assessments for 2002 and 2004 were compared to determine if the quality of the data collected in both surveys was similar (Table 10). The data in both surveys needs to be of similar quality if valid comparisons of the prevalence of anthropometric indictors are to be made between the surveys. The standard deviations for height-for-age and weight-for-age were slightly lower than the usual range in 2002 and lower than observed in the 2004 data. But these differences are not important and valid comparisons of the prevalence of malnutrition between the two surveys are feasible.

Table 10 Comparison of data quality between Nutrition Assessments, 2002 and 2004
Standard deviations of distributions of anthropometric indicator Z- scores for DPRK Nutrition Assessment for 2002 and 2004, with and without flagged improbable values

Indicator	2004 DPRK Nutrition Assessment			2002 DPRK Nutrition Assessment		
	Mean Z score*	SD*	N	Mean Z score*	SD*	N
Height-for-age - no flagged values	-1.47	1.15	4,795	-1.72	0.99	5,992
Height-for-age - all data	-1.47	1.15	4,800	-1.72	0.99	6,000
Weight-for-age - no flagged values	-1.30	1.02	4,795	-1.48	0.86	5,992
Weight-for-age - all data	-1.29	1.03	4,800	-1.48	0.86	6,000
Weight-for-height -no flagged values	-0.47	1.02	4,795	-0.50	1.00	5,992
Weight-for-height - all data	-0.46	1.04	4,800	-0.50	1.01	6,000

* Unweighted estimates to assess data quality

4.3 Child nutritional status

The main findings are summarised in Table 11 below.

Table 11 Prevalence of malnutrition in children aged less than 72 months by gender
The prevalence of underweight (low weight-for-age <-2Z), stunting (low height-for-age < -2Z) and wasting (low weight-for-height <-2Z) by gender, DPRK Nutrition Assessment 2004

Anthropometric indicator	Boys		Girls		Total	
	Percent[1] <-2 Z *[95% CI*]*	Number of boys	Percent[1] <-2 Z *[95% CI*]*	Number of girls	Percent[1] <-2 Z *[95% CI*]*	Total Number
Underweight (low weight for age)	24.2 *[21.8 26.8]*	2445	22.6 *[20.2 25.2]*	2350	23.4 *[21.5 25.5]*	4795
Stunting (low height for age)	38.6 *[36.4 40.9]*	2445	35.2 *[33.1 37.4]*	2350	37.0 *[35.4 38.6]*	4795
Wasting (low weight for height)	7.0 *[5.9 8.2]*	2445	7.1 *[5.9 8.5]*	2350	7.0 *[6.2 8.0]*	4795

Weighted to represent all the children in the sampled households and to adjust for differences in province populations
* Confidence intervals

4.3.1 Weight-for-age

As seen in Table 11, the prevalence of underweight children (weight-for-age < -2 Z-score) aged 0-71 months in 2004 was 23.4%. This is a high prevalence of low weight-for-age in pre-school aged children (WHO 1995). The prevalence of severe underweight (<-3 Z-score) for children aged 0-71 months was 8.1% (Appendix C – Detailed Results, Table 37). The mean weight-for-age Z-score for children 0-71 months was -1.31 indicating that the distribution of this anthropometric indicator was shifted significantly below zero, the expected value of the reference distribution.

Figure 62, reveals a progressive increase in the prevalence of underweight until 24-35 months and then a slight decline, although the prevalence was very similar for the children in the older age groups. There was a similar age pattern for severe underweight although a more marked decline was seen for older children 54 to 71 months (Appendix C – Detailed Results, Table 43).

The prevalence of underweight was similar in girls and boys (see Figure 3) and similarly there was no gender difference for severe underweight (Appendix C – Detailed Results, Table 37). However, the mean weight-for-age Z-score for boys (-1.37) was lower than for girls (-1.25) and this difference was statistically significant (Appendix C – Detailed Results, Table 38).

Figure 2 Prevalence of underweight by age groups
The prevalence of underweight (weight-for-age <-2 Z-score) and 95% confidence intervals by age groups (n=4795), DPRK National Nutrition Assessment, 2004

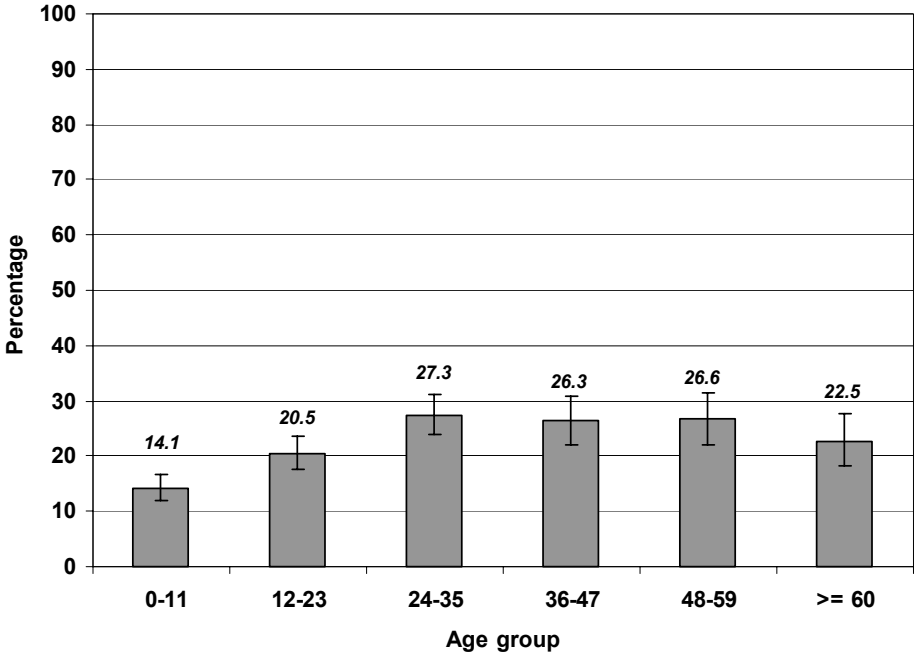
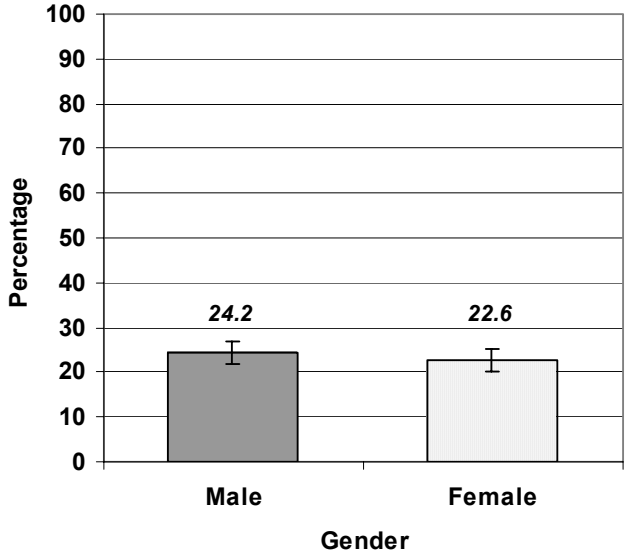
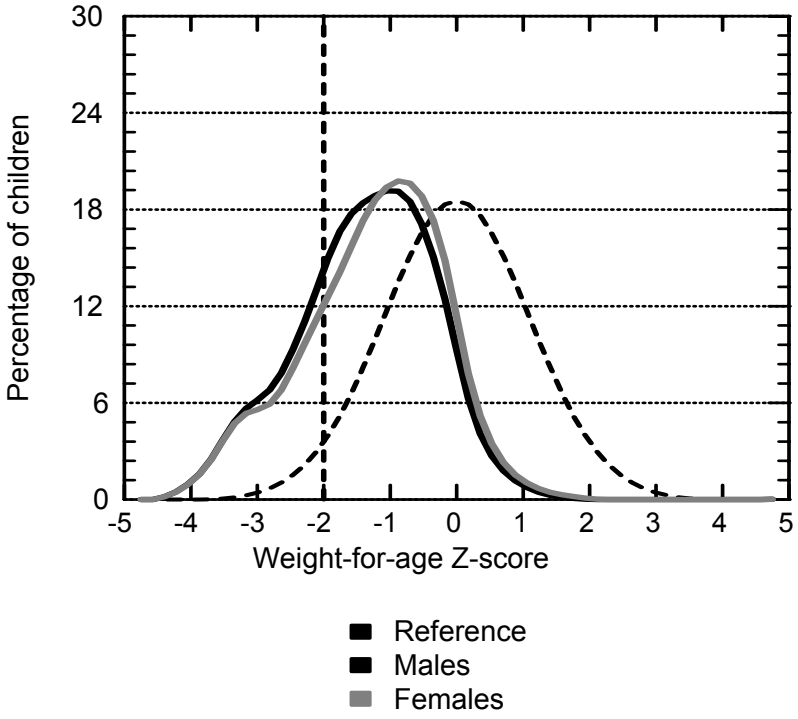


Figure 3 Comparison of the prevalence of underweight in girls and boys
The prevalence of underweight (weight-for-age <-2 Z-score) and 95% confidence intervals by sex (n=4795), DPRK National Nutrition Assessment, 2004



The shift of the entire weight-for-age distribution for children 0-71 months below the reference is illustrated in the Figure 4. The Z-score curve for weight-for-age for males is slightly to the left of the curve for females, which accounts for the lower mean Z-score for males. However, the tails of the distributions are similar for males and females accounting for the similar prevalence of low weight-for-age. The shape of the weight-for-age Z-score curves for the children in DPRK differs from the reference curve. The curves are stretched out on the lower side indicating a malnourished population, but they fall sharply after the peak on the upper side indicating no overweight in the population.

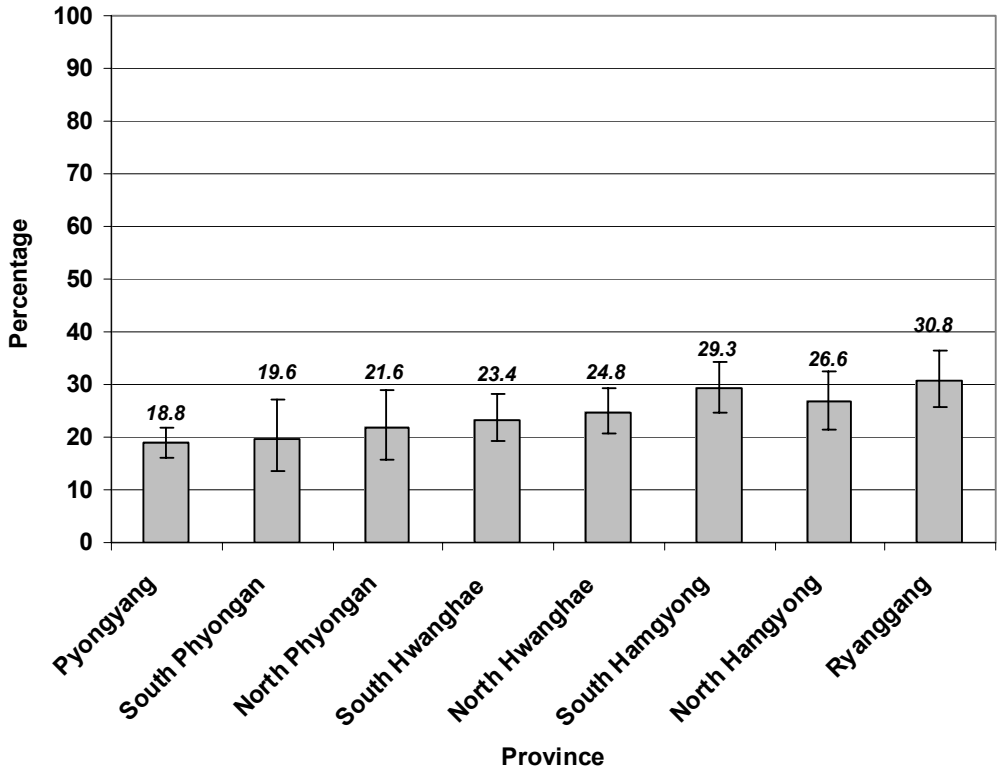
Figure 4 Weight-for-age Z-score distributions for girls and boys
Weight-for-age Z-score distributions (unweighted) for female and male children aged 0-71 months compared to the reference Z-score curve, DPRK National Nutrition Assessment, 2004



The prevalence of underweight children varied significantly by province (Figure 5). The highest prevalence was in the more remote northern provinces of South Hamgyong, North Hamgyong and Ryanggang, and in these provinces underweight was significantly higher than in Pyongyang, the province with the lowest prevalence. In six provinces the prevalence of underweight was high (>20%) based on WHO criteria.

A similar pattern was found with the mean weight-for-age Z-scores for the provinces. Ryanggang and South Hamgyong had the lowest mean weight-for-age Z-scores (-1.59 and -1.53 respectively) while Pyongyang and South Phyongan had the highest mean weight-for-age-scores (both -1.12) (Appendix C – Detailed Results, Table 38).

Figure 5 Comparison of the prevalence of underweight in surveyed provinces
The prevalence of underweight (weight-for-age <-2 Z-score) and 95% confidence intervals by province (n=4795), DPRK National Nutrition Assessment, 2004

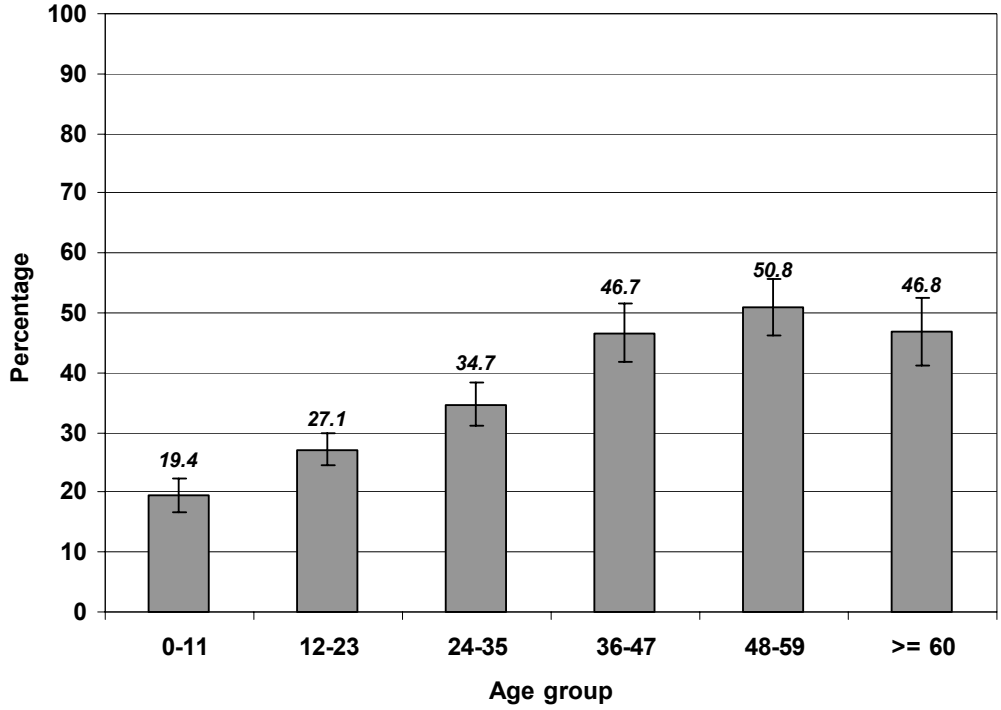


4.3.2 Height-for-age

The prevalence of stunted children (height-for-age < -2 Z-score) aged 0-71 months in 2004 was 37.0% (see Table 11). The prevalence of severely stunted (<-3 Z-score) children aged 0-71 months was 12.2% (Appendix C – Detailed Results, Table 39). The mean height-for-age Z-score for children 0-71 months was -1.49 indicating that the distribution of this anthropometric indicator was shifted significantly below zero, the expected value of the reference distribution.

As illustrated in Figure 6, there was a continuing increase in the prevalence of stunting of children through to 48-59 months, but a slight decline with the oldest age group. This figure reveals that close to 50% of the children in DPRK were stunted as they reached school age. There was a similar age pattern observed for severely stunted children (Appendix C – Detailed Results, Table 44).

Figure 6 Prevalence of stunting (height-for-age <-2 Z-score)
The prevalence of stunting (height-for-age <-2 Z-score) and 95% confidence intervals by age groups (n=4795), DPRK National Nutrition Assessment, 2004



The prevalence of stunting was higher in boys (38.6%) than in girls (35.2%) and this difference was statistically significant (see Figure 7, and Table 11). The mean height-for-age Z-score for boys (-1.55) was lower than for girls (-1.43) (Appendix C – Detailed Results, Table 40).

Figure 8 reveals the entire height-for-age Z-score distribution for children 0-71 months in DPRK was shifted to the left below the reference. The curve for the boys was shifted further to the left than the curve for the girls indicting that boys had slightly higher levels of malnutrition.

Figure 7 Comparison of the prevalence of stunting in girls and boys
The prevalence of stunting (height-for-age <-2 Z-score) and 95% confidence intervals by sex (n=4795), DPRK National Nutrition Assessment, 2004

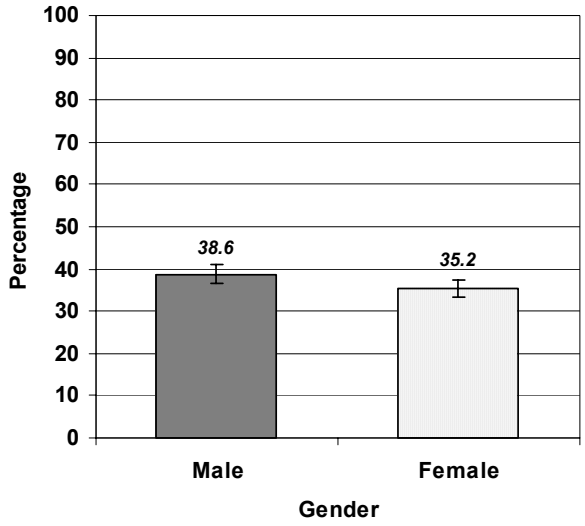
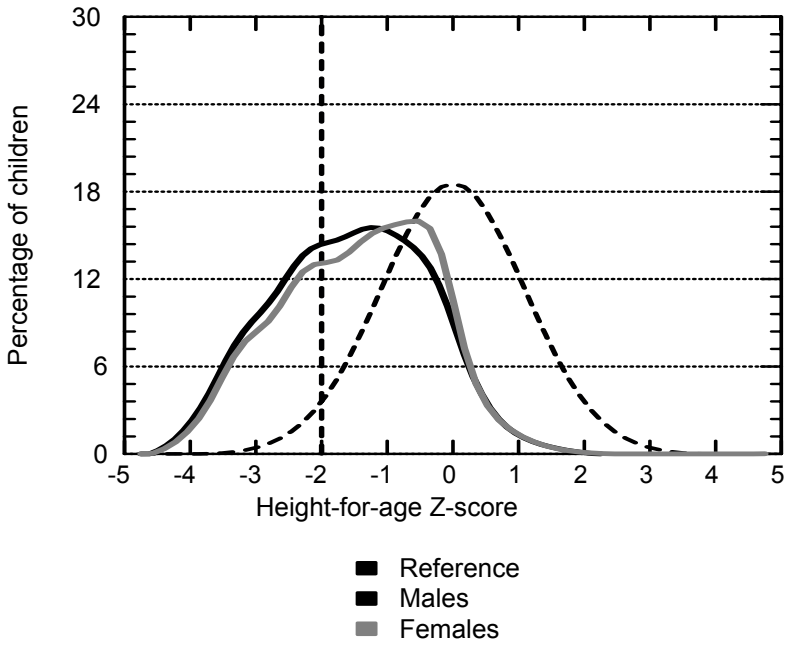


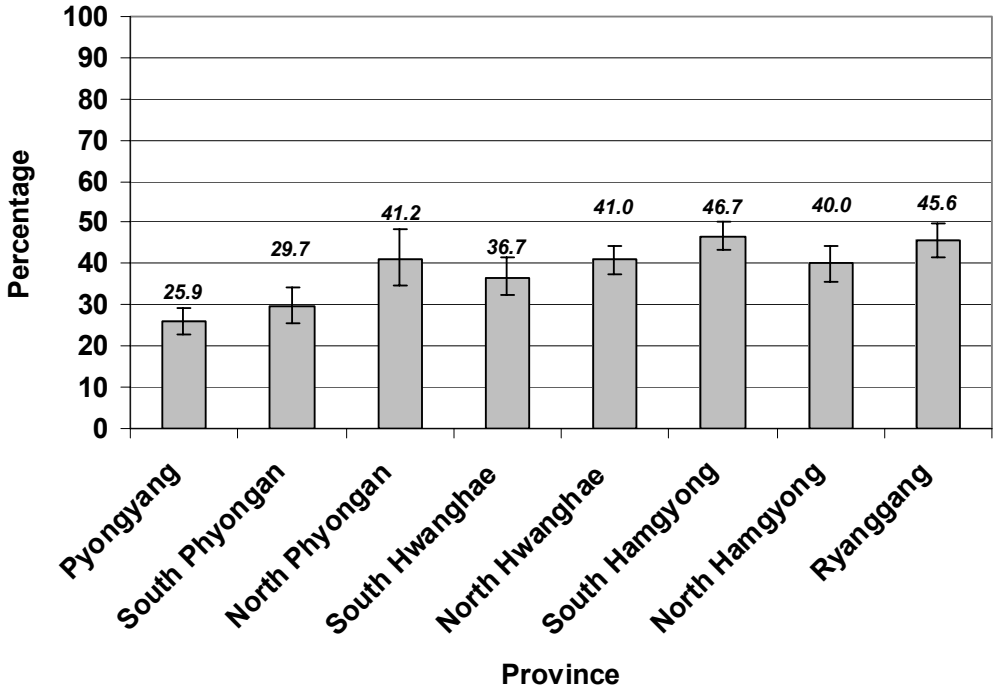
Figure 8 Height-for-age Z-score distributions for girls and boys
Height-for-age Z-score distributions (unweighted) for female and male children aged 0-71 months compared to the reference Z-score curve, DPRK National Nutrition Assessment, 2004



The prevalence of stunted children varied significantly by province (Figure 9). As with underweight, two provinces, South Hamgyong, and Ryanggang, had a very high level of stunting (>40%), and four other provinces had a high level (30-39%) based on WHO criteria.

A similar pattern was found with the mean height-for-age Z-scores for the provinces. Ryanggang and South Hamgyong had the lowest mean height-for-age Z-scores (-1.78 and -1.69 respectively) while Pyongyang and South Phyongan had the highest mean height-for-age-scores (-1.18 and -1.31 respectively) (Appendix C – Detailed Results, Table 40).

