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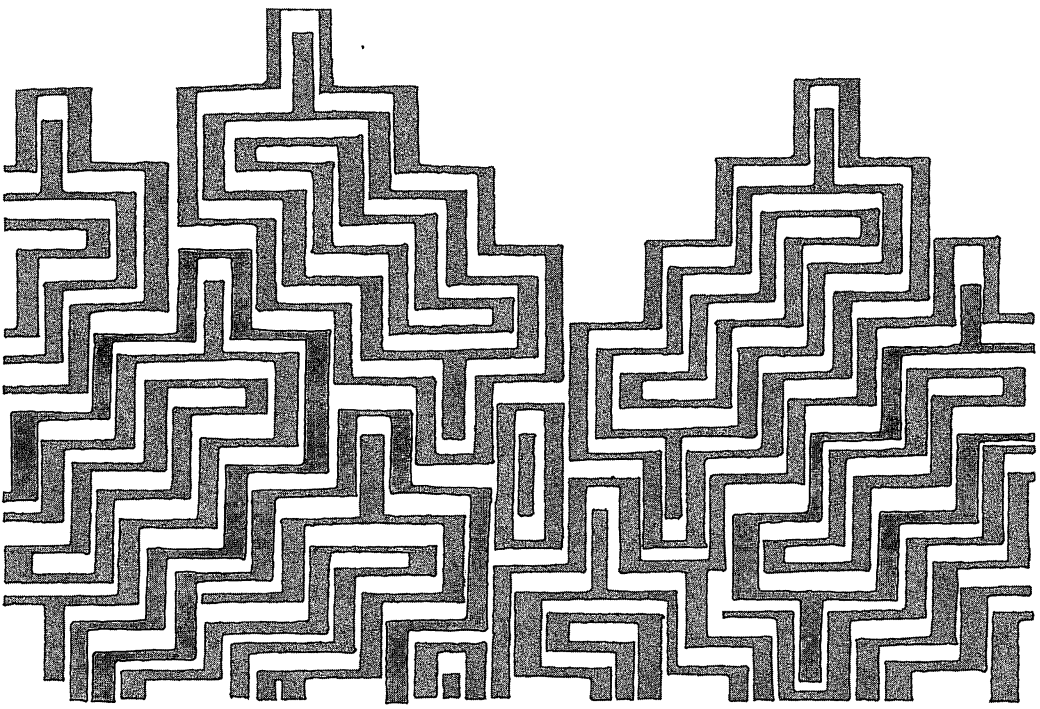
The Population of North Korea

NICHOLAS EBERSTADT and
JUDITH BANISTER



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ISBN 1-55729-030-x
Library of Congress Catalog Card Number 91-76771
Printed in the United States of America
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Contents

List of Tables vi
List of Figures viii
List of Maps viii
Acronyms/Abbreviations Used ix
Preface xi
Summary xiii
Introduction 1
Key Findings 2
Background 3
Available Demographic Data on the DPRK 5
Overview of the Data 6
Faithfully Reported or Falsified? 8
Regional Population Distribution 13
Trends and Geographical Variations in Household Size 18
Urbanization 20
Migration 28
Total Population Size, Growth, and Sex Ratio 31
Elections as an Indicator of Total Population Size 35
Population and Party Membership 38
Age Structure 38
Vital Statistics and Rates 41
Mortality and Health 43
Expectation of Life at Birth 45
Crude Death Rates 50
Infant Mortality 50
Reported vs. Estimated Mortality Trends 52
Causes of Death 55
The Health Care System 58
The 1980s Marriage Boom 63
Fertility 66
Population Policy 69

North Korea—1990 Population Profile 72
Educational Attainment 75
Labor Force 79
"Missing Males": The Military Population 86
Conclusions 97
Appendix A: Modeling North Korean Population Dynamics 101
Appendix B: Data Accuracy and Completeness 113
Appendix C: North Korea 1990 Population Profile 117
Appendix D: Range of Estimates of DPRK Armed Forces 119
Notes 124
Works Frequently Cited 143

TABLES

Table 1. Reported North Korean Mortality in Relation to CMEA Countries, 1960–1986 12
Table 2. North Korea, Administrative Units, 1949–1987 14
Table 3. North Korea, Provincial Civilian Population Density, Year-end 1987 15
Table 4. North Korea, Civilian Population and Sex Ratio by Province, Year-end 1987 17
Table 5. North Korea, Number of Households by Province, 1980–1987 19
Table 6. North Korea, Civilian Population by Urban and Rural Residence, 1953–1987 21
Table 7. Population of Major Cities in North Korea, 1980–1987 22
Table 8. Urbanization in North and South Korea, 1935–1985 28
Table 9. North Korea, Internal Migration, 1980–1987 30
Table 10. Annual Domestic Migration as Reported Through Residential Registration System: North and South Korea, 1980–1987 30
Table 11. North Korea, Reported Total Population by Sex, 1946–1987 32
Table 12. North Korea, Estimated Total Population Size and Growth, 1960–1990 34
Table 13. North Korean Population Totals Implied by Elections for Supreme People's Assembly (SPA), 1948–1990 36

Table 14. Claimed or Estimated Party Membership as a Percentage of Total Population: North Korea and Selected Other Communist Countries, 1987 39
Table 15. North Korea, Reported Civilian Population by Age Group, Year-end 1986 40
Table 16. North Korea, Reported Crude Vital Rates and Infant Mortality, 1944–1986 42
Table 17. North Korea, Reported Life Expectancy, 1936–1986 46
Table 18. Estimated Expectation of Life at Birth for North Korea, South Korea, Prepartition Korea, 1940–1986 48
Table 19. North Korea, Causes of Death, 1960–1986 56
Table 20. Breakdown of Reported Mortality by Cause of Death: Korea 1938–1942, South Korea 1985, North Korea 1986 57
Table 21. Structure and Performance of Health Care Sectors in Korea, Selected Years, 1938–1987 60
Table 22. North Korea, Number of Cases of Marriage and Divorce, 1949–1987 64
Table 23. Total Fertility Rates, North and South Korea, 1966–1988 68
Table 24. North Korea, School Enrollment, 1986–1987 76
Table 25. North Korea, College and University Graduates, 1988 76
Table 26. Reported Educational Attainment for the DPRK and Selected Other Countries, Recent Years 77
Table 27. North Korea, Population Ages 16 and Over by Occupation, 1986 and 1987 80
Table 28. Reported Classification of North Korean Population by Occupation, 1960–1987 83
Table 29. North Korea, Estimated and Projected Population in Labor Force Ages, 1986–2050 85
Table 30. North Korea, Males Not Reported, 1975–1987 88
Table 31. World's Largest Military Forces, Totals and Percent of Population, 1987 93
Table 32. Military Mobilization, Estimated 1986 Percent of Population in Armed Forces, North Korea and "Top Ten" Other Countries by Source of Estimate 94
Table 33. Estimates of North Korea Armed Forces by Source, 1975–1987 95
Table A-1. North Korea: Population and Vital Rates, 1960–2050 104

Table A-2. North Korea: Estimates of Mortality and Fertility, 1960–2050 108
Table B-1. North Korea, Estimated Completeness of Infant Mortality Reporting, 1960–1986 116
Table C-1. North Korea, 1990 Population Profile 117
Table D-1. North Korea, Alternate Estimates of Males Not Reported, 1975–1987 120
Table D-2. North Korea, Estimation of Missing Males using Sex Ratios, 1975–1987 121

FIGURES

Figure 1. North Korean Population by Various Indicators: Selected Years, 1962–1990 37
Figure 2. North Korea, Estimated Vital Rates, 1960–1990 44
Figure 3. North Korea, Life Expectancy as Reported and Model 1 Estimates, 1960–1986 53
Figure 4. North Korea, Infant Mortality as Reported and Model 1 Estimates, 1960–1986 54
Figure 5. North Korea 1990 Population Structure 74
Figure 6. Reported Occupations by Sector: North and South Korea, 1987 81

MAPS

Map 1. North Korea, Provincial Population Densities, 1987 16
Map 2. Leading Cities of North Korea, Comparative 1987 Population Sizes 26

Acronyms/Abbreviations Used

ACDA	Arms Control and Disarmament Agency, Washington, D.C.
CMEA, COMECON	Council for Mutual Economic Assistance
CBR	crude birth rate
CDR	crude death rate
CSB	(DPRK) Central Statistics Bureau
DPRK	Democratic People's Republic of Korea (North Korea)
DMZ	demilitarized zone
GDP	gross domestic product
GDR	German Democratic Republic
GFR	general fertility rate
GNI	gross national income
ICD	International Classification of Diseases
IISS	International Institute for Strategic Studies, London
KCNA	Korea Central News Agency
KIPH	Korea Institute for Population and Health, Seoul
KPA	(DPRK) Korean People's Army
KWP	(DPRK) Korean Workers' Party
NAS	National Academy of Sciences, Washington, D.C.
NUB	(Republic of Korea) National Unification Board
PRC	People's Republic of China
PVC	(PRC) People's Volunteer Army
RUP	Rural-Urban Projection Program, U.S. Bureau of the Census
SPA	(DPRK) Supreme People's Assembly
TFR	total fertility rate
UNFPA	United Nations Population Fund (formerly, United Nations Fund for Population Activities)

