Foreword

Food insecurity and malnutrition in the Democratic People’s Republic of Korea are chronic in nature and remain highly vulnerable to shocks, especially those affecting domestic food production. While important action has been taken to improve the situation in DPRK, more can and needs to be done. Achieving the best results, moreover, relies on close partnership and cooperation in implementing complementary activities across multiple sectors.

To better understand and map the situation in the country, the United Nation’s World Food Programme (WFP) initiated a programme in 2012 to analyze food and nutrition security in the country, culminating in this report on Food and Nutrition Security in the Democratic People’s Republic of Korea. For WFP, this work will serve as one of the important guides helping the organization to better develop its programmes and interventions, allocate limited resources, and improve targeting for better outcomes. It is hoped that this publication will also serve as a key reference for the DPRK government and humanitarian partners working across the country, expanding the evidence base necessary for improved decision making.

This work also stands as an advocate for greater availability of geographically disaggregated data in DPRK. Currently, information available at county and lower administrative levels is sparse, thereby restricting the ability to analyze and understand the relative influence of underlying factors on food and nutrition security and limiting the capacity to effectively and efficiently target vulnerable populations.

WFP would like to express its sincere gratitude to the government of DPRK for its continuous support of WFP projects and looks forward to a fruitful partnership towards improving assistance in the future.

Dierk Stegen

September 2013

WFP Representative

Pyongyang, DPRK
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Photo credits:

Cover: Weeding Rice Paddies, Gerald Bourke/WFP
Foreword (Page v): Girl eating noodles, Rein Skullerud/WFP; Boy eating lunch, Rein Skullerud/WFP; Schoolgirls at lunch, Gerald Bourke/WFP
Availability (Page 9): Road through the Mountains, Marcus Prior/WFP; Hay Mound, Marcus Prior/WFP
Utilization (Page 17): Food Aid, Ruangdech Poungprom/WFP; Woman Cooking, Rein Skullerud/WFP; Mother and Child, Marcus Prior/WFP

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Map Designations Used:

The depictions and use of boundaries, geographic names and related data shown on maps and included in the tables throughout the document are not warranted to be error-free, nor do they necessarily imply official endorsement or acceptance by the World Food Programme.
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</tr>
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<tr>
<td>ARI</td>
<td>Acute Respiratory Illness</td>
</tr>
<tr>
<td>CBS</td>
<td>Central Bureau of Statistics, DPRK</td>
</tr>
<tr>
<td>CFSAM</td>
<td>Crop and Food Security Assessment Mission</td>
</tr>
<tr>
<td>DPRK</td>
<td>Democratic People’s Republic of Korea</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
</tr>
<tr>
<td>FCS</td>
<td>Food Consumption Score</td>
</tr>
<tr>
<td>Ha</td>
<td>Hectare</td>
</tr>
<tr>
<td>ICN</td>
<td>Institute of Child Nutrition</td>
</tr>
<tr>
<td>IMR</td>
<td>Infant Mortality Rate</td>
</tr>
<tr>
<td>IPC</td>
<td>Integrated Phase Classification</td>
</tr>
<tr>
<td>IUD</td>
<td>Intra-uterine Device</td>
</tr>
<tr>
<td>IYCF</td>
<td>Infant and Young Child Feeding</td>
</tr>
<tr>
<td>KPW</td>
<td>Korean People’s Won</td>
</tr>
<tr>
<td>MAM</td>
<td>Moderate Acute Malnutrition</td>
</tr>
<tr>
<td>MDG</td>
<td>Millennium Development Goal</td>
</tr>
<tr>
<td>MDRTB</td>
<td>Multi-drug Resistant Tuberculosis</td>
</tr>
<tr>
<td>MICS</td>
<td>Multiple Indicator Cluster Survey</td>
</tr>
<tr>
<td>MMR</td>
<td>Maternal Mortality Ratio</td>
</tr>
<tr>
<td>MOLEP</td>
<td>Ministry of Land and Environmental Planning</td>
</tr>
<tr>
<td>MoPH</td>
<td>Ministry of Public Health, DPRK</td>
</tr>
<tr>
<td>MUAC</td>
<td>Mid-Upper Arm Circumference</td>
</tr>
<tr>
<td>NCC</td>
<td>National Coordination Committee</td>
</tr>
<tr>
<td>PDS</td>
<td>Public Distribution System</td>
</tr>
<tr>
<td>PPPD</td>
<td>Per person per day</td>
</tr>
<tr>
<td>ROK</td>
<td>Republic of Korea</td>
</tr>
<tr>
<td>SAM</td>
<td>Severe Acute Malnutrition</td>
</tr>
<tr>
<td>TB</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>USMR</td>
<td>Under five Mortality Rate</td>
</tr>
<tr>
<td>UNFPA</td>
<td>United Nations Population Fund</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
</tr>
<tr>
<td>USD</td>
<td>United States Dollar</td>
</tr>
<tr>
<td>WFP</td>
<td>World Food Programme</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
Executive Summary

In the context of domestic and foreign policies grounded in self-sufficiency, food security and nutritional adequacy in the Democratic People’s Republic of Korea rely heavily on its domestic agricultural capacity. While national cereal production has steadily improved in recent years, food shortages still pose a considerable challenge and key gaps exist particularly in the production of foods rich in necessary nutrients such as protein. According to government sources, food produced throughout the country is centrally collected and redistributed to all households in the nation through the Public Distribution System (PDS). However, distribution can be erratic and rations often insufficient. With international trade constrained, household market activity restricted, and individual and household movement limited, household access to additional nutritious food exists mainly through small-scale home gardening and livestock production, collection of wild foods and informal mechanisms such as exchange and bartering. The result is a food system remarkably vulnerable to natural disasters and other shocks to domestic agricultural productivity.

This analysis of food and nutrition security in DPRK aims to provide an overview of trends in food security and nutrition in the country based on the most recent available data and supplemented with a series of thematic maps. At present, analysis is largely available at the national and provincial levels or related to certain sectors, such as agriculture or health, with very little available at more disaggregated levels. As such, this document is an attempt to start more disaggregated analyses that can be used to improve the targeting of the most food insecure and malnourished counties and population groups, and facilitate the prioritization of activities accordingly.

As there is no single measure of food insecurity, the report employs the analytical framework of the Integrated Phase Classification (IPC) to describe vulnerable populations according to the three food security dimensions (availability, access and utilization), the contributing factors of vulnerability and the main outcomes of food and nutrition security. A map of relative food insecurity, based on a composite index of data selected to reflect each of the three food security dimensions provides an indication of which areas are likely to experience greater food insecurity. Subsequent sections of the report then explore in greater depth the individual dimensions and factors affecting food and nutrition security.

Overall this analysis indicates that geographic disparities of food insecurity in DPRK are largely driven by patterns of food availability and access. The northern and eastern counties and districts tend to be more vulnerable to food insecurity when compared to those in the “cereal bowl” areas of the country (southern and western counties/districts) where most of the production occurs. Households in small more remotely located urban districts tend also to be more food insecure as access to home gardening is more limited.

Access to food is impacted by access to the PDS, with select groups such as workers in the defence, public administration, compulsory social security, mining, quarrying and construction sectors, as well as cooperative farmers, receiving preferential access. Household access to gardening space and to forests and rivers can increase access to nutritious foods, carrying geographic implications such as for urban households compared to rural. Informal exchange in the form of bartering and gifts is common practice for households and can also improve access to food.

A major bottleneck for food utilization and for nutrition outcomes in DPRK remains the quality and diversity of women’s and children’s diets. Household food consumption is poor and for most households consists of cereals or tubers combined with vegetables and oil in small quantities. While the prevalence rates of stunting and underweight in DPRK have seen steady improvement since the late 1990s, seasonal peaks in acute child malnutrition as well as micronutrient deficiencies remain major concerns. Mortality rates have also declined, but remain high compared to regional neighbours.

Given the unique context of DPRK, a twin-track approach of long-term initiatives, including large-scale investment in agriculture and promotion of market reform and trade liberalization, combined with short-term approaches including provision of humanitarian food, nutrition support and livelihood assistance is needed to lift DPRK out of its current situation of recurrent food insecurity. Inherently, the long-term changes necessary to improve food and nutrition security will involve both environmental and infrastructural changes as well as changes to individual behavioural and management practices.
What is Food and Nutrition Security?

Food and nutrition security exists when all people, at all times, have physical, social and economic access to food which is consumed in sufficient quantity and quality to meet their dietary needs and food preferences, and is supported by an environment of adequate sanitation, health services and care, allowing for a healthy and active life (Committee on World Food Security, 2012).