Figure 9 Comparison of the prevalence of stunting in surveyed provinces
The prevalence of stunting (height-for-age <-2 Z-score) and 95% confidence intervals by province (n=4795), DPRK National Nutrition Assessment, 2004



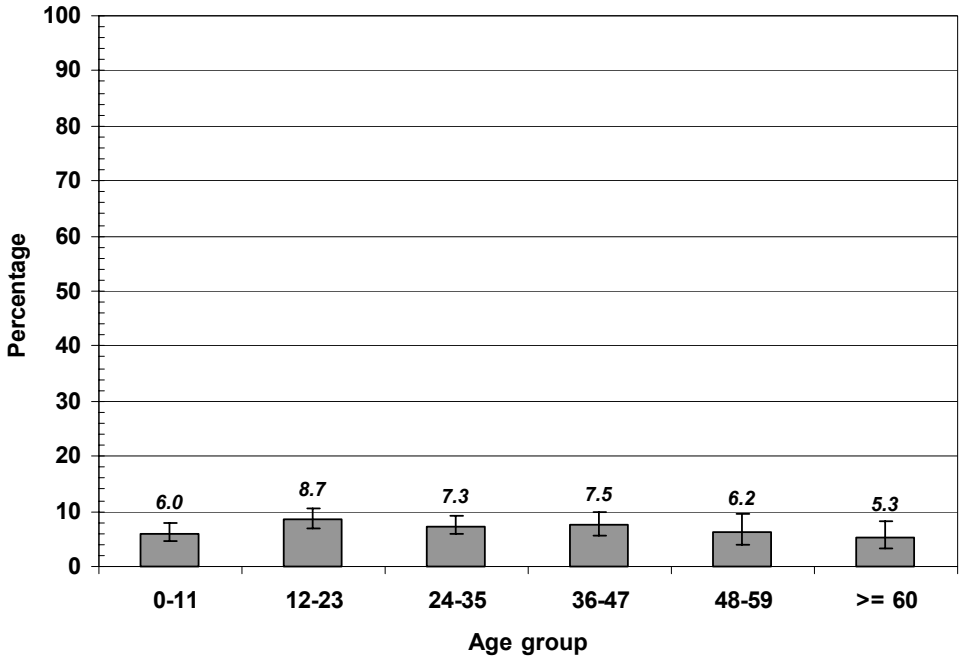
4.3.3 Weight-for-height

The prevalence of wasted children (weight-for-height <-2 Z-score) aged 0-71 months in 2004 was 7.0% (Table 11). This is a medium level prevalence of low weight-for-height in pre-school aged children (WHO 1995). The prevalence of severely wasted (<-3 Z-score) children aged 0-71 months was 1.8% (Appendix C – Detailed Results, Table 41). The mean weight-for- height Z-score for children 0-71 months was -0.47 indicating an intermediate shift of the distribution of this anthropometric indicator below zero, the expected value of the reference distribution.

As illustrated in Figure 10, there was a slight increase in the prevalence of wasting in children 12-23 months, and thereafter a slow decline with increasing age. There was a similar age pattern observed for severely wasted children although the peak was in children 18 to 23 months (Appendix C – Detailed Results, Table 45).

Figure 10 Prevalence of wasting by age groups

The prevalence of wasting (weight-for-height <-2 Z-score) and 95% confidence intervals by age groups (n=4795), DPRK National Nutrition Assessment, 2004



The prevalence of wasting was similar in girls and boys(see Figure 11, and Table 11). Also there were no gender differences in the prevalence of severe wasting (Appendix C – Detailed Results, Table 41). However, the mean weight-for-height Z-score for boys (-0.52) was lower than for girls (-0.42) and this difference was borderline statistically significant (Appendix C – Detailed Results, Table 42).

Figure12 reveals that the entire weight-for-height Z-score distribution for children 0-71 months in DPRK was shifted to the left below the reference indicating more wasting in the study population than in the reference. The weight-for-height Z-score curves have a very high narrow peak. The curve is spread out to the left also indicating the presence of acute malnutrition in the population and it falls sharply after the peak on the right side indicating there are virtually no overweight children in the population

Figure 11 Comparison of the prevalence of wasting in girls and boys
The prevalence of wasting (weight-for-height <-2 Z-score) and 95% confidence intervals by sex (n=4795), DPRK National Nutrition Assessment, 2004

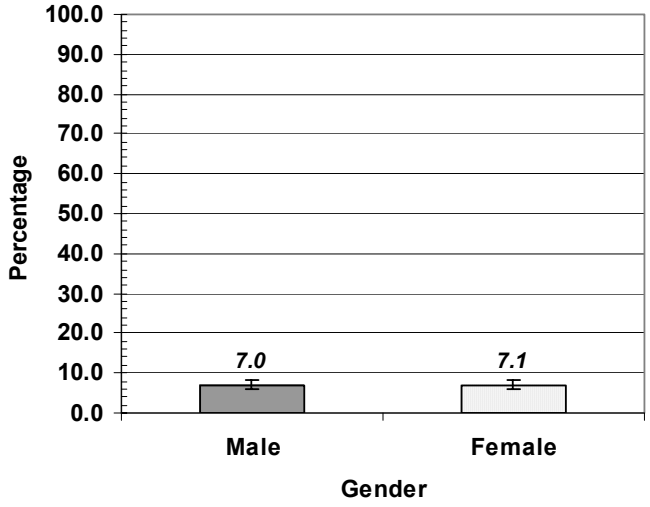
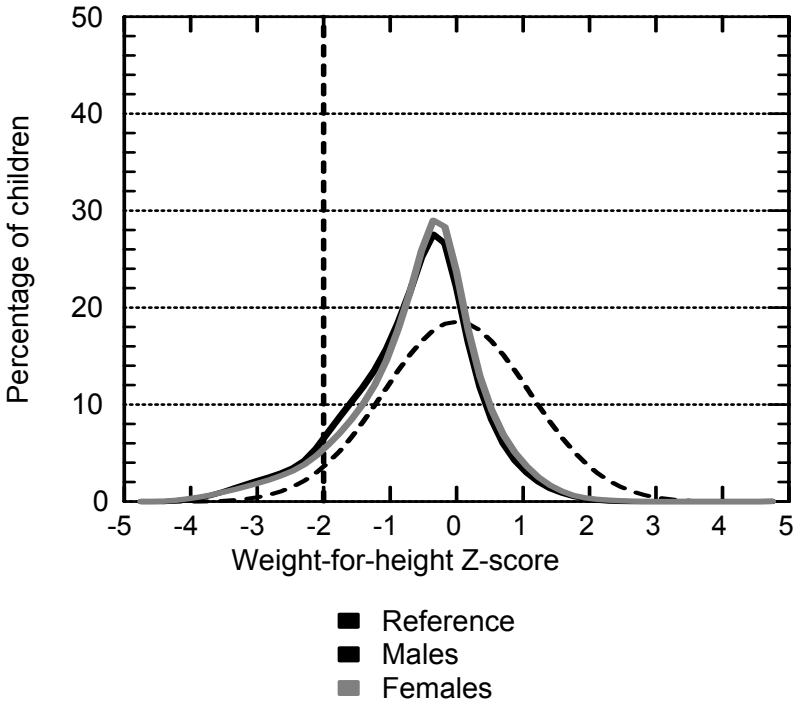


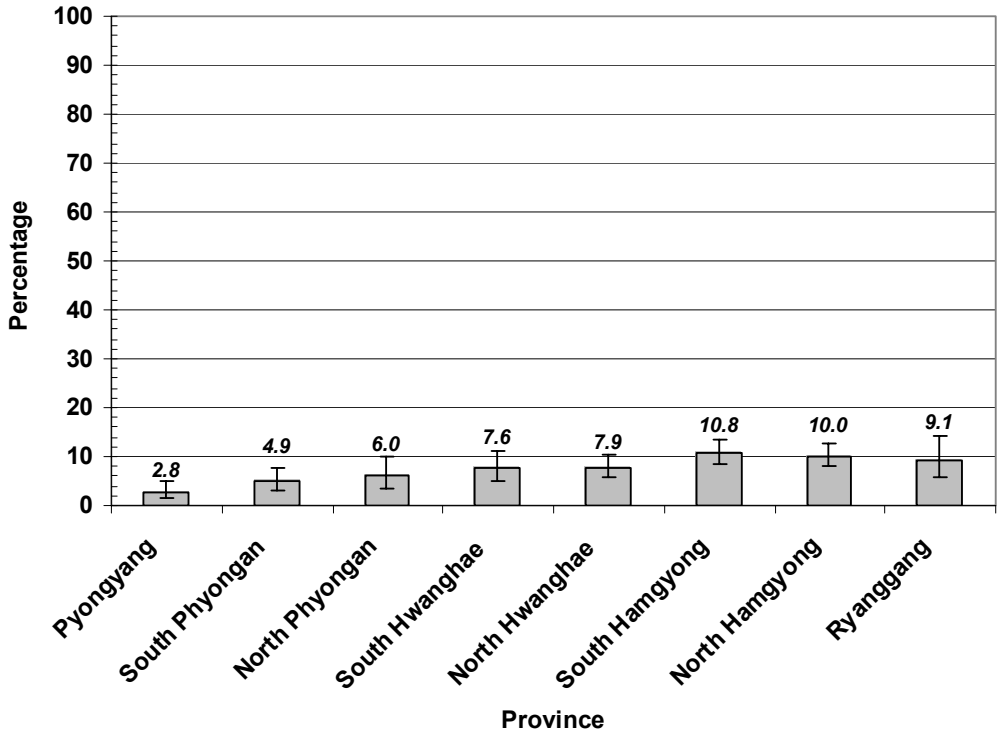
Figure 12 Weight-for-height Z-score distributions for girls and boys
Weight-for-height Z-score distributions (unweighted) for female and male children aged 0-71 months compared to the reference Z-score curve, DPRK National Nutrition Assessment, 2004



The prevalence of wasted children varied significantly by province (Figure 13). As with the other indicators, the highest prevalence was in the more remote Northern provinces of the country. Two provinces, South and North Hamgyong, had a high level of wasting (>10%), and four other provinces had a medium level (5-9%) based on WHO criteria.

The pattern found with the mean weight-for-height Z-scores for the provinces differed slightly from the prevalence data. South Hamgyong and Ryanggang had the lowest mean weight-for-height Z-scores (both -0.62) while North Phyongan had the highest mean weight-for-height Z-score (-0.34). The mean weight-for-height Z-score was surprisingly low in Pyongyang (-0.47), (See Appendix C – Detailed Results, Table 42).

Figure 13 Comparison of the prevalence of wasting in surveyed provinces
The prevalence of wasting (weight-for-height <-2 Z-score) and 95% confidence intervals by province (n=4795), DPRK National Nutrition Assessment, 2004



4.3.4 Factors associated with child malnutrition

In order to identify sub groups in the population at greater risk of malnutrition, a variety factors potentially associated with child malnutrition were examined by comparing the prevalence of stunting in different categories of these variables. The variables examined included maternal education, maternal nutrition status, sources of staples foods and low, medium or high average household daily intakes of different food groups. Stunting was selected as the malnutrition indictor because this indicator changes slowly and is not influenced by recent illness. However the associations were examined for all anthropometric indicators and the details of this analysis can be found in Appendix C – Detailed Results, Table 46. All children 0 to 71 months were included in

these analyses, except where the factors examined were only measured for children less than 24 months.

Maternal malnutrition was associated with an increased prevalence of child low height-for-age. The prevalence of stunting was 22% higher in the children of malnourished mothers, although this difference was not statistically significant; there was a statistically significant association between mean height-for-age and maternal malnutrition (see Appendix C – Detailed Results, Table 46). In addition, low weight-for-age was associated with maternal malnutrition and the prevalence of underweight was 43% higher in malnourished mothers (see Appendix C – Detailed Results, Table 46).

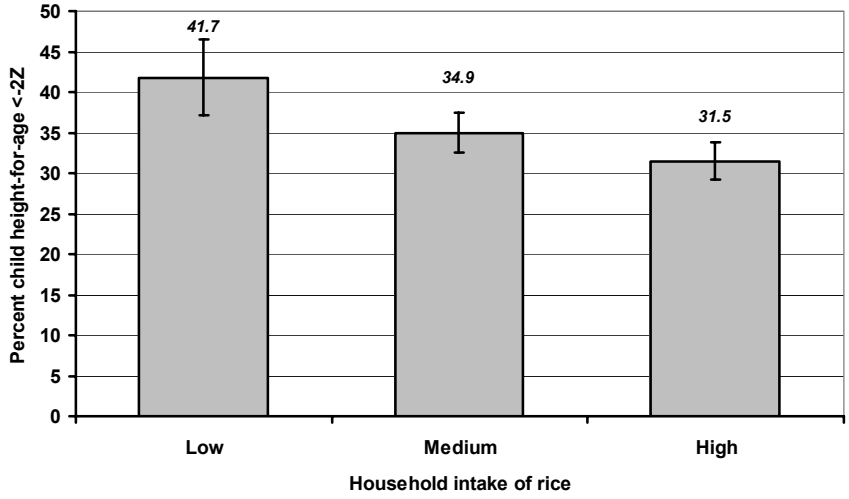
In the DPRK 2004 National Nutrition Assessment mothers were asked to report on the perceived size of their child at birth. This data was collected for all children less than 24 months and has been used to provide insight into the possible role of low birth weight in childhood malnutrition. The prevalence of stunting increased by 62% as reported perceived birth size decreased from 19.0% in children who were very large at birth to 30.7% in children who were perceived to be very small at birth. This finding suggests an important role of low birth weight in early childhood malnutrition.

In the DPRK 2004 National Nutrition Assessment the mothers were asked to report the usual frequency of household consumption of 14 different food groups over the six months prior to the survey. These frequencies of consumption for each food group were expressed as average daily household frequencies of consumption, ranked in order and divided into three equal groups from the lowest to the highest frequencies. The results for all food groups and anthropometric indicators are presented in Appendix C – Detailed Results, Table 46. Below is a selection of these analyses for those food groups that were significantly associated with childhood stunting.

The usual frequency of household consumption of rice and rice products was associated with childhood malnutrition. Figure 14 reveals the prevalence of stunting in children from those households with the lowest intake was higher than children from households with the highest intake. This difference was statistically significant (i.e. it did not occur by chance). The usual frequency of household consumption of rice was also statistically significantly associated with mean height for age (see Appendix C – Detailed Results, Table 46).

Figure 14 Prevalence of stunting by frequency of household intake of rice

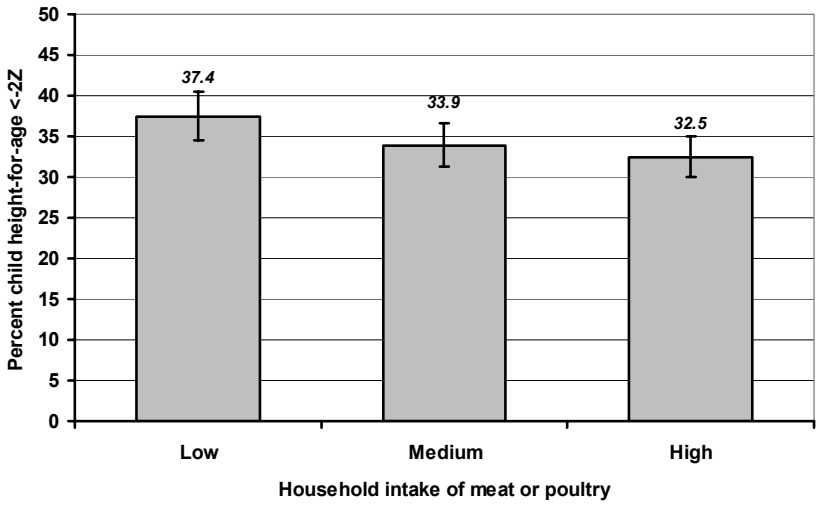
Comparison of the prevalence of stunting (height-for-age <-2Z) and 95% confidence intervals in children <72 months of age according to low, medium or high average household daily intakes of rice and rice products



* Mean daily intake was 1.00, 2.00 and 3.00 times per day in the low, medium and high groups respectively.

The usual frequency of household consumption of poultry or meat was associated with childhood malnutrition and there was a 15% higher prevalence of stunting in children from those households with the lowest frequency of intake in comparison to those with the highest frequency of intake (figure 15). The usual frequency of household consumption of poultry or meat was statistically significantly associated with mean height-for-age (see Appendix C – Detailed Results, Table 46). There was only a weak association between consumption of poultry or meat and underweight or wasting (see Appendix C – Detailed Results, Table 46). Similar relationships were observed for levels of intake of fish and stunting but they were not statistically significant.

Figure 15 Prevalence of stunting by frequency of household intake of poultry or meat
Comparison of the prevalence of stunting (height-for-age <-2Z) and 95% confidence intervals in children <72 months of age according to low, medium or high average household daily intakes* of poultry or meat



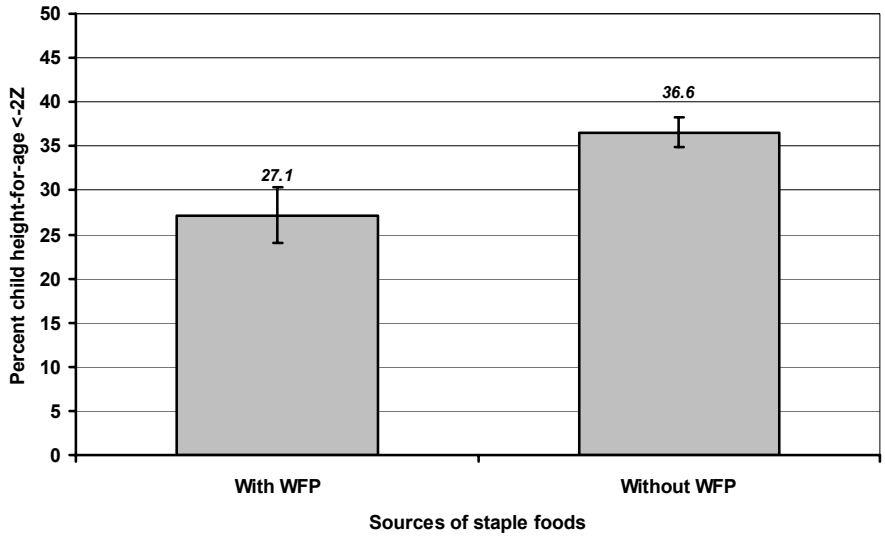
* Mean daily intake was 0.03, 0.08 and 0.23 times per day in the low, medium and high groups respectively.

The usual frequency of household consumption of red or yellow vegetables (an important source of vitamin A) was weakly associated with childhood malnutrition with an 8% higher prevalence of stunting in children from those households with the lowest frequency of intake in comparison to those with the highest frequency of intake

The consumption of oils and fats by the household was also associated with childhood malnutrition. Households with the lowest usual frequency of consumption of oils and fats had an 18% higher prevalence of child stunting than those households with the highest frequency of intake.

Figure 16 Prevalence of stunting by source of household staple foods

Comparison of the prevalence of stunting (height-for-age <-2Z) and 95% confidence intervals in children <72 months by source of household staple foods



Households using WFP foods were strongly associated with lower rates of child malnutrition. Prevalence of stunting in children from households not consuming any WFP foods was 35% higher than for children from households consuming these foods (figure 16). The households reporting use of WFP foods were also the households reporting consumption of fortified foods (on average 1.98 times per day). The consumption of 'any versus 'no' fortified foods was also strongly associated with reduced child malnutrition (see Appendix C – Detailed Results, Table 46). In DPRK the only fortified foods available are the blended foods in the WFP rations which are produced by the Government of DPRK and WFP with support from UNICEF.

4.3.5 Trends in child malnutrition

The results of the 2002 and 2004 national nutrition assessments can be compared because the surveys used similar designs and sampling methods. The data was collected by teams from the same institutions and many of the data collectors participated in both surveys. Finally an examination of the quality of the age and anthropometric data found similar quality of data in these two surveys.

The application of survey sampling weights for unmeasured children effects the prevalence by less than 2% in the same direction in both surveys. It is possible to apply the same methods to weight the prevalence by province but it is not possible to apply exactly the same child weight to account for the unmeasured children because the two surveys collected information from slightly different age ranges (0 to 71 months for 2004 and 0 to 83 months for 2002). For these reasons it was judged that prevalence estimates from the surveys weighted for province population only would provide the best comparison. The results for the 2002 DPRK National Nutrition Assessment were recalculated for children 0 to 71 months before making comparisons.

The 95% confidence intervals were calculated for both surveys to provide an indication of the statistical significance of any differences between the surveys.

Table 12 Trends in the prevalence of child malnutrition - DPRK 2002 to 2004
The prevalence of underweight (low weight-for-age <-2Z), stunting (low height-for-age < -2Z) and wasting (low weight-for-height <-2Z) in children <72 months in DPRK Nutrition Assessments of 2002 and 2004

Sex	Anthropometric indicator	2004 National Nutrition Assessment					2002 National Nutrition Assessment[1]				
		Percent <-2 Z [95% CI*]		Percent <-3 Z [95% CI*]		N	Percent <-2 Z [95% CI*]		Percent <-3 Z [95% CI*]		N
Boys	**Underweight**	24.1		7.9		2445	20.4		6.9		2930
		22.0	26.4	6.6	9.3		18.9	22.1	6.0	8.0	
	Stunting	37.5		12.6		2445	39.6		14.6		2930
		35.5	39.7	11.2	14.2		37.5	41.7	13.3	16.0	
	Wasting	7.4		2.1		2445	9.1		2.9		2930
		6.3	8.7	1.6	2.7		8.0	10.3	2.3	3.6	
Girls	**Underweight**	22.4		8.2		2350	19.6		7.0		2698
		20.2	24.7	7.0	9.5		17.9	21.4	6.0	8.0	
	Stunting	34.1		11.0		2350	38.1		14.1		2698
		32.2	36.2	9.6	12.6		36.0	40.1	12.8	15.5	
	Wasting	7.6		1.9		2350	7.3		2.2		2698
		6.3	9.0	1.4	2.6		6.3	8.5	1.7	2.8	
Both	**Underweight**	23.3		8.0		4795	20.0		6.9		5628
		21.6	25.0	7.1	9.1		18.7	21.4	6.3	7.7	
	Stunting	35.9		11.8		4795	38.8		14.4		5628
		34.4	37.4	10.8	12.9		37.2	40.5	13.5	15.3	
	Wasting	7.5		2.0		4795	8.3		2.6		5628
		6.6	8.5	1.6	2.5		7.5	9.1	2.2	3.0	

[1] Prevalence is lower than in the report of 2002 NNA because analysis here is based on children 0-71 months to allow for comparison with 2004 NNA data.

* Confidence intervals

Table 12 presents the prevalence of underweight (low weight-for-age <-2Z), stunting (low height-for-age < -2Z) and wasting (low weight-for-height <-2Z) in children 0 to 71 months from the DPRK Nutrition Assessments of 2002 and 2004. The most reliable indicator to assess trends is low height-for-age or stunting. This indicator changes slowly and is not influenced by recent acute shortages of food or of illness in the children. It is less subject to seasonal changes in morbidity or food availability.

As seen in Table 12 the prevalence of stunting has fallen by 2.9% from 38.8%[3] in 2002 to 35.9% in 2004. This is an average decline of stunting prevalence of 1.45% per year. The fall in the prevalence of stunting was statistically significant because the confidence intervals for the estimates between the two surveys only just overlap. The decline was greater for girls (4%) than for boys (2.1%). There was a significant decline in the prevalence of severe stunting between the two surveys, from 14.4% in 2002 to 11.8% in 2004 and this difference was significant.

An examination of the Z-score curves for height-for-age for the 2002 and 2004 surveys (Figure 17) reveals a modest shift of the curve for 2004 to the right and closer to the curve for the growth

[3] The 2002 result is presented unadjusted for the age groups 0-71months.

reference. This is confirmed by the statistically significant reduction in the mean height-for-age Z score curve from -1.72 Z (95% CI -1.69,-1.74) in 2002 to -1.47 Z (95% CI -1.44,-1.50) in 2004.

The age specific trends in stunting illustrated in Figure 18 also revealed important policy significant findings. Firstly, there was no change in the stunting rates between the surveys for children 0-11 months. Stunting in this age group is largely influenced by foetal growth and maternal malnutrition. The association between small birth size and stunting observed in this survey indicates that more efforts to improve maternal nutritional status will be required to rapidly reduce the prevalence of stunting in infants.

Secondly, the stunting rate in children 12 to 35 months has fallen sharply and was approximately 30% lower in 2004. Stunting in these children is largely the result of inadequate dietary intake and high levels of infectious disease morbidity often found at these ages. If this progress in reducing stunting continues the overall prevalence of stunting will fall by a substantial amount in future surveys.

Thirdly, the stunting rate in the children 36 to 71 months did not change between the surveys, although the prevalence is lower in the youngest age group – 36-47 months. This finding is not surprising because many of these children would have been stunted at younger ages as was found in the 2002 survey. Children usually do not exhibit catch up growth beyond three years of age even if their diets improve. So it is critically important to provide interventions that have an impact on the growth of very young children.