Preface

This study was originally prepared as a paper for the Center for International Research of the U.S. Bureau of the Census. The analyses and conclusions in this report, however, are solely the responsibility of the authors. We are grateful to all those who made it possible for Nicholas Eberstadt to travel to Pyongyang in May 1990, and we especially appreciate the cooperation of the DPRK Central Statistics Bureau personnel who gave us permission to cite all the official data used in this report. In addition, we would like to thank Andrea Miles, Jonathan Tombes, and Christina Harbaugh for their assistance with research, tables, and graphs. Our thanks also go to Jack Gibson, who created the maps. We received helpful comments on an earlier draft from John Aird, Eduardo Arriaga, Richard Forstall, Christina Harbaugh, Frank Hobbs, Ward Kingkade, Barry Kostinsky, and Barbara Boyle Torrey. The comments and suggestions of Professor Chong-Sik Lee were especially helpful.

Our study benefited from the criticism, and encouragement, offered by some of the DPRK's specialists on population statistics during Nicholas Eberstadt's visit to Pyongyang. We were looking forward to additional comments, criticisms, and suggestions on the penultimate draft of this study. For half a year, however, there was no reply. Official reaction finally came in the form of a brief written communiqué from a leading figure in the DPRK's Central Statistics Bureau; he stated that permission had not been given to use the materials in our study, that no data had been transmitted to us, and that the data in our report were unreliable.

It is our hope that this study will demonstrate the utility of analyzing these available North Korean data, their acknowledged limitations notwithstanding, and that it may help to illustrate the merit of permitting increased contact between foreign students of the DPRK and their counterparts in that country.

Summary

The population situation of North Korea has been a mystery since 1963, when its Communist government commenced an almost total embargo on the release of population-related data. In 1989, the Central Statistics Bureau of the Democratic People's Republic of Korea (DPRK) released a set of official tables of demographic data for the country to lay the groundwork for technical assistance from the United Nations Population Fund. These tables reveal a great deal of information about North Korea that was previously unknown. Enough statistical detail was released to allow modeling of North Korea's demographic trends for the last three decades, characterization of the population situation today, and creation of meaningful projections of population change in the coming decades. This report concludes that:

- At midyear 1990, North Korea has a population of about 21.4 million, 10.6 million male (49 percent) and 10.8 million female. These estimates include civilians and military personnel.
- The country has achieved relatively low mortality, with a projected 1990 life expectancy of 69 years, 66 years for men and 72 for women. Infant mortality is comparatively low, about 31 infant deaths per thousand live births, 35 for boys and 28 for girls.
- North Korea may have an antinatalist policy deliberately hidden from outsiders. Fertility dropped steeply in the early 1970s and is now about 2.5 births per woman. The 1990 birth rate is projected to be approximately 24 births per thousand population, with a population growth rate of about 1.9 percent a year.
- The DPRK male armed forces numbered at least 714,000 in 1975, 909,000 in 1980, and 1.2 million in 1986. By our estimates, North Korea would have had, as of the late 1980s, the sixth largest military in the world. Our estimates are derived from the official statistics analyzed in this report. In the late 1980s, North Korea had a higher proportion of its population under arms than any other country. If all military men were in the ages thought to be used for conscriptees, ages

16–28, they would constitute about 40 percent of the age group. The same size military force would constitute 43 percent of this cohort in the year 2000 because of a drop in the size of the 16–28 age group in the coming decade.

- One-quarter of civilians at ages 16 and above are reported to be engaged in agriculture, whereas three-quarters are nonagricultural. In the coming decade, North Korea's pool of young workers (for civilian or military jobs) will decline in size, whereas the number of middle-aged people of working age will increase.
- The population of North Korea is 60 percent urban. The DPRK's economic transformation from a rural agricultural society to an urban nonagricultural society seems to have progressed far.
- About 95 percent of children ages 6–15 are enrolled in primary or secondary school. Half a million people are enrolled in higher education—universities and specialized schools—and there are 1.4 million graduates of these postsecondary schools.
- North Korea's system of vital registration appears to miss some births, but not many. Around 15 percent of deaths go unregistered, but well over half of infant deaths are unrecorded.

Population Trends and Prospects in North Korea

Introduction

North Korea—formally known as the Democratic People's Republic of Korea (DPRK)—is a country of demographic mystery. In a world where the demographic trends of previously remote areas are being surveyed with increasing frequency and improving precision, strikingly little is known about population conditions in the DPRK. Even such basic figures as the country's total population have been a matter of uncertainty for decades. Indeed, the DPRK is one of only a handful of countries in the modern world never to have published the results of a national census.

North Korea, however, is different from other countries for which demographic data are currently scarce. Unlike some countries in sub-Saharan Africa, North Korea has a population that is neither predominantly illiterate nor largely nomadic—nor is the country's administrative apparatus rudimentary. In contrast to such places as Afghanistan and Cambodia, North Korea is not presently in the process of recovering from a period of protracted turmoil and chaos. The dearth of demographic information about the DPRK, like the more general lack of data about the country, does not reflect the inability of local authorities in this highly planned and strictly regimented society to obtain and process data. Rather, the unavailability of statistics reflects the longstanding determination by the political leadership of this closed nation to control—or withhold—information about the country. Basic statistical information about the DPRK appears to be withheld not only from international organizations in which it has membership, but also from fraternal Marxist-Leninist govern-

ments, and even from the Soviet Union (USSR) and the People's Republic of China (PRC), upon whom North Korea has long relied for economic and military assistance.

Now, however, the DPRK has begun to receive financial and technical assistance from the United Nations Population Fund, which requires certain basic population figures from recipient countries. In 1989, therefore, North Korean officials released to the United Nations a set of tables on its population and related social indicators. In 1990, Nicholas Eberstadt visited North Korea and received permission from officials at the DPRK Central Statistics Bureau to cite these and other statistics. Our purpose here is to analyze the reported data, assess the validity and detect inaccuracies in the figures, and derive some of the preliminary insights about North Korea's population situation that can be gleaned from the newly released information.

Key Findings

The most important finding in this report is that, as of 1987, the male armed forces population of North Korea may have been at least as large as 1.25 million men. This, in fact, would seem to be the smallest plausible estimate for the armed forces of the DPRK that can be derived from the newly released official population data. These available official statistics imply that the male military population constituted at least 6 percent of the total population of the DPRK in 1987, making North Korea at that time the most militarized country in the world in terms of proportion of population in the armed forces. Our various estimates for the armed forces of the DPRK (each based on slightly different assumptions) are all far higher than the contemporaneous estimate of 838,000 active duty military personnel for 1987 published by the International Institute for Strategic Studies in London and the U.S. Arms Control and Disarmament Agency.

Another important and unexpected finding in this report is that North Korea appears to have already achieved a low fertility level, a total fertility rate (TFR) of only about 2.5 births per woman by 1987. Yet in 1989, the UN Population Fund stated that the DPRK Ministry of Public Health had a goal of reducing North Korea's TFR, estimated by the United Nations as 3.6 births per woman in 1985, to 2.5 by 1993!

This report also concludes that North Korea has achieved a relatively high expectation of life at birth and low infant mortality for a developing

country. Though the medical, social, economic, and political systems of North and South Korea are very different, both countries have achieved fairly low mortality and are characterized by similar patterns of cause of death.

DPRK population statistics show the North Korean population as quite urbanized, though the urban population is distributed around the country in small- and medium-sized cities and towns. Pyongyang is highly dominant in the North Korean urban hierarchy, just as Seoul is in South Korea. North Korea's urbanization was rapid until 1970, but since then urban population growth has been slow.

The occupational structure of the adult population of North Korea reflects the transformation out of agriculture that has taken place. Only one-quarter of adults are categorized as agricultural workers. The rest are almost all classified as employees in state-owned industry or service enterprises. A very high proportion of women as well as men is employed in North Korea.

As of midyear 1990, the DPRK has a total population (including the military) of about 21.4 million people, slightly more women than men. Smaller cohorts born since the sharp drop in fertility in the early 1970s are now entering labor force, military, and childbearing ages. Rapid shifts in the young adult age structure are expected in the 1990s and the first decade of the twenty-first century. These shifts can be projected with some confidence using the models we have created, which fit the reported demographic data quite well.