Improving food and nutrition security requires knowing where the most vulnerable are located and understanding what makes them vulnerable. Targeting is a key mechanism for reaching vulnerable populations and ensuring efficient and effective use of limited resources. It relies on the availability of up-to-date, disaggregated data. At present, food security analyses in DPRK provide an overview at the national and provincial levels in relation to certain sectors such as agriculture or health. Very little data and information is available at more disaggregated levels. As such, this document is an attempt to start more disaggregated analysis that can be used to improve the targeting of the most food insecure counties and population groups, and facilitate the prioritization of activities accordingly.

The IPC Analytical Framework

Household food security is influenced by a complex interaction of agro-environmental, socio-economic and biological factors with no direct measure. The Integrated Phase Classification (IPC) analytical framework integrates the conceptual frameworks from food security, nutrition and livelihoods analysis in order to provide a comprehensive and integrated approach to the analysis of food and nutrition security.
Food Security Outcomes

Two sets of outcomes, primary and secondary, are identified as directly related to household food security status. Only one of the four outcomes, food consumption, is exclusively related to food security. The other three outcomes, livelihood change, malnutrition, and mortality, all have additional non-food impacts that require analysis from other sectors including health, water and sanitation.

Primary Outcomes

The typical diet in DPRK is heavily based on staples with frequent vegetable consumption and limited consumption of protein source foods. Consumption patterns are highly vulnerable to national declines in agricultural production and households fall easily from borderline to poor consumption in the wake of a hazard. At the same time, an acceptable consumption pattern is difficult to reach and hard to maintain. The lack of household food stocks plays a key role in this fragility. Due to limited data, it is not possible to assess livelihood change.

Secondary Outcomes

Malnutrition in DPRK has improved steadily over the past 14 years, with stunting and underweight on average declining by more than 2 and 3 percent per year respectively. However, national prevalence rates remain of “medium” public health significance according to WHO thresholds at 27.9 percent stunted and 15.2 percent underweight in 2012. The highest rates of stunting are seen in Ryanggang, South Hamgyong and Chagang. Seasonal fluctuations in acute malnutrition and persistence of micronutrient deficiencies are major concerns.

Availability

Agricultural production in DPRK has seen steady improvement over the last several years but remains critically vulnerable to natural hazards, limited arable land, low soil fertility, and a lack of key inputs. Production is particularly low in the mountainous northern regions. Double-cropping and cultivation of sloping land as means to improve utilization of arable land and increase production have limited success given climate risks, lack of inputs and soil erosion in the case of sloping land. Food assistance from bilateral and multilateral sources has been intermittent and import capacity is low.

Access

The PDS is a key determinant of access to food for most of the population. However, PDS rations have been below target for years and distribution can be erratic. Household gardens, raising of small livestock and gathering of wild foods can improve access to food, particularly in rural areas where land is more available. Economic access improves in urban areas, especially in and around the bigger cities, as incomes are higher and there is greater access to daily markets. There is anecdotal evidence that the contribution of markets to food access is gaining importance.

Utilization

While the health system provides wide coverage in DPRK, access to healthcare is higher in urban areas compared to rural given the greater proportion of skilled healthcare workers and larger number of facilities. However, the lack of medicines and medical supplies hampers the system nationwide. The prevalence of childhood diseases (diarrhoea and acute respiratory infections) is still high and requires attention. A major bottleneck in food utilization is adequate dietary intake for women and children, and low practice of appropriate infant and young child feeding (IYCF) practices.

Risk & Vulnerability

Natural hazards are a major risk factor in DPRK. Heavy rains, floods, cyclones and dry spells can wreak havoc on agricultural production particularly in the southern and western parts of the country, often referred to as the “cereal bowl”. In the north, extremely cold and prolonged winters can delay agricultural production, while drought in the central and southern regions can force extensive replanting of crops. Hazards can also have a major impact on infrastructure and the distribution of food, thus affecting household access to food. Floods and storms can also play an important role in the prevalence of infectious diseases, which can impact the body’s utilization of nutrients and overall nutritional status.
Who is Food Insecure in DPRK?

Vulnerability to food insecurity in DPRK, as defined by analysis of available government data and depicted in Map 1, is relatively higher in the northern mountainous counties and in predominantly urban districts and counties. Apparent cereal availability is a driving factor in explaining relatively higher food insecurity in the northern and eastern counties, given that the bulk of cereal production occurs in the southern counties. Furthermore, the rugged topography in these areas may limit road access and hinder access to PDS rations. In urban areas, fewer and smaller kitchen gardens reduces access to additional sources of nutritious food. In some of the larger more strategically important cities such as Pyongyang, Chongjin City and Hamhung City, preferential PDS access and better utilization scores drive the relatively lower food insecurity.

Methodology

Five variables were selected from available government data based on their comparative ability to explain each of the three dimensions of food security (Table 1). The indicators were standardized, combined using equal weight per dimension and categorized into quintiles to depict relative food insecurity at the county/district level. While useful for situating food insecurity geographically, the analysis was nonetheless limited by the paucity of data at county/district level. Data on factors known to affect food security in the context of DPRK was notably lacking, such as among others, information on income and expenditures, access to wild foods, market functionality and extent of and ability to engage in informal mechanisms to secure food. As such, caution should be taken when interpreting the results.

| Table 1. Definition and Rationale for Selected Indicators of Food Security in DPRK |
|---------------------------------|-----------------|--------------------------------|-----------------|
| **Dimension** | **Indicator** | **Definition** | **Rationale** | **Source** |
| Availability | Apparent cereal availability | Number of cereal equivalents (gram/person/day), calculated using the following conversion rates: 4 to 1 for potatoes, 1.2 to 1 for soybean and 1 to 1 for other cereal crops. | Provides an estimate of the potential food available per capita per day in each county, capturing aspects of both agriculture productivity and population density. | Population data 2010 and 2012 and the Ministry of Agriculture production data 2010-12 |
| Access | Preferential groups and cooperative farmers | The proportion of the population that are workers in defense, public administration or compulsory social security, mining and quarrying, construction, and cooperative farmers. | According to government sources, these populations have preferential access to PDS rations. | Population Census 2008 |
| | Detached dwellings | The proportion of the population living in a detached dwelling (compared to a row house or apartment). | Detached dwellings are associated with greater access to land for vegetable gardens. | Population Census 2008 |
| Utilization | Health workers/1,000 inhabitants | The number of people working in the health field per 1,000 inhabitants. | With a higher the ratio of health workers to inhabitants, it is assumed that access to healthcare is greater. | Population Census 2008 |
| | Female schooling level | The proportion of women with more than secondary education. | Women’s education levels are associated with improved nutrition outcomes for the household and for children. | Population Census 2008 |
Food Security Context in DPRK

The Democratic People’s Republic of Korea (DPRK), located in East Asia, occupies the northern half of the Korean Peninsula and shares borders with the Republic of Korea, the People’s Republic of China and the Russian Federation. Of a total land area of 123,138 square kilometres, approximately 80 percent is mountainous terrain and 17 percent is arable land concentrated in the south and coastal plains of the east. The country has a centralized model of government based out of the capital, Pyongyang. Based on the 2008 census, there are 9 provinces, 208 counties/districts/cities, and over 4,000 smaller units known as Ri in rural areas and Dong in urban areas.

Population & Economy

According to the census conducted in 2008, the population of DPRK is about 24 million, 61 percent of whom live in urban areas. The population is almost completely homogenous, with the exception of small Chinese and Japanese-origin communities. The average density of the population is 198 people per square kilometre with an annual population growth rate of 0.85 percent.

In the 14 years between the censuses, the age structure has shifted towards a more elderly population (Fig. 1), with approximately 8.7 percent 65 years and older in 2008 compared to 5.4 percent in 1993. In general, the mortality conditions in the country have worsened over the 14 year span, reflected in the shorter life expectancy in 2008 compared to 1993 (Table 2). However, data from several surveys conducted in the interim suggest that the risk of dying was highest in the mid/late-1990s before beginning a steady decline through the 2000s: According to the MDG baseline survey in 1998 and infant mortality was 23.5 and maternal mortality was 105.