Figure 17 Height-for-age Z-score distributions for 2002 and 2004

Height-for-age Z-score distributions (unweighted) for DPRK National Nutrition Assessment, 2002 and 2004

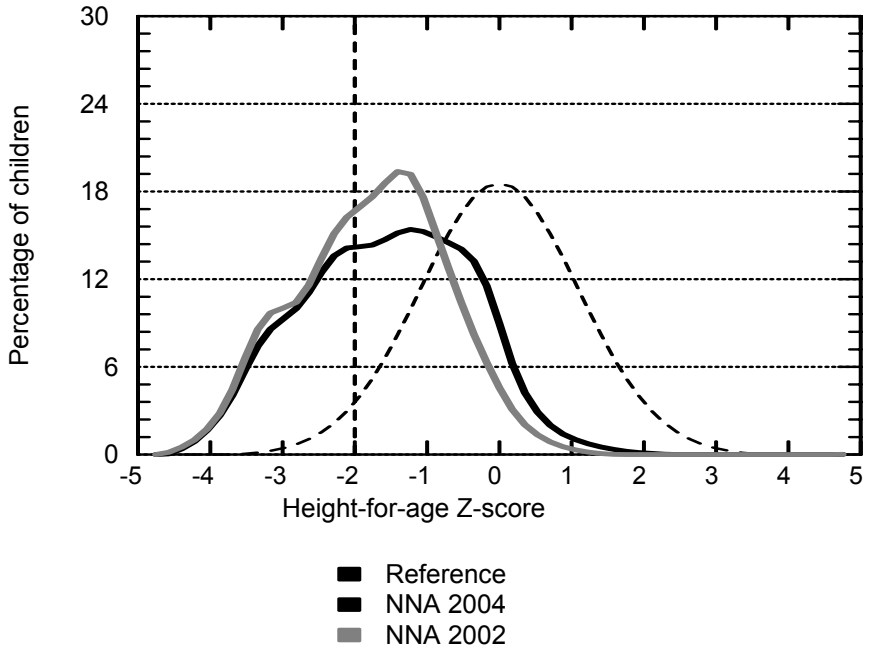


Figure 18 Trends in age specific stunting rates for 2002 and 2004

The prevalence of stunting (low height-for-age < -2Z) for 12 month age intervals in DPRK Nutrition Assessments of 2002 and 2004

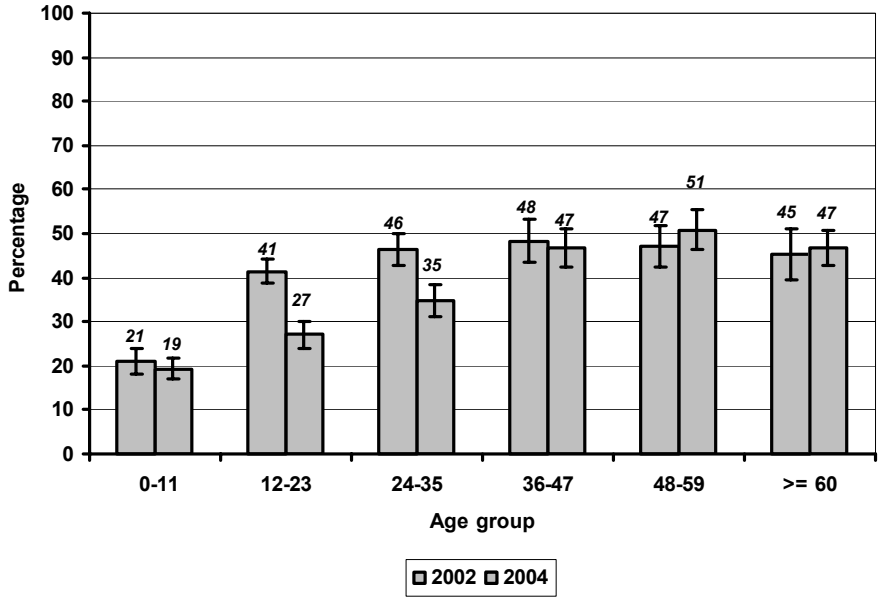
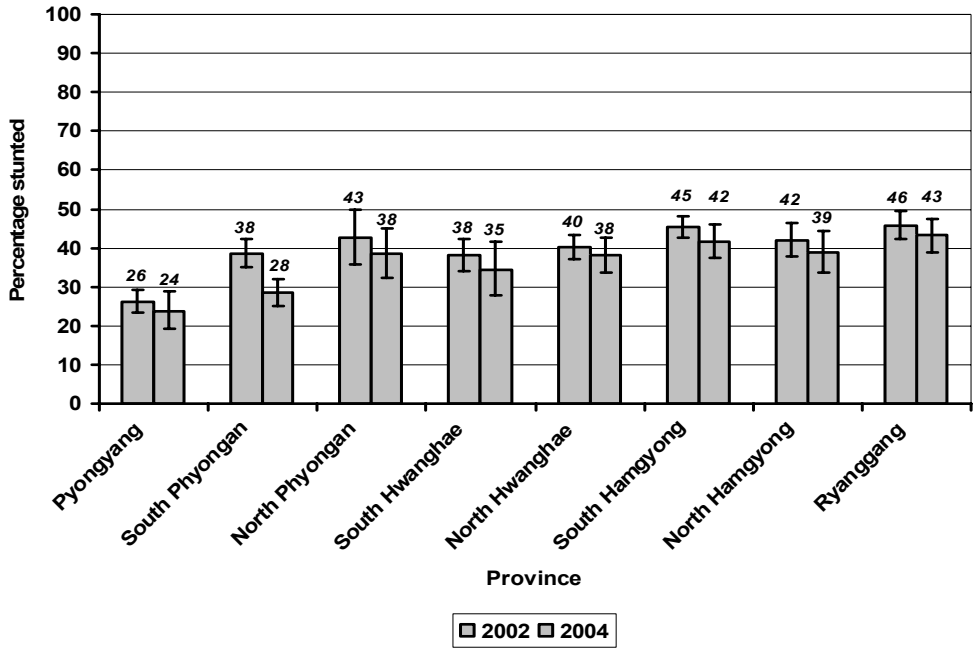


Figure 19 shows the prevalence of stunting decreased in all provinces and on average the decline was from 2% to 3% in each province. These findings indicate improvements occurred uniformly across the country.

Figure 19 Trends in child malnutrition by province between 2002 and 2004

The prevalence of stunting (low height-for-age < -2Z) for children <72 months in DPRK Nutrition Assessments of 2002 and 2004



Surprisingly, Table 12 reveals that the prevalence of underweight has apparently increased by 3.3% from 20.0% in 2002 and to 23.3% in 2004. An examination of the Z score curves illustrated in Figure 20 reveals an unusual shape to the curve in 2002 with a very high peak just above --2 Z score. However the 2004 weight-for-age Z score curve has shifted to the right and closer towards the curve for the growth reference. This shift was confirmed by the statistically significant reduction in the mean weight-for-age Z score curve from -1.48 Z (95% CI -1.46,-1.50) in 2002 to -1.30 Z (95% CI -1.27,-1.33) in 2004.

The age specific trends presented in figure 21 reveals a drop in the prevalence for the children 12 to 23 months but thereafter the prevalence of underweight is higher in 2004 than in 2002. This increase in prevalence in low weight-for-age in children two years and older is the reverse of the findings for stunting.

Figure 20 Weight-for-age Z-score distributions for 2002 and 2004

Weight-for-age Z-score distributions (unweighted) for DPRK National Nutrition Assessment, 2002 and 2004

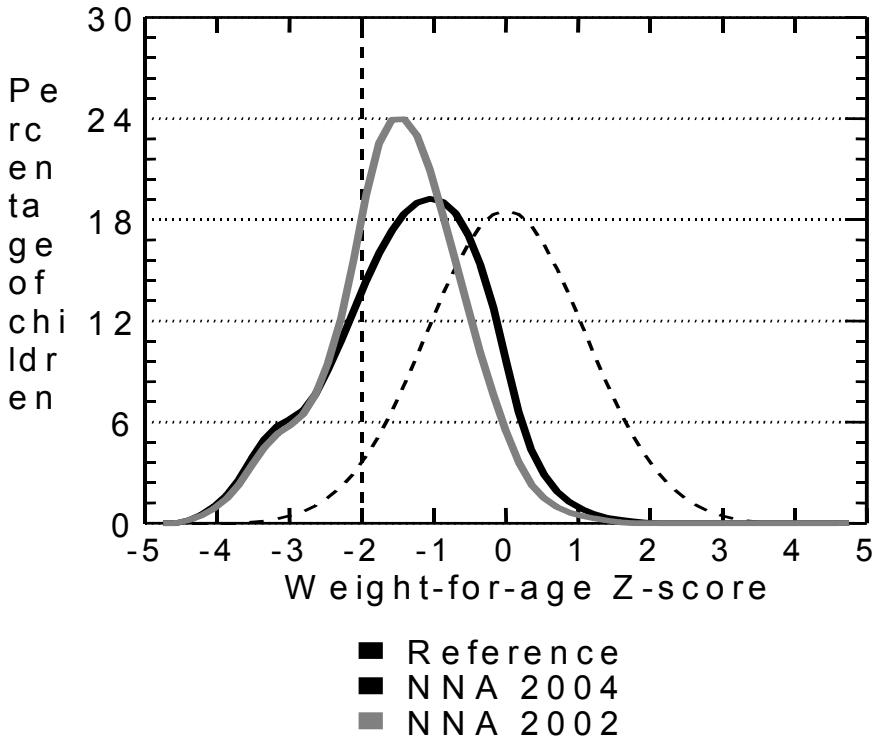
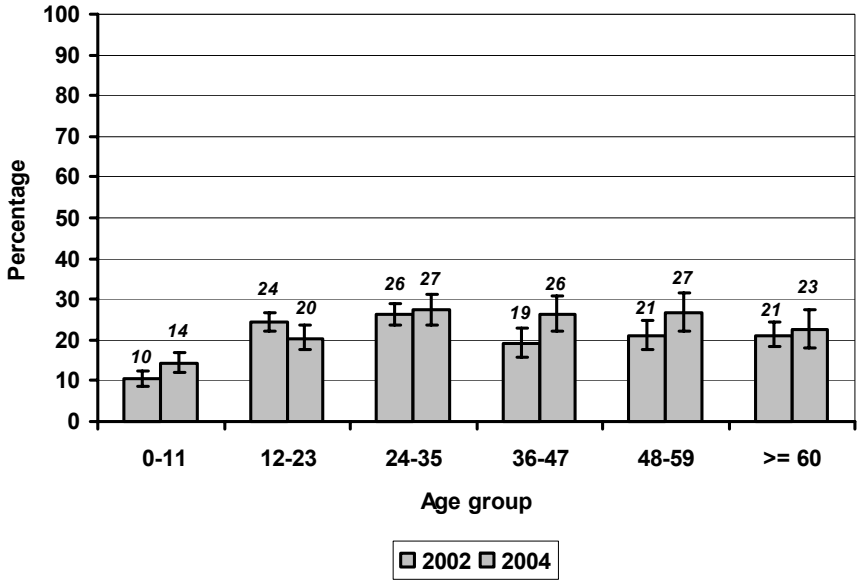


Figure 21 Trends in age specific underweight rates for 2002 and 2004

The prevalence of underweight (low weight-for-age < -2Z) (unweighted) for 12 month age intervals in DPRK Nutrition Assessments of 2002 and 2004



There are several possible explanations for these unexpected findings related to the trend in the prevalence of low weight-for-age between 2002 and 2004. The examination of the overall distribution of weight-for-age and the mean weight-for-age Z scores reveals however an improvement in nutritional status which was similar to that seen for height-for-age.

As seen in Table 12, overall there was no significant change in the prevalence of low weight-for-height. An examination of the age specific trends as presented reveals an approximately 30% drop in the prevalence of wasting between 2002 and 2004 in the most vulnerable age group, namely children aged 12 to 23 months, while for the remaining age groups the prevalence was similar in both years.

4.4 Maternal nutritional status

4.4.1 Maternal malnutrition

Table 13 reveals that 32.4% of the women with a child less than 24 months had a mid upper arm circumference (MUAC) less than 22.5 centimetres. The prevalence of low MUAC demonstrated a U shaped relationship with age where by both younger and older women had higher levels. There was a slightly lower prevalence of maternal malnutrition in women with tertiary education but the difference was not significant.

The highest prevalence of low MUAC was found in North Hamgyong province and the lowest in South Hwanghae province. The prevalence of maternal malnutrition was similar in all provinces except for South Hwanghae which was 28% lower than the national average. This might reflect better nutritional status of women because the prevalence of maternal anaemia was also lowest in this province (see Table 15).These findings are consistent with the pattern reported in the DPRK 2002 National Nutrition Assessment.

Similar patterns were observed in the distribution of women by body weight categories - Table 14. There was also a U shaped relationship of the percentage of women with body weight <50kg with age where by both younger and older women had higher levels. Maternal education was not associated with low body weight. The percentage of women with low body weight (<50 kg) was slightly higher in northern provinces and was highest in North Hamgyong, and lowest in North Hwanghae.

Table 14 also shows the percentage of women in different body weight groups by the level of their intake of a selection of food groups. Low intakes of rice and rice products, poultry and meat, and green leafy vegetables had a weak relationship with higher prevalence of maternal body weight < 45 kg.

Table 13 Prevalence of maternal malnutrition by background characteristics

Prevalence of low mid upper arm circumference (MUAC) < 22.5 cm (unweighted) by province, DPRK Nutrition Assessment 2004

Background characteristics	Percent MUAC < 22.5 cm *[95% CI*]*		N
Maternal age			
20 - 24	39.6		229
	[33.6	*45.9]*	
25 - 29	30.7		1109
	[27.9	*33.7]*	
30 - 34	31.7		669
	[28.3	*35.3]*	
> 35	38.4		102
	[27.8	*50.2]*	
Maternal education			
Completed secondary	32.9		1587
	[30.5	*35.5]*	
Tertiary education	30.6		522
	[26.3	*35.2]*	
Province			
Pyongyang	33.8		263
	[28.3	*39.8]*	
South Phyongan	35.0		260
	[28.2	*42.4]*	
North Phyongan	31.1		267
	[24.1	*39.0]*	
South Hwanghae	23.4		269
	[20.2	*27.0]*	
North Hwanghae	32.1		268
	[28.7	*35.7]*	
South Hamgyong	31.7		262
	[28.0	*35.6]*	
North Hamgyong	37.2		261
	[32.3	*42.3]*	
Ryanggang	33.6		259
	[27.2	*40.6]*	
Sources of staple food			
More than one source with WFP	34.9		979
	[31.7	*38.4]*	
More than one source without WFP	30.3		1128
	[27.6	*33.2]*	
Total Urban	31.7		1286
	[29.2	*34.3]*	
Total Rural	33.5		823
	[29.6	*37.6]*	
DPRK	32.4		2109
	[30.2	*34.6]*	

* Confidence intervals

Table 14 Body weight of mothers by background characteristics

Percentage of women in different body weight groups, by background characteristics, DPRK Nutrition Assessment 2004

Background characteristics	Maternal weight group			
	Percent < 45 kg	Percent 45-49.9kg	Percent > 50 kg	N
Maternal age				
20 - 24	26.2	39.7	34.1	229
25 - 29	20.0	38.8	41.2	1109
30 - 34	21.5	39.0	39.5	669
> 35	19.6	42.2	38.2	102
Maternal education				
Completed secondary	20.6	39.6	39.8	1587
Tertiary education	22.8	37.5	39.7	522
Province				
Pyongyang	18.6	39.9	41.4	263
South Phyongan	27.7	31.9	40.4	260
North Phyongan	16.5	46.8	36.7	267
South Hwanghae	14.9	45.0	40.1	269
North Hwanghae	15.7	36.6	47.8	268
South Hamgyong	21.8	40.5	37.8	262
North Hamgyong	30.3	35.6	34.1	261
Ryanggang	24.3	36.3	39.4	259
Maternal food intake				
Rice and rice products				
Lowest intake	22.2	38.2	39.6	1053
Highest intake	20.1	40.1	39.9	1056
Beans and bean products				
Lowest intake	19.5	45.1	35.4	113
Medium intake	20.8	38.0	41.3	1183
Highest intake	21.9	40.0	38.1	813
Poultry and meat				
Lowest intake	23.4	38.6	37.9	947
Highest intake	19.3	39.5	41.2	1162
Green leafy vegetables.				
Lowest intake	25.8	37.4	36.9	198
Highest intake	20.7	39.3	40.0	1911
Red/yellow vegetables				
Lowest intake	17.9	38.4	43.7	190
Medium intake	20.7	37.2	42.1	739
Highest intake	21.9	40.4	37.6	1180
Sources of staple food				
More than one source with WFP	22.2	39.3	38.5	979
More than one source without WFP	20.3	38.9	40.8	1128
Urban/ Rural				
Urban	23.3	37.7	39.0	1286
Rural	17.7	41.3	40.9	823
DPRK	21.1	39.1	39.7	2109

Trends in maternal malnutrition were examined by comparing the prevalence of low MUAC in the two surveys. Figure 22 compares the prevalence of low MUAC by maternal age groups. There were small reductions in maternal nutritional status between the 2002 and 2004 assessments mainly for women 25 to 29 and 30 to 34 years but none of the differences were statistically significant.

Figure 22 Trends in the prevalence of maternal malnutrition by age, 2002 to 2004
Comparison of the prevalence of low mid upper arm circumference (MUAC) <22.5 cm between DPRK Nutrition Assessments of 2002 and 2004

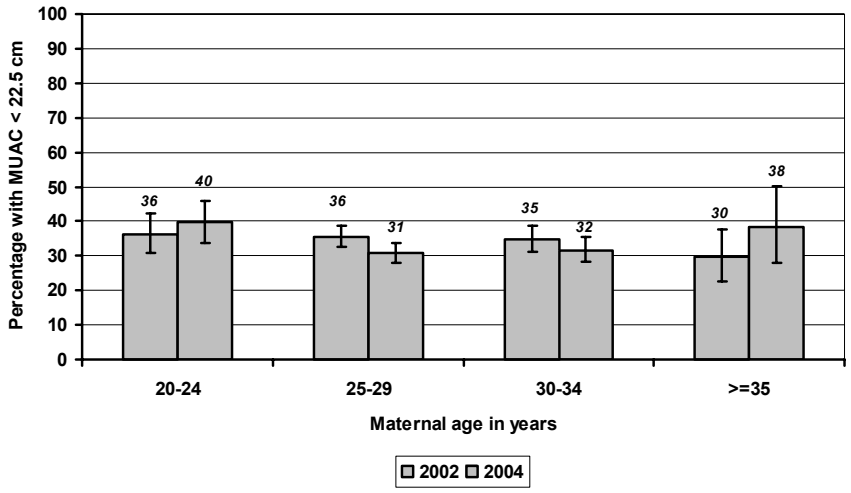
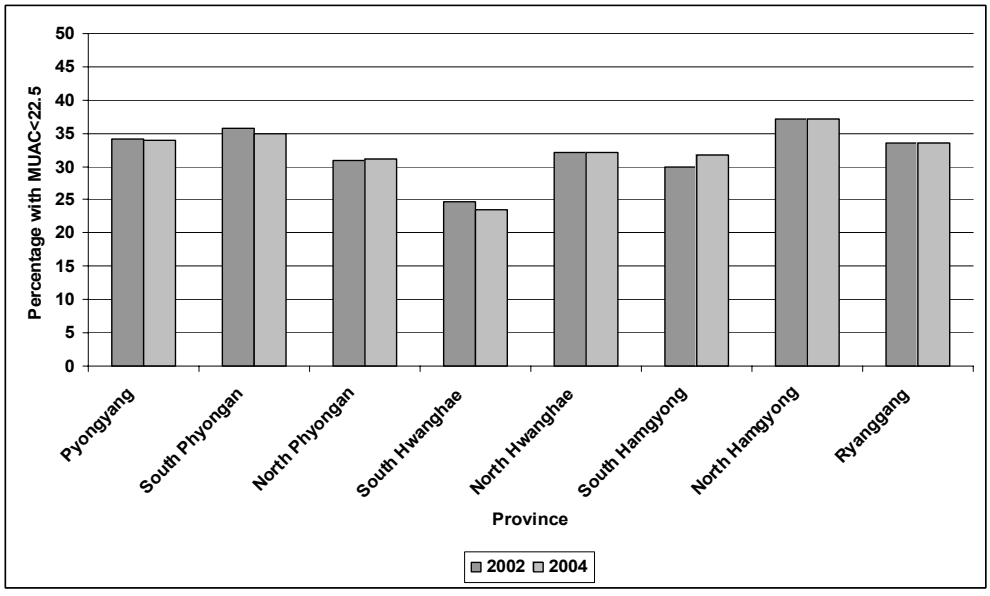


Figure 23 Trends in the prevalence of maternal malnutrition by province,2002 to 2004

Comparison of the prevalence of low mid upper arm circumference (MUAC) <22.5 cm (unweighted) between DPRK Nutrition Assessments of 2002 and 2004



4.4.2 Maternal hemoglobin status

Anaemia has a number of adverse health effects in adults. The fatigue resulting from anaemia impairs work performance and endurance even for tasks that require only moderate levels of activity. Thus anaemia can result in reduced household productivity especially where many household tasks which require high levels of effort are mainly the responsibility of women. Maternal anaemia in pregnancy increases the risk of preterm and low birth weight and subsequent risk of anaemia in the infant.

Table 15 presents the anaemia levels of women with children less than two years who agreed to the haemoglobin measurement. Overall, 34.7% of the women had anaemia (Hb < 12.0 g/dl), but only 0.5% had moderate to severe anaemia (Hb < 9.0 g/dl). Not shown in the table was the very low prevalence (0.1%) of women with severe anaemia (Hb < 7.0 g/dl). Anaemia tended to be higher in the youngest and oldest age groups and was slightly lower in women who had completed tertiary education.

There was a marked variation in the prevalence of anaemia by province. The highest prevalence of anaemia was found in South Phyongan (61.3%) followed by North Phyongan (47.8%). The lowest prevalence was found in South Hwanghae, Pyongyang and South Hamgyong.

Maternal food intake was also associated with anaemia. Low intakes of rice and rice products, beans and bean products, poultry and meat and red / yellow vegetables were associated with higher prevalence of anaemia. Women from households that reported WFP foods as one of their sources of staple foods had higher prevalence of anaemia. The foods supplied through this program do not include high levels of iron fortified foods and would not be expected to prevent anaemia in women. This finding however indicates that the WFP programs were targeting women who have poorer nutritional status.

Table 15 Prevalence of maternal anaemia by background characteristics

Prevalence any anaemia (Hb <12.0g/dL) and moderate to severe anaemia (Hb <9.0g/dL) in mothers with a child <24 months, by background characteristics, DPRK Nutrition Assessment 2004

Background characteristics	Anaemia groups[1]		N
	Hb < 12.0 g/dl %	Hb < 9.0 g/dl %	
Maternal age			
20 – 24	35.9	0.7	142
25 – 29	34.6	0.5	650
30 – 34	33.8	0.5	393
> 35	38.2	0.0	68
Maternal education			
Completed secondary	35.4	0.3	955
Tertiary education	32.6	1.0	298
Provinces			
Pyongyang	22.2	0.0	153
South Phyongan	61.3	0.0	204
North Phyongan	47.8	1.1	184
South Hwanghae	15.8	0.0	165
North Hwanghae	36.3	1.4	146
South Hamgyong	22.3	0.5	193
North Hamgyong	31.0	0.0	71
Ryanggang	32.1	0.7	137
Maternal food intake			
Rice and rice products			
Lowest intake	48.6	0.0	111
Medium intake	38.4	0.8	508
Highest intake	29.3	0.3	634
Beans and bean products			
Lowest intake	47.9	1.4	71
Medium intake	38.1	0.4	714
Highest intake	27.6	0.4	468
Poultry and meat			
Lowest intake	38.7	0.4	550
Highest intake	31.6	0.6	703
Green leafy vegetables.			
Lowest intake	22.9	1.9	105
Highest intake	35.8	0.3	1148
Red/yellow vegetables			
Lowest intake	37.7	0.0	114
Medium intake	33.5	0.9	448
Highest intake	35.0	0.3	691
Sources of staple food			
More than one source with WFP	38.8	0.5	603
More than one source without WFP	30.9	0.5	650
Total Urban	36.8	0.3	753
Total Rural	31.6	0.8	500
DPRK	34.7	0.5	1253

[1] Not weighted by province

4.5 Food availability

Household food availability was assessed in the survey by asking the women respondents about the usual frequency of consumption of fourteen different food groups during the six months prior to interview. The average daily consumption of the different food groups for each province is presented in Table 16. Consumption of rice was lowest in Ryanggang and North Hwanghae, but these provinces had high daily consumption of other cereals and potatoes. The usual consumption of poultry or meat and fish was about half that of beans and bean products across most provinces. The consumption of poultry or meat and fish was very low in Ryanggang. Green leafy vegetables and non-coloured vegetables were consumed with a similar high frequency across all provinces. There was more variation by province in the consumption of red/yellow vegetables with the highest levels in Ryanggang and North Hamgyong. Overall the average consumption of red/yellow vegetables was much lower than for the other vegetables. Oils and fats were consumed least frequently in the Ryanggang and more frequently in lowland southern provinces. The frequency of consumption of fortified foods was highest in the northern provinces.