Background

For many hundreds of years, what is now North Korea was merely the northern portion of a united Kingdom of Korea, covering the whole Korean peninsula and inhabited almost exclusively by an ethnic Korean population.[1] In the nineteenth century, Korea came to be known in the West as the "Hermit Kingdom" because of its inaccessibility, and inhospitality, to outsiders. The Korean attitude toward the outside world was decidedly uninviting; in fact, missionaries, traders, and other non-Koreans caught trespassing within the Korean kingdom were often severely punished and on occasion even executed. In 1910, the Yi dynasty, which had come to power in 1392, gave way to Japanese colonial rule. Briefly incorporated into Japan during the height of World War II, the Korean peninsula was liberated by Soviet and American forces at the time of Japan's surrender in

August and September 1945. The Soviet zone of occupation was North Korea, demarcated at its southern border by the 38th parallel.

In 1948, Soviet occupation formally ended and the Democratic People's Republic of Korea was officially established. The DPRK's political system was closely modeled on that of the USSR.[2] A Marxist-Leninist party, the Korean Workers' Party (KWP), assumed supreme political authority. The General Secretary of the KWP and head of state was Kim Il Sung; he continues to rule North Korea to the present day.[3]

In 1950, in an attempt to unite the entire Korean population under DPRK authority, the North Korean People's Army (KPA) launched a surprise attack against the Republic of Korea to the south and swiftly overran most of South Korea. United Nations forces (led by American military authorities) came to the assistance of the South and pushed northward through both Koreas toward the border of China. The PRC's People's Volunteer Army (PVA) then intervened to aid the North, forcing a retreat of UN forces to South Korean territory. Fighting was fierce, and casualties in the Korean military and civilian populations were high. In July 1953, after months of military stalemate, an armistice was signed. The ceasefire line—close to, but not identical with, the 38th parallel—still demarcates North Korea's southern boundary.

In the years immediately following the Korean War, the DPRK pursued a policy of "socialist transformation" and "socialist construction." By the late 1950s, agriculture had been almost completely collectivized and industry was virtually fully owned by the state. The two first postwar economic plans—a Three-Year Plan (1954–1956) focusing upon economic recovery and a Five-Year Plan (completed in four years 1957–1960) emphasizing the growth of heavy industry—reportedly generally met, and often exceeded, seemingly ambitious targets.[4] The period of the late 1950s and very early 1960s was a high-water mark for statistical openness in the DPRK. Though the range and detail of the revealed demographic and economic data were restricted, even by comparison with contemporary statistical reports from other Communist states, far more information was made available than in earlier, or in more recent, years.

The almost complete statistical blackout that prevails over North Korea to the present day had its origins in the early 1960s. North Korea's third multiyear economic plan, a Seven-Year Plan originally slated for the years 1961–1967, was eventually extended an additional three years, apparently because of difficulties in meeting targets. By 1963, a tightening over the

release of even basic demographic and economic data was evident; 1963, for example, was the last year for which the official *North Korea Central Yearbook* listed a birth rate, death rate, or population total for the country. Since the Seven-Year Plan that was extended through 1970, the DPRK has completed a Six-Year Plan (1971–1976) and a second Seven-Year Plan (1978–1984); it is currently in the midst of a third Seven-Year Plan (1987–1993).

It is likely that the government gathers a great deal of economic and population information. Central planning in a command-style economy is commonly thought to require detailed and accurate data if it is to be effective. Yet the DPRK has published fewer statistics than most other Marxist-Leninist governments over the past quarter century. The suppression of data has coincided with the rise of the *chuch'e* campaign, an officially sponsored doctrine at once emphasizing national self-reliance and fashioning a cult of personality around Kim Il Sung and his son and designated heir, Kim Jong Il.

Available Demographic Data on the DPRK

Between 1963 and 1983, virtually no demographic data were published by the DPRK. Attempts to estimate North Korean population totals during this period, for example, required concentration on such esoterica as changing delegate totals at KWP congresses and announcements of per-capita production of items whose aggregate output had been stated. Population totals deduced from such fragmentary information were often inconsistent with one another.

In 1983, the DPRK published an English-language volume, *The Health Statistics of the Democratic People's Republic of Korea;* in it, for the first time since the early 1960s, the government provided figures for birth rates, death rates, and "average life span" for men and women. It also included numbers pertaining to causes of death, totals of children enrolled in nurseries, and various measures of the performance of the DPRK's public health system. An updated version of the volume was published in 1987. Also, in 1984, a North Korean medical journal, *Chuch'e Uihak,* published an article containing data on health and mortality not found in *Health Statistics of the DPRK,* including some information on mortality differentials between urban and rural areas and a chart plotting crude death rates for the years 1971–1980.[5] Despite these revelations, fewer basic demographic statistics were available for the DPRK in the late 1980s than for any but a

handful of countries (such as Chad, Laos, and Oman).

In 1989, the DPRK effected an unprecedented release of demographic data to the United Nations Population Fund (known as UNFPA from its former name the United Nations Fund for Population Activities). The UNFPA had been invited by North Korea to help the government prepare for a national census—currently scheduled for January 1992, and apparently the first census since Japanese occupation in the 1940s. As part of its "needs assessment" process, the UNFPA requested and was provided some basic demographic data on the country. Although these statistics are more limited, and perhaps less accurate, than the data commonly available for many other countries, they constitute vastly more population information than has ever before been available for the DPRK. These data, moreover, form a basis upon which population trends and prospects for North Korea may at last be estimated.

Overview of the Data

Official statistics of North Korea are collected solely under the authority of the Central Statistics Bureau (CSB). The Central Statistics Bureau was established in 1952 as a branch of the State Planning Commission. It is formally charged with the following responsibilities:

1. To collect, analyze, and submit to the government the statistical data necessary for national administration and economic control
2. To conduct statistical investigations concerning the pursuance of economic planning and study the causes of plan failures
3. To unify and standardize the statistical computational system, reports, and forms
4. To construct various "balances" of the national economy for economic planning
5. To publish final results of the national economic plans[6]

Under the CSB each province has a provincial statistics bureau, and within the provinces, each county and city has a statistics department. Population statistics are compiled from North Korea's permanent population registration system. UN representatives reported the following information from their fact-finding visit of January 1989:

> There has not been a national census in the DPRK since 1945. However, there is a vital statistics registration and bottom-to-top reporting system. The actual registration agency is the "ri" in the rural, and "dong" in the urban, local government Secretary's office. We visited the Bong Dea "ri"

registration office, Jong Pyong County, South Hamgyong Province. We found that in the "ri" office, the Secretary is responsible for registering the vital statistics. The registration is regularly done. The household leader is responsible to report the vital events to the office in a certain period. For example, a birth should be reported within 15 days and a death within 10 days. After reporting the events to the "ri" secretary's office, the household leader must report the events again to the "ri" public security office. It is the public security office which is responsible to compile and report the numbers of vital events and population to the statistics department of the county level government by the end of every year. The county statistical department usually has two or three persons in charge of population data. After compiling the data of the whole county, the department reports the data to the Provincial Statistics Bureau and then to the Central Statistics Bureau. This is the population registration and reporting system.

The items of the registration in the "ri" office include (1) name, (2) sex, (3) date of birth, (4) place of birth, (5) nationality, (6) education (normal education, political education) (7) social organization, (8) occupation, (9) marital status, (10) number of citizenship card, (11) former residence place, and (12) date of residence (date of moving into this "ri").

The annual report from the bottom to top includes only the numbers of population change. So, they conduct a detailed report of population data every three years. This report includes population by age, sex, occupation.

The process of the reporting from bottom to top will take three months.[7]

Many of the tables released in 1989 included relatively detailed figures from 1980, 1982, 1985, 1986, and 1987. This suggests the possibility that up to 1985 the detailed compilations were done every two or three years as reported above, but they might have been carried out annually at least since 1985.[8]

Some of the recently released demographic information gives hints about the economic development of North Korea. For instance, a table on the urban and rural proportions of the total population suggests that rapid urbanization occurred from 1953 to 1970, but that the pace of urbanization subsequently slowed. Data on civilian occupational structure show that the transformation of the labor force out of agriculture had proceeded fairly far by the late 1980s. The only strictly economic piece of information released in the tables was a figure of 47.02 billion won for the "GNI" (gross national income) of North Korea in 1987.[9]

Some of the new tables are useful for analyzing the geographical distribution and movement of the North Korean population. There are tables on the population of each province by sex at year-end 1987, the urban-

rural breakdown of the total population, the populations of the 23 major cities from 1980 through 1987, the numbers of households by province, and internal migration figures for the 1980s.

Most important, the newly released statistics combined with data from the two *Health Statistics* volumes facilitate reasonably refined modeling of demographic trends in North Korea from the 1950s to 1987 and beyond. The most useful tables for this purpose are the 1986 civilian population age structure, birth and death rates over time, absolute numbers of registered births and deaths in the 1980s, figures on the total population over time, data on life expectancy, and fertility data.