The planned economy of DPRK is based on state-owned enterprises and cooperative farms. The agricultural sector is the major contributor to the gross domestic product (GDP). However, the importance of the sector has declined over time, from approximately 30 percent of GDP in the early 2000s to 21 percent in 2010 (FAO-WFP 2012). In terms of employment, the sector provides jobs for more than one third of the working population (36 percent). Other major job-

Table 2. Trends in Selected Demographic Data

<table>
<thead>
<tr>
<th></th>
<th>Census Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1993</td>
</tr>
<tr>
<td><strong>Total Population</strong></td>
<td>21,213,378</td>
</tr>
<tr>
<td>Male</td>
<td>10,329,699</td>
</tr>
<tr>
<td>Female</td>
<td>10,883,679</td>
</tr>
<tr>
<td><strong>Sex Ratio</strong></td>
<td>94.9</td>
</tr>
<tr>
<td><strong>Life Expectancy at Birth</strong></td>
<td>72.7</td>
</tr>
<tr>
<td>Male</td>
<td>68.4</td>
</tr>
<tr>
<td>Female</td>
<td>76.0</td>
</tr>
<tr>
<td><strong>Urban (%)</strong></td>
<td>60.9</td>
</tr>
<tr>
<td><strong>Dependency Rate</strong></td>
<td>0.50</td>
</tr>
<tr>
<td><strong>Total Fertility Rate</strong></td>
<td>2.1</td>
</tr>
<tr>
<td><strong>Infant Mortality Rate</strong></td>
<td>14.1</td>
</tr>
<tr>
<td><strong>Maternal Mortality Rate</strong></td>
<td>54.0</td>
</tr>
</tbody>
</table>


Figure 1. Population Pyramid, 2008

Source: Population Census 2008
Creating sectors include the manufacturing sector, which employs 24 percent of the population, and the mining/quarrying sector and public administration sector, which each employ 6 percent (CBS 2009).

Between 2006 and 2011, total economic growth in DPRK was relatively slow, with a cumulative increase in GDP of about 3 percent. For three out of these six years, the country experienced negative growth rates, seeing most of the positive growth in recent years (0.7 percent in 2010 and 1.9 percent in 2011). This recent economic recovery is attributable to relatively good performance of the agriculture sector, significant expansion of the construction sector, increased exports of natural resources, as well as remittance inflows from workers sent to China and Russia (FAO-WFP 2012).

Economic trade is limited to a few countries: In 2010, China and the Republic of Korea accounted for almost 90 percent of the country's total international trade. Between 2003 and 2008, the trade deficit increased by almost 50 percent, from US $983 million to an estimated record high of US $1.52 billion. However, increasing exports to China has helped reduce the annual deficit in recent years, a trend expected to continue in the future (FAO-WFP 2012).

Food Security-Related Policies

Several key policies contribute greatly to shaping the food security context in DPRK. The directive of self-sufficiency in food underscores food availability in the country and the PDS supposedly acts as the main distributor of food, providing rations to about 70 percent of households. Although market activities seem to be increasingly practiced, policies related to market trade have remained restrictive, directly affecting household access to food.

Self-Sufficiency

Self-sufficiency in food is at the heart of DPRK agricultural policies. The government aims to produce a target of 7 million tons of cereals per year, a figure it estimates to be sufficient to meet the caloric needs of the population (Mandal 2012). Three major themes guide its agricultural strategies: (1) the principle of "the right crop on the right soil and the right crop in the right time"; (2) increased production area (cropping intensity, reclamation of tidal lands, use of sloped lands) and (3) increased agricultural yields (through better soil and crop management, and greater use of improved inputs).

The PDS & Market Policies

Free trade was initially banned in DPRK in December 1957 and the PDS was established to control the distribution of food centrally. Under this system, the National People's Committee (NPC) reportedly receives production data from all over the country and, based on factors such as household size and age composition, occupations of all household members and number of hours worked per day, determines how to distribute the food equitably. For approximately 16.5 million people (70 percent of the population), this is an important means of accessing staple foods in the diet (see section on Access for more details). Following the economic crisis and precipitous decline in agricultural production in the 1990s, the distribution of rations through the PDS all but ground to a halt. Households were encouraged to find alternative means of accessing food. In 2002, economic reforms were implemented that allowed small-scale private farming and recognized farmers' markets. However, according to government sources, the PDS was reinstated in 2006 following improvements in agricultural production and the private sale of grain was again forbidden. Farmers' markets continue to operate on a limited scale, open three days per month and serving primarily as a venue for the sale of products from home gardens and a limited supply of consumer goods.
Food Availability

Until the 1980s, DPRK was self-sufficient in food production, in large part due to effective subsidies for fuel and fertilizer from China and the Union of Soviet Socialist Republics (USSR). However, with the dissolution of the Soviet trading bloc and shifts in China’s trade policy in the late 1980s, prices for key inputs rose sharply, agricultural productivity plummeted and food imports shrank. In the mid-1990s, an already weakened agriculture sector was further hit by heavy flooding, together resulting in a devastating decline in availability. Food assistance was given in the immediate aftermath, continuing at scale until domestic crop production sustained several years of good returns, at which point it was sharply curtailed. In the context of limited imports and restricted assistance, a situation of chronic food shortages has emerged.

Domestic Production

The total aggregate domestic production of food in DPRK from the 2012/13 harvest was 5.8 million tons, the first time since 1994 that output has exceeded 5 million tons (FAO-WFP 2012). Despite this progress, however, production is still well short of that achieved in the late 1980s (over 6 million tons).

The main cereal crops planted in DPRK are paddy rice and maize, accounting for over 85 percent of area under main crops. The majority of this production occurs in the “cereal bowl” (the lowland parts of North and South Pyongan, North and South Hwanghae, Pyongyang, Nampo municipality and the Kaesong area), although maize production is much more evenly spread across the country in comparison to rice.

After years of national campaigns to increase production of soybeans and potatoes, both crops have seen a decline in planted area in recent years. Soybean cultivation increased steadily between 2004 and 2011, from 60,000 ha to 131,000 ha, but declined by 12 percent to 115,000 ha in 2012. Similarly, potato cultivation increased from 89,000 ha to a high of 181,000 ha between 2004 and 2010, before experiencing two years of decline to an estimated 131,000 ha in 2012. The declines in planted area for soybeans and potatoes are largely attributed to a lack of planting materials, while overall decrease in production reflects not only area, but also heavy storage losses in the case of potatoes (FAO-WFP 2012).

Production from household gardens contributes fairly minimally to national cereal output, but serves as an important source of nutrient-rich foods for households. As such, it is discussed in the section on “Access”. Likewise, livestock production, particularly of small animals, is discussed under “Access” given the fact that a large proportion of livestock is raised in household gardens and is a key source of protein for these households.

Map 2 reflects average per capita cereal production from Figure 2. Agricultural Production, 1995-2012

Table 3. Food Crop Production (area, yield, and output) in 2012/13

<table>
<thead>
<tr>
<th>Crop Type</th>
<th>Area ('000 ha)</th>
<th>Yield (t/ha)</th>
<th>Production ('000 t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paddy</td>
<td>563</td>
<td>4.8</td>
<td>2681</td>
</tr>
<tr>
<td>Maize</td>
<td>531</td>
<td>3.8</td>
<td>2040</td>
</tr>
<tr>
<td>Potato*</td>
<td>26</td>
<td>3.2</td>
<td>84</td>
</tr>
<tr>
<td>Soybean</td>
<td>115</td>
<td>1.5</td>
<td>168</td>
</tr>
<tr>
<td>Other cereals</td>
<td>29</td>
<td>2.0</td>
<td>59</td>
</tr>
<tr>
<td>Total Main</td>
<td>1,265</td>
<td></td>
<td>5,031</td>
</tr>
<tr>
<td>Wheat/Barley</td>
<td>80</td>
<td>2</td>
<td>160</td>
</tr>
<tr>
<td>Potatoes</td>
<td>105</td>
<td>3</td>
<td>315</td>
</tr>
<tr>
<td>Total Early</td>
<td>185</td>
<td></td>
<td>475</td>
</tr>
</tbody>
</table>

Other food crop production

<table>
<thead>
<tr>
<th>Crop Type</th>
<th>Area ('000 ha)</th>
<th>Yield (t/ha)</th>
<th>Production ('000 t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sloping land</td>
<td>550</td>
<td>0.4</td>
<td>220</td>
</tr>
<tr>
<td>Household gardens</td>
<td>25</td>
<td>3</td>
<td>75</td>
</tr>
<tr>
<td>Vegetables</td>
<td>300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit orchards</td>
<td>160</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Other</td>
<td>1,035</td>
<td></td>
<td>295</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>5,801</td>
</tr>
</tbody>
</table>

*Potato figures are given as cereal equivalents using 4:1 conversion rate

Source: Ministry of Agriculture, FAO-WFP 2012, FAO/GIEWS
2010 to 2012, measured in terms of grams per person per day (PPPD). Despite flooding in 2011 and 2012 that caused considerable crop damage, cereal availability was still highest in the south and west of the country where most of the production occurs, driven by factors such as the greater availability of arable land, higher use of inputs and a greater proportion of cooperative farmers. By contrast, cereal availability is lowest in the northern mountainous counties, as well as in urban areas such as Pyongyang. For urban areas, low availability reflects limited agricultural production and does not take into account factors such as markets or state-regulated transfers of agriculture outputs between counties (the PDS) that improve household access to food.