Table 16 Frequency of food groups consumed by households
Mean frequency per day of food groups consumed by households during 6 months prior to survey, by province, DPRK Nutrition Assessment 2004

Province	Rice and rice products	Other cereal or grains	Potatoes and sweet potatoes	Beans or bean products	Poultry and meat:	Fish	Green leafy vegetables	Red/yellow vegetables	Non-coloured vegetables	Fruit	Eggs	Dairy products (except butter)	Oils or fat	Fortified foods	N
Pyongyang	2.34	1.59	0.29	0.27	0.15	0.11	2.84	0.27	2.83	0.21	0.18	0.12	2.20	0.06	600
South Phyongan	2.54	1.47	0.62	0.32	0.10	0.25	2.92	1.22	2.99	0.37	0.26	0.57	2.81	0.52	600
North Phyongan	2.00	1.58	0.27	0.20	0.12	0.12	2.99	0.25	2.97	0.22	0.15	0.16	1.88	0.47	600
South Hwanghae	2.48	1.99	0.45	0.33	0.13	0.15	3.00	0.35	3.00	0.29	0.20	0.25	2.47	0.48	600
North Hwanghae	1.47	2.10	0.26	0.27	0.11	0.11	2.85	0.32	3.00	0.24	0.13	0.23	2.12	0.52	600
South Hamgyong	2.43	2.13	0.73	0.45	0.16	0.26	2.64	0.38	2.95	0.29	0.19	0.33	1.72	0.56	600
North Hamgyong	2.55	1.83	0.67	0.61	0.13	0.28	2.81	0.47	2.89	0.38	0.27	0.24	2.78	0.61	600
Ryanggang	1.89	1.52	2.07	0.34	0.08	0.06	2.43	0.42	2.99	0.08	0.08	0.14	1.42	0.79	600
DPRK	2.21	1.78	0.67	0.35	0.12	0.17	2.81	0.46	2.95	0.26	0.18	0.25	2.17	0.50	4800

Note national figures in table are not weighted by province

As can be seen in Table 17, wild foods were frequently used by households across all provinces. The most frequently used of these foods was wild grass and herbs. The use of wild grasses, roots, nuts and herbs was low in Ryanggang, while the use of herbs was very high in South Hwanghae. Even in Pyongyang the reported use of wild foods was high for most groups except nuts.

Table 17 Use of wild foods

Percentage of households reporting use of wild foods during 6 months prior to survey by province, DPRK Nutrition Assessment 2004

Province	Wild grass Percent	Roots Percent	Mushroom Percent	Herbs Percent	Nuts Percent	Other Percent	N
Pyongyang	85.0	62.0	43.0	74.2	9.2	0.0	600
South Phyongan	43.7	46.8	33.2	60.8	47.0	0.3	600
North Phyongan	85.7	61.2	44.7	73.0	23.5	0.0	600
South Hwanghae	87.5	40.0	29.3	96.7	66.3	0.0	600
North Hwanghae	86.2	59.2	40.5	69.3	22.2	0.2	600
South Hamgyong	88.2	65.5	51.2	79.2	14.5	8.3	600
North Hamgyong	46.3	65.7	73.5	63.2	39.2	0.0	600
Ryanggang	59.3	44.8	61.2	28.5	4.8	0.0	600
DPRK	72.7	55.6	47.1	68.1	28.3	1.1	4800

Note national figures in table are not weighted by province

The sources of three food groups were evaluated in the survey by asking the women respondents if they obtained the food from each of eight different sources. Most households reported multiple sources for all the foods and these were then classified as including or not including WFP foods. The sources of main staple foods are shown in Table 18. As expected the most common source of staple foods was the PDC rations or Farmers rations. A quarter of the households reported that WFP foods were received. There was a wide variation in the percentage of households reporting "own production" as a source of staple foods across provinces with the highest levels reported from Ryanggang, South Hamgyong and South Hwanghae.

Table 18 Sources of main staple food

Percentage distribution of sources of main staple food, and percentage reporting multiple sources with or without WFP rations, by province, DPRK Nutrition Assessment 2004.

	Percentage reporting the sources below								Percentage reporting more than 1 source		
Province	**PDC Ration**	**WFP Rations**	**Farmers ration**	**Own production**	**Foraging**	**Kin support**	**Markets**	**Other source**	**with WFP**	**without WFP**	**N**
Pyongyang	85.0	2.7	15.0	7.7	0.5	10.0	19.0	0.0	2.7	97.3	600
South Phyongan	68.7	26.2	31.0	14.8	0.2	8.2	6.3	0.0	25.8	73.8	600
North Phyongan	52.2	23.0	47.8	22.3	0.2	9.8	23.2	0.0	23.0	77.0	600
South Hwanghae	37.0	21.8	63.0	41.7	4.8	10.0	20.3	0.0	21.8	78.2	600
North Hwanghae	55.5	24.7	44.5	30.0	1.3	2.5	20.0	0.0	24.7	75.3	600
South Hamgyong	61.8	27.2	39.3	40.0	5.0	12.0	20.0	0.0	27.2	72.8	600
North Hamgyong	65.0	36.8	35.0	21.8	3.3	12.0	15.8	0.0	36.8	63.2	600
Ryanggang	70.3	38.5	31.7	60.5	5.0	17.2	31.8	0.0	38.5	61.5	600
DPRK	61.9	25.1	38.4	29.9	2.5	10.2	19.6	0.0	25.1	74.9	4800

Note national figures in table are not weighted by province

Households obtained their bean and bean products from different sources than their staple foods. Apart from Pyongyang PDC rations were not an important source of beans. The most common sources in roughly equal proportions were farmer's rations, self production, kin support and markets. WFP foods were a source for 20% of households.

Table 19 Sources of beans and bean products

Percentage distribution of sources of bean and bean products, and percentage reporting multiple sources with or without WFP rations, by province, DPRK Nutrition Assessment 2004.

	Percentage reporting the sources below								Percentage reporting more than 1 source		
Province	PDC Ration	WFP Rations	Farmers ration	Own production	Foraging	Kin support	Markets	State shop	with WFP	without WFP	N
Pyongyang	23.7	2.7	8.7	8.3	0.0	37.0	35.5	8.5	2.7	97.3	600
South Phyongan	7.2	22.7	23.8	28.5	0.7	26.8	33.2	8.2	21.0	77.2	600
North Phyongan	1.3	21.8	40.3	13.5	0.0	20.0	31.5	18.0	21.7	78.0	600
South Hwanghae	1.8	22.0	52.0	30.0	0.0	24.3	20.5	4.0	22.0	78.0	600
North Hwanghae	0.3	22.3	27.3	24.0	0.8	16.3	24.3	4.5	16.7	76.3	600
South Hamgyong	2.2	21.0	23.5	22.0	0.0	34.3	28.0	6.0	18.8	79.0	600
North Hamgyong	2.5	22.3	24.0	19.7	0.0	40.8	29.5	14.0	18.2	77.5	600
Ryanggang	0.0	22.0	14.8	67.7	0.0	18.3	44.3	0.0	20.8	78.0	600
DPRK	4.9	19.6	26.8	26.7	0.2	27.3	30.9	7.9	17.7	80.2	4800

Note national figures in table are not weighted by province

As seen in Table 20, the sources of fruits and vegetables were also strikingly different from the sources of staple foods. The main sources were state shops, markets, self production and farmer's rations. WFP foods were not a source of these foods.

Table 20 Sources of fruits and vegetables

Percentage distribution of sources of fruits and vegetables, and percentage reporting multiple sources with or without WFP rations, by province, DPRK Nutrition Assessment 2004.

	Percentage reporting the sources below								Percentage reporting more than 1 source		
Province	PDC Ration	WFP Rations	Farmers ration	Own production	Foraging	Kin support	Markets	State shop	with WFP	without WFP	N
Pyongyang	0.0	0.0	15.0	20.5	0.0	9.0	60.7	100.0	0.0	100.0	600
South Phyongan	0.0	0.0	12.3	40.8	0.0	3.5	58.5	100.0	0.0	100.0	600
North Phyongan	0.0	0.0	47.0	32.2	0.0	4.8	37.5	100.0	0.0	100.0	600
South Hwanghae	0.0	0.0	63.0	66.8	0.0	6.5	30.0	100.0	0.0	100.0	600
North Hwanghae	0.0	0.0	42.0	54.8	0.0	0.2	37.2	100.0	0.0	100.0	600
South Hamgyong	0.0	0.0	36.3	46.0	0.0	8.0	46.0	100.0	0.0	100.0	600
North Hamgyong	0.0	0.0	34.5	42.3	0.0	7.5	44.7	100.0	0.0	100.0	600
Ryanggang	0.0	0.0	27.3	69.0	0.0	18.5	80.8	100.0	0.0	100.0	600
DPRK	0.0	0.0	34.7	46.6	0.0	7.3	49.4	100.0	0.0	100.0	4800

Note national figures in table are not weighted by province

4.6. Maternal and child care

4.6.1. Child feeding patterns

From Table 21 and Figure 24 information can be obtained about four key indicators of breastfeeding performance: the percentage of children less than 6 months of age who were exclusively breastfed; the percentage of breastfed children aged 6-9 months receiving at least some complimentary food, and the percentages of children aged 12-15 months and 20-23 months who were still being breastfed.

At < 6, 6-9, 12-13 and 22-23 months 98 5%, 86.1%, 71.2% and 38.9% respectively of the children were still being breastfed. It is recommended that infants are exclusively breastfed for up to six months. Table 21 shows that 65% of children less than six months of age were exclusively breastfed according to 24hours recall before interview. About 22% of the children less than six months were receiving both breast feeds and other water based liquids. A smaller percentage was being given other milks. Amongst the breastfed children 31% were receiving at least some complimentary food at 6-9 months.

Table 21 Distribution of breastfeeding by age

Percentage distribution of breastfeeding status in children < 2 years according to child's age, DPRK Nutrition Assessment 2004

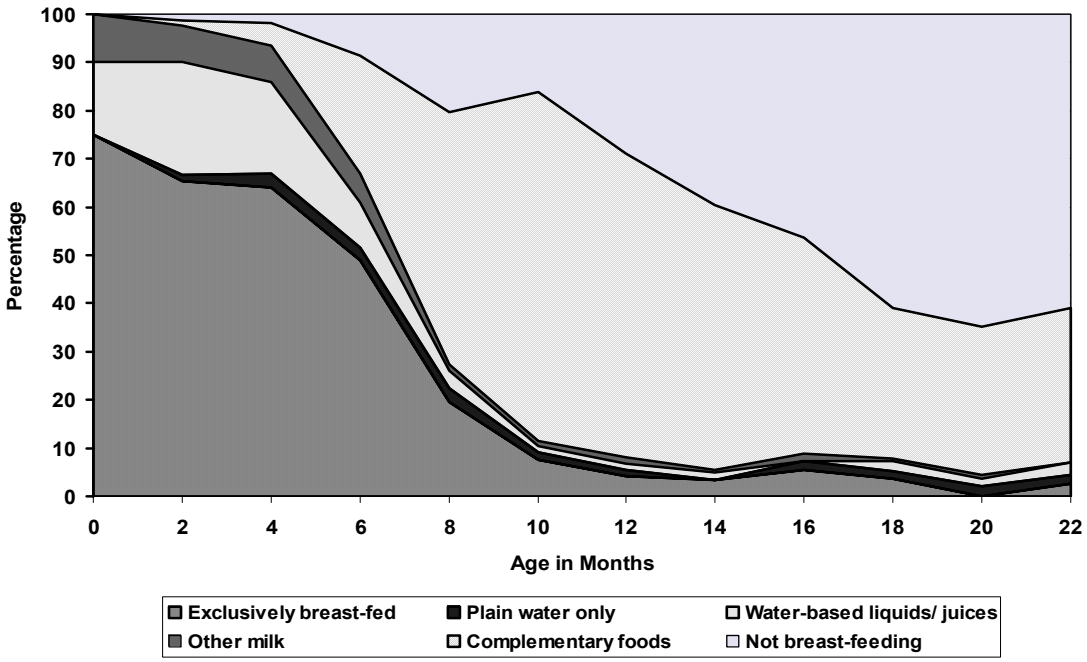
Age in months	Ever breast-fed	Currently breastfed	Breastfeeding and consuming							Number ever breast feed	Using a bottle with a nipple	Number of children < 2 years
			Not breast-feeding	Exclusively breast-fed	Plain water only	Water-based liquids/ juice	Other milk	Complementary foods	Total			
<2	100.0	100.0	0.0	75.0	0.0	15.0	10.0	0.0	100.0	20	5.0	20
2-3	100.0	98.8	1.2	65.4	1.2	23.5	7.4	1.2	100.0	81	3.7	81
4-5	98.7	98.2	1.8	64.2	2.7	19.0	7.5	4.9	100.0	223	3.1	226
6-7	98.3	91.3	8.7	49.0	2.5	9.5	5.8	24.5	100.0	237	1.7	241
8-9	93.0	79.8	20.2	19.4	2.9	3.7	1.2	52.5	100.0	225	2.9	242
10-11	96.1	83.8	16.2	7.5	1.8	1.3	0.9	72.4	100.0	219	1.3	228
12-13	91.5	71.2	28.8	4.2	1.3	1.3	1.3	63.1	100.0	216	0.9	236
14-15	87.4	60.4	39.6	3.3	0.0	1.6	0.5	54.9	100.0	159	1.1	182
16-17	87.2	53.7	46.3	5.4	2.0	0.0	1.3	45.0	100.0	130	0.0	149
18-19	80.2	39.1	60.9	3.6	1.6	2.1	0.5	31.3	100.0	154	1.0	192
20-21	85.4	35.2	64.8	0.0	2.0	1.5	1.0	30.7	100.0	170	2.0	199
22-23	82.3	38.9	61.1	2.7	1.8	2.7	0.0	31.9	100.0	94	1.8	113
<4 months	100.0	99.0	1.0	67.3	1.0	21.8	7.9	1.0	100.0	101	4.0	101
<6 months	99.1	98.5	1.5	65.1	2.1	19.9	7.6	3.7	100.0	324	3.4	327
6-9 months	96.1	86.1	13.9	40.6	1.9	7.8	4.4	31.4	100.0	346	2.0	360
Total	91.4	69.8	30.2	20.3	1.8	5.5	2.5	39.6	100.0	1928	1.8	2109

Breastfeeding status in this table refers to the 24 hours prior to interview (yesterday & last night). It presents the cumulative percentages of children divided into six mutually exclusive feeding pattern groups: exclusive breastfeeding (only breast milk); breast milk plus plain water only; breast milk plus other water based liquids (can include plain water but excludes other milks); breast milk plus other milk (includes infant formula & cows milk but can also consume other water based

liquids); breast milk plus complimentary solid or semi-solid foods (can also consume other milk & water based liquids); and no breast milk.

Figure 24 Distribution of children by breastfeeding status, according to age

Percentage of children who are exclusively breastfeeding, who are breastfeeding and also consuming plain water alone, or water based liquids or juices, or other milk, or complementary foods, and who are not breastfeeding by age in months



The breast feeding status of children less than 6 months by province is presented in table 22. There were wide fluctuations in breast feeding status between provinces.

Table 22 Breastfeeding by province

Percentage distribution of breastfeeding status based on 24 hour recall prior to interview in children < 6 months by province, DPRK Nutrition Assessment 2004

Province	Not breast-feeding	Exclusively breast-fed	Partially breast-fed	Number of children < 6 months
Pyongyang	0.0	64.3	35.7	28
South Phyongan	6.8	56.8	36.4	44
North Phyongan	0.0	54.5	45.5	44
South Hwanghae	0.0	92.6	7.4	54
North Hwanghae	5.0	22.5	72.5	40
South Hamgyong	0.0	65.4	34.6	52
North Hamgyong	0.0	72.7	27.3	33
Ryanggang	0.0	90.6	9.4	32
Total Urban	1.0	69.1	29.9	194
Total Rural	2.3	59.4	38.3	133
Total	1.5	65.1	33.3	327

4.6.2. Use of micronutrients

In children vitamin A deficiency can lead to increased risk of blindness, morbidity and mortality. Preventing vitamin A deficiency in children is a key child survival intervention. In DPRK the coverage of supplementation of children with high dose vitamin A in the six months prior to the survey was very high. Table 23 presents the coverage of vitamin A supplementation for all children in the survey. In the group of children born before 20 November 2003 the coverage was uniformly very high across all provinces.

Table 23 Coverage of vitamin A supplementation of child
Percentage of children age 6-23 months who received vitamin A supplements in the six months preceding the survey (unweighted), by background characteristics (unweighted), DPRK Nutrition Assessment 2004

Background characteristics	Consumed vitamin A supplements for children born before 20/11/2003	Number of children <2 years and born before 20/11/2003
	Percent	n
Age in months		
<6	0	0
6-11.	96.7	151
12-23.	98.4	1071
Sex of child		
Male	98.5	595
Female	97.9	627
Province		
Pyongyang	100.0	161
South Phyongan	98.6	142
North Phyongan	98.1	157
South Hwanghae	99.3	148
North Hwanghae	98.0	151
South Hamgyong	98.7	156
North Hamgyong	99.3	147
Ryanggang	93.8	160
Nutritional status of child		
Stunted	98.5	884
Not stunted	97.3	338
DPRK	98.2	1222

The majority of children less than two years who received vitamin A in the six months prior to the survey obtained it from local nurseries (Table 24). There was some variation by province with the majority of children in South Hamgyong receiving it from the local Dong or Ri clinic.

Table 24 Sources of Vitamin A supplements

Percentage distribution of sources of vitamin A supplements for children < 2 years in the six months preceding the survey, by province (unweighted), DPRK Nutrition Assessment 2004

Province	Dong or Ri clinic	Nursery	Number of children who received vitamin A
	Percent	Percent	
Pyongyang	37.3	62.7	161
South Phyongan	47.3	52.7	146
North Phyongan	22.6	77.4	159
South Hwanghae	40.7	59.3	150
North Hwanghae	35.8	64.2	159
South Hamgyong	65.2	34.8	155
North Hamgyong	34.5	65.5	148
Ryanggang	39.0	61.0	159
DPRK	40.2	59.8	1237

Vitamin A deficiency in pregnancy has been associated an increased risk of maternal morbidity and mortality. Adequate maternal vitamin A stores at birth are needed to ensure that breast milk vitamin A levels are sufficient to protect the newborn during the first six months of life. Table 25 shows the coverage of postpartum vitamin A supplementation among mothers in DPRK by background characteristics.

Table 25 Maternal postpartum vitamin A supplementation

Percentage of women who received a vitamin A dose in the first two months after last delivery (unweighted), by background characteristics, DPRK Nutrition Assessment 2004

Background Characteristics	Received vitamin A dose postpartum %	Number of women with child < 2 years
Mother's age at birth		
20-24	35.9	312
25-29	34.1	1157
30-34	31.6	563
> 35	28.6	77
Maternal nutritional status		
Normal MUAC	33.2	1430
Low MUAC (<22.5 cm)	34.2	679
Province		
Pyongyang	52.1	263
South Phyongan	36.5	260
North Phyongan	33.0	267
South Hwanghae	29.4	269
North Hwanghae	27.2	268
South Hamgyong	33.6	262
North Hamgyong	26.4	261
Ryanggang	30.1	259
Maternal education		
Completed secondary	33.1	1587
Tertiary education	34.7	522
Total Urban	40.0	1286
Total Rural	23.3	823
DPRK	33.5	2109

Overall, 33.5% of women received vitamin A postpartum. Younger women were more likely to receive vitamin A supplements after birth. The coverage of maternal postpartum vitamin A supplementation varied considerably by province with the highest levels in Pyongyang (52.1%) and the lowest in North Hamgyong (26.4%).

Night blindness, or difficulty with vision after sunset, is an indicator of vitamin A deficiency. A prevalence of night blindness of greater than 5% in pregnancy is an indication of maternal vitamin A deficiency . Table 26 shows that overall 5.7% of women in the survey reported night blindness during their last pregnancy.

Table 26 Maternal night blindness

Percentage of women who suffered from night blindness during pregnancy (unweighted), by background characteristics, DPRK Nutrition Assessment 2004

Background Characteristics	Suffered night blindness during pregnancy %	Number of women with child < 2 years
Mother's age at birth		
20-24	5.8	312
25-29	5.8	1157
30-34	5.7	563
> 35	5.2	77
Maternal nutritional status		
Normal MUAC	5.5	1430
Low MUAC (<22.5 cm)	6.2	679
Province		
Pyongyang	5.7	263
South Phyongan	4.6	260
North Phyongan	5.6	267
South Hwanghae	5.9	269
North Hwanghae	6.0	268
South Hamgyong	5.7	262
North Hamgyong	5.7	261
Ryanggang	6.6	259
Maternal food intake		
Green leafy vegetables.		
Lowest	5.6	198
Highest	5.8	1911
Red/yellow vegetables		
Low	7.9	190
Medium	6.8	739
Highest	4.7	1180
Total urban	6.0	1286
Total Rural	5.4	823
DPRK	5.7	2109

Night blindness was more common in women with low MUAC. There was little variation in the prevalence of night blindness by province with the highest prevalence in Ryanggang and the lowest in South Phyongan. Lower intakes of red / yellow vegetables, an important source of vitamin A, was associated with a higher prevalence of maternal night blindness.

The usage of iodised salt is shown in Table 27 and overall 40% of the surveyed households were using iodised salt. There was less usage of iodised salt in the northern mountainous provinces. In Ryanggang only 15% of the households were using iodised salt. The highest level of usage of iodised salt was in Pyongyang.

Table 27 Household usage of iodised salt
Percentage of households using iodised salt by province, DPRK Nutrition Assessment 2004

Province	Not iodised	Any iodine	Number of households
	Percent	Percent	
Pyongyang	41.8	58.1	600
South Phyongan	45.0	55	600
North Phyongan	55.0	45	600
South Hwanghae	47.0	53	600
North Hwanghae	59.8	40.1	600
South Hamgyong	70.0	30	600
North Hamgyong	75.2	24.8	600
Ryanggang	84.7	15.3	600
DPRK	59.8	40.2	4800

4.6.3. Immunisations of child

Table 28 reveals uniformly high coverage of all childhood immunisations.