Faithfully Reported or Falsified?

The circumstances surrounding North Korea's release of population data to the UNFPA may prompt some skeptics to question the authenticity and veracity of the new figures. As a tightly closed state with a highly developed, if often crudely exercised, propaganda apparatus, disclosure of objective—and thus potentially embarrassing—information to foreign observers might seem to be fundamentally inconsistent with basic state policies. Suspicions might further arise that the DPRK government, required as it was to divulge basic population data as a condition for UNFPA assistance that it had requested, simply forwarded falsified numbers to meet the conditions for technical aid from abroad—in the process misleading foreigners about the true nature of the DPRK's population situation.

From the beginning, we dissected the revealed figures with open minds, ready to discover that the numbers could indeed have been compiled from registration data or that suspicious and ideologically self-serving figures had been inserted. Examination and review of these data suggest that, by and large, the new numbers have been reported as collected, without adjustments. Although some of the period and time series figures show a number of internal inconsistencies, these inconsistencies are similar to those encountered in collected demographic data from many less developed countries. It would, in fact, be much more suspicious if North Korea's newly revealed data showed no internal inconsistencies!

On a number of counts, the newly revealed figures do appear to be of questionable accuracy. Reported infant mortality rates and crude death rates, for example, seem implausibly low; reported life expectancy appears strangely high, especially in the 1970s. Such questionable figures, however, do not necessarily indicate an intention to misreport. Underregistration

of deaths is common among low-income countries; life expectancy figures computed on the basis of underreported deaths will automatically be too high. With its strict and comprehensive state supervision of the daily lives of its populace, North Korea might seem a less likely candidate for such errors of registration than many other low-income countries; it is intriguing that the state's capacity for documenting the vital events of its populace appears incomplete.[10]

In the USSR, the PRC, and elsewhere in the Communist world, the most common treatment for highly sensitive numbers is omission or suppression; falsification appears to be a less common practice. North Korea's newly released demographic data seem to conform with this general Communist approach toward statistics. Some data pertaining indirectly to national security were simply not released. The population totals for the 1980s, for example, count only North Korea's civilian population; the country's sizeable military population is explicitly excluded from the count. Unlike standard presentations of data on age-sex structures, which typically tabulate by five-year cohorts, the population pyramid reported by North Korea divided the total into irregular groupings, including one enormous category covering people ages 17–54. Although this classification scheme may have its own internal uses,[11] it also serves the purpose of concealing information about the country's labor force and military age groups.

Communist countries have not been above direct falsification of numbers that are taken to be of supreme political significance and sensitivity. Reminders of this tendency would include Fidel Castro's declaration that results of the Cuban sugar harvest had been deliberately inflated in the 1960s "to confuse the enemies of the revolution"[12] and the USSR's 1989 disclosure that its military budget had been officially understated by about a factor of four.[13] Like other Communist countries, North Korea has released some evidently politicized, and highly suspect, statistics in its time. At the very beginning of January 1980, for example, North Korea reported that its "national income" per capita for 1979 was exactly US$1,920.[14] The political significance of the claim was clear enough; it would have put North Korea's output per capita above South Korea's level of per-capita GNP reported at the time. But it is unlikely that the DPRK could reliably calculate its national output for the previous year within one day of that year's end. Processing such estimates takes time.[15]

In the past, Communist regimes have at times falsified demographic data. The most well known example concerns the Soviet census of 1937.

Presented with its results, Stalin charged the USSR's statistical authorities with plotting to "make the population low"; the director of the 1937 census was purged and imprisoned, and the results were never published. A 1939 census was later published; its results were evidently politically acceptable, but for that very reason perhaps of questionable validity.[16] Another example of the release of intentionally misleading population figures was the People's Republic of China during the early and mid-1970s. In order to claim that per-capita grain output had greatly increased since the 1950s, Chinese newspapers and radio broadcasts used the severely outdated, rounded figures of 700 million and 800 million for China's total population, though the registration system was recording 900 million people at the time.[17]

Some Communist countries release population statistics that are intentionally misleading because they have been defined in a nonstandard way. For example, the Soviet Union and some Eastern European countries have systematically underreported the level of their infant mortality rates. In these countries, when premature or low birth weight babies die within the first week of life, their deaths are called stillbirths rather than infant deaths.[18] It is not known whether North Korea has adopted this Soviet practice of excluding the deaths of certain live-born infants from the reported infant mortality rate.

North Korean health authorities consider the country's very low recorded crude death rate to be a politically significant figure. They seem unaware that the level of the crude death rate is determined by a combination of mortality conditions and age structure—developed countries with older populations may have a higher crude death rate than developing countries with young populations, even if the developed country has lower mortality. The following assertions appeared in a leading North Korean medical journal in 1984:

> The general mortality rate is one of the overall indicators for assessing the health and longevity of a population.... in 1982, the [crude death] rate for West Germany and the U.K. was more than 2.7 times that in our nation, with the U.S. 2 times greater and Japan 1.4 times greater.... As can be seen from the above, the fact that our nation, which had been the most backward in terms of mortality rate indices, surpassed the so-called developed capitalist nations in a short period of time, is entirely the glorious result of the wise leadership and ardent love for the people of the great leader Comrade Kim Il-so˘ng and the glorious Party Center.[19]

Though Communist regimes do sometimes release falsified demographic data, most of the time when they report incorrect population information the cause is unintentional errors in their recording or reporting systems. For example, North Korea's life expectancy is reported to be unusually high, and its infant mortality rate and crude death rate are reportedly very low. As shown in Table 1, North Korea's mortality claims would rank the country first or second compared to the socialist member states in the CMEA (Council for Mutual Economic Assistance, also known as COMECON). North Korean government officials apparently believe the data to be correct and indicative of the DPRK's superior health and mortality conditions. As this report will show, North Korea does seem to have fairly good mortality conditions for a developing country, but deaths are underreported and mortality is higher than reported. Deliberate falsification, however, would not be required to explain this disparity between claim and reality. Such an outcome could be merely a happy coincidence of underregistration of deaths and official ideological predisposition.

Demographic analysis of North Korea's population is aided by the fact that population changes in any population are tightly intertwined and mutually dependent. A change in fertility (births) or mortality (deaths) affects the age structure, population growth, and total population size. Therefore, it is very difficult to falsify a figure or set of figures without detection. North Korea's almost total lack of trained demographers makes successful deception even less likely. (During 1989, after the official statistics analyzed in this report had been released to the United Nations, the UNFPA Pyongyang representative began training what were described as North Korea's first 40 students of demography.)

During the process of analyzing North Korea's reported population statistics, we discovered an unexpected degree of internal consistency and reasonableness.[20] The simplest explanation for this finding is that the figures reflect reality, even though they are not perfect. For incorrect statistics, if the errors are typical of those found in population data from other developing or Communist countries, we see no need to hypothesize that any falsification has taken place. We conclude that, for the most part, North Korea's population statistics released to the United Nations were reported as they were collected and calculated from the registration system.

Table 1. Reported North Korean Mortality in Relation to CMEA* Countries, 1960–1986

Demographic characteristic	1960	1970	1975	1980	1985	1986
Infant mortality rate						
Lowest CMEA country	Czechoslovakia	GDR	GDR	GDR	GDR	GDR
Reported rate	23.5	18.5	15.9	12.1	9.6	9.2
North Korea reported rate	37.0	22.7	18.1	14.2	10.5	9.8
North Korea's rank with CMEA countries	Third	Second	Second	Second	Second	Second
Crude death rate						
Lowest CMEA country	Cuba	Cuba	Cuba	Cuba	Cuba	Cuba
Reported rate	6.1	6.3	5.4	5.7	6.4	6.2
North Korea reported rate	10.5	7.0	4.7	4.5	4.6	5.0
North Korea's rank with CMEA countries	Eighth	Second	First	First	First	First
Expectation of life at birth (both sexes)						
Highest CMEA country						Cuba
Reported level (1983–1984)						74.3
North Korea reported level (1986)						74.3
North Korea's rank with CMEA countries						First

*CMEA stands for Council for Mutual Economic Assistance. The DPRK is not a member but has observer status.

Notes: Infant mortality rates are infant deaths per thousand live births. Crude death rates are deaths per thousand population per year. Expectation of life at birth is in years. GDR is the German Democratic Republic (East Germany).

Sources: CSB, 1987, pp. 5, 7, 23; Sovet Ekonomicheskoy Vzaimopomoshchi (Council for Mutual Economic Assistance), *Statisticheskiy yezhegodnik stran—chlenov Soveta Ekonomicheskoy Vzaimopomoshchi* (Statistical Yearbook of Countries that are Members of CMEA), Moscow: Finansy i statistika, 1972, p. 10; 1980 edition, p. 9; 1988 edition, pp. 19–20.