### Food Assistance & Commercial Imports

Prior to 2008/09, DPRK received more than 400,000 tons of rice per year in bilateral assistance from the Republic of Korea and substantial multilateral assistance through WFP. In recent years, however, bilateral and multilateral food assistance has declined considerably, with only 35,000 tons received in 2012/13 (FAO-WFP 2012). China continues to contribute with 20,000 tons of soybeans each year, as well as a supply of critical non-food assistance (fuel, agricultural support). Other countries, including Russia, Myanmar, Vietnam, Taiwan, Brazil and India have provided cereals, but not in quantities sufficient to compensate for the general decline in assistance.

Commercial imports of food are generally limited by the high prices, growing trade imbalance and domestic economic policies (Hari Har Ram 2012). Additionally, China, as a main source of food imports for DPRK, has recently become a net importer of food. Overall, the quantities of cereal imports have been low and slowly declining from 400,000 tons in the early 2000s to 300,000 tons in 2012/13. In the last two years, sustained agricultural production has meant reduced need for imports.

### Food Balance

While food shortages are a chronic problem in DPRK, the trend since 2000 has been one of declining cereal deficits, mainly a function of increasing agricultural production and sustained imports, as well as food aid during critical years. The cereal deficit is calculated as the sum of domestic production and estimated food imports less the projected total food utilization.\(^6\) In Figure 3, the deficit after the estimated imports but before food aid is reflected in the total height of the columns. Between 2000 and 2013, with the notable exception of 2008/09,\(^7\) the total deficit has declined by more than 80 percent, from about 1.5 million to 207,000 tons required (FAO-WFP CFSAM data 1995-2012).\(^8\) Notably, this deficit does not reflect on nutrient-specific deficits, particularly for protein, which remain a key challenge for the country.

---

\(^6\) Figure 3. Food Deficit 1995/96-2012/13

Source: FAO-WFP CFSAM data
Production Challenges

Aside from the impact of natural disasters, key determinants of low productivity include a lack of arable land, poor soil fertility, the low use of agricultural inputs and low yields. Since opportunities to expand land area are limited, DPRK seeks to maximize land use through double-cropping and improve yields by enhancing soil fertility, increasing use of agricultural inputs and improving management practices.

Sloping Land

As a result of pressure for additional agricultural land, marginal lands such as sloping land have increasingly come under cultivation. Indeed, state policies in the 1980s allowed the removal of natural forest which contributed substantially to the estimated loss of 2.5 million hectares of natural forest (an average of 127,000 hectares lost per year in the last 2 decades) and increased the risk of soil erosion and landslides. While the Ministry of Land and Environmental Protection has since initiated regulations on the use of sloping land and promoted reforestation, the rehabilitation and renewal process has been slow. According to the most recent estimates, 550,000 hectares of sloping land remains under cultivation (JRC 2012).

Seasonality and Double-cropping

In 1997, the government introduced a new policy to promote a two-crop farm system (double-cropping). Double-cropping involves planting different crops with short-growth periods on the same piece of land within the same year, one in the early and one in the main season.

The main crop season, beginning in April and ending in mid/late August (maximum duration of 135 days) results in the production of approximately 80 percent of food in DPRK. The early season, falling between March and June/mid-July (maximum duration of 90 days) sees the production of mainly wheat, barley and potatoes, which together account for less than 10 percent of total annual production. Indeed in 2012, early crops contributed less than 8 percent of total production.

The main challenges to early crop production are risk associated with climatic variability (e.g. dry spells), heavy demand on labour and/or inputs, and insufficient inputs, particularly tractors and plastic sheeting to protect seedlings during cold weather. The harsh winters make double-cropping virtually impossible in the north.

Figure 4. Crop Seasons in DPRK

<table>
<thead>
<tr>
<th>Early crops</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter barley/wheat</td>
<td></td>
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<tr>
<td>Spring barley/wheat</td>
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<td>Early potato</td>
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<td>Main crops</td>
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<tr>
<td>Paddy rice</td>
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<tr>
<td>Maize</td>
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<tr>
<td>Soybean</td>
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<td>potatoes</td>
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<td>Vegetables</td>
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<tr>
<td>Early garden vegetables</td>
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<td>Main garden vegetables</td>
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</table>

Source: Ministry of Agriculture DPRK, FAO-DPRK, FAO/GIEWS 2012
Soil Fertility

Land in DPRK tends to be of poor fertility as a result of low levels of organic matter and high levels of soil acidity. Poor soil fertility in turn directly affects achievable yields. Average yields plummeted to low levels in the mid- to late-1990s following the decline in fuel and fertilizer imports, but have steadily increased since then as fertilizer use and soil management practices have expanded (Fig. 5).

Appropriate fertilization, through application of organic manure, crop residues or chemical compounds, can help to mitigate poor fertility. However, while the use of organic manure is reportedly improving, it remains limited due to the small populations of livestock and resulting constraints on manure availability; in addition, the use of crop residue is limited by competing demands within the household for heating and livestock feed.

The appropriate use of chemical fertilizers is a major challenge for several reasons: (1) overall availability of fertilizer has decreased dramatically as a result of a decline in domestic production and a corresponding increase in the dependence on imports; (2) when fertilizers are available, it is often as an imbalanced formula that can lead to further acidification of the soil; and (3) application of lime to reduce acidity and of phosphate soil to improve fertility requires large-scale excavation, transport and spreading, a process that requires the mobilization of large labour forces in the absence of adequate fuel and machinery (FAO-WFP 2004, 2011, 2012). As a result, typical application rates for lime remain at half a ton/ha every three years, well below the recommended application rate of 2 to 7.8 tons/ha every 3 to 5 years for soils with such level of acidity (Goodbody 2013; FAO-WFP 2004, 2010).

Other Agricultural Inputs

The economic isolation of DPRK contributes to a critical shortage of key agricultural inputs that limits agricultural production. Use is low country-wide, but the difficulty in accessing areas of the north (lack of infrastructure, poor weather) and priority on supporting farms in the south where returns are higher with fewer inputs means use is even lower in northern counties. Mechanization represents perhaps the biggest challenge and potential in DPRK. The rehabilitation of old and acquisition of new tractors has improved the availability, but use is still constrained by a lack of spare parts, tires and fuel (FAO-WFP 2012). Distribution of tractors varies by province, with 60 percent of tractors found in 4 provinces, North and South Hwanghae, and North and South Pyongan (ranging from 12 to 21 percent).

Irrigation potential has increased in recent years due to the re-alignment of canals as gravity-fed systems, thus reducing dependency on electrically-powered pumping stations. However, irrigation is typically limited to paddy fields with supplementary irrigation in the face of dry spells or drought (e.g. in 2012) dependent on massive mobilization of labour forces to dig wells and carry water (FAO-WFP 2012).

Additional inputs that can improve productivity include high-yielding seeds, planting materials (e.g. plastic sheeting) and pesticides. In terms of high-yielding seeds, the government is promoting and supporting initiatives for quality seed production. However, these initiatives face key challenges to simultaneously attain high-yield varieties while addressing resistance to major diseases and pests.

Plastic sheets are particularly important in the early season to protect seedlings against the cold. The availability of plastic sheets has improved substantially as a result of an FAO-MoA initiative; however limited supply creates major challenges in the early season.

Pesticide use is very low in DPRK. The shortage of pesticides increases reliance on labour intensive means of controlling pests, labour that could otherwise be used for more productive activities (FAO-WFP 2011).
Food Access

According to the government, the PDS is the main means of accessing food for the vast majority (70 percent) of households in DPRK. However, rations are frequently below target and distribution can be at best erratic, especially in the more remote areas of the country. Physical access to land for kitchen gardens and to raise small livestock, as well as access to forests and coasts for gathering of wild foods, are important in providing nutritious supplements to the PDS ration. Economic access to additional food depends largely on employment, salaries and access to markets, information about which is exceedingly limited in DPRK. Informal exchange in the form of bartering and gifts is common practice for households and can also improve access to food.