Table 28 Coverage of childhood immunisations
Percentage of children under two years of age who have been vaccinated for BCG, Polio, DTP and measles, according to background characteristics, DPRK Nutrition Assessment 2004

Background characteristic	0-23 months	3.5 - 23 months										9-23 months	No. of children < 2 years
	% BCG	% any Polio	Percentage of children receiving given number of polio doses				% any DPT	Percentage of children receiving given number of DTP doses				% Measles	
			0	1	2	3		0	1	2	3		
Province													
Pyongyang	100.0	100.0	0.0	0.0	0.0	100.0	93.1	6.9	10.0	10.8	72.3	97.8	263
South Phyongan	99.6	100.0	0.0	0.0	0.4	99.6	92.3	7.7	10.2	9.8	72.4	95.2	260
North Phyongan	99.6	100.0	0.0	0.0	0.4	99.6	100.0	0.0	8.4	16.3	75.3	95.0	267
South Hwanghae	100.0	100.0	0.0	0.0	0.0	100.0	92.5	7.5	9.7	9.7	73.1	96.0	269
North Hwanghae	99.6	100.0	0.0	0.0	0.0	100.0	92.0	8.0	9.9	9.9	72.1	96.1	268
South Hamgyong	99.6	100.0	0.0	0.0	0.4	99.6	93.2	6.8	10.6	11.5	71.1	98.3	262
North Hamgyong	99.6	100.0	0.0	0.0	0.0	100.0	90.0	10.0	8.8	9.6	71.6	96.0	261
Ryanggang	99.2	100.0	0.0	0.0	0.4	99.6	93.8	6.2	8.1	13.6	72.1	96.3	259
Urban	99.7	100.0	0.0	0.0	0.2	99.8	93.9	6.1	9.1	12.3	72.5	96.4	1286
Rural	99.6	100.0	0.0	0.0	0.3	99.7	92.6	7.4	10.1	9.9	72.5	96.3	823
DPRK	99.7	100.0	0.0	0.0	0.2	99.8	93.3	6.7	9.5	11.4	72.5	96.3	2109

4.6.4. Childhood illnesses

Table 29 shows the period prevalence of diarrhoea for children less than two years during the two weeks preceding the interview. About one five children had diarrhoea in the two weeks prior to the survey. The prevalence of diarrhoea was lower in Pyongyang than other provinces. No relationship was seen between the type of toilet or water source and diarrhoea.

Table 29 Prevalence of childhood diarrhoea

Percentage of children under two years with diarrhoea in the two weeks preceding the survey, DPRK Nutrition Assessment 2004

Background characteristics	Diarrhoea in the two weeks preceding the survey Percent	Number of children < 2 years
Age in months		
<6	15.9	327
6-11	19.4	711
12-17	20.1	567
18-23	18.8	504
Sex		
Male	19.1	1049
Female	18.8	1060
Province		
Pyongyang	13.7	263
South Phyongan	20.4	260
North Phyongan	17.6	267
South Hwanghae	20.4	269
North Hwanghae	19.4	268
South Hamgyong	20.6	262
North Hamgyong	21.5	261
Ryanggang	17.8	259
Sanitation facilities		
Flush to sewage or septic	21.7	595
Pour flush latrine	17.6	635
Pit latrine	19.6	547
Open pit	15.4	332
Source of drinking water		
Piped into dwelling	18.8	1739
Public tap	19.7	66
Tube well/borehole with pump	18.6	204
Protected dug well	21.0	100
Total Urban	20.0	1286
Total Rural	17.3	823
DPRK	18.9	2109

Table 30 shows the types of fluids, and the amount of fluids and food given to young children with diarrhoea. Overall 83% of the mothers gave ORS or other acceptable fluids during the diarrhoea episode. Also 62% of the mothers appropriately continued to breastfed. However 30% of mothers did report reducing food intake during the diarrhoea episode and 20% reported giving fewer fluids.

Table 30 Fluids and liquids during diarrhoea

Among children under two years of age who had diarrhoea in the two weeks preceding the survey, percentage given different types of fluids and percentage given more or less to drink and eat, DPRK Nutrition Assessment 2004

Feeding or drinking pattern	Percent	Number of children with diarrhoea
Fluids during illness		
Breast milk.	62.1	247
Gruel.	53.0	211
Other acceptable locally made fluids.	13.8	55
ORS packet.	69.8	278
Other milk.	4.8	19
Water with feeding.	29.9	119
Water alone.	10.1	40
Unacceptable fluids.	0.3	1
Nothing.	3.5	14
Amount of food during illness		
None	0.5	2
Much less	30.2	112
Somewhat less	49.1	182
About the same	16.4	61
More	3.8	14
Drinking during illness		
Much less or none	20.2	73
About the same (or somewhat less)	47.6	172
More	32.1	116
Total	n/a	361

Table 31 shows the percentage of children whose mothers reported they had symptoms of acute respiratory illness (ARI), or a fever, or ARI with fever within the two weeks preceding the survey, and the percentage with ARI for whom treatment was sought. The table reveals that 12% of the children had ARI symptoms, 20% had a fever and 85% had both ARI and fever in the two weeks prior to the survey. Children 6 to 17 months were more likely to have ARI and ARI with fever. There was a slightly higher rate of ARI in boys. The prevalence did vary by province and was highest in Ryanggang and South Phyongan. The vast majority of children with ARI were taken for treatment.

Table 31 Prevalence of acute respiratory illness

Percentage of children under two years of age who had symptoms of ARI, percentage who sought treatment for ARI, and percentage of children who had ARI & fever in the two weeks preceding the survey, according to background characteristics, DPRK Nutrition Assessment 2004

Background characteristic	Children with symptoms of ARI[#]				Number of children < 2 years
		ARI symptoms	Children who sought treatment	Children with fever	
	N	Percent	Percent	Percent	
Age in months					
<6	27	8.3	92.6	84.6	327
6-11	88	12.4	95.5	88.6	711
12-17	78	13.8	89.7	75.6	567
18-23	57	11.3	93.0	91.2	504
Sex					
Male	132	12.6	93.2	84.1	1049
Female	118	11.1	92.4	85.5	1060
Maternal education					
Completed secondary	185	11.7	94.1	83.7	1587
Tertiary education	65	12.5	89.2	87.7	522
Province					
Pyongyang	27	10.3	92.6	92.6	263
South Phyongan	47	18.1	93.6	83.0	260
North Phyongan	32	12.0	96.9	87.5	267
South Hwanghae	19	7.1	100.0	100.0	269
North Hwanghae	33	12.3	97.0	90.9	268
South Hamgyong	21	8.0	100.0	70.0	262
North Hamgyong	31	11.9	87.1	51.6	261
Ryanggang	40	15.4	82.5	100.0	259
Urban	151	11.7	92.7	82.8	1286
Rural	99	12.0	92.9	87.8	823
DPRK	250	11.9	92.8	84.7	2109

[#] Cough and rapid breathing

4.6.5. Pregnancy care

Table 32 reveals a very high level of antenatal care during pregnancy with 60.7% of women attending ten or more antenatal care checks during their last pregnancy. The coverage of antenatal care was uniformly high across all provinces. Only 5% of the women received less than the WHO recommended minimum of four antenatal care checks.

Table 32 Coverage of antenatal care in last pregnancy
Use of antenatal care by background characteristics, DPRK Nutrition Assessment 2004

Background characteristics	Number of antenatal care visits					Total	Number of women
	No ANC	1-3 times	4-6 times	7-9 times	≥10 times		
	%	%	%	%	%	%	
Maternal age							
20 – 24	0.0	3.1	11.8	21.4	63.8	100.0	260
25 – 29	0.0	4.8	10.3	24.9	60.1	100.0	1695
30 – 34	0.0	6.0	11.2	22.4	60.4	100.0	2185
> 35	0.0	5.9	11.8	18.6	63.7	100.0	660
Maternal education							
Completed secondary	0.0	5.7	11.0	22.9	60.5	100.0	3641
Tertiary education	0.0	3.1	10.3	25.1	61.5	100.0	1159
Province							
Pyongyang	0.0	5.7	11.4	22.1	60.8	100.0	600
South Phyongan	0.0	4.6	12.3	25.0	58.1	100.0	600
North Phyongan	0.0	2.6	6.4	28.8	62.2	100.0	600
South Hwanghae	0.0	5.9	11.2	21.9	61.0	100.0	600
North Hwanghae	0.0	5.6	11.2	22.4	60.8	100.0	600
South Hamgyong	0.0	5.7	11.5	22.1	60.7	100.0	600
North Hamgyong	0.0	4.6	11.1	22.6	61.7	100.0	600
Ryanggang	0.0	5.4	11.6	22.4	60.6	100.0	600
Total	0.0	5.0	10.8	23.4	60.7	100.0	4800

As seen in Table 33 women reported a uniformly high level of care during delivery from medically trained birth attendants.

Table 33 Delivery assistance by background characteristics

Percentage of women assisted by different birth attendants in their last pregnancy by background characteristics, DPRK National Nutrition Assessment 2004

Background characteristics	Type of birth attendant				Total %	Number of women
	No one %	Doctor %	Nurse/midwife %	Relative/friend %		
Maternal age						
20 – 24	0.0	34.5	62.0	3.5	100.0	260.0
25 – 29	0.0	29.9	66.7	3.3	100.0	1695.0
30 – 34	0.0	27.8	70.0	2.2	100.0	2185.0
> 35	0.0	26.5	71.6	2.0	100.0	660.0
Maternal education						
Completed secondary	0.0	30.1	66.8	3.1	100.0	3641.0
Tertiary education	0.0	28.0	69.5	2.5	100.0	1159.0
Province						
Pyongyang	0.0	30.8	67.7	1.5	100.0	600.0
South Phyongan	0.0	31.2	66.9	1.9	100.0	600.0
North Phyongan	0.0	31.5	66.7	1.9	100.0	600.0
South Hwanghae	0.0	30.9	66.2	3.0	100.0	600.0
North Hwanghae	0.0	27.6	69.0	3.4	100.0	600.0
South Hamgyong	0.0	28.6	67.6	3.8	100.0	600.0
North Hamgyong	0.0	28.4	67.8	3.8	100.0	600.0
Ryanggang	0.0	27.8	68.0	4.2	100.0	600.0
Total	0.0	29.6	67.5	2.9	100.0	4800.0

4.7. Water and sanitation

The types of household water sources and mean time to water source are reported in Table 34. Overall 82% of the households in DPRK have water piped into the dwelling even in the remote northern provinces. The only provinces with a lower proportion of households with piped water source were North Phyongan and South Hwanghae. For households with water not on the premises was only 5.8 minutes and showed little variation across provinces.

Table 34 Household water sources by province

Percent distribution of household water sources, and mean time in minutes to water source by province, DPRK Nutrition Assessment 2004

Province	Piped into dwelling	Public tap	Tube well / borehole with pump	Protected dug well	Average time to get water			Number of households
	Percent	Percent	Percent	Percent	Mean (Minutes)	SE	n	
Pyongyang	93.3	0.7	4.3	1.7	7.10	2.73	10	600
South Phyongan	87.7	0.8	8.5	3.0	10.11	0.77	44	600
North Phyongan	66.5	14.2	17.0	2.3	4.13	0.12	139	600
South Hwanghae	73.8	3.8	11.3	11.0	6.12	0.29	86	600
North Hwanghae	81.0	1.7	9.2	8.2	5.11	0.07	38	600
South Hamgyong	84.2	1.7	11.0	3.2	7.74	0.74	19	600
North Hamgyong	86.3	1.2	9.8	2.7	6.00	0.44	26	600
Ryanggang	82.8	0.8	11.0	5.3	5.43	0.38	37	600
DPRK	82.0	3.1	10.3	4.7	5.80	0.17	399	4800

Table 35 shows the types of toilet facilities available to households in DPRK. Approximately 57% of households have flush toilet system and 43% have pit toilets. There was similar pattern found in all provinces. In one quarter of the households the facility is not within the dwelling.

Table 35 Household toilets by province

Percent distribution of types of toilets by province, DPRK Nutrition Assessment 2004

Province	Flush to sewage system or septic tank	Pour flush latrine	Traditional pit latrine	Open pit	Facility within dwelling /compound	Number of households
	Percent	Percent	Percent	Percent	Percent	
Pyongyang	32.3	39.7	16.8	11.2	87.8	600
South Phyongan	28.0	27.8	28.2	16.0	76.5	600
North Phyongan	25.0	30.8	32.2	12.0	72.5	600
South Hwanghae	26.2	27.2	29.0	17.7	86.7	600
North Hwanghae	27.0	26.5	30.5	16.0	72.7	600
South Hamgyong	27.0	26.8	29.2	17.0	69.8	600
North Hamgyong	26.5	27.3	31.3	14.8	76.5	600
Ryanggang	26.3	27.7	29.8	16.2	69.7	600
DPRK	27.3	29.2	28.4	15.1	76.5	4800

The spread of infectious diseases, especially diarrhoeal diseases, is strongly related to the level of faecal contamination in the environment surrounding homes where young children often play.

Table 36 presents the reported disposal of children's stools, by background characteristics, including type of sanitation facilities in the household. It shows the 80% of mothers with a young child 0-3 years, disposed of their children's stools using a method that contained the stools.

Table 36 Disposal of child's faecal matter

Percent distribution of way mothers dispose of child's faecal matter, according to background characteristics and type of toilet facilities in household, DPRK Nutrition Assessment 2004

Background characteristics	Stools contained			Stools uncontained			
	Child always uses toilet/ latrine	Thrown into toilet/ latrine	Buried in yard	Thrown outside yard	Left on ground	No children 0-3 years in house	Number of households
Province							
Pyongyang	25.7	53.5	0.3	0.3	0.0	20.2	600
South Phyongan	13.0	67.3	0.3	0.2	0.0	19.2	600
North Phyongan	22.5	60.8	8.3	0.0	0.0	8.3	600
South Hwanghae	12.5	69.0	0.0	0.0	0.0	18.5	600
North Hwanghae	16.8	59.2	0.0	3.3	0.0	20.7	600
South Hamgyong	5.5	68.2	0.0	3.7	0.0	22.7	600
North Hamgyong	23.3	51.8	0.0	1.7	0.0	23.2	600
Ryanggang	14.5	64.7	1.5	1.0	0.0	18.3	600
Maternal education							
Completed secondary	16.1	61.7	1.6	1.3	0.0	19.3	3641
Tertiary education	18.8	62.0	0.5	1.2	0.0	17.4	1159
Sanitation facilities							
Flush to sewage or septic	17.0	64.1	0.5	0.4	0.0	17.9	1310
Pour flush latrine	18.6	61.7	0.6	0.6	0.0	18.5	1403
Pit latrine	17.0	59.0	2.1	2.2	0.0	19.7	1362
Open pit	12.1	63.0	2.6	2.5	0.0	19.7	725
Toilet location							
In dwelling/compound	16.7	63.7	0.4	0.7	0.0	18.4	3673
Outside dwelling/compound	16.7	55.5	4.2	3.3	0.0	20.3	1127
DPRK	16.7	61.8	1.3	1.3	0.0	18.9	4800

5 Conclusions and Recommendations

DPRK has achieved some improvement maternal and child nutrition during the last two years, in collaboration with the international organisations.

This can be seen from the decline in the childhood malnutrition since 2002. Stunting in children 0-71 months in DPRK has fallen by 2.9% from 2002 to 2004. This is an average decline of stunting prevalence of 1.45% per year. The improvements have been greatest in children 12 to 35 months where there was a 30% relative decline in the rate of stunting between 2002 and 2004. However in 2004 there still remained malnutrition of children 0-71 months with 37% stunted, 23% underweight and 7% wasted.

Childhood malnutrition was found to be associated with maternal malnutrition and with birth size. These findings, together with the lack of progress infant malnutrition, suggest the need for more programs to prevent maternal malnutrition in pregnancy. The well developed maternal pregnancy care system in DPRK provides an ideal opportunity for delivering these interventions.

Higher levels of household consumption of rice and rice products, poultry or meat, red or yellow vegetables, and oils and fats were associated with reduced childhood malnutrition. These findings highlight the importance of continued food assistance to ensure ongoing improvements in child nutritional status.

There were small improvements in maternal nutritional status between the 2002 and 2004 assessments mainly for women 25 to 34 years, but nearly one in three women with young children were malnourished and had anaemia. Further focuses are needed to accelerate the improvement in nutritional status of women of reproductive age and interventions such as micronutrient supplements and communications about healthy diet are especially needed for pregnant and lactating women, which have already started.

Future surveys need to use methodologies that will allow the results to be compared with past surveys, but also gather more information for developing national nutrition policies. Specific recommendations for the design of future studies include: sampling using the standard methods recommended by UNICEF for MICS surveys, measuring all preschool aged children in the house, conducting interviews and taking measurements at home at least for children less than six months of age. Also more attention must be paid to the preparations for future nutrition assessments such as the survey design methodology and appropriate training.

And for more policy relevant information further analyses of the 2004 nutrition assessment data would be required including extensive examination of the food consumption data and the factors associated with child and maternal malnutrition and anaemia.

6 References

WHO (World Health Organisation). Indicators for assessing breast-feeding practices. 1991. Geneva, Switzerland, WHO.

WHO (World Health Organisation). Physical Status: The use and interpretation of anthropometry. Geneva: World Health Organisation, 1995.

Appendix A – List of Selected Clusters

Cluster	Province/City	City/District/County	Name of Dong /Ri	Dong / Ri
011	Pyongyang	01. Pyongchon District	1. Phyongchon Dong No.2	D
012			2. Bongnam Dong	D
013			3. Haeun Dong No.1	D
021		02. Tongdaewon Dist.	1. Munsin Dong No.2	D
022			2. Tongsin Dong No.1	D
031		03. Taesong Dist.	1. Ryonghung Dong No.3	D
032			2. Ryongbuk Dong	D
041		04. Hyongjesan Dist.	1. Sopo Dong No.2	D
051		05. Mangyongdae Dist.	1. Chilgol Dong No.3	D
061		06. Rakrang Dist.	1. Chungsong Dong No.1	D
062			2. Chungsong Dong No.2	D
071		07. Songyo Dist.	1. Namsin Dong No.1	D
072			2. Sanob Dong No.1	D
081		08. Moranbong Dist.	1. Inhung Dong No.2	D
091		09. Ryongsong Dist.	1. Chonggye Dong	D
101		10. Sadong Dist.	1. JangChon Dong	D
102			2. Ory Ri	R
111		11. Kangnam Dist.	1. Up	D
121		12. Junghwa Dist.	1. Paeun Ri	R
122			2. Ganbong Ri	R
131	South Phyongan	13. Nampo City	1. Jisan Dong	D
132			2. Namhung Dong	D
133			3. Sohung Dong	D
134			4. Gonguk Dong No.2	D
135			5. Ryongnam Ri	R
136			6. Gomsan Ri	R
141		14. Chonrima Dist.	1. Pogu Dong	D
151		15. Phyongsong City	1. Hacha Dong	D
161		16. Gaechon County	1. Chonrigil Dong	D
162			2. Alil Dong	D
163			3. Namchon Dong	D
171		17.Unsan County	1. haksan Gu	D
172			2. Ryujong Ri	R
181		18. Dokchon City	1. Chongsin Dong	D
182			2. Hungdok Dong	D
191		19. Sunchon City	1. Jungsan Dong	D
192			2. Sonam Ri	R
201		20. Anju City	1. Chongsong Ri	R
202			2. Sonhung Ri	R
211		21. Sinyang County	1. Dokhung Ri	R
221	North Phyongan	22. Sinuiju City	1. Gunhwa Dong	D
222			2. Paesa Dong	D
223			3. Ryonsang Ri	R
224			4. Sumun Dong	D

Cluster	Province/City	City/District/County	Name of Dong /Ri	Dong / Ri
225			5. Rusang Dong No.1	D
231		23. Jongju City	1. Samma Dong	D
232			2. Namchon Dong	D
233			3. Sinchon Ri	R
241		24. Gujang County	1. Up	D
251		25. Pakchon County	1. Maengjung Gu	D
261		26. Gusong City	1. Gwail Dong	D
262			2. Bangjik Dong	D
263			3. Namsin Ri	R
271		27. Uiju County	1. RyongJe Ri	R
281		28. Unsan County	1. Jonsung Ri	R
291		29. Ryongchon County	1. Sangryong Ri	R
301		30. Gwaksan County	1. Sokdong Ri	R
311		31. Cholsan County	1. Wolbong Ri	R
321		32. Tongrim County	1. Jambong Ri	R
331		33. Sonchon County	1. Sambong Ri	R
341	South Hwanghae	34. Haeju City	1. Taegok Dong	D
342			2. Okgye Dong	D
343			3. Yangsa Dong	D
344			4. Kwangsok Dong	D
345			5. Yongyang Dong	D
351		35. Byoksong County	1. Up	D
361		36. Samchon County	1. Up	D
371		37. Unryul County	1. Up	D
372			2. Gumbok Ri	R
373			3. Unsong Ri	R
381		38. Anak County	1. Guwa Ri	R
382			2. Wonryong Ri	R
391		39.Taetan County	1. Buyang Ri	R
392			2. Songnam Ri	R
401		40. Sinchon County	1. Rimok Ri	R
411		41. Sinwon County	1. Rula Ri	R
412			2. Gomchon Ri	R
421		42. Gangryong County	1. Kwangchon Ri	R
431		43. Bongchon County	1. Taea Ri	R
441		44. Baechon County	1. Kangho Ri	R
451	North Hwanghae	45. Sariwon City	1. Sangha Dong	D
452			2. Bu Dong No.1	D
453			3. Won ju Dong	D
454			4. Migok Ri	R
461		46. Bongsan County	1. Up	D
462			2. Unjong Ri	R
471		47. Songrim City	1. Saesalri Dong No. 4	D
481		48. Gaesong City	1. Manwol Dong	D
482			2. Bukan Dong	D
483			3. Sonjuk Dong	D

Cluster	Province/City	City/District/County	Name of Dong /Ri	Dong / Ri
491		49. Phyongsan County	1. Up	D
492			2. Risan Ri	R
501		50. Unpa County	1. Guryon Ri	R
502			2. Mukchon Ri	R
511		51. Tosan County	1. Songchon Ri	R
512			2. Songse Ri	R
513			3. Munsong Ri	R
521		52. Rinsan County	1. Sangwal Ri	R
522			2. Dongsa Ri	R
531		53. Hwangju County	1. Sokjong Ri	R
541	South Hamgyong	54. Hamhung City	1. Unhung Dong No.1	D
542			2. Sohung Dong	D
543			3. Yowi Dong	D
544			4. Dangbo Dong	D
551		55. Danchon City	1. Muhak Dong	D
552			2. Paegumsan Dong	D
553			3. Jikjol Dong	D
561		56. Doksong County	1. UP	D
571		57. Sinpo City	1. Yanghwa Dong	D
581		58. Hungnam City	1. Jakdo Dong	D
582			2. Unsong Dong No.1	D
583			3. Soho Dong No.2	D
591		59. Hongwon County	1. Samsong Ri	R
592			2. Goup Ri	R
601		60. Jongpyong County	1. Munchang Ri	R
602			2. Sondok Ri	R
603			3. Daho Ri	R
604			4. Jangdong Ri	R
611		61. Riwon County	1. Munang Ri	R
621		62. Rakwon County	1. Sinpung Ri	R
631	North Hamgyong	63. ChonjinCity Ranam Dist.	1. Puam Dong	D
632			2. Rigok Dong	D
633			3. Rabuk Dong No.1	R
641		64. Chongjin City Sinam Dist.	1. Sinjin Dong	D
651		65. Hwasong County	1. Ryongban Gu	D
661		66. Chongjin City Songpyong Dist.	1. Jechol Dong	D
671		67. Chongjin City Chongam Dist.	1. Ryongje Dong	D
672			2. Munhwa Dong No.1	D
673			3. Jongsang Dong	D
681		68. Onsong County	1. Up	D
691		69. Saebyol County	1. Ryongbuk Gu	D
701		70. Undok County	1. Up	D
702			2. Haksong Gu	D
711		71. Hoiyong City	1. Sanob Dong	D