Regional Population Distribution

The Democratic People's Republic of Korea administers a territory just under 123,000 square kilometers in area (approximately 6,000 square kilometers less than its initial postpartition area in 1945 because of a net loss of land in its 1953 Military Demarcation Line boundaries).[21] Almost 80 percent of North Korea is hilly or mountainous. A narrow coastal plain borders the Sea of Japan to the east, and much broader plains run along the Yellow Sea and the Korea Bay to the west.[22] North Korea's administrative divisions include the *do* (province), the *shi* (city), and the *gun* (county); below these are the *dong* (urban district or block) and the rural *ri* (village), the country's smallest and most localized administrative units.[23]

In 1987, the DPRK accorded provincial status to 13 areas: nine ordinary provinces (South Pyongan, North Pyongan, Chagang, South Hwanghae, North Hwanghae, Kangwon, South Hamgyong, North Hamgyong, Yanggang); the capital, Pyongyang; two other municipalities—Kaesong, near the demilitarized zone (DMZ), and the port of Nampo—and the Hyangsan Special District, a zone apparently being developed for tourism. North Korea reported a total of 207 *shi* and *gun*, 1,520 *dong*, and 4,107 *ri* for that same year, as shown in Table 2. Of the 207 "cities and counties," there are approximately 148 counties, each with a county seat defined as an urban place.[24]

North Korea has released year-end 1987 population totals by province—apparently the first such figures the regime has ever provided to the outside world. In aggregate, they placed the country's civilian population at 19.346 million. These numbers also make it possible to calculate regional civilian population density, and its variations, within the DPRK (see Table 3).

Table 3 has some minor limitations and one major qualification. For one thing, tiny Hyangsan Special District (1987 reported population: 28,000) is counted in Table 3 as part of North Pyongan, the province that surrounds it. More important, it must be emphasized that all population figures for Table 3 pertain only to *civilian* population. Authorities from the DPRK's Central Statistics Bureau explained to the UNFPA officials to whom they transmitted these data that the country's reported population figures *excluded the military population.* In North Korea, as we shall see, the armed forces account for an unusually large fraction of the national population. Moreover, military personnel may be concentrated in certain provinces.

Table 2. North Korea, Administrative Units, 1949–1987

Year	Provinces and province-level municipalities	Cities and counties	Dong (city and town blocks)	Ri (villages)
1949	8	109	—	10,666
1953	9	186	568	3,772
1956	11	189	591	3,750
1960	13	222	866	3,783
1965	13	211	1,065	3,805
1970	11	204	1,301	3,826
1975	11	204	1,325	3,857
1980	13	202	1,394	3,901
1982	13	203	1,446	3,932
1985	13	206	1,480	4,032
1986	13	206	1,496	4,095
1987	13	207	1,520	4,107

Note: This table gives the numbers of administrative units in the three levels of administration below the DPRK national government. At the local level, the lowest level of administration is the "ri" in rural areas and the "dong" in urban areas. The next higher level of administration is the county, made up of "ri," and the city, made up of "dong." Above them in the hierarchy are the province-level units.

Source: Nicholas Eberstadt received permission from officials of the Central Statistics Bureau to cite the statistics in this table, Pyongyang, May 25, 1990.

As of year-end 1987, North Korea's overall population density was 158 civilians per square kilometer. (Our estimate of the year-end 1987 total population density, including the military, was 167 persons per square kilometer. By way of comparison, South Korea's total population density at midyear 1987 was 424 persons per square kilometer.)[25] Pronounced variations in civilian population density by province were apparent in the DPRK, as seen in Table 3 and Map 1. In the province-level municipalities of Pyongyang and Nampo, population density was reported to be over six times the national average; on the other hand, the municipality of Kaesong, whose boundaries include a large rural area, had a population density only slightly higher than some of the country's other, and geographically much larger, *do*. Among North Korea's nine "ordinary" provinces, reported civilian population density ranged from a high of 239 per square kilometer in South Hwanghae to a low of 44 in Yanggang. Gen-

Table 3. North Korea, Provincial Civilian Population Density, Year-end 1987 (population in thousands)

Province	Civilian population	Area (square kilometers)	Density (persons per sq. kilometer)
Pyongyang Municipality	2,355	2,000	1,178
South Pyongan	2,653	11,577	229
North Pyongan*	2,408	12,191	198
Chagang	1,156	16,968	68
South Hwanghae	1,914	8,002	239
North Hwanghae	1,409	8,007	176
Kangwon	1,227	11,152	110
South Hamgyong	2,547	18,970	134
North Hamgyong	2,003	17,570	114
Yanggang	628	14,317	44
Kaesong Municipality	331	1,255	264
Nampo Municipality	715	753	950
Total	19,346	122,762	158

*North Pyongan Province includes Hyangsan Special District.

Notes: The area of each province is calculated by computer from a digitized map of North Korea. Provincial areas have not been reported by North Korea. Provincial population densities were calculated from more precise estimates of the area of each province. But these estimates of provincial areas may not be perfectly accurate because the areas of some small islands were not digitized, and because our maps of North Korean provincial boundaries may contain errors.

Sources: A North Korean source reported that: "the area of north Korea is 122,762.338 square kilometers." Pang, 1987, p. 2. Nicholas Eberstadt received permission from officials of the Central Statistics Bureau to cite the statistics in this table, Pyongyang, May 25, 1990.

erally speaking, civilian population density was highest in the westernmost provinces close to the Korea Bay and Yellow Sea, and lowest in the landlocked provinces bordering northeast China (Manchuria).

North Korea has released not only civilian population figures by province for year-end 1987, but also the breakdown by sex within these provinces (see Table 4). The reported civilian sex ratio for the country as a whole was low, just 84.2 men per 100 women. Only in the Hyangsan Special District, which accounted for barely 0.1 percent of the country's reported civilian population, were there equal numbers of male and female

Map 1. North Korea,
Provincial Population Densities, 1987

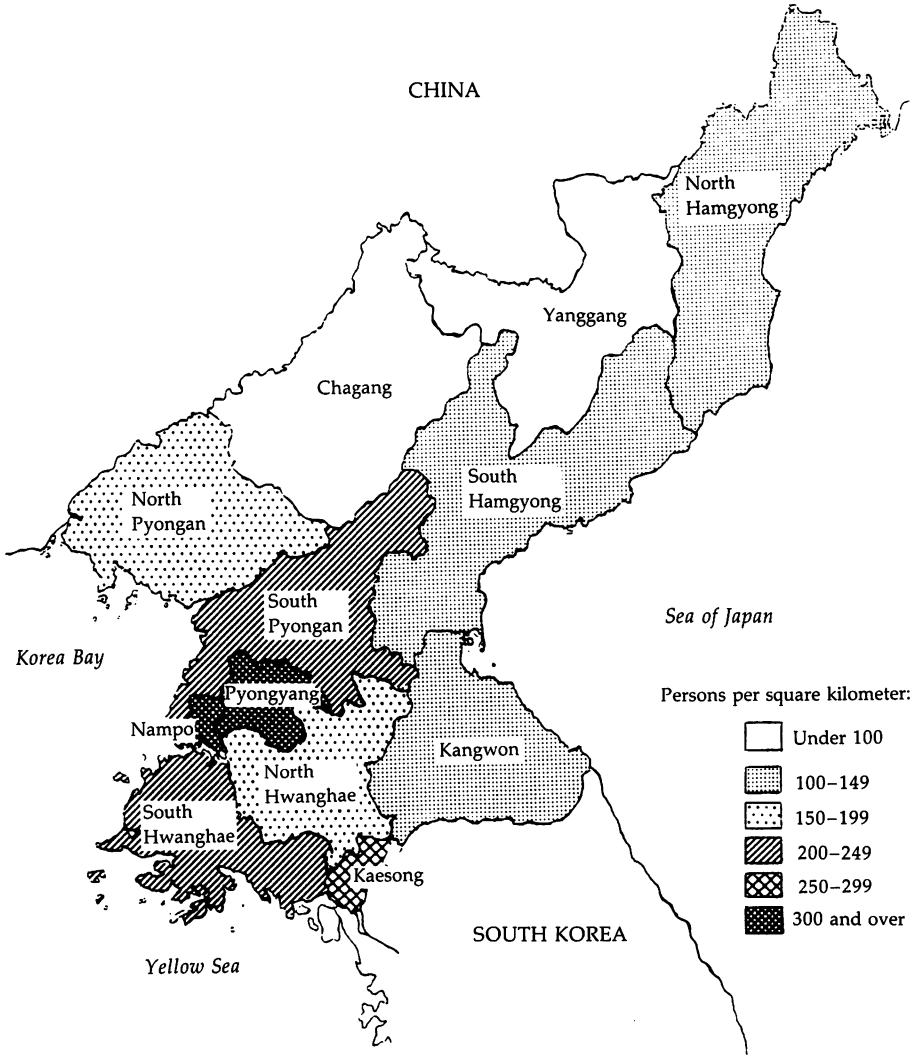


Table 4. North Korea, Civilian Population and Sex Ratio by Province, Year-end 1987 (in thousands)

Province	Total	Male	Female	Sex ratio
Pyongyang Municipality	2,355	1,070	1,285	83.3
South Pyongan	2,653	1,222	1,431	85.4
North Pyongan	2,380	1,086	1,294	83.9
Chagang	1,156	543	613	88.6
South Hwanghae	1,914	873	1,041	83.9
North Hwanghae	1,409	652	757	86.1
Kangwon	1,227	546	681	80.2
South Hamgyong	2,547	1,161	1,386	83.8
North Hamgyong	2,003	919	1,084	84.8
Yanggang	628	279	349	79.9
Kaesong Municipality	331	146	185	78.9
Nampo Municipality	715	330	385	85.7
Hyangsan	28	14	14	100.0
Total	19,346	8,841	10,505	84.2

Note: Pyongyang, Kaesong and Nampo are province-level municipalities under central authority. Besides the population in city districts, their totals include suburban or rural counties administered by the municipality. Hyangsan is a small special district.