Physical Access

The Public Distribution System

The PDS is a centrally-controlled system of food distribution in DPRK. According to government sources, national production is redistributed to households based on factors such as household size and age composition, occupations of all household members and number of hours worked per day. From within the PDS-dependent population, three groups are considered priority populations based on their occupation: (1) the defence, public administration and compulsory social security workers; (2) mining and quarrying workers; and (3) construction workers. The average household with workers from one of the priority populations receives a ration of 700 grams PPPD. Cooperative farmers, representing 30 percent of the population, receive their ration as an annual allotment from their own production after the main harvest. For the average farmer’s household, the allotment is approximately 219 kilograms per person per year, or 600 grams PPPD. Depending on availability, the farmer’s ration consists of 20 to 50 percent rice, and 50 to 80 percent maize or potatoes. It can also include wheat from the winter production or soybean. In addition to cereals, cooperative farmers receive a ration of bean paste, cooking oil, salt and soy sauce.

After allocations are made to preferential groups and farmers, the balance of cereals, potatoes and soybeans is distributed to the rest of the households in the country. PDS dependent households are entitled to receive their ration every 15 days or once a month, depending on location. Household stocks are small if existent, and are carefully managed to last.

Given that cooperative farmers receive their ration as an allotment of their total production and certain groups are prioritized for distribution, it is assumed that these population groups have greater access to food compared to the majority of the PDS dependent population. Geographically, a greater proportion of cooperative farmers and priority groups live in the southern and western counties, with the lowest proportion in the northern and urban areas (Map 3).

Map 3. Proportion of Cooperative Farmers and Priority Groups

According to government sources, the planned average target ration for PDS dependents is 573 grams PPPD. In reality, however, rations face monthly adjustments and rarely reach the target. Indeed in the last four years, according to government sources, the ration size has rarely exceeded an average of 400 grams PPPD, an amount which would provide approximately 1600 kcal PPPD and is well below the recommended intake of 2100 kcal. In 2007/08 and again in 2010/11, ration sizes reportedly dropped as low as 150 grams PPPD in the lean season (April to August), reflecting a serious shortage of food.

**Wild Foods**

In DPRK, gathering of wild foods is both a traditional practice as well as a key coping mechanism to meet food shortages at specific times in the year. In addition, these foods play an important nutritional role in the diet as their nutritional value can be high.

The main products collected include algae in coastal areas, acorns, bellflower roots, edible grasses, mushrooms, pine nuts, and wild berries, with most gathering occurring in the spring season. Most of the gathered food is typically consumed within the household, either immediately or preserved for use in the winter, while a smaller proportion may be reserved for sale, bartering or gifting to elderly or urban relatives. Wild foods can also be found in state shops and markets (FAO-WFP 2012).

**Household Gardens & Livestock**

Kitchen gardens are important household assets not only for providing vitamin and mineral-rich foods to supplement PDS rations, but also for providing a modest source of income, items for gifting, bartering or exchange, and a key space to rear of small livestock.

The average size of a kitchen plot varies widely—for cooperative farmers, plot size ranges from 15 to 30 pyong, for rural PDS dependents, average size is 20 pyong, and for urban PDS dependents, 7 pyong (FAO-WFP 2012). Kitchen gardens are intensively cultivated with an early crop of potatoes and green maize, followed by vegetables such as cabbages, peppers, radishes and garlic. Many of these vegetables are then preserved in a popular dish known as “kimchi” that can be eaten year-round and throughout the lean season.

Small livestock, such as rabbits, goats and poultry, are frequently raised in gardens and provide a key source of protein for the household. Indeed, the populations of small livestock have grown substantially in recent years in contrast to the relatively stagnant growth of larger livestock, a trend partially informed by the high demand of larger livestock on limited grain supplies (Fig. 7).

Of all population groups, cooperative farmers have the greatest access to kitchen gardens. Among PDS dependents, rural households tend to have greater opportunities...
to grow vegetables and to raise small livestock than their urban counterparts. Nonetheless, according to the 2008 census, about 45 percent of the urban population reported growing some vegetables and 37 percent reported raising some livestock that year (CBS 2009).

Detached dwellings can serve as a proxy indicator for access to kitchen gardens: detached dwellings tend to have more available surrounding land to cultivate than row homes or apartments. As indicated in Map 4, counties in the south and east have a greater proportion of detached households and thus are presumed to have greater access to gardens and livestock.

Social Access

Social support networks, including friends and relatives, are a key mechanism for accessing food in DPRK. For example, urban households struggling to meet their food needs may receive support from rural relatives that have greater access to food from their own production, while women who are pregnant or lactating traditionally continue to receive support from their parents.

According to the 2012 CFSAM, approximately 78 percent of all households reported relying on help from a friend or relative in order to meet food needs in the last month, with a greater proportion of PDS dependent households reporting social support (90 percent) compared to just under half (48.5 percent) of cooperative farmer households (FAO-WFP 2012). This support may place an additional strain on the already low food stocks of the supporting families and stress their ability to meet their own household needs.

Financial Access

Outside of the PDS and own production, households may turn to formal and informal mechanisms for accessing food. While little data exists on incomes and expenditures, it is suspected that the cash economy is largely underdeveloped in DPRK, with a much greater reliance on systems of barter and exchange. In 2011, for example, an average worker salary was estimated at KPW 3,000 to 4,000, while at the same time a kilogram of rice was estimated to cost KPW 2,000 and a kilogram of maize was KPW 1,000, suggesting very low formal purchasing power if the household were to rely solely on purchases for food supply (WFP-FAO-UNICEF 2011).
Livelihoods

With no private sector, the population of DPRK depends almost entirely on the government for employment. Of a total working population\(^6\) of 17.4 million, 70 percent are working in government institutions, state enterprises or on cooperative farms/enterprises. Of the remaining working-aged population, 24 percent are not engaged in any economic activity, either as students (5.4 percent) or as retired workers (18 percent) and 5.3 percent identified household work as their primary activity, most of them female (CBS 2009). Within the working population, the majority (60 percent) are working in just two sectors: either agriculture, forestry and fishing or manufacturing. As such, a large proportion of the population is vulnerable to a shock affecting one of these two sectors.

Nationally, the work participation rate is higher for males (80 percent) than females (62 percent). However, women workers outnumber men in certain sectors, particularly wholesale and retail trade (68 percent female workers) and slightly more in the agriculture, forestry and fishing sector (53 percent). Participation in the market for sale of goods or food from gardens is often restricted to older women in DPRK. The sectors in which men dominate include manufacturing, mining and quarrying and public administration.

In addition to primary livelihoods, household-based activities can improve household access to food. As shown in Figure 8, about 84 percent of the total working-aged population reported engaging in at least one type of household-based economic activity (e.g. gardening, raising livestock) that provides additional goods or food for household consumption, barter or sale (CBS 2009).

As shown in Figure 8, rural households have a more strongly gendered division of labour than urban areas: more women engage in gardening and raising of livestock compared to men pointing to their importance in household food security (CBS 2009).

Markets

Formal markets in DPRK can be classified as three main types: state shops, urban daily markets and county-level farmers’ markets. As part of their ration, households receive coupons to purchase essential commodities such as soy sauce, bean paste and cooking oil at subsidized prices from the state shops. Each household is assigned to a state shop and is entitled to a monthly quota for certain commodities that is set by the Ministry of Commerce. However, full allocation of the quota to households depends primarily on the availability of the commodities, which can vary from county to county.

Urban daily markets and rural farmers’ markets (held 3 days/month) are organized such that people can negotiate directly with sellers to buy food and other items. However, cooperative farmers are not allowed to sell their surplus produce directly in these markets. The markets also offer opportunities for people to sell, barter or exchange handicrafts and other industrial products, including processed food.

Outside of formal markets, informal market mechanisms do exist such as bartering, exchanging or gifting of cereals and other products (FAO-WFP 2012). However, knowledge about these activities or the flow of goods through informal markets is very limited. Based on available data in 2012 for domestic cereal production, anticipated cereal imports and the reported annual PDS distribution (calculated from the reported average monthly ration for both PDS dependents and cooperative farmers), there is a cereal surplus of over one million tons unaccounted for that may be flowing into informal markets (Table 4).

<table>
<thead>
<tr>
<th>Table 4. Potential availability in informal markets (‘000t), 2012/13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Cereal Production</td>
</tr>
<tr>
<td>Anticipated Cereal Imports</td>
</tr>
<tr>
<td>Estimated PDS distribution</td>
</tr>
<tr>
<td>Unaccounted cereals</td>
</tr>
</tbody>
</table>

Source: FAO-WFP 2012
Food Utilization

The health system in DPRK provides extensive coverage with a focus on prevention, driven by a system of household doctors. A significant achievement of the system has been the extensive vaccination campaigns resulting in over 90 percent coverage. Nonetheless, a lack of medical supplies continues to pose a serious challenge to the healthcare system. Access to clean water and improved sanitation is widespread, although there is limited information on the maintenance of piping systems and therefore the quality of piped water to households. Poor quality and diversity of women’s and children’s diets remains a critical concern.