Cluster	Province/City	City/District/County	Name of Dong /Ri	Dong / Ri
712			2. Gumsaeng Ri	R
721		72. Gyongsong County	1. Osang Ri	R
731		73. Orang County	1. Ryongyon Ri	R
741		74. Musan County	1. Munam Ri	R
742			2. Sangchang Ri	R
751		75. Gilju County	1. Sangryong Ri	R
761	Ryanggang	76. Samsu County	1. Posong Gu	D
762			2. Dongsu Ri	R
763			3. Chongsu Ri	R
771		77. Hyesan City	1. Yonhung Dong	D
772			2. Sinhung Dong	D
773			3. Wiyon Dong	D
774			4. Songhu Dong	D
781		78. Kimhyonggwon County	1. Up	D
791		79. Samjiyon County	1. Tongnam Gu	D
792			2. Boso Gu	D
793			3. Sinmusong Gu	D
794			4. Up	D
801		80. Daehongdan County	1. Gaechok Gu	D
811		81. Pungso County	1. Hampo Gu	D
812			2. gwanhung Ri	R
813			3. Hoiun Ri	R
821		82. Gabsan County	1. Dongjom Gu	D
822			2. Joyang Ri	R
831		83. Unhung County	1. Ilgon Gu	D
832			2. Janghang Ri	R

Appendix B – Survey teams

No. of Team & Province	Name	Sex	Institution
Team 1	Kim Gyong Sun	F	Officer, central Bureau of Statistics
	Rim Hui Yong	M	Researcher, Institute of Child Nutrition
	Yang Gon Suk (fixed)	F	National Officer, UNICEF
Pyongyang	Sarita Neupane (fixed)	F	International staff UNICEF
		M	Driver, WFP
	Kim Ryu Gyong	F	Officer, central Bureau of Statistics
Team 2	Kang Hye Yong	F	Researcher, Institute of Child Nutrition
	Kim Ok Gyong	F	National Officer, WFP
Pyongyang	Yvonne Forsen (mobile)	F	International staff WFP
		M	Driver, WFP
	Yu Chun Ae	F	Officer, central Bureau of Statistics
Team 3	Yang Bun Hui	F	Researcher, Institute of Child Nutrition
	Jong Ho Bom	M	National Officer, WFP
South Phyongan	Wolfram Herfurth(mobile)	M	International staff WPF
	Kim Bun I (mobile)	F	National Officer, WFP
		M	Driver, WFP
	Ri Jong Hwa	F	Officer, central Bureau of Statistics
Team 4	Sin Byong Chil	M	Researcher, Institute of Child Nutrition
		M	
South Phyongan		M	
		M	
		M	
	Choe Yong Su	M	Officer, central Bureau of Statistics
Team 5	Kim Jong Sun	F	Researcher, Institute of Child Nutrition
	Kim Chol Min	M	National Officer, WFP
North Phyongan	Yun Dae In (mobile)	M	National Officer, UNICEF
	Taufique Mujtaba (mobile)	M	International staff UNICEF
		M	Driver, WFP
	Kim Yong Suk	F	Officer, central Bureau of Statistics
Team 6	Pak Hak Chol	M	Researcher, Institute of Child Nutrition
	Kang Mun Chol (fixed)	M	National Officer, WFP
North	Magnus Nilsson(fixed)	M	International staff WFP
Phyongan	Paek Tae San	M	Driver, WFP
	Pak Yong	F	Officer, central Bureau of Statistics
Team 7	Min Gyong Hyon	M	Researcher, Institute of Child Nutrition
	Kim Bong Chol (fixed)	M	National Officer, WFP
South Hwanghae	Miriam Sebit (fixed)	M	International staff WFP
	Ri Ung Ryol	M	Driver, WFP
	Kim Chun Son	F	Officer, central Bureau of Statistics
Team 8	Ri Gyong Ae	F	Researcher, Institute of Child Nutrition
	Kim Song Ho	M	National Officer, WFP
South			
Hwanghae			

No. of Team & Province	Name	Sex	Institution
			Driver, WFP
	Yang Myong Suk	F	Officer, central Bureau of Statistics
Team 9	Wang Hye Song	F	Researcher, Institute of Child Nutrition
	Sim Dong Guk (fixed)	M	National Officer, UNICEF
North Hwanghae	Tharnkamol Suvilaisunthorn (fixed)	F	International staff UNICEF
	Kim Chun San	M	Driver, UNICEF
	O Gi Ho	M	Officer, central Bureau of Statistics
Team 10	Pak Gyong Suk	F	Researcher, Institute of Child Nutrition
	Rim Su Ho	M	National Officer, WFP
North Hwanghae	Wolfram Herfurth(mobile)	M	International staff WPF
	Kim Bun I (mobile)	F	National Officer, WFP
		M	Driver, WFP
	Ryu Gwang Song	M	Officer, central Bureau of Statistics
Team 11	Kim Rak Chol	M	Researcher, Institute of Child Nutrition
	Ri Hyok Chol	M	National Officer, UNICEF
South Hamgyong	Nagi Shafik	M	International staff UNICEF
	Chong Tae Yong	M	Driver, UNICEF
	Kim Ryong Sun	F	Officer, central Bureau of Statistics
Team 12	Sim Byong Chol	M	Researcher, Institute of Child Nutrition
	Kim Chol Ung	M	National Officer, WFP
South Hamgyong	Annmarie Isler	F	International staff WPF
	Pak Yong Sik	M	Driver, WFP
	Ri Sun Gil	F	Officer, central Bureau of Statistics
Team 13	Kim Ho Yongl	M	Researcher, Institute of Child Nutrition
	Kang Tae Hyok	M	National Officer, UNICEF
North Hamgyong	Marina Ahl	M	International staff UNICEF
	Kim Yong Il	M	Driver, UNICEF
	Kim Hui Yong	F	Officer, central Bureau of Statistics
Team 14	Sim Un Yong	F	Researcher, Institute of Child Nutrition
	Hyon Gwang Song	M	National Officer, WFP
North Hamgyong	Jacinta Govendar	M	International staff WPF
	Ko Mun Song	M	Driver, WFP
	Jong On Sun	F	Officer, central Bureau of Statistics
Team 15	Kim Yong Sok	M	Researcher, Institute of Child Nutrition
	Kim Chol Ho	M	National Officer, UNICEF
Ryanggang	Abdulai Kai Kai	M	International staff UNICEF
	So Man Ho	M	Driver, UNICEF
	Ri Ran Ok	F	Officer, central Bureau of Statistics
Team 16	Kim Su Hwan	M	Researcher, Institute of Child Nutrition
	Hong Ryul	M	National Officer, WFP
Ryanggang	Prab Addala	M	International staff WPF
	Choi Yong Gwang	M	Driver, WFP

Appendix C – Detailed Results

Table 37 Prevalence of underweight and severe underweight by gender and province

Prevalence of underweight (weight-for-age Z-score <-2) and severe underweight (weight-for-age Z-score <-3) for children aged less than 72 months, by gender and province, DPRK Nutrition Assessment 2004

Province	Weight-for-age Z-score								
	Boys			Girls			Total		
	Percent <-2 Z *[95% CI*]*	Percent <-3 Z *[95% CI*]*	No. of boys	Percent <-2 Z *[95% CI*]*	Percent <-3 Z *[95% CI*]*	No. of girls	Percent <-2 Z *[95% CI*]*	Percent <-3 Z *[95% CI*]*	N
Pyongyang	20.5 *[16.7 24.9]*	5.6 *[4.0 8.0]*	306	17.0 *[12.6 22.5]*	6.9 *[4.2 11.3]*	294	18.8 *[16.2 21.7]*	6.3 *[4.3 9.0]*	600
South Pyongan	21.0 *[13.6 31.0]*	8.1 *[3.5 17.4]*	303	18.1 *[13.2 24.5]*	5.3 *[3.2 8.6]*	293	19.6 *[13.7 27.2]*	6.7 *[3.6 12.3]*	596
North Pyongan	19.2 *[15.1 24.2]*	6.8 *[4.2 10.7]*	310	24.1 *[15.8 34.9]*	8.0 *[4.8 13.0]*	290	21.6 *[15.9 28.8]*	7.4 *[4.8 11.3]*	600
South Hwanghae	28.9 *[22.5 36.3]*	10.8 *[7.5 15.4]*	300	17.6 *[13.3 23.0]*	6.4 *[4.4 9.4]*	300	23.4 *[19.3 28.1]*	8.7 *[6.5 11.4]*	600
North Hwanghae	24.1 *[18.2 31.2]*	7.5 *[4.5 12.3]*	306	25.6 *[20.4 31.5]*	9.5 *[6.1 14.4]*	294	24.8 *[20.8 29.4]*	8.4 *[6.1 11.7]*	600
South Hamgyong	29.6 *[23.1 37.0]*	8.6 *[5.6 13.0]*	305	28.9 *[22.3 36.6]*	11.1 *[7.2 16.6]*	295	29.3 *[24.7 34.3]*	9.8 *[7.1 13.4]*	600
North Hamgyong	25.3 *[19.3 32.5]*	8.5 *[5.5 12.9]*	309	28.0 *[21.1 36.1]*	11.4 *[7.8 16.4]*	290	26.6 *[21.4 32.6]*	9.9 *[7.2 13.4]*	599
Ryanggang	32.8 *[26.9 39.3]*	11.0 *[7.4 16.2]*	306	28.6 *[21.5 36.9]*	9.6 *[6.5 14.0]*	294	30.8 *[25.6 36.5]*	10.4 *[7.9 13.4]*	600
Rural	*25.0 [21.0 29.5]*	*10.1 [7.1 14.1]*	*949*	*21.6 [18.1 25.7]*	*7.7 [6.0 9.7]*	*938*	*23.3 [20.3 26.7]*	*8.9 [6.9 11.3]*	*1887*
Urban	*23.7 [20.8 26.9]*	*6.8 [5.5 8.3]*	*1496*	*23.3 [20.2 26.6]*	*8.6 [6.9 10.6]*	*1412*	*23.5 [21.1 26.1]*	*7.6 [6.4 9.1]*	*2908*
DPRK	24.2 *[21.8 26.8]*	8.0 *[6.5 9.8]*	2445	22.6 *[20.2 25.2]*	8.2 *[7.0 9.7]*	2350	23.4 *[1.5 25.5]*	8.1 *[7.0 9.4]*	4795

* Confidence intervals

Table 38 Mean weight-for-age Z-score, by gender and province

Mean weight-for-age Z-score for children aged less than 72 months, by gender and province, DPRK Nutrition Assessment 2004

Province	Weight-for-age Z-score								
	Boys			Girls			Total		
	No. of boys	Mean *[95% CI *]*	SE*	No. of girls	Mean *[95% CI *]*	SE*	N	Mean *[95% CI *]*	SE*
Pyongyang	306	-1.19 *[-1.32 -1.06]*	0.07	294	-1.05 *[-1.18 -0.91]*	0.07	600	-1.12 *[-1.23 -1.01]*	0.05
South Phyongan	303	-1.21 *[-1.40 -1.01]*	0.10	293	-1.03 *[-1.16 -0.91]*	0.06	596	-1.12 *[-1.27 -0.97]*	0.08
North Phyongan	310	-1.27 *[-1.45 -1.09]*	0.09	290	-1.31 *[-1.56 -1.06]*	0.13	600	-1.29 *[-1.50 -1.08]*	0.10
South Hwanghae	300	-1.51 *[-1.63 -1.40]*	0.06	300	-1.16 *[-1.28 -1.05]*	0.06	600	-1.34 *[-1.42 -1.26]*	0.04
North Hwanghae	306	-1.43 *[-1.58 -1.29]*	0.07	294	-1.20 *[-1.34 -1.07]*	0.07	600	-1.32 *[-1.44 -1.21]*	0.06
South Hamgyong	305	-1.56 *[-1.69 -1.44]*	0.06	295	-1.49 *[-1.66 -1.31]*	0.09	600	-1.53 *[-1.64 -1.41]*	0.06
North Hamgyong	309	-1.42 *[-1.56 -1.28]*	0.07	290	-1.49 *[-1.60 -1.38]*	0.05	599	-1.46 *[-1.55 -1.37]*	0.05
Ryanggang	306	-1.65 *[-1.78 -1.53]*	0.06	294	-1.53 *[-1.69 -1.37]*	0.08	600	-1.59 *[-1.71 -1.48]*	0.06
Rural	949	-1.49 *-1.57 -1.40*	0.04	938	-1.30 *-1.39 -1.20*	0.05	1,887	-1.39 *-1.47 -1.32*	0.04
Urban	1,496	-1.29 *-1.37 -1.22*	0.04	1,412	-1.21 *-1.29 -1.13*	0.04	2,908	-1.25 *-1.32 -1.19*	0.03
DPRK	2,445	-1.37 *[-1.43 -1.31]*	0.03	2,350	-1.25 *[-1.30 -1.19]*	0.03	4,795	-1.31 *[-1.36 -1.26]*	0.03

* Confidence interval

Table 39 Prevalence of stunting and severe stunting by gender and province

Prevalence of stunting (height-for-age Z-score < -2) and severe stunting (height-for-age Z-score < -3) for children aged less than 72 months, by gender and province, DPRK Nutrition Assessment 2004

Province	Height-for-age Z-score											
	Boys					Girls				Total		
	Percent <-2 Z [95% CI*]		Percent <-3 Z [95% CI*]		n	Percent <-2 Z [95% CI*]		Percent <-3 Z [95% CI*]		n	Percent <-2 Z [95% CI*]		Percent <-3 Z [95% CI*]		n
Pyongyang	26.3		8.4		306	25.4		7.5		294	25.9		8.0		600
	23.6	29.3	6.0	11.8		20.2	31.5	4.1	13.5		22.9	29.1	6.0	10.6	
South Phyongan	33.6		10.0		303	25.7		6.5		293	29.7		8.3		596
	27.5	40.3	5.3	18.0		21.7	30.1	4.0	10.4		25.6	34.2	5.1	13.1	
North Phyongan	39.1		13.0		310	43.4		15.6		290	41.2		14.3		600
	32.0	46.7	8.7	18.9		35.6	51.5	10.4	22.7		34.6	48.2	10.6	19.0	
South Hwanghae	39.3		13.3		300	34.0		10.8		300	36.7		12.0		600
	33.2	45.7	9.5	18.2		27.9	40.7	6.8	16.5		32.2	41.5	9.1	15.8	
North Hwanghae	44.5		16.6		306	37.0		9.8		294	41.0		13.4		600
	39.4	49.7	13.1	20.9		32.5	41.8	5.4	17.0		37.6	44.4	10.4	17.1	
South Hamgyong	47.4		15.4		305	46.0		17.8		295	46.7		16.6		600
	42.1	52.8	12.1	19.5		41.3	50.7	15.0	21.1		43.4	50.0	14.9	18.5	
North Hamgyong	42.3		15.2		309	37.5		12.3		290	40.0		13.8		599
	34.7	50.2	10.8	20.9		31.5	43.9	8.9	16.8		35.7	44.4	11.1	17.1	
Ryanggang	47.4		17.6		306	43.6		14.5		294	45.6		16.1		600
	41.9	53.0	12.9	23.5		37.8	49.6	10.3	20.0		41.6	49.6	12.6	20.3	
Rural	43.9		14.2		949	36.6		13.4		938	40.3		13.8		1887
	40.6	47.3	11.4	17.6		33.4	39.9	11.1	16.2		37.7	42.9	11.9	16.0	
Urban	35.4		12.2		1496	34.4		10.1		1412	34.9		11.2		2908
	32.5	38.4	10.3	14.3		31.3	37.6	8.1	12.5		32.6	37.3	9.8	12.7	
DPRK	38.6		12.9		2445	35.2		11.4		2350	36.99		12.2		4795
	36.4	40.9	11.3	14.8		33.1	37.4	9.9	13.1		35.4	38.6	11.0	13.4	

* Confidence intervals

Table 40 Mean height-for-age Z-score, by gender and province

Mean height-for-age Z-score for children aged less than 72 months, by gender and province, DPRK Nutrition Assessment 2004

Province	Height-for-age Z-score											
	Boys				Girls				Total			
	n	Mean [95% CI t]		SE*	n	Mean [95% CI t]		SE*	n	Mean [95% CI t]		SE*
Pyongyang	306	-1.19		0.07	294	-1.18		0.07	600	-1.18		0.05
		-1.32	-1.06			-1.32	-1.03			-1.29	-1.08	
South Phyongan	303	-1.42		0.09	293	-1.20		0.06	596	-1.31		0.06
		-1.59	-1.25			-1.31	-1.09			-1.43	-1.20	
North Phyongan	310	-1.59		0.11	290	-1.64		0.12	600	-1.62		0.10
		-1.81	-1.37			-1.87	-1.41			-1.82	-1.41	
South Hwanghae	300	-1.63		0.06	300	-1.41		0.07	600	-1.52		0.05
		-1.74	-1.51			-1.54	-1.27			-1.62	-1.42	
North Hwanghae	306	-1.70		0.08	294	-1.35		0.09	600	-1.53		0.07
		-1.85	-1.55			-1.52	-1.17			-1.68	-1.39	
South Hamgyong	305	-1.71		0.07	295	-1.68		0.07	600	-1.69		0.05
		-1.85	-1.57			-1.81	-1.54			-1.80	-1.59	
North Hamgyong	309	-1.68		0.08	290	-1.60		0.07	599	-1.64		0.05
		-1.85	-1.52			-1.73	-1.46			-1.74	-1.55	
Ryanggang	306	-1.82		0.05	294	-1.73		0.06	600	-1.78		0.04
		-1.92	-1.72			-1.86	-1.61			-1.86	-1.69	
Rural	949	-1.70		0.04	938	-1.48		0.04	1,887	-1.59		0.04
		-1.78	-1.61			-1.56	-1.39			-1.66	-1.51	
Urban	1,496	-1.46		0.04	1,412	-1.41		0.04	2,908	-1.43		0.03
		-1.54	-1.38			-1.49	-1.32			-1.50	-1.37	
DPRK	2,445	-1.55		0.03	2,350	-1.43		-1.43	4,795	-1.49		0.02
		-1.61	-1.49			-1.49	-1.38			-1.54	-1.45	*

* Confidence interval

Table 41 Prevalence of wasting and severe wasting by gender and province

Prevalence of wasting (weight-for-height Z-score < -2) and severe wasting (weight-for-height Z-score < -3) for children aged less than 72 months, by gender and province, DPRK Nutrition Assessment 2004

Province	Weight-for-height Z-score													
	Boys					Girls					Total				
	Percent <- 2 Z [95% CI*]		Percent <- 3 Z [95% CI*]		n	Percent <- 2 Z [95% CI*]		Percent <- 3 Z [95% CI*]		n	Percent <- 2 Z [95% CI*]		Percent <- 3 Z [95% CI*]		n
Pyongyang	2.4		0.2		306	3.2		0.9		294	2.8		0.6		600
	1.3	4.7	0.0	1.6		1.4	7.4	0.2	4.0		1.6	4.9	0.2	1.9	
South Phyongan	5.1		0.4		303	4.8		2.1		293	4.9		1.3		596
	2.9	8.7	0.1	2.8		2.7	8.2	1.1	4.3		3.2	7.6	0.6	2.7	
North Phyongan	5.9		2.5		310	6.1		1.1		290	6.0		1.8		600
	3.6	9.4	1.2	5.1		2.9	12.5	0.4	2.9		3.5	10.1	0.9	3.6	
South Hwanghae	9.3		3.6		300	5.8		1.8		300	7.6		2.7		600
	5.9	14.3	1.6	7.7		3.4	9.7	0.7	4.5		5.1	11.1	1.4	5.0	
North Hwanghae	7.0		2.4		306	8.8		1.6		294	7.9		2.0		600
	4.6	10.5	1.2	4.6		5.9	13.1	0.6	4.2		5.9	10.4	1.2	3.4	
South Hamgyong	11.0		3.1		305	10.6		1.5		295	10.8		2.3		600
	7.6	15.6	1.8	5.3		7.0	15.9	0.6	3.5		8.6	13.5	1.6	3.4	
North Hamgyong	8.8		2.3		309	11.3		2.7		290	10.0		2.5		599
	5.9	13.1	1.2	4.2		8.2	15.5	1.4	5.0		7.9	12.7	1.6	3.9	
Ryanggang	8.8		2.8		306	9.3		2.4		294	9.1		2.6		600
	5.1	14.9	1.3	6.3		5.1	16.2	0.9	6.4		5.7	14.1	1.1	6.0	
Rural	7.9		1.9		949	6.2		1.6		938	7.1		1.8		1887
	6.2	10.0	1.2	3.1		4.5	8.5	0.9	2.7		5.7	8.7	1.2	2.6	
Urban	6.4		2.0		1496	7.6		1.7		1412	7.0		1.9		2908
	5.0	8.0	1.4	2.8		6.1	9.6	1.2	2.6		5.9	8.2	1.4	2.4	
DPRK	7.0		1.9		2445	7.1		1.7		2350	7.0		1.8		4795
	5.9	8.2	1.5	2.6		5.9	8.5	1.2	2.3		6.2	8.0	1.5	2.3	

* Confidence interval

Table 42 Mean weight-for-height Z-score, by gender and province

Mean weight-for-height Z-score for children aged less than 72 months, by gender and province, DPRK Nutrition Assessment 2004

Province	Weight-for-Height Z-score											
	Boys				Girls				Total			
	n	Mean [95% CI t]		SE*	n	Mean [95% CI t]		SE*	n	Mean [95% CI t]		SE*
Pyongyang	306	-0.57		0.06	294	-0.36		0.06	600	-0.47		0.04
		-0.68	-0.45			-0.49	-0.23			-0.55	-0.38	
South Phyongan	303	-0.41		0.09	293	-0.32		0.06	596	-0.37		0.07
		-0.60	-0.23			-0.44	-0.21			-0.51	-0.23	
North Phyongan	310	-0.35		0.08	290	-0.34		0.11	600	-0.34		0.09
		-0.50	-0.19			-0.57	-0.11			-0.52	-0.16	
South Hwanghae	300	-0.66		0.07	300	-0.32		0.06	600	-0.50		0.05
		-0.80	-0.52			-0.44	-0.21			-0.59	-0.40	
North Hwanghae	306	-0.49		0.07	294	-0.41		0.06	600	-0.45		0.04
		-0.62	-0.35			-0.52	-0.30			-0.53	-0.36	
South Hamgyong	305	-0.66		0.07	295	-0.57		0.10	600	-0.62		0.07
		-0.80	-0.53			-0.76	-0.38			-0.75	-0.49	
North Hamgyong	309	-0.49		0.08	290	-0.59		0.07	599	-0.54		0.06
		-0.65	-0.33			-0.73	-0.44			-0.66	-0.41	
Ryanggang	306	-0.69		0.07	294	-0.54		0.09	600	-0.62		0.06
		-0.83	-0.55			-0.72	-0.37			-0.74	-0.50	
Rural	949	-0.57		-0.57	938	-0.43		-0.43	1,887	-0.50		-0.50
		-0.65	-0.48			-0.52	-0.34			-0.57	-0.43	
Urban	1,496	-0.50		-0.50	1,412	-0.40		-0.40	2,908	-0.45		-0.45
		-0.57	-0.42			-0.48	-0.33			-0.51	-0.39	
DPRK	2,445	-0.52		0.03	2,350	-0.42		0.03	4,795	-0.47		0.02
		-0.58	-0.47			-0.47	-0.36			-0.52	-0.42	

* Standard deviation

t Confidence intervals

Table 43 Prevalence of underweight & severe underweight by gender & 6 month age groups

Prevalence of underweight (weight-for-age Z-score < -2) and severe underweight (weight-for-age Z-score <-3) for children aged less than 60 months, by gender and 6 month age groups, DPRK Nutrition Assessment 2004