Source: Nicholas Eberstadt received permission from officials of the Central Statistics Bureau to cite the statistics in this table, Pyongyang, May 25, 1990.

civilians. Although the sex ratios for the DPRK's other provinces were reported to be very low, they were by no means uniform. Reported civilian population sex ratios varied by almost 10 points, from a high of 88.6 males per hundred females for Chagang Province in the north to a low of 78.9 for Kaesong down by the DMZ. These variations could reflect differential male losses in the Korean War, mortality differentials by sex that are not uniform all over the country, variations in the proportions of males recruited into the military, or perhaps different migration patterns for males and females by province.

Trends and Geographical Variations in Household Size

For the first time ever, North Korea has released data on numbers of households by province. As shown in Table 5, household totals are reported for 1980, 1982, 1985, 1986, and 1987. For North Korea as a whole, reported average household size in 1980 was 5.09 persons; by 1987, it had declined to 4.77, about 6 percent lower than in 1980. Such a decline is not particularly significant or unusual. It could be caused by the reported 1970s drop in the birth rate, which would be expected to result in smaller numbers of children living with each set of parents. Declining average household size could also be caused by a shift away from joint families with several generations living in the household toward more nuclear families living separately. In the People's Republic of China, average size of household declined 9 percent from 4.61 persons per household in 1980 to 4.18 in 1987.[26] In South Korea, average household size dropped 10 percent in five years, from 5.13 persons per household in 1975 to 4.62 in 1980, and the steep drop continued.[27]

For North Korea, on the basis of numbers of households and population totals reported by province for 1987, it is possible to calculate a reported average household size at the provincial level. Provincial variations are not dramatic. In 1987, for example, reported averages ranged from a low of 4.50 persons per household for Kangwon Province to a high of 5.50 for the small Hyangsan Special District; among the 12 larger units the reported high was for Chagang Province, at 5.02. In 1987, Pyongyang Municipality's reported average household size was slightly lower than the reported national average (4.71 vs. 4.77); on the other hand, Kaesong (4.93) and Nampo (4.84) both reported in above the national average. Average household size appears to be somewhat higher today in North Korea than in South Korea, where, as of 1985, the average for the country as a whole had dropped to 4.16 persons (4.10 in urban areas and 4.27 in rural areas).[28]

There are apparent problems with the series of household totals for Pyongyang Municipality. From 1982 to 1985, there is an unexplained sharp increase in the number of households, as if a new definition of "household" has been introduced. Combining these figures on the number of households in Pyongyang with the reported population of Pyongyang (see Table 7) gives an unlikely series for Pyongyang household size. Household size in Pyongyang reportedly averaged 4.99 persons in 1980 and 4.91 persons in 1982. Such a slow decline is reasonable. But from

Table 5. North Korea, Number of Households by Province, 1980–1987

Province	1980	1982	1985	1986	1987	Average household size, 1987*
Pyongyang Municipality	369,031	388,582	462,519	479,323	499,793	4.71
South Pyongan	479,653	504,668	519,614	537,559	554,505	4.78
North Pyongan	420,300	438,492	464,038	476,195	489,433	4.86
Chagang	201,108	208,059	218,852	224,676	230,100	5.02
South Hwanghae	340,032	353,307	373,440	383,357	393,183	4.87
North Hwanghae	241,565	251,699	272,415	280,342	289,877	4.86
Kangwon	229,411	237,812	254,853	264,885	272,373	4.50
South Hamgyong	463,758	482,369	520,328	534,115	547,108	4.66
North Hamgyong	370,112	382,442	405,831	417,527	429,211	4.67
Yanggang	109,737	112,541	120,814	124,170	128,702	4.88
Kaesong Municipality	56,750	58,986	63,435	65,532	67,166	4.93
Nampo Municipality	114,177	126,519	134,910	140,507	147,734	4.84
Hyangsan	—	—	4,654	4,861	5,092	5.50
Total	3,395,634	3,545,476	3,815,703	3,933,049	4,054,277	4.77

*Using provincial civilian population totals for 1987 from Table 4.

Note: We assume that these figures refer to civilian households only. Average household size for 1987 is computed using provincial civilian population totals.

Source: Nicholas Eberstadt received permission from officials of the Central Statistics Bureau to cite the statistics in this table, Pyongyang, May 25, 1990.

1982 to 1986, population growth in Pyongyang averaged only 2.1 percent a year whereas growth in the number of households averaged 5.2 percent annually. Average household size dropped from 4.91 in 1982 to 4.32 in 1986, based on these figures.

From 1986 to 1987, there was a 12.9 percent increase in Pyongyang's population, suggesting expansion of the boundary of Pyongyang Municipality by annexation of some land from contiguous provinces. The reported number of households, however, rose only 4.2 percent. These statistics imply that average household size jumped from 4.32 persons in 1986 to 4.71 persons in 1987. If in this one year there were little or no change in mean household size for those households already a part of Pyongyang, these numbers would imply that households newly added in 1987 through in-migration or annexation averaged about 20 persons!

In a 1987 publication, one North Korean source claimed that membership in the Korean Workers' Party totaled "over 3 million."[29] The total number of households for North Korea as a whole at the end of 1987, by way of comparison, was reported to be just over 4 million. By doctrine and practice, Marxist-Leninist parties have customarily been operated as elite organizations. In North Korea, however, the ratio of Party members to households seems remarkably high. In fact, under a variety of assumptions about the distribution of KWP memberships, it would be possible for half or more of all North Korean households to contain at least one Party member. As we shall see, in comparison with other Communist countries the ratio of Party members to total population is unusually high in North Korea today.

Urbanization

Table 6 shows the urban-rural breakdown of North Korea's total reported population from 1953, just after the Korean War, to year-end 1987. The definition of the urban population has not been formally provided.[30] From the notes and data in Tables 6 and 7, it appears that the boundaries of cities are drawn just around the areas where the nonagricultural populations live and work. Some small agricultural populations fall within the city boundaries and do seem to be included in the city population totals given in Table 7, but they may be excluded from the urban population total for the country (Table 6). Where a municipality includes a contiguous suburban county, generally speaking the residents of the *ri* within the county are excluded from the urban population totals given in Table 6.

Table 6. North Korea, Civilian Population by Urban and Rural Residence, 1953–1987 (in thousands)

Date, year-end	Total	Urban	Urban annual growth rate	Rural	Rural annual growth rate	Percent urban	Tempo of urbanization
1953	8,491	1,503		6,988		17.7	
			19.7		−1.7		21.4
1956	9,359	2,714		6,645		29.0	
			12.0		−.9		12.9
1960	10,789	4,380		6,409		40.6	
			5.9		.3		5.6
1965	12,408	5,894		6,514		47.5	
			5.9		.5		5.4
1970	14,619	7,924		6,695		54.2	
			2.7		.7		2.0
1975	15,986	9,064		6,922		56.7	
			1.6		1.5		.2
1980	17,298	9,843		7,455		56.9	
			2.6		−.3		2.9
1982	17,774	10,362		7,412		58.3	
			2.3		1.3		1.0
1985	18,792	11,087		7,705		59.0	
			1.6		1.2		.4
1986	19,060	11,265		7,795		59.1	
			2.3		.3		2.1
1987	19,346	11,530		7,816		59.6	

Notes: The original table included the following note from the Central Statistics Bureau: "Urban/rural areas and populations are divided according to the administrative units regardless of the nature of people's life, food supply, or occupation. Cities also include some rural 'ri.' In this table, 'urban' does not include the people living in the city's 'ri.' These people are accounted as rural." Annual growth rates are in percent. The "tempo of urbanization" is the difference between the exponential growth rates of the urban and rural populations.