Health in DPRK

The Health System

DPRK has a free centralized health management system focused on prevention and primary healthcare. The system provides significant coverage across the country, but the quality of treatment is hampered by widespread shortages of basic medications and medical supplies and aging infrastructure. The system relies primarily on household doctors and additional networks of hospitals and clinics in urban, rural and industrial areas. One household doctor specializing in preventive and curative services is placed per 130 households and province and county hospitals provide more specialized care (MoPH 2012). In total, there are 216,000 health personnel in DPRK, of which 80 percent are nurses and doctors (Table 5). Overall, 33 medical doctors are provided per 10,000 people (MoPH and WHO 2011). The number of health workers per 1,000 inhabitants tends to be higher in urban areas and in the western region of the country (Map 5).

The Ministry of Public Health has taken key actions to increase local vaccine plant capacity and, through greater cooperation with different international organizations, to ensure increased vaccination coverage for children. As a result of these efforts, the immunization rate is between 90 and 99 percent for BCG, hepatitis B, poliomyelitis, pertussis, DPT3 plus hepatitis B, measles and tetanus (MoPH 2012). However, adequate care for vulnerable populations such as pregnant and lactating women, newborns and children under five remains compromised, as evidenced in the consistently high mortality rates for these groups (See mortality section).

Table 5. Health Personnel in DPRK

<table>
<thead>
<tr>
<th>Staff Category</th>
<th>Numbers of staff by category</th>
<th>% workforce</th>
<th>Staff per 1,000 inhabitants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td>79,931</td>
<td>37%</td>
<td>3.3</td>
</tr>
<tr>
<td>Nurses</td>
<td>93,400</td>
<td>43%</td>
<td>3.9</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>8,622</td>
<td>4%</td>
<td>0.4</td>
</tr>
<tr>
<td>Midwives</td>
<td>7,368</td>
<td>3%</td>
<td>0.3</td>
</tr>
<tr>
<td>Other health person</td>
<td>26,406</td>
<td>12%</td>
<td>1.1</td>
</tr>
<tr>
<td>Total</td>
<td>215,727</td>
<td>100%</td>
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</tr>
</tbody>
</table>

Source: MoPH and WHO 2011

Map 5. Number of Health Workers per 1000 Inhabitants

Source: Population Census 2008
Disease

The main communicable diseases are acute respiratory infections (ARI) and diarrhoea amongst children, and tuberculosis amongst adults (MoPH and WHO 2011). According to the Ministry of Public Health, no cases of HIV/AIDS have been detected in DPRK to date. In 2012, the prevalence of diarrhoea among children younger than 5 years was estimated at 8.5 percent and ARI at 6.5 percent. The prevalence of tuberculosis was estimated at 418 cases per 100,000 people in 2008, of which 4 percent was multi-drug resistant (MoPH and WHO 2011). The National TB control programme, with support of the Global Fund, has continued to increase the proportion of TB patients treated with DOTS, from 65.2 percent in 2006 to 94.5 percent in 2010. Prevalent vector-borne diseases include malaria and Japanese encephalitis. While DPRK was declared malaria-free in the 1970s, the disease returned again in the late 1990s. Since then, progress has been made in efforts to control it and the incidence of malaria dropped from 300,000 in 2001 to 7,400 in 2007. Non-communicable diseases (cerebro-, cardio-vascular, cancers and respiratory illnesses) account for an increasing burden of morbidity and mortality in DPRK. The high prevalence of adult male smokers (52.3 percent in 2009) is a major contributor to the disease burden.

Reproductive Health

On average, women between 15 and 49 years of age bear two children. Contraception is quite common in DPRK, with approximately 70 percent of married women reporting the use of some kind of contraceptive method, most commonly an IUD (CBS and UNFPA 2010). Antenatal care is a key forum for delivering health messages to improve the health and nutrition of the mother and baby. Over half of women (61.6 percent) receive the recommended number of antenatal visits (16) over the course of their pregnancy, with higher access in urban compared to rural areas. Antenatal care is typically provided by skilled medical personnel. Low birth weight of the infant is an important outcome indicator of the health and nutrition of the mother during pregnancy, and a risk factor for health and nutrition of the child: The risk of stunting increases substantially for infants weighing less than 2,500 grams at birth. Between 1998 and 2009, the proportion of low birth weight babies has declined by 37 percent (6 percent in 2009) (MoPH 2012). Most deliveries occur in health facilities (87.9 percent) and are attended by a doctor (CBS and UNFPA 2010). Nonetheless, pregnancy-related deaths remain fairly common (MMR of 85.1), suggesting a critical gap in quality care and the provision of adequate supplies (CBS 2009).

Water & Sanitation

Access to safe water and improved sanitary facilities is directly linked to reduced incidence of disease and therefore to the body’s utilization of food. Based on the available data from the 2008 census and 2009 MICS, some 90 percent of the households have access to piped water, and for majority, the pipes reach the dwelling. While distribution of water is maintained and managed by people’s committees at the local level, little information exists on the level of maintenance and current state of the piped water system, with implications for the quality of the water delivered to households. In 2009, only 20 percent of households treated water before use, mostly by boiling it (CBS 2010). The proportion of the population using improved sanitary facilities such as private flush toilets and private pit latrines is 83 percent (CBS 2010). Flushable toilets are available to more than half (58 percent) of all households while 35 percent use pit latrines and another 7 percent use public facilities or share with other households. Access to improved sanitation facilities is higher in urban areas than in rural areas (90 versus 73 percent). For all, the risk of water contamination and diarrheal diseases increases during periods of flooding as sewage systems are easily overwhelmed.

Education on hygienic practices is supported throughout DPRK. Household doctors pass on messages on hygiene as part of their routine work; messages are included in schoolroom education; and health education and sanitary messages are distributed through mass media via television and newspapers (MoPH 2012).
Diets of Women and Children

The nutritional status of women and children is directly affected by the mother’s diet during and after the pregnancy, as well as by how the child is fed.

The 2012 national nutrition survey provides insight into the diets of mothers, suggesting that only half (49.6 percent) of mothers have acceptable dietary diversity, defined as consuming 4 of 9 food groups in the previous 24 hours. The survey also found that women in Pyongyang have a distinctly more diverse diet than any other province in the country, with similar findings for greater household-level dietary diversity in Pyongyang compared to other provinces.

According to international recommendations, infants should be introduced to breastfeeding within one hour of birth (early initiation) and be exclusively breastfed until 6 months of age, at which point safe and appropriate complementary foods should be introduced. For a child between 6 and 23 months of age, acceptable dietary diversity is defined as consuming at least 4 of 7 food groups in the previous 24 hours.

In 2012, 28 percent of infants under the age of two years had received breastmilk within one hour after birth and 69 percent of infants less than 6 months were exclusively breastfed. Approximately 60 percent of 6 month olds had been introduced to complementary foods, while by 8 months about 80 percent were receiving complementary foods. In addition, the diversity of the complementary foods received was considered poor for 3 out of every 4 children aged 6 to 23 months (73.5 percent), a rate that worsens for infants 6 to 11 months of age (93.5 percent).

Women’s Education

Women’s education is widely understood to have an impact on child nutrition status. Women with higher education tend to have greater access to information on improved care and feeding practices for children. In DPRK, the majority of women (75 percent) have completed secondary education, reflecting the 11-year free and compulsory education system in the country (CBS 2009). An additional 10 percent have a university education or higher. As indicated in Map 6, the proportion of women with more than secondary education is higher in predominantly urban counties than in rural counties. Only 6 percent of women have primary education or no formal education. A key data gap is the extent of nutrition-specific knowledge amongst women.
Risk and Vulnerability

In DPRK, where national food security is shaped by low or non-existent food reserves, no established trade relations for commodities and a unreliable system of centralized distribution, the lack of resilience in the face of a shock, particularly to domestic agriculture production, is striking. At household level, vulnerability to food insecurity is compounded by restrictions on movement and on market engagement, activities that might otherwise enable a household to weather a shock to its supply of food. Natural shocks or hazards in DPRK include droughts, floods, tidal surges, typhoons and extremely cold winters. Non-natural hazards, such as deforestation and hazards related to urbanization including degradation of urban air, water and soil and indoor pollution, are increasingly of concern as well.