Age in months	Weight-for-age Z-score														
	Boys					Girls					Total				
	Percent <-2 Z [95% CI*]		Percent <-3 Z [95% CI*]		n	Percent <-2 Z [95% CI*]		Percent <-3 Z [95% CI*]		n	Percent <-2 Z [95% CI*]		Percent <-3 Z [95% CI*]		n
0—5	10.1		3.6		163	12.3		5.8		164	11.2		4.7		327
	6.1	16.4	1.5	8.3		7.6	19.3	2.5	12.5		7.9	15.8	2.6	8.3	
6—11	15.8		4.9		362	15.2		5.8		349	15.5		5.3		711
	12.1	20.2	3.1	7.6		11.5	19.8	3.7	9.0		12.7	18.8	3.9	7.3	
12—17	20.9		4.3		276	21.0		7.9		291	20.9		6.0		567
	15.9	26.9	2.4	7.4		16.2	26.8	5.2	11.8		17.5	24.8	4.3	8.4	
18-23	22.9		6.5		248	17.2		6.0		256	20.0		6.2		504
	17.9	29.0	4.0	10.5		12.2	23.8	3.4	10.1		16.0	24.7	4.3	9.0	
24-29	28.2		9.7		316	22.8		7.8		294	25.6		8.8		610
	22.9	34.1	6.7	13.7		17.8	28.6	5.0	11.9		21.8	29.8	6.6	11.5	
30-35	32.2		13.0		188	29.4		10.1		193	30.7		11.5		381
	26.1	39.0	9.0	18.3		23.2	36.4	6.4	15.6		26.2	35.7	8.5	15.3	
36-41	26.9		9.2		204	25.9		9.0		199	26.4		9.1		403
	20.7	34.2	5.5	15.2		19.9	33.0	5.6	14.1		21.5	32.1	6.2	13.2	
42-47	25.9		10.1		153	27.1		10.4		146	26.5		10.2		299
	18.9	34.4	5.9	16.7		20.0	35.5	6.5	16.2		21.2	32.6	7.2	14.4	
48-53	24.4		10.0		163	28.6		11.7		161	26.5		10.8		324
	17.8	32.4	5.8	16.7		21.4	37.1	7.4	17.9		21.3	32.4	7.4	15.5	
54-59	27.1		6.0		124	26.0		12.2		92	26.6		8.6		216
	19.6	36.1	2.8	12.5		17.5	36.9	6.7	21.1		20.6	33.7	5.2	14.1	
60-65	27.5		9.2		154	18.1		4.8		126	23.2		7.2		280
	20.1	36.4	5.2	15.9		11.7	27.1	2.2	10.4		18.0	29.3	4.4	11.4	
66-71	19.1		5.3		94	25.6		7.5		79	22.2		6.4		173
	12.1	28.9	2.1	13.0		16.8	37.1	3.4	15.7		15.9	30.1	3.5	11.2	
Total 0-71	24.2		8.0		2445	22.6		8.2		2350	23.43		8.1		4795
	21.8	26.8	6.5	9.8		20.2	25.2	7.0	9.7		21.5	25.5	7.0	9.4	

Table 44 Prevalence of stunting & severe stunting by gender & 6 month age groups

Prevalence of stunting (height-for-age Z-score < -2) and severe stunting (height-for-age Z-score <-3) for children aged less than 60 months, by gender and 6 month age groups, DPRK Nutrition Assessment 2004

Age in months	Height-for-age Z-score														
	Boys					Girls					Total				
	Percent <-2 Z [95% CI*]		Percent <-3 Z [95% CI*]		n	Percent <-2 Z [95% CI*]		Percent <-3 Z [95% CI*]		n	Percent <-2 Z [95% CI*]		Percent <-3 Z [95% CI*]		n
0--5	18.8		5.5		163	18.3		6.4		164	18.6		6.0		327
	12.8	26.8	2.6	11.3		12.9	25.4	3.6	11.3		14.6	23.3	3.8	9.3	
6--11	19.0		4.5		362	20.6		6.5		349	19.8		5.4		711
	14.9	23.9	2.7	7.3		16.3	25.7	4.1	10.0		16.8	23.2	4.0	7.4	
12--17	29.4		8.0		276	21.5		3.7		291	25.5		5.9		567
	24.3	35.1	5.2	12.1		16.8	27.0	2.0	6.8		22.3	29.0	4.2	8.2	
18-23	31.5		9.7		248	26.3		10.7		256	28.8		10.2		504
	25.5	38.3	6.1	15.0		21.1	32.2	7.4	15.3		24.6	33.5	7.8	13.3	
24-29	35.6		12.4		316	27.0		6.3		294	31.5		9.5		610
	29.6	42.1	9.1	16.6		21.6	33.1	3.9	10.1		27.4	35.9	7.3	12.2	
30-35	42.4		14.3		188	38.7		12.2		193	40.5		13.2		381
	35.6	49.6	9.9	20.2		31.9	45.9	8.1	18.0		35.1	46.1	10.1	17.2	
36-41	46.6		18.9		204	45.6		12.3		199	46.1		15.7		403
	39.4	54.0	13.9	25.3		38.7	52.7	8.1	18.2		40.5	51.9	12.3	19.8	
42-47	52.3		17.8		153	44.0		16.9		146	48.2		17.4		299
	43.2	61.2	12.1	25.6		35.6	52.7	11.5	24.2		41.6	54.8	13.3	22.4	
48-53	49.4		16.8		163	46.5		18.4		161	48.0		17.6		324
	40.8	58.1	11.9	23.2		38.2	55.1	12.4	26.3		42.0	54.1	13.9	22.0	
54-59	53.2		17.9		124	58.2		22.7		92	55.3		20.0		216
	42.8	63.3	11.1	27.6		47.3	68.4	15.0	32.9		47.8	62.6	14.4	27.1	
60-65	49.1		15.4		154	45.0		13.4		126	47.2		14.5		280
	39.9	58.4	10.5	22.0		35.6	54.7	8.3	21.0		40.4	54.1	10.7	19.4	
66-71	41.3		15.0		94	52.7		20.8		79	46.7		17.7		173
	31.5	51.9	9.1	23.6		41.8	63.4	13.7	30.1		38.7	54.8	12.7	24.1	
Total 0-71	38.6		12.9		2445	35.2		11.4		2350	37.0		12.2		4795

Table 45 Prevalence of wasting & severe wasting, by gender & 6 month age groups

Prevalence of wasting (weight-for-height Z-score < -2) and severe wasting (weight-for-height Z-score <-3) for children aged less than 60 months, by gender and 6 month age groups, DPRK Nutrition Assessment 2004

Age in months	Weight-for-Height Z-score														
	Boys					Girls					Total				
	Percent <-2 Z [95% CI*]		Percent <-3 Z [95% CI*]		n	Percent <-2 Z [95% CI*]		Percent <-3 Z [95% CI*]		n	Percent <-2 Z [95% CI*]		Percent <-3 Z [95% CI*]		n
0—5	4.1		0.6		163	3.2		1.7		164	3.6		1.2		327
	1.9	8.5	0.1	4.4		1.2	7.7	0.4	6.6		2.1	6.3	0.4	3.6	
6—11	8.0		1.8		362	6.1		1.6		349	7.1		1.7		711
	5.5	11.4	0.8	3.9		3.7	10.0	0.6	4.4		5.1	9.7	0.9	3.1	
12—17	7.5		1.1		276	11.0		3.2		291	9.2		2.1		567
	4.8	11.7	0.3	3.3		7.7	15.4	1.5	6.6		7.1	11.9	1.2	3.9	
18-23	8.6		2.3		248	7.5		3.6		256	8.1		3.0		504
	5.8	12.7	1.1	4.9		4.4	12.5	1.9	7.0		5.8	11.2	1.7	5.3	
24-29	6.4		2.5		316	7.5		1.5		294	6.9		2.0		610
	4.2	9.6	1.3	4.6		4.8	11.4	0.6	4.1		5.1	9.4	1.2	3.5	
30-35	8.2		2.9		188	8.2		2.1		193	8.2		2.5		381
	4.9	13.2	1.3	6.6		5.1	12.7	0.8	5.5		5.9	11.2	1.4	4.5	
36-41	8.9		1.7		204	7.0		1.2		199	8.0		1.4		403
	5.4	14.3	0.6	5.1		4.2	11.4	0.3	4.8		5.6	11.3	0.6	3.4	
42-47	6.5		2.9		153	7.8		2.2		146	7.1		2.5		299
	3.4	12.1	1.1	7.2		4.5	13.2	0.8	6.1		4.5	11.0	1.3	5.0	
48-53	6.2		1.4		163	7.4		1.4		161	6.8		1.4		324
	3.5	10.9	0.3	5.7		3.8	13.9	0.3	5.6		4.2	10.8	0.5	3.7	
54-59	6.2		1.7		124	3.9		0.0		92	5.2		1.0		216
	2.9	12.6	0.4	6.5		1.4	10.7	0.0	0.0		2.8	9.5	0.2	3.8	
60-65	5.6		1.7		154	3.9		0.2		126	4.8		1.0		280
	2.4	12.3	0.5	5.8		1.6	9.3	0.0	1.6		2.6	8.8	0.3	3.3	
66-71	4.3		1.6		94	8.1		0.0		79	6.1		0.8		173
	1.7	10.6	0.3	7.8		3.9	16.2	0.0	0.0		3.2	11.4	0.2	4.2	
Total 0-71	7.0		1.9		2445	7.1		1.7		2350	7.0		1.8		4795
	5.9	8.2	1.5	2.6		5.9	8.5	1.2	2.3		6.2	8.0	1.5	2.3	

Table 46 Factors associated with child malnutrition

Association between underweight (weight-for-age Z-score < -2), stunting (height-for-age Z-score <-2) and wasting (weight-for-height Z-score <-2) for children aged less than 72 months according to maternal and household food intake characteristics, DPRK Nutrition Assessment 2004

Background characteristics	Weight-for-age Z-score					Height-for-age Z-score					Weight-for-height Z-score				
	Percent <-2 Z		Mean		n	Percent <-2 Z		Mean		n	Percent <-2 Z		Mean		n
	[95% CI*]		[95% CI*]			[95% CI*]		[95% CI*]			[95% CI*]		[95% CI*]		
Maternal nutritional status															
Normal MUAC	15.2		-0.95		1430	21.7		-1.05		1430	6.5		-0.33		1430
	13.0	*17.7*	*-1.02*	*-0.89*		*19.3*	*24.4*	*-1.13*	*-0.97*		*5.2*	*8.2*	*-0.40*	*-0.26*	
Low MUAC (<22.5 cm)	21.8		-1.18		679	26.5		-1.26		679	9.0		-0.44		679
	18.2	*25.9*	*-1.30*	*-1.07*		*22.9*	*30.5*	*-1.37*	*-1.15*		*7.0*	*11.6*	*-0.54*	*-0.34*	
Sources of staple food															
More than 1 with WFP	18.6		-1.00		1204	27.1		-1.15		1204	6.7		-0.22		1204
	16.1	*21.4*	*-1.09*	*-0.91*		*24.1*	*30.3*	*-1.24*	*-1.06*		*5.2*	*8.5*	*-0.30*	*-0.14*	
More than 1 without WFP	23.4		-1.33		3591	36.6		-1.50		3591	7.1		-0.52		3591
	21.3	*25.6*	*-1.39*	*-1.28*		*34.9*	*38.3*	*-1.56*	*-1.45*		*6.2*	*8.2*	*-0.57*	*-0.47*	
Household food frequency															
Rice intake															
Lowest intake	18.0		-1.29		743	41.7		-1.64		743	4.9		-0.33		743
	14.6	*22.1*	*-1.40*	*-1.18*		*37.1*	*46.4*	*-1.77*	*-1.52*		*3.5*	*6.8*	*-0.42*	*-0.23*	
Medium intake	24.0		-1.30		2303	34.9		-1.43		2303	7.4		-0.50		2303
	21.2	*27.1*	*-1.37*	*-1.22*		*32.5*	*37.4*	*-1.50*	*-1.37*		*6.1*	*8.8*	*-0.56*	*-0.43*	
Highest intake	21.6		-1.19		1749	31.5		-1.34		1749	7.3		-0.44		1749
	19.3	*24.1*	*-1.27*	*-1.12*		*29.2*	*33.8*	*-1.41*	*-1.27*		*6.0*	*8.8*	*-0.51*	*-0.37*	
Poultry and meat															
Lowest intake	22.1		-1.28		1591	37.4		-1.53		1591	6.6		-0.40		1591
	19.3	*25.1*	*-1.35*	*-1.20*		*34.4*	*40.5*	*-1.61*	*-1.45*		*5.2*	*8.3*	*-0.47*	*-0.33*	
Medium intake	24.1		-1.28		1203	33.9		-1.38		1203	7.6		-0.51		1203
	21.3	*27.2*	*-1.35*	*-1.20*		*31.3*	*36.6*	*-1.45*	*-1.31*		*6.1*	*9.4*	*-0.59*	*-0.44*	
Highest intake	21.2		-1.22		2001	32.5		-1.37		2001	7.0		-0.44		2001
	18.6	*23.9*	*-1.30*	*-1.15*		*30.0*	*35.0*	*-1.44*	*-1.30*		*5.8*	*8.5*	*-0.51*	*-0.37*	
Fish															
Lowest intake	21.6		-1.22		1685	36.4		-1.48		1685	5.5		-0.36		1685
	18.8	*24.7*	*-1.31*	*-1.13*		*33.3*	*39.7*	*-1.57*	*-1.39*		*4.3*	*7.1*	*-0.43*	*-0.29*	
Medium intake	24.4		-1.31		1249	35.6		-1.43		1249	7.7		-0.52		1249
	21.7	*27.3*	*-1.39*	*-1.24*		*32.5*	*38.8*	*-1.51*	*-1.35*		*6.1*	*9.6*	*-0.58*	*-0.45*	
Highest intake	21.3		-1.24		1861	32.0		-1.37		1861	7.7		-0.47		1861
	18.4	*24.4*	*-1.31*	*-1.18*		*29.7*	*34.4*	*-1.45*	*-1.30*		*6.5*	*9.3*	*-0.54*	*-0.41*	
Green leafy vegetables															
Lowest intake	27.9		-1.36		652	38.3		-1.54		652	8.1		-0.51		652
	23.1	*33.3*	*-1.50*	*-1.23*		*34.4*	*42.3*	*-1.66*	*-1.43*		*5.7*	*11.5*	*-0.63*	*-0.39*	
Medium intake	21.6		-1.24		4143	33.9		-1.41		4143	6.9		-0.44		4143
	19.7	*23.6*	*-1.29*	*-1.19*		*32.3*	*35.6*	*-1.46*	*-1.36*		*6.0*	*7.9*	*-0.49*	*-0.39*	
Highest intake	0.0		0.00		0	0.0		0.00		0	0.0		0.00		0
	0.0	*0.0*	*0.00*	*0.00*		*0.0*	*0.0*	*0.00*	*0.00*		*0.0*	*0.0*	*0.00*	*0.00*	
Red/yellow vegetables															
Lowest intake	23.6		-1.30		1310	36.3		-1.47		1310	7.6		-0.48		1310
	20.5	*27.0*	*-1.39*	*-1.22*		*33.3*	*39.4*	*-1.56*	*-1.39*		*6.0*	*9.5*	*-0.55*	*-0.40*	

Background characteristics	Weight-for-age Z-score					Height-for-age Z-score					Weight-for-height Z-score				
	Percent <-2 Z		Mean		n	Percent <-2 Z		Mean		n	Percent <-2 Z		Mean		n
	[95% CI*]		[95% CI*]			[95% CI*]		[95% CI*]			[95% CI*]		[95% CI*]		
Medium intake	21.5		-1.23		2083	33.8		-1.41		2083	6.2		-0.43		2083
	19.2	*24.0*	*-1.30*	*-1.17*		*31.4*	*36.4*	*-1.48*	*-1.33*		*5.1*	*7.4*	*-0.49*	*-0.37*	
Highest intake	22.2		-1.24		1402	33.5		-1.40		1402	7.7		-0.46		1402
	19.7	*24.9*	*-1.32*	*-1.17*		*31.2*	*35.9*	*-1.46*	*-1.33*		*6.3*	*9.4*	*-0.53*	*-0.38*	
Non coloured vegetable															
Lowest intake	25.8		-1.33		184	34.8		-1.48		184	9.6		-0.52		184
	19.4	*33.4*	*-1.53*	*-1.13*		*27.6*	*42.9*	*-1.69*	*-1.26*		*6.4*	*14.3*	*-0.71*	*-0.34*	
Medium intake	22.1		-1.25		4611	34.4		-1.42		4611	6.9		-0.45		4611
	20.2	*24.1*	*-1.30*	*-1.20*		*32.8*	*36.0*	*-1.47*	*-1.37*		*6.0*	*7.9*	*-0.49*	*-0.40*	
Highest intake	0.0		0.00		0	0.0		0.00		0	0.0		0.00		0
	0.0	*0.0*	*0.00*	*0.00*		*0.0*	*0.0*	*0.00*	*0.00*		*0.0*	*0.0*	*0.00*	*0.00*	
Fruits															
Lowest intake	22.3		-1.25		1684	35.5		-1.47		1684	6.8		-0.42		1684
	19.6	*25.3*	*-1.34*	*-1.17*		*32.7*	*38.4*	*-1.55*	*-1.40*		*5.6*	*8.2*	*-0.49*	*-0.35*	
Medium intake	24.2		-1.29		1320	34.2		-1.42		1320	8.1		-0.50		1320
	21.3	*27.3*	*-1.36*	*-1.22*		*31.6*	*36.9*	*-1.49*	*-1.34*		*6.5*	*10.0*	*-0.57*	*-0.43*	
Highest intake	20.9		-1.23		1791	33.6		-1.38		1791	6.5		-0.44		1791
	18.6	*23.4*	*-1.29*	*-1.18*		*31.3*	*36.0*	*-1.44*	*-1.32*		*5.4*	*7.8*	*-0.50*	*-0.38*	
Oils and fats															
Lowest intake	23.0		-1.32		1414	38.2		-1.52		1414	7.5		-0.48		1414
	20.4	*26.0*	*-1.41*	*-1.23*		*35.2*	*41.3*	*-1.60*	*-1.43*		*6.0*	*9.2*	*-0.55*	*-0.40*	
Medium intake	27.8		-1.42		464	37.4		-1.53		464	8.7		-0.56		464
	24.1	*31.7*	*-1.51*	*-1.33*		*33.0*	*42.0*	*-1.63*	*-1.43*		*6.5*	*11.6*	*-0.66*	*-0.47*	
Highest intake	21.1		-1.20		2917	32.4		-1.37		2917	6.6		-0.42		2917
	18.9	*23.6*	*-1.26*	*-1.14*		*30.5*	*34.3*	*-1.43*	*-1.31*		*5.6*	*7.8*	*-0.48*	*-0.37*	
Fortified foods															
Lowest intake	0.0		0.00		0	0.0		0.00		0	0.0		0.00		0
	0.0	*0.0*	*0.00*	*0.00*		*0.0*	*0.0*	*0.00*	*0.00*		*0.0*	*0.0*	*0.00*	*0.00*	
Medium intake	23.4		-1.33		3589	36.6		-1.50		3589	7.1		-0.52		3589
	21.3	*25.6*	*-1.39*	*-1.28*		*34.9*	*38.3*	*-1.56*	*-1.45*		*6.2*	*8.2*	*-0.57*	*-0.47*	
Highest intake	18.5		-1.00		1206	27.1		-1.15		1206	6.6		-0.22		1206
	16.0	*21.3*	*-1.09*	*-0.91*		*24.1*	*30.4*	*-1.24*	*-1.06*		*5.1*	*8.5*	*-0.30*	*-0.13*	

The following variables were examined and were not associated with childhood malnutrition: maternal education; usual frequency of household food consumption for other cereals, potatoes, beans, eggs and dairy products.

Appendix D- Questionnaires

NUTRITION ASSESSMENT 2004
IN DPR KOREA

THIS ASSESSMENT WILL BE CARRIED OUT BY THE GOVERNMENT OF DPRK IN COLLABORATION WITH UNICEF AND WFP

1. HOUSEHOLD QUESTIONNAIRE

1.1 HOUSEHOLD INFORMATION MODULE

1. CLUSTER NUMBER: ..... ___ ___ ___ Province/city name:_____	2. HOUSEHOLD NUMBER:..... ___ ___ Dong/Ri name: _____
3. DAY/MONTH/YEAR OF INTERVIEW: ___ ___ / ___ ___ / ___ ___	4. INTERVIEWER NUMBER: ..... ___ ___
5. DATA EDITOR NUMBER ..... ___ ___	6. DATA ENTRY CLERK NUMBER ..... ___ ___

7. NAME OF HEAD OF HOUSEHOLD: _____

8.NUMBER OF PERSON IN THE HOUSEHOLD___ ___

9.NUMBER OF CHILDREN UNDER 6 IN THE HOUSEHOLD ___

10.AGE OF MOTHER OF THE INDEX (YOUNGEST) CHILD: ___ ___

11.WHAT IS THE HIGHEST LEVEL OF SCHOOL ATTENDED BY MOTHER?

- No education 1
- Primary - incomplete 2
- Primary - completed 3
- Secondary - incomplete 4
- Secondary - completed 5
- Higher 6
- Don't know 9

IS THE INDEX CHILD UNDER 2 YES 1 / NO 2

(If yes you have to check Maternal and Child Questionnaire and Maternal Anthropometry/Haemoglobin Module in the cluster control sheet)

12.RESULT OF HH INTERVIEW:

- Completed 1
- Refused 2
- Other (*specify*) 7

Interviewer/supervisor notes*: Use this space to record notes about the interview with this household, such as call-back times, incomplete individual interview forms, number of attempts to re-visit, etc.*

1.2 SALT IODIZATION MODULE (COMPLETE WHEN SELECTING HOUSEHOLDS)

1. WE WOULD LIKE TO CHECK WHETHER THE SALT USED IN YOUR HOUSEHOLD IS IODIZED. MAY I SEE A SAMPLE OF THE SALT USED TO COOK THE MAIN MEAL EATEN BY MEMBERS OF YOUR HOUSEHOLD LAST NIGHT? *Once you have examined the salt, circle the number that corresponds to test outcome.*	Not iodized 0 PPM (no colour).....1 Less than 15 PPM (weak colour).....2 15 PPM or more (strong colour).....3 No salt in home .....8 Salt not tested 9

GO TO 1.3 WATER AND SANITATION MODULE ⇨

Cluster no. __ __ __ Household no. __ __ __

1.3 WATER AND SANITATION MODULE

This module is to be administered once for every household.
Record only one response for each question.
If more than one response is given, record the most usual source or facility.

1. WHAT IS THE MAIN SOURCE OF DRINKING WATER FOR MEMBERS OF YOUR HOUSEHOLD?	Piped into dwelling.....01 Public tap.....02 Tubewell/borehole with pump.....03 Protected dug well.....04 Protected spring.....05 Unprotected dug well.....06 Unprotected spring.....07 Pond, river or stream.....08 Tanker-truck, vendor.....09 Other (*specify*) _____ 10 No answer or Don't know.....99	
2. HOW LONG DOES IT TAKE TO GO THERE, GET WATER, AND COME BACK?	No. of minutes..... __ __ __ Water on premises.....888 Don't know.....999	
3. WHAT KIND OF TOILET FACILITY DOES YOUR HOUSEHOLD USE?	Flush to sewage system or septic tank.....1 Pour flush latrine (water seal type).....2 Traditional pit latrine.....3 Open pit.....4 Bucket.....5 Other.....6 (*specify*) _____ No facilities or bush or field.....8	8⇨Q.5
4. IS THIS FACILITY LOCATED WITHIN YOUR DWELLING, OR COMPOUND?	Yes, in dwelling/compound.....1 No, outside dwelling/compound.....2 Don't know.....9	
5. WHAT HAPPENS WITH THE STOOLS OF YOUNG CHILDREN (0-3 YEARS) WHEN THEY DO NOT USE THE LATRINE OR TOILET FACILITY?	Children always use toilet or latrine.....1 Thrown into toilet or latrine.....2 Thrown outside the yard.....3 Buried in the yard.....4 Not disposed of or left on the ground.....5 Other (*specify*) _____ 6 No young children in household.....8	

GO TO 1.4 HOUSEHOLD FOOD AVAILABILITY MODULE ⇨

Cluster no. __ __ __ Household no. __ __

1.4 HOUSEHOLD FOOD AVAILABILITY MODULE (**Ask** mothers of children less than 6 years)

Ask the mother "I" would like to talk with you now about the foods that have been consumed on average in your house over the last 6 months. Can you tell me how frequently different groups of foods are consumed in your household per day or per week or per month?