Source: Nicholas Eberstadt received permission from officials of the Central Statistics Bureau to cite the statistics in this table, Pyongyang, May 25, 1990.

Table 7. Population of Major Cities in North Korea, 1980–1987 (in thousands)

City	1980		1982		1986		1987	
	Total pop.	Agri. pop.	Total pop.	Agri. pop.	Total pop.	Agri. pop.	Total pop.	Agri. pop.
Pyongyang	1,842	120	1,907	127	2,071	142	2,355	157
Pyongsong	199	16	212	19	234	20	239	19
Sinuiju	271	15	276	14	286	15	289	14
Kusong	154	18	160	21	176	22	177	22
Kanggye	194	15	198	5	208	6	211	6
Manpo	85	10	89	11	93	11	93	11
Huichon	149	13	151	12	159	13	163	13
Haeju	182	9	184	10	191	10	195	10
Sariwon	174	9	187	10	216	18	221	19
Songnim	103	6	104	6	107	6	108	5
Wonsan	233	8	242	8	265	11	274	12
Hamhung	594	25	613	27	649	28	701	30
Sinpo	146	18	148	18	156	18	158	19
Tanchon	—	—	259	38	283	41	284	42
Chongjin	509	19	531	18	514	15	520	16
Kimchaek	168	17	172	17	178	18	179	18

Najin	86	6	86	6	87	7	89	7
Hyesan	150	6	152	6	160	7	164	7
Kaesong	108	4	112	4	119	5	120	5
Nampo	—	—	—	—	363	19	370	20
Sunchon	—	—	—	—	340	36	356	36
Tokchon	—	—	—	—	215	13	217	13
Anju	—	—	—	—	—	—	186	24
Total	5,347	334	5,783	377	7,070	481	7,669	525

Note: According to a note on the original table recorded by United Nations personnel: "Strictly speaking, DPRK does not consider the agricultural population living within the city boundary as urban." This presumably means that the agricultural populations living in the city districts are counted as part of the "total population" of cities given here, but excluded from the urban figures in Table 6. The total population figures given here are for the city districts; they do not include the populations of suburban counties, except possibly in the case of Pyongyang, as discussed in the text.

Source: Nicholas Eberstadt received permission from officials of the Central Statistics Bureau to cite the statistics in this table, Pyongyang, May 25, 1990.

For example, the province-level municipality of Kaesong had a year-end 1987 total population of 331,000 (Table 3), of whom only 120,000 were in the city districts (Table 7). This suggests that 211,000 may live in suburban counties of Kaesong, and most of them would be designated rural population unless they live in other cities or towns designated "urban." The 5,000 agricultural residents living within the city districts of Kaesong may be excluded from figures on the urban population of Kaesong Municipality and therefore from urban population totals for North Korea, judging from the note in Table 7 that came from the Central Statistics Bureau.

This fragmentary information indicates that, in general, city boundaries are not excessively wide in North Korea and that the population of cities is defined according to conservative criteria.[31] Yet Table 6 shows that 60 percent of the country's total population is urban. That statistic, and data showing that 75 percent of North Korea's adult civilian population is categorized as nonagricultural, supports the generalization that the economic transformation from a rural agricultural society to an urban nonagricultural society has proceeded rather far in North Korea.

It is very common in developing countries for one leading city, usually the capital of the country, to be much more populous than any other city. This is true of Seoul in South Korea, for example, which has almost three times the population of South Korea's second largest city of Pusan.[32] In North Korea, Pyongyang has over 2 million residents, which does not make it a large capital city from an international perspective. Yet Pyongyang's reported population is more than three times as large as that of the next largest city, Hamhung.

There is some confusion about the Pyongyang figure, however. Though the province-level municipality of Pyongyang includes the city districts and four counties, the county populations have not been excluded from the city total population given in Table 7.[33] This contrasts with Kaesong and Nampo, whose suburban county populations were not included in the city populations listed in Table 7. There are several possible explanations for this anomaly. First, Table 7 states that the agricultural population within the entire municipality is rather small. Since the populations of the suburban counties of Pyongyang are apparently mainly nonagricultural, perhaps the Central Statistics Bureau considers them urban. Alternatively, since Pyongyang is categorized as the DPRK's only "special city," it may be that its whole population is arbitrarily defined as urban.[34] A third possibility is that Pyongyang Municipality is more rural than the

statistics suggest; its population density is not particularly high for a city.[35]

The individual cities in Table 7 generally showed very modest population growth during the 1980s. The total population of the cities for which 1980 data were reported grew only 1.6 percent a year from 1980 to 1982 and 1.5 percent a year from 1982 to 1986. This indicates essentially no net in-migration. The sudden increase to a population growth rate of 6.4 percent for the same group of cities in 1987 was apparently caused by boundary expansion in Pyongyang (whose population grew 13 percent that year) and Hamhung (with 8 percent population growth).

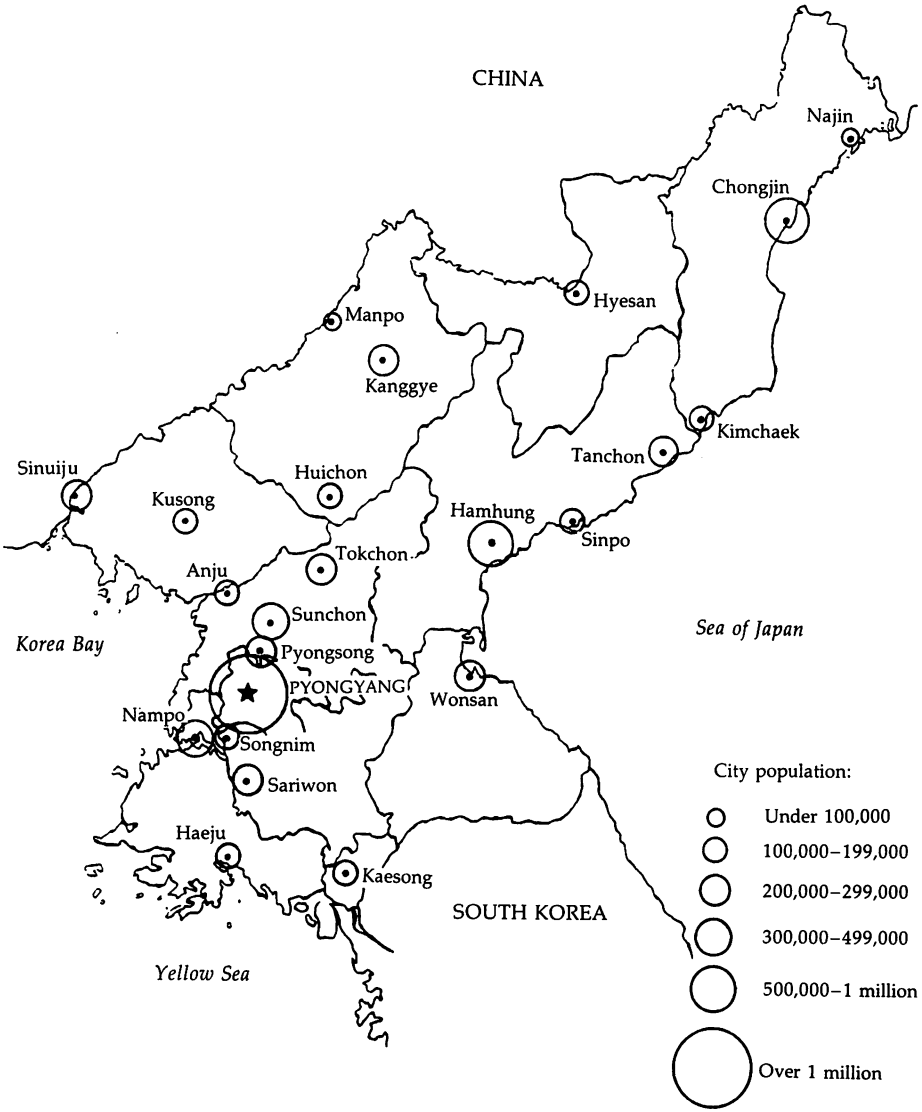
In general, the cities in Table 7 whose populations were not listed in earlier years were reclassified from county to city status during the 1980s. For instance, Tanchon County was "elevated" to Tanchon City in 1982, Sunchon County became Sunchon City in 1983, and Anju County was made a city in 1987.[36] If, in these cases, the new city boundaries are the same as the former county boundaries, it is puzzling why the agricultural population of these newly established cities is so small.

Map 2 shows the 23 leading cities of North Korea as circles whose size represents the comparative sizes of their urban populations. Most of North Korea's leading cities are located either in the relatively densely populated provinces of the west-central region or along the coastline or inland borders of less densely populated provinces.