Hazards

Despite positive achievements in terms of disaster management, the country remains highly vulnerable to natural disasters, with serious implications for food security. Heavy rainfall, storms and flooding are fairly common with the risk rising during the summer months (July through early September). Moderate dry spells, while not major disasters, can pose a considerable challenge to production particularly in the spring season when risk is higher. In the last 20 years, the country has experienced approximately 20 floods, 7 storms and one major dry spell (April 2012), that have affected over 15 million people (EM-DAT 2013).

In the last two years alone, natural disasters have caused considerable damage and placed millions of people at risk of food insecurity. In 2011, three floods hit the main food producing provinces in the south-eastern cereal bowl, particularly South and North Hangwae, affecting over 50,000 people and resulting in serious damage to crops (EM-DAT 2013).

In 2012, a dry spell in April, flood in July and a storm in August together affected 3.14 million people (EM-DAT 2013). The flood and cyclone together resulted in a total estimated loss of 11,400 hectares of crop land, flattened 47,000 hectares and caused widespread damage to infrastructure (FAO-WFP 2012).

Non-natural hazards, including deforestation and urbanization, often exacerbate the impacts of natural hazards, in-

Vulnerability

There is considerable variation in the exposure to hazards around the country. In the north, extreme cold and prolonged winter seasons frequently delay crop planting. Flooding, storms and dry spells are more likely to impact the coastal and southern cereal bowl regions of the country. On sloping lands, landslides are also a risk.

Given the lack of private assets and alternative livelihoods, as well as the formal restrictions in cereal trade and population movement, all households in DPRK are strikingly vulnerable to food insecurity in the face of a large-scale natural disaster that affects food production. However, households in counties with low food production that are reliant on inflows of food from counties with higher production are particularly vulnerable as transport and accessibility are a challenge. These counties can be found mostly in the northern and eastern provinces of Ryanggang, Chagang, North Hamgyong, South Hamgyong, and Kangwon.
Primary Outcomes

Primary outcomes associated with a household’s food security status include food consumption patterns and changes in livelihood patterns. Information on changes in livelihoods, however, is limited in DPRK. Undernourishment, as an indicator of hunger, has shown little improvement overall since the 1990s: in 2012, undernourishment was estimated at 32 percent of the population (FAO 2012). Food consumption patterns in DPRK are strikingly similar across households and are characterized by heavy reliance on staples, almost daily consumption of vegetables and low protein intake. Consumption patterns are highly vulnerable to shocks to agricultural production and food-based coping strategies are commonly employed. The lack of household food stocks plays a key role in this vulnerability.

Food Consumption

Undernourishment

Undernourishment, not to be confused with underweight, is a proxy indicator of hunger in a country, reported as the proportion of the population that has food consumption (kilocalories) falling below the minimum energy requirements. It is not a measure of nutritional status, but a theoretical construct of the potential per capita availability of food. According to the FAO State of Food Insecurity in the World 2012, trends in undernourishment for DPRK have shown an increase overall between 1990/92 and 2010/12 (26 percent increase), although with some improvement in the last few years (Fig. 10). In 2010/12, an estimated 8 million people were considered hungry, equal to 32 percent of the total population.

Household Food Consumption

The food consumption score (FCS) is a tool developed to assess dietary diversity at the household level and can provide important insight into household access to food and resulting consumption patterns. The FCS weights food groups based on their relative nutritive value and takes into account the frequency of consumption of each group within the past seven days. Based on agreed thresholds, the households are then classified into three food consumption groups: poor, borderline and acceptable.19

Dietary diversity in DPRK is remarkably similar from household to household, a function mainly of the centralized distribution of rations and similarity in household crop and garden production. The diet is heavily based on staple grains (rice and/or maize), with daily consumption of pickled vegetables (kimchi) and condiments (bean paste), but limited consumption of oils and fats. Protein-source foods are poorly represented in the diet, with average consumption on one or two days of the week. A recent assessment indicated that one in five households (19 percent) did not consume protein of any kind in the past week. Households with livestock have greater access to animal-source protein in the diet, but meat consumption is still primarily reserved for special occasions (FAO-WFP 2012, WFP 2012).

Using a typical ration-based diet comprised of 260 grams of cereals, 15 grams of oil, 30 grams of bean paste and 30 grams of soy sauce, a macro-nutrient gap analysis suggests that the diet falls short of recommended intake of energy by 30 percent, of protein by 25 percent, and of fats by 30 percent (FAO-WFP 2012).

In DPRK, households achieve acceptable consumption usually when they are able to access more protein-source foods. Since meat consumption is generally
As highlighted in the section on Access, PDS rations rarely reach targeted levels and are often unable to meet the needs of households. In addition, distributions may be unreliable, especially in more remote areas of the country. During the lean season or in the event of a shock, household food supply from rations may therefore decline dramatically. While some households may be able to increase reliance on household kitchen gardens, small livestock, fishing and collecting of wild foods, capacity is limited. It is common for households to resort to food-based coping strategies in which food intake is reduced, water is added to foods to increase bulk and less-preferred foods are consumed.

### Food-Based Coping Strategies

As highlighted in the section on Access, PDS rations rarely reach targeted levels and are often unable to meet the needs of households. In addition, distributions may be unreliable, especially in more remote areas of the country. During the lean season or in the event of a shock, household food supply from rations may therefore decline dramatically. While some households may be able to increase reliance on household kitchen gardens, small livestock, fishing and collecting of wild foods, capacity is limited. It is common for households to resort to food-based coping strategies in which food intake is reduced, water is added to foods to increase bulk and less-preferred foods are consumed. In addition, households frequently increase reliance on relatives to improve household food supply.

While the sample of households was small and controlled, the 2012 CFSAM still found that three in four households reported worrying about the ability to get enough food, and approximately three in four indicated that they ate smaller meals than they need (Fig. 12).

Skipping meals was less common, although just under half of households reported having to eat fewer meals than usual. Overall, the low resilience of the food system in DPRK translates into a high level of vulnerability for households, particularly PDS dependents. Access to food for the majority of households is precarious and can tip easily over the edge into food insecurity.

**Figure 11. Food Consumption Groups 2012**

Overall, consumption patterns of cooperative farmers tend to be more resilient to shocks than PDS dependent households, given their greater access to own production, gardens and livestock. According to the 2012 CFSAM, households overall reported better consumption patterns compared to a year ago, with 37 percent having acceptable consumption, another 37 percent borderline, and 26 percent poor. However, 45 percent of cooperative farmer households had acceptable consumption compared to 32 percent of PDS dependent households (Fig. 11).

**Figure 12. Household-Level Impacts of Food Security 2012**

The decline in production and distribution of soybeans therefore poses a serious challenge to the improvement of consumption patterns in the country. A striking characteristic of consumption patterns over time in DPRK is the widespread vulnerability to seasonality (peak lean season in June/July) and to hazards that affect production and therefore distribution via the PDS. The lack of resilience, due in part to negligible household food stocks, translates into relatively rapid shifts from one food consumption category into another, such as from borderline to poor consumption, in the face of shortages.

Overall, consumption patterns of cooperative farmers tend to be more resilient to shocks than PDS dependent households, given their greater access to own production, gardens and livestock.
Secondary Outcomes

Child malnutrition and mortality rates are considered secondary outcomes of household food insecurity. While the prevalence rates of stunting, underweight and wasting in DPRK have seen steady improvement since the late 1990s, child malnutrition, and particularly vulnerability to seasonal fluctuations, remains a major concern. In 2012, the national prevalence of stunting was 27.9 percent, considered “serious” according to the WHO thresholds. Micronutrient deficiencies are a major concern, particularly anemia and iodine deficiency disorders. Mortality rates have also declined since 1998, but remain higher than those in 1993.

Child Malnutrition

Child nutritional status is measured based on child’s weight, height and/or age. Overall, child undernutrition indicators have improved in DPRK since 1998, with stunting declining at more than 2 percent per year. However, the rates differ between the provinces with the northern parts having consistently worse rates of malnutrition. While the 2012 Nutrition Survey did not disaggregate according to rural/urban locale, the MICS 2009 results indicate that children in rural areas have generally worse indicators for malnutrition as well. In terms of the MDG for child undernutrition (underweight), DPRK has reached its goal by halving malnutrition from 60.6 percent already in year 2000.

Chronic Malnutrition

Chronic malnutrition, or stunting, is measured as low height-for-age. Generally stunting is a result of inadequate nutrition over a prolonged period of time and/or prolonged or recurrent infections. Stunting that occurs within the first 24 months is considered irreversible and carries serious implications for the development capacity and future income-earning potential of the next generation (Lancet series, 2008).