LINE	FOOD GROUP	HOW OFTEN ON AVERAGE OVER THE LAST 6 MONTHS DID YOUR HOUSEHOLD CONSUME THE FOLLOWING PRODUCTS?		
		Day	Week	Month
		1	2	3
1	RICE AND RICE PRODUCTS	.____.	.____.	.____.
2	OTHER CEREAL OR GRAINS (*For example, maize, wheat, barley, or millet*)	.____.	.____.	.____.
3	POTATOES AND SWEET POTATOES	.____.	.____.	.____.
4	BEANS OR BEAN PRODUCTS (*For example, white or green beans, peas, soy beans, soy milk, bean curd, lentils*)	.____.	.____.	.____.
5	POULTRY AND MEAT: (*For example, chicken, beef, pork. rabbit*)	.____.	.____.	.____.
6	FISH (*For example, any fish or aquatic products*)	.____.	.____.	.____.
7	GREEN LEAFY VEGETABLES (*For example, spinach, mustard green, edible grass*)	.____.	.____.	.____.
8	RED/YELLOW COLOURED VEGETABLES (*For example, pumpkin, carrot, squash*)	.____.	.____.	.____.
9	NON-COLOURED VEGETABLES (*For example, onion, garlic, radish, cabbage)*	.____.	.____.	.____.
10	FRUIT (*For example, apple, pears, peaches, plums, persimmon, grapes*)	.____.	.____.	.____.
11	EGGS	.____.	.____.	.____.
12	DAIRY PRODUCTS (*EXCEPT butter*) (*For example, milk, cheese, yoghurt*)	.____.	.____.	.____.
11	OILS OR FAT (*For example, vegetable oil, butter, pork fat*)	.____.	.____.	.____.
12	FORTIFIED FOODS (*For example, CSB, CSM, Noodles from PDC*)	.____.	.____.	.____.

5. OVER THE LAST 6 MONTHS HAS YOUR FAMILY GATHERED ANY OF THE FOLLOWING WILD FOODS (MORE THAN ONE ANSWER IS POSSIBLE)	Y	N	DK
5-1 Wild grass	1	2	9
5-2 Roots	1	2	9
5-3 Mushroom	1	2	9
5-4 Herbs	1	2	9
5-5 Nuts	1	2	9
5-6 Other	1	2	9
Specify (_____)			

6A. WHAT ARE THE SOURCES OF THE MAIN STAPLE FOOD OR STARCHY FOODS, (*such as rice, maize, or potatoes*,) CONSUMED IN YOUR HOME OVER THE LAST 6 MONTHS? (R*ead each item below and record response before proceeding to the next item*) 6-1 PDC Ration 6-2 WFP Rations 6-3 Farmers ration 6-4 Own production 6-5 Foraging 6-6 Kin support 6-7 Markets 6-8 Other source	**Y N DK** 6-1 PDC Ration ..... 1 2 9 6-2 WFP Rations ..... 1 2 9 6-3 Farmers ration ..... 1 2 9 6-4 Own production..... 1 2 9 6-5 Foraging ..... 1 2 9 6-6 Kin support..... 1 2 9 6-7 Markets..... 1 2 9 6-8 Other source ..... 1 2 9 Specify (.....)	
7A. WHAT ARE THE SOURCES OF BEANS & BEAN PRODUCTS, (*such as green beans, soy beans, peas, bean curd & other legumes*), CONSUMED IN YOUR HOME OVER THE LAST 6 MONTHS? (R*ead each item and record response before going to next item*) 7-1 PDC Ration 7-2 WFP Rations 7-3 Farmers ration 7-4 Own production 7-5 Foraging 7-6 Kin support 7-7 Markets 7-8 State shop 7-9 Other source	**Y N DK** 7-1 PDC Ration ..... 1 2 9 7-2 WFP Rations ..... 1 2 9 7-3 Farmers ration ..... 1 2 9 7-4 Own production ..... 1 2 9 7-5 Foraging ..... 1 2 9 7-6 Kin support..... 1 2 9 7-7 Markets..... 1 2 9 7-8 State shop ..... 1 2 9 7-9 Other source ..... 1 2 9 Specify (.....)	
8A. WHAT ARE THE SOURCES OF THE FRUITS & VEGETABLES CONSUMED IN YOUR HOME OVER THE LAST 6 MONTHS? (R*ead each item and record response before going to next item*) 8-1 PDC Ration 8-2 WFP Rations 8-3 Farmers ration 8-4 Own production 8-5 Foraging 8-6 Kin support 8-7 Markets 8-8 State shop 8-9 Other source	**Y N DK** 8-1 PDC Ration ..... 1 2 9 8-2 WFP Rations ..... 1 2 9 8-3 Farmers ration ..... 1 2 9 8-4 Own production ..... 1 2 9 8-5 Foraging ..... 1 2 9 8-6 Kin support..... 1 2 9 8-7 Markets..... 1 2 9 8-8 State shop ..... 1 2 9 8-9 Other source ..... 1 2 9 Specify (_____)	

IF THE INDEX CHILD IS UNDER 2 ⇨ GO TO MATERNAL AND NEWBORN HEALTH QUESTIONNARE

IF NO ⇨ STOP INTERVIEW AND GO TO CHILD ANTHROPOMETRY MODULE

2 MATERNAL AND NEWBORN HEALTH QUESTIONNAIRE

Cluster no. __ __ __ Household no. __ __

2.1 MATERNAL AND NEWBORN HEALTH MODULE		
Only those mother with child aged less than 2		
1. IN THE FIRST TWO MONTHS AFTER YOUR LAST BIRTH, DID YOU RECEIVE A VITAMIN A DOSE LIKE THIS? *Show 200,000 IU capsule*	Yes ..... 1 No ..... 2 Don't know 9	
2. HOW MANY TIMES DID YOU SEE ANY HEALTH OFFICERS/WORKER FOR ANTENATAL CARE FOR THE LAST PREGNANCY?	Did not see anyone ..... 0 1-3 ..... 1 4-6 ..... 2 7-9 ..... 3 Don't know 9	
3. WHO ASSISTED WITH THE DELIVERY OF YOUR LAST CHILD (*or name*)? ANYONE ELSE?	Doctor ..... 1 Nurse/midwife ..... 2 Relative/friend ..... 3 Other ..... 4 (Specify)_____ No one 0	
4. WAS (*name*) WEIGHED AT BIRTH?	Yes ..... 1 No ..... 2 Don't know 9	2,9⇨ Go Q. 6
5A. HOW MUCH DID (*name*) WEIGH? *Record weight from health card, if available, otherwise ask the mother if she can remember..* *5B.*WHAT WAS THE SOURCE OF THE BIRTH WEIGHT INFORMATION?	__ , __ __ __ (grams) Don't know ..... 9 From Health Card ..... 1 Maternal recall 2	
6. WHEN (*name*) WAS BORN, WAS HE/SHE VERY LARGE, LARGER THAN AVERAGE, AVERAGE, SMALLER THAN AVERAGE, OR VERY SMALL?	Very large ..... 1 Larger than average ..... 2 Average ..... 3 Smaller than average ..... 4 Very small ..... 5 Don't know 8	
7. WHEN YOU WERE PREGNANT WITH (*name*), DID YOU HAVE DIFFICULTY WITH YOUR VISION DURING THE DAYLIGHT?	Yes ..... 1 No ..... 2 Don't know 8	
8. WHEN YOU WERE PREGNANT WITH (*name*),, DID YOU SUFFER FROM NIGHT BLINDNESS (USE LOCAL TERM)?	Yes ..... 1 No ..... 2 Don't know 8	

GO TO 2.2 VITAMIN A MODULE ⇨

Cluster no. __ __ __ Household no. __ __

2.2 VITAMIN A MODULE

Ask regarding the index (youngest) child experience (must be under 2)

1. HAS (*name*) EVER RECEIVED A VITAMIN A CAPSULE (SUPPLEMENT) LIKE THIS ONE? *Show capsule.*	Yes .....1 No .....2 Don't know 9	2⇨NEXT MODULE 9⇨NEXT MODULE
2. HOW MANY MONTHS AGO DID (*name*) TAKE THE LAST DOSE?	Months ago .....__ __ Don't know 99	
3. WHERE DID (*name*) GET THIS LAST DOSE?	Health centre .....1 Nursery .....2 Other (*specify*) _____ 3 Don't know 9	
DID (*name*) GET THIS LAST DOSE ON A NATIONAL CHILD HEALTH DAY?	Yes on 2003-11-20 .....1 Yes on 2004-05-20 .....2 No .....3 Don't know 9	

GO TO 2.3 INFANT FEEDING MODULE ⇨

Cluster no. __ __ __ Household no. __ __

Ask the mother regarding the index (youngest) child experience (must be under 2)

2.3 INFANT FEEDING MODULE

1. SINCE THIS TIME YESTERDAY, DID (CHILD'S *name*) RECEIVE ANY OF THE FOLLOWING: *Read each item aloud and record response before proceeding to the next item.*	**Y N DK**	
1-1 VITAMIN, MINERAL SUPPLEMENTS OR MEDICINE?	1-1 Vitamin supplements 1 2 9	
1-2 PLAIN WATER?	1-2 Plain water 1 2 9	
1-3 SWEETENED, FLAVOURED WATER OR FRUIT JUICE OR TEA OR INFUSION?	1-3 Sweetened water or juice 1 2 9	
1-4 ORAL REHYDRATION SOLUTION (ORS)?	1-4 ORS 1 2 9	
1-5 TINNED, POWDERED OR FRESH MILK OR INFANT FORMULA?	1-5 Milk 1 2 9	
1-6 SOLID OR SEMI-SOLID (MUSHY) FOOD?	1-6 Mushy food 1 2 9	
1-7 ANY OTHER LIQUIDS?	1-7 Other liquids (*specify*) _____ 1 2 9	
2. HAS (CHILD'S *name*) EVER BEEN BREASTFED?	Yes ..... 1 No ..... 2 Don't know 9	 2⇨Q.4 9⇨Q.4
3. IS HE/SHE STILL BEING BREASTFED?	Yes ..... 1 No ..... 2 Don't know 9	
4. SINCE THIS TIME YESTERDAY, HAS (*name*) BEEN GIVEN ANYTHING TO DRINK FROM A BOTTLE WITH A NIPPLE OR TEAT?	Yes ..... 1 No ..... 2 Don't know 9	

GO TO 2.4 CARE OF ILLNESS MODULE ⇨

Cluster no. __ __ __ Household no. __ __

Ask the mother regarding the index (youngest) child experience (must be under 2)

2.4 CARE OF ILLNESS MODULE		
1. HAS (*name*) HAD DIARRHOEA IN THE LAST TWO WEEKS, THAT IS, SINCE (*day of the week*) OF THE WEEK BEFORE LAST? *Diarrhoea is determined as perceived by mother or caretaker, or as three or more loose or watery stools per day, or blood in stool.*	Yes .....1 No .....2 Don't know 9	1⇨Q.3
2. IN THE LAST TWO WEEKS, HAS (*name*) HAD ANY OTHER ILLNESS.	Yes .....1 No .....2 Don't know 9	1⇨Q.4 2⇨Next Module 9⇨Next Module
3. DURING THIS LAST EPISODE OF DIARRHOEA, DID (*name*) DRINK ANY OF THE FOLLOWING: *Read each item aloud and record response before proceeding to the next item.*	Y N DK	
3-1 BREAST MILK?	3-1 Breast milk 1 2 9	
3-2 CEREAL-BASED GRUEL OR GRUEL MADE FROM ROOTS OR SOUP?	3-2 Gruel..... 1 2 9	
3-3 O*ther locally-defined acceptable home fluids (e.g., SSS, yogurt drink)*?	3-3 Other acceptable..... 1 2 9	
3-4 ORS PACKET SOLUTION?	3-4 ORS packet..... 1 2 9	
3-5 OTHER MILK OR INFANT FORMULA?	3-5 Other milk 1 2 9	
3-6 WATER WITH FEEDING DURING SOME PART OF THE DAY?	3-6 Water with feeding..... 1 2 9	
3-7 WATER ALONE?	3-7 Water alone 1 2 9	
3-8 *Defined "unacceptable" fluids (e.g., cola)*	3-8 Unacceptable fluids..... 1 2 9	
3-9 NOTHING	3-9 Nothing..... 1 2 9	1⇨Q.5
4. DURING (*name's*) ILLNESS, DID HE/SHE DRINK MUCH LESS, ABOUT THE SAME, OR MORE THAN USUAL?	Much less or none.....1 About the same (or somewhat less) .....2 More.....3 DK.....9	
5. DURING (*name's*) ILLNESS, DID HE/SHE EAT LESS, ABOUT THE SAME, OR MORE FOOD THAN USUAL? *If "less", probe:* MUCH LESS OR A LITTLE LESS?	None.....1 Much less.....2 Somewhat less .....3 About the same.....4 More.....5 Don't know 9	
6. HAS (*name*) HAD AN ILLNESS WITH A FEVER AT ANY TIME IN THE LAST TWO WEEKS, THAT IS, SINCE (*day of the week*) OF THE WEEK BEFORE LAST?	Yes .....1 No .....2 Don't know 9	
7. HAS (*name*) HAD AN ILLNESS WITH A COUGH AT ANY TIME IN THE LAST TWO WEEKS, THAT IS, SINCE (*day of the week*) OF THE WEEK BEFORE LAST?	Yes .....1 No .....2 Don't know 9	2⇨Next Module 9⇨Next Module

8. WHEN (*name*) HAD AN ILLNESS WITH A COUGH, DID HE/SHE HAVE ABNORMAL BREATHING?	Yes ..... 1 No ..... 2 Don't know 9	
9. DID YOU SEEK ADVICE OR TREATMENT FOR THE ILLNESS OUTSIDE THE HOME?	Yes ..... 1 No ..... 2 Don't know 9	2⇨Next Module 9⇨Next Module
10. FROM WHERE DID YOU SEEK CARE? ANYWHERE ELSE? *Circle all providers mentioned, but do NOT prompt with any suggestions.*	Y N Provincial Hospital ..... 1 2 City/District/County Hospital ..... 1 2 Nursery ..... 1 2 Village Health Office ..... 1 2 Traditional Health Worker/Doctor ..... 1 2 Relative or friend ..... 1 2 Other ..... 1 2 (*specify*) _____	

GO TO 2.5 IMMUNIZATION MODULE ⇨

Cluster no. __ __ __ Household no. __ __

2.5 IMMUNIZATION MODULE		
Ask the mother regarding the index (youngest) child experience (must be under 2		
1. DID (*CHILD'S name*) RECEIVE ANY VACCINATIONS	Yes .....1 No .....2 Don't know 9	2⇨ Next Module 9⇨ Next Module
2. HAS (*name*) EVER BEEN GIVEN A BCG VACCINATION AGAINST TUBERCULOSIS – THAT IS, AN INJECTION IN THE LEFT SHOULDER THAT CAUSED A SCAR?	Yes .....1 No .....2 Don't know 9	
3. CHECK LEFT SHOULDER (MOST COMMON SITE) FOR BCG SCAR	Scar present .....1 Scar absent .....2 Unable to examine/ Don't know 9	
4. HAS (*name*) EVER BEEN GIVEN ANY "VACCINATION DROPS IN THE MOUTH" TO PROTECT HIM/HER FROM GETTING DISEASES – THAT IS, POLIO?	Yes .....1 No .....2 Don't know 9	2⇨Q.7 9⇨Q.7
5. HOW OLD WAS HE/SHE WHEN THE FIRST DOSE WAS GIVEN – JUST AFTER BIRTH OR LATER?	Just after birth .....1 Later 2	
6. HOW MANY TIMES HAS HE/SHE BEEN GIVEN THESE DROPS?	No. of times .....__ __	
7. HAS (*name*) EVER BEEN GIVEN "VACCINATION INJECTIONS" – THAT IS, AN INJECTION IN THE THIGH OR BUTTOCKS – TO PREVENT HIM/HER FROM GETTING TETANUS, WHOOPING COUGH, DIPHTHERIA? (*sometimes given at the same time as polio*)	Yes .....1 No .....2 Don't know 9	2⇨Q.9 9⇨Q.9
8. HOW MANY TIMES?	No. of times .....__ __	
9. HAS (*name*) EVER BEEN GIVEN "VACCINATION INJECTIONS" – THAT IS, A SHOT IN THE ARM AT THE AGE OF 9 MONTHS OR OLDER - TO PREVENT HIM/HER FROM GETTING MEASLES?	Yes .....1 No .....2 Don't know 9	

GO TO 2.6 MATERNAL FOOD INTAKE MODULE ⇨

Cluster no. __ __ __ Household no. __ __

2.6 MATERNAL FOOD FREQUENCY MODULE

This module is to be administered to the mother of child less than two complete years of age (the youngest). See Instructions for Interviewers for further discussion of these questions.

1. NOW I WOULD LIKE TO TALK WITH YOU ABOUT THE MEALS THAT YOU ATE YESTERDAY. 1-1 HOW MANY MEALS DID YOU EAT YESTERDAY? 1-2 WAS THIS THE USUAL NUMBER OF YOUR MEALS?	1-1 Circle……0..…1…2…3…4…5…6…. ≥7 Usual number .....1 More than usual number.....2 Less than usual number.....3

MATERNAL FOOD FREQUENCY

Ask the mother "I" would like to talk with you now about the foods that you consumed ON AVERAGE .over the last 6 months. Can you tell me how frequently you have consumed different groups of foods per day or per week or per month?

LINE	FOOD GROUP	HOW OFTEN ON AVERAGE OVER THE LAST 6 MONTHS DID YOU CONSUME THE FOLLOWING PRODUCTS?		
		Day	Week	Month
2		1	2	3
1	RICE AND RICE PRODUCTS	.____.	.____.	.____.
2	OTHER CEREAL OR GRAINS (*For example, maize, wheat, barley, or millet*)	.____.	.____.	.____.
3	POTATOES AND SWEET POTATOES	.____.	.____.	.____.
4	BEANS OR BEAN PRODUCTS (*For example, white or green beans, peas, soy beans, soy milk, bean curd, lentils*)	.____.	.____.	.____.
5	POULTRY AND MEAT: (*For example, chicken, beef, pork. rabbit*)	.____.	.____.	.____.
6	FISH (*For example, any fish or aquatic products*)	.____.	.____.	.____.
7	GREEN LEAFY VEGETABLES (*For example, spinach, mustard green, edible grass*)	.____.	.____.	.____.
8	RED/YELLOW COLOURED VEGETABLES (*For example, pumpkin, carrot, squash*)	.____.	.____.	.____.
9	NON-COLOURED VEGETABLES (*For example, onion, garlic, radish, cabbage)*	.____.	.____.	.____.
10	FRUIT (*For example, apple, pears, peaches, plums, persimmon, grapes*)	.____.	.____.	.____.
11	EGGS	.____.	.____.	.____.
12	DAIRY PRODUCTS (*EXCEPT butter*) (*For example, milk, cheese, yoghurt*)	.____.	.____.	____.
11	OILS OR FAT (*For example, vegetable oil, butter, pork fat*)	.____.	.____.	.____.
12	FORTIFIED FOODS (*For example, CSB, CSM, Noodles from PDC*)	.____.	.____.	.____.

Stop interview and go to Child Anthropometry module ⇨

NUTRITION ASSESSMENT 2004 IN DPR KOREA

(THIS ASSESSMENT WILL BE CARRIED OUT BY THE GOVERNMENT OF DPRK IN COLLABORATION WITH UNICEF & WFP)

3. CHILD ANTHROPOMETRY MODULE (CHILDREN AGED LESS THAN 6)

Cluster no. __ __ __ Household no. __ __

ANTHROPOMETRY MODULE (CHILDREN AGED LESS THAN 6)		
Only the youngest child aged less than 6 years will be weighed		
1A. CHILD'S WEIGHT. *(Please weigh child with no shoes and only light clothing. Wrap the child in pre-weighed blanket if necessary)* *(Mother weight if child under 2)* 1B RECORD IF ANY ITEMS OF CLOTHING WERE WORN BY CHILD WHEN WEIGHED.	Child Kilograms (kg) ..... ___ ___ . ___ (Mother Kilograms (kg) ..... ___ ___ . ___) **Y N DK** Light clothes ..... 1 2 9 Heavy clothes or Jacket..... 1 2 9 Shoes..... 1 2 9 Blanket..... 1 2 9 Weight of blanket _____	
2A. CHILD'S LENGTH OR HEIGHT. *Check age of child:* *☐ Child under 2 years old. ⇨ Measure length (lying down).* *☐ Child age 2 or more years. ⇨ Measure height (standing up).* 2B. RECORD METHOD OF MEASUREMENT	Length/Height (cm) ..... ___ ___ ___ . ___ Measured lying down .....1 Measured standing up.....2	
3. SEX	Male .....1 Female 2	
4.BIRTH DATE (DAY/MONTH/YEAR)	___ ___/___ ___/___ ___ ___ ___	
5. MEASUREMENT DATE (DAY/MONTH/YEAR)	___ ___/___ ___/___ ___ ___ ___	
6. CONDUCTED BY	Code ……..___ ___	

If the index child is less than 2 go to Maternal Anthropometry Module

If the child is more than 2 - STOP and THANK THE MOTHER

NUTRITION ASSESSMENT 2004
IN DPR KOREA

(THIS ASSESSMENT WILL BE CARRIED OUT BY THE GOVERNMENT OF DPRK IN COLLABORATION WITH UNICEF & WFP)

INFORMED CONSENT FOR WOMEN

- As part of this survey we are measuring the hemoglobin level in the blood of women (i.e. the strength of their blood) to check for anemia. Anemia is a serious health problem for women, especially during pregnancy, which results from poor nutrition and infections. This survey of anemia in women will assist the government of DPRK to develop programs to prevent and treat anemia.
- We invite you to participate in the anemia testing part of this survey. For the anemia survey we will collect a few drops of your blood from your finger. This test uses disposable sterile instruments that are clean and very safe. The blood sample we collect will be analyzed with new equipment in your presence and the results of the test will be given to you right after the blood is taken. We will provide you with a referral to your local health service if you have anemia and need treatment. The collection of this information usually takes between 10 to 15 minutes to complete. Whatever information you provide will be kept strictly confidential and will not be shown to other persons.
- At this time, do you want to ask me anything about this survey?
- Participation in this survey is voluntary and you can choose not to participate in any or all of these measurements.
- May I now ask you to participate in the anemia study? However, if you decide not to participate in the anemia study, it is your right and we will respect your decision. Now please tell me if you agree to have the anemia test?

Tick box below based on mothers response.

Mother agrees to hemoglobin test [___] Mother declines hemoglobin test [___]

I declare that I have completed a verbal informed consent for this eligible woman and recorded the results above.

Signature of interviewer: _____ Date: _____

4. MATERNAL ANTHROPOMETRY AND HEMOGLOBIN MODULE
(MOTHER WITH CHILDREN AGED LESS THAN 2)

Cluster no. _____ Household no. _____

ANTHROPOMETRY AND HEMOGLOBIN MODULE		
Mother with child aged less than 2 years will be weighed and her hemoglobin tested.		
1. MOTHER'S MUAC	MUAC.....___ ___ . ___	
2. HEMOGLOBIN TEST REFER ALL WOMEN WITH HEMOGLOBIN < 12 G/DL	Hemoglobin.....___ ___ . ___	
3. CONDUCTED BY	Code .....___ ___	

STOP AND THANK THE MOTHER

6.1.1.1 CLUSTER CONTROL SHEET

Dong or Ri Name_____ **Cluster Number** ___ ___ ___

Interviewer Code 1 ___ ___
Anthropometrist Code 2 ___ ___ Date _____
Supervisor Code ___ ___ Date _____
Data Supervisor code ___ ___

HH No.	Name of Head of HH	Household Questionnaire	Maternal and Child Questionnaire	Child Anthropometry form	Mother Anthropometry and Hb test	Notes
01						
02						
03						
04						
05						
06						
07						
08						
09						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
Total:		(30)		(30)		

Notes: (continue on reverse side, as needed)