While DPRK has experienced a steady decline overall in the prevalence of stunting among children under 5, from 62 percent in 1998 to 28 percent in 2012, regional disparities are still evident. As indicated in Map 7, stunting remains highest in the northern and eastern provinces of Ryanggang, Chagang and South Hamgyong.

The 2012 national survey also found that stunting increases rapidly between 6 and 23 months, pointing to the importance of addressing stunting in the first 1000 days of life, from inception to 2 years. This focus also draws further attention to the health and nutrition of the mother pre-, during and post-pregnancy.
Acute Malnutrition

The prevalence of acute malnutrition (wasting) measured as low weight-for-height, is one of the short-term consequences of extreme food shortages and/or severe illness and accordingly is a key indicator in emergencies. In DPRK, wasting reflects the seasonal vulnerability of children, with noted peaks in prevalence occurring during the rainy season and pre-harvest (May-Aug).

National assessments, typically conducted post-harvest (September/October), generally fail to capture the fluctuations in wasting that can occur rapidly and pose a serious threat to child health and mortality. Measures of the Mid-Upper Arm Circumference (MUAC) are often used as a proxy indicator for increased risk of mortality and for acute malnutrition, with less than 115 mm circumference considered severely malnourished, and between 115 and 125 mm considered moderately malnourished.20

Micronutrient Deficiencies

Poor dietary diversity can also contribute to micronutrient deficiencies. Data on micronutrient deficiencies in DPRK is limited to Vitamin A supplementation for women and children, micronutrient supplementation during pregnancy, anaemia in women and children, and salt iodization.

The Government has made significant progress towards universal coverage of Vitamin A supplementation for children and for post-partum women. Data from 2012 reported 98 percent coverage of children, while data from 2009 reported 97.5 percent coverage of post-partum women. Similarly, micronutrient supplementation for pregnant women is quite high, found to be 98 percent in 2009, although dropping to 74 percent in 2012. Likewise, compliance to take the supplements for the intended six months had reduced from 44 percent to some 20 percent.

Approximately 31 percent of mothers were found to have anaemia in 2012, a slight improvement from the 35 percent of women of reproductive age in 2004. Some 29 percent of children under the age of five and almost half of children under two were anaemic in 2012, constituting a serious public health problem. In terms of iodine, only 24.5 percent of households consume adequately iodized salt in 2009, with higher use in urban households (29 percent) compared to rural households (18 percent). As a result, goitre tends to be more prevalent in the mountainous counties of DPRK.

Mortality

DPRK mortality indicators, while showing declines since the 1998 MDG baseline values, remained higher in 2008 compared to 1993. In addition, a child and a mother’s risk of dying remained worse in rural areas in 2008: IMR and USMR were 21.7 and 29.6 deaths per 1,000 live births each and MMR was 105.0 deaths per 100,000 live births in rural areas, compared to 17.6, 24.6 and 70.0 respectively in urban areas.

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Source: MoPH 2012
Recommendations

Given the unique context of DPRK, a twin-track approach of long-term initiatives, including large-scale investment in agriculture and promotion of market reform and trade liberalization, combined with short term approaches including provision of humanitarian food, nutrition support and livelihood assistance is needed to lift DPRK out of its current situation of recurrent food insecurity. Inherently, the long-term changes necessary to improve food and nutrition security will involve both environmental and infrastructural changes as well as changes to individual behavioural and management practices.

Long-Term Assistance

Availability: To increase national food availability in DPRK, it is recommended that attention be drawn to both household-level production (kitchen gardens) as well as large-scale agricultural production (cooperative farms). Priority areas for all agricultural production include soil management and conservation, input availability and use, access to and use of improved crop varieties, and the reduction of post-harvest losses. In addition, it is recommended that production of pulses (e.g. soybean) be further encouraged given the benefits for protein availability. Coordination between Government, UN agencies, and INGOs will be key to sustained improvement in crop production.

Access: It is recommended that small livestock production in DPRK be further studied and improved so as to be more cost-effective and sustainable for households. Expansion of small livestock production can be potentially beneficial for both food security and nutrition outcomes. Relaxation of restrictions on movement and on market activity similar to the 2002 reforms would similarly be beneficial for food security and nutrition.

Utilization: Dietary diversity for women and children, as well as infant and young child feeding practices can be improved in DPRK. It is recommended that micronutrients or fortified food be provided for pregnant and lactating women to improve nutrition and mortality outcomes for both the women and their children. It is also recommended that long-term programming in DPRK target women for nutrition education as well as education on optimal child care practices in coordination with the People’s committees, the Ministry of Health and where possible with support from UNICEF and WHO.

Nutrition: Activities to prevent stunting are recommended in order to interrupt the inter-generational cycle of malnutrition. Such activities could include the provision of fortified blended foods to children less than 2 or 3 years of age.

Vulnerability: Considering that forest coverage has already been depleted to dangerously low levels, the intensification of reforestation, soil conservation, agroforestry and other catchment management practices are urgently needed to limit soil erosion and reduce vulnerability to natural hazards. In addition, it is recommended that the preparedness and response capacity of the government to risks and hazards continue to be supported and expanded. Improvements in food security monitoring, especially in those most insecure counties, can help to refine targeting of the most insecure households and ensure limited resources are effectively and efficiently used.

Short-Term Assistance

In the short-term, it is recommended that programmes focus on targeting the most vulnerable populations for immediate assistance, particularly in the north east of the country. Broadly speaking, priority populations include children under five, pregnant and lactating women, and the elderly, from which the most vulnerable can be identified for food, nutrition and livelihood assistance.

In terms of nutrition support, it is recommended that specialized care be established for the treatment of severe acute malnutrition (SAM) in both hospitals and in communities, particularly in those counties with the highest prevalence of malnutrition. Early identification and treatment of moderate acute malnutrition (MAM) should likewise be implemented to reduce the incidence of SAM. It is also recommended that blanket supplementary food provision be considered for all children under 5 years at least during the lean season, especially during the years when food production is reduced.

Given the unique context of DPRK, a twin-track approach of long-term initiatives, including large-scale investment in agriculture and promotion of market reform and trade liberalization, combined with short term approaches including provision of humanitarian food, nutrition support and livelihood assistance is needed to lift DPRK out of its current situation of recurrent food insecurity. Inherently, the long-term changes necessary to improve food and nutrition security will involve both environmental and infrastructural changes as well as changes to individual behavioural and management practices.
End Notes

1 The economic data for DPRK is based on publications from EIU, Bank of Korea, Korea Development Institute, Seoul and FAO-WFP CFSAMs.

2 The official exchange rate is currently 129 KPW to US $1 and 172 KPW to 1 EURO.

3 After two consecutive years of summer flooding in 2006 and 2007, food assistance returned in 2008, with continued support in 2011 and 2012.

4 Measured in cereal equivalents, domestic production includes main and early season outputs from cooperative farms and individual plots, plus outputs from sloping land and gardens.

5 Area planted with potatoes includes early season and main season crop production.

6 “Utilization” in terms of the food balance sheet includes food use, feed use, seed requirements, post-harvest losses and stock build-up.

7 The deficit in 2008/09 reflected poor domestic production as a result mainly of low availability of inputs and soil infertility.

8 The 2012/13 balance sheet breakdown ('000t): 4,922 available (after post harvest losses), 5,429 utilized, 300 imported, 35 in food aid.

9 Forest cover was also lost as a result of firewood extraction and logging.

10 The short time between the harvest of the first crop and the planting of the second crop puts a heavy demand on labour and tractors (FAO, 2003).

11 Acidic soils have a pH between 4.5 and 5.5, while optimal soil pH is 6.5.

12 In 2012, several farms reportedly increased the use of organic manure at a target application rate of 20 tons/ hectare.

13 The steady increase in the number of draught oxen over the last few years is indicates the continuing shortage of farm power.

14 One pyong is equal to 3.3 square metres.

15 In 2012, the rabbit population was estimated at 1.2 rabbits per capita and represented a significant source of food and protein.

16 The working population is defined in the population census as those at least 16 years of age.

17 Domestic cereal production reflects cereal equivalents after subtracting estimated post-harvest losses (FAO-WFP 2012).

18 However, data on infections was collected in September and October and therefore does not capture seasonal changes in infection levels.

19 The thresholds for food consumption score applied in DPRK are the following: poor <28; borderline 28-42; acceptable >42.

20 MUAC cutoffs are determined on the basis of admission criteria to selective feeding programmes.

21 Varieties with tolerance to both weather stress and to major diseases and pests.

22 Fortified blended food should be formulated to be ideal for stunting prevention instead of wasting prevention.
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