For year-end 1987, the total population of these 23 cities was 7,669,000 and their urban population (excluding the agricultural population in the city districts) was 7,144,000. But Table 6 shows that the urban population of North Korea at the end of 1987 was 11,530,000. This figure indicates that North Korea at that time had 4,386,000 people living in other small cities and in urban towns. In North Korea, the definition of an urban place may include small towns that in many other countries might be called rural.

A substantial portion of the total population of the DPRK's leading cities was reported to reside in cities of intermediate size. Of the 21 cities reported to have populations of 100,000 or more at year-end 1987, 16 were in the range of 100,000 to 299,999; such cities, moreover, accounted for 43 percent of the population living in urban areas of 100,000 or more. By way of comparison, in Taiwan the same year, only 31 percent of the population in urban areas of 100,000 or more resided in such intermediate-sized cities. Yet Taiwan and North Korea have other demographic charac-

Map 2. Leading Cities of North Korea, Comparative 1987 Population Sizes



teristics in common. Both are in East Asia and have relatively urbanized populations. Taiwan's midyear 1987 population size was 19.7 million, close to that of North Korea.[37] But Taiwan's overall population density is far higher than that of North Korea, which may help explain the concentration of Taiwan's urban population in the larger cities. In North Korea, the comparative prominence of intermediate-sized cities may partly reflect conscious and deliberate efforts by government planners to shape the country's population distribution and patterns of development.

Table 8 compares trends in urbanization reported in North and South Korea. Before partition, both northern and southern Korea were overwhelmingly rural. The tempo of urbanization was rapid in South Korea in the late 1940s and early 1950s. In North Korea, the pace of urbanization was most rapid just after the Korean War, from 1953 to 1960; the total urban population (Table 6) grew 20 percent a year from 1953 to 1956 and 12 percent a year in the late 1950s. The urban population continued to grow at the rapid rate of 6 percent a year in the 1960s. North Korea's population reached the 50 percent urban mark in the late 1960s.

In South Korea, the tempo of urbanization slowed considerably in the late 1950s and early 1960s. South Korea's population did not become half urban until the late 1970s. But the speed of urbanization picked up in the late 1960s and continued to be brisk at least until 1985. Meanwhile, North Korea'a tempo of urbanization slowed to a crawl in the early 1970s and has remained sluggish since then.

Since 1980, South Korea's population has been recorded as more urbanized than the North Korean population. The figures in Table 8 should be read with an understanding that definitions of "urban areas" are not available for North Korea; thus, the data cannot be presumed to be totally comparable. Whereas South Korea's urban definition excludes towns of 20,000 to 50,000 people, North Korea's urban definition apparently includes them.

To get a better idea how urbanized North Korea is compared to South Korea, we have compared the proportion of each country's total population who live in cities of 100,000 or more people. We are assuming that the cities listed in Table 7 as having populations of 100,000 or larger comprise all North Korean cities in this category. In South Korea, 63 percent of the 1985 census population were counted in cities of 100,000 or more population.[38] But in 1987, only 39 percent of North Korea's population lived in cities of that size. Using this criterion, North Korea today is much less urbanized than South Korea.

Table 8. Urbanization in North and South Korea, 1935–1985

Year	North Korea percent urban	Tempo of urbanization	South Korea percent urban	Tempo of urbanization
1935	4.9		6.0	
		9.8		9.1
1944	10.6		12.3	
				7.8
1949	NA	6.1	17.1	
1953	17.7		NA	7.1
		21.4		
1955	29.0 (1956)		24.5	
		12.9		3.5
1960	40.6		28.0	
		5.6		4.5
1965	47.5		33.5 (1966)	
		5.4		8.1
1970	54.2		41.1	
		2.0		5.9
1975	56.7		48.4	
		.2		7.1
1980	56.9		57.3	
		1.7		6.9
1985	59.0		65.4	

NA = Not available.

Notes: In the prepartition period, "urban areas" were defined as cities and towns with over 20,000 population within their administrative boundaries. For South Korea, urban areas are defined as administrative cities with an urban population of 50,000 or more. The definition of the urban population for North Korea is unknown. The tempo of urbanization is the annual percent growth in the urban population size minus the annual percent growth of the rural population.

Sources: Dae Young Kim and John E. Sloboda, "Migration and Korean Development," in Robert Repetto et al., *Economic Development, Population Policy, and Demographic Transition in the Republic of Korea* (Cambridge, Mass: Harvard University Press, 1981), p. 40; *Migration, Urbanization and Development in the Republic of Korea* (Bangkok: ESCAP, 1980), p. 16; *Social Indicators in Korea 1987*, p. 60; *Korea Statistical Yearbook 1988*, p. 40. North Korean data from Table 6.

Migration

For all intents and purposes, the DPRK is a closed society. Virtually no international migration has been permitted since 1953, when the Military Demarcation Line from the Korean War armistice established the country's current boundaries.[39]

For the first time, however, the DPRK has released figures on internal migration, which are given in Table 9. We assume that the geographical movements of active duty military personnel are excluded from these figures. It is not clear whether the shift from civilian registration to military status or military to civilian is included or whether the numbers refer only to shifts from one civilian registration location to another.[40]

For this table, migration is defined by the Central Statistics Bureau as "permanent residence change from a *ri* to another and from a province and another [*sic*]." We assume this signifies that any shift of residence by a civilian out of or into a *ri* or a *dong,* both of which are the lowest level of residence registration, qualifies as migration. The reported annual number of migrants rose from 920,000 in 1980 to 1,134,000 in 1987, with a notable drop to 882,000 in 1985. The figures show more women than men moving. The sex ratio of registered migration is low—ranging from 87.6 men per hundred women in 1982 to 90.9 in 1987. It is interesting to note, though, that the reported sex ratio of migrants is higher than that of the civilian population in the prime working ages (17–59), which is only 76.7 men per hundred women or, for the civilian population as a whole, 84.1 males per hundred females for 1986. In 1987, for example, 6.1 percent of civilian males migrated from one residence location to another, compared to 5.7 percent of female civilians.

North Korea's reported migration totals may be compared with those of South Korea (see Table 10). In the 1980s, reported rates of domestic migration were roughly four times as high in the South as in the North. In view of the DPRK's reputation as a tightly controlled totalitarian society, this differential might seem surprisingly small. The table, however, understates actual differences in migration patterns in the two Koreas. North Korea's figures on domestic migration refer to movement into or out of a *ri,* which is a small administrative unit with an average population of about 1,900 in 1987, or a *dong,* which averaged 7,600 people. South Korea's residential registration data, by contrast, refer to moves into or out of a *gun* or a *shi,* units whose population averaged over 200,000 in 1987. We conclude that short moves within a county or city would usually be counted as migration in North Korea but not in South Korea.

In South Korea, reported domestic migration overwhelmingly involves movement to urban areas. Over 80 percent of the country's internal inmigration in the 1980s was to cities, either from other urban areas or from the countryside.[41] Although North Korean data lack comparable detail,

Table 9. North Korea, Internal Migration, 1980–1987 (in thousands)

Year	Total	Male	Female
1980	920	434	486
1982	927	433	494
1985	882	418	464
1986	997	474	523
1987	1,134	540	594

Note: The original table included the following definition: "The action of migration including permanent residence change from a 'ri' to another and from a province and another [sic]."

Source: Nicholas Eberstadt received permission from officials of the Central Statistics Bureau to cite the statistics in this table, Pyongyang, May 25, 1990.

Table 10. Annual Domestic Migration as Reported Through Residential Registration System: North and South Korea, 1980–1987

	North Korea		South Korea	
Year	Total (in thousands)	Percent of registered population	Total (in thousands)	Percent of registered population
1980	920	5.3	8,259	21.9
1982	927	5.2	8,616	22.1
1985	882	4.7	8,679	21.4
1986	997	5.2	8,660	21.3
1987	1,134	5.9	9,309	22.6

Notes: Migration figures for North Korea refer to "ri," administrative units with an average reported population in 1987 of 1,900, and "dong," urban administrative units averaging 7,600 people. Migration figures for South Korea pertain to "gun" and "shi," administrative units with an average reported population in 1987 of over 200,000.

Sources: For North Korea, Tables 6 and 9. For South Korea, derived from *Korea Statistical Yearbook 1988*, p. 61.

one may infer that domestic migration in the DPRK is not primarily a rural-to-urban affair. In 1986, for example, 997,000 persons were reported to have changed their permanent residence; reported growth of the urban population during 1986, by contrast, was 178,000 persons. Assuming a 1.5 percent rate of natural increase for urban areas, and assuming no

boundary changes to urban territory, net in-migration to cities would have been about 12,000—or only one percent of the total migration reported. Though information on migration policy is fragmentary, it seems that domestic migration is currently directed toward purposes other than increasing the size of the urban populace.

A South Korean source reported that the North Korean government in the 1970s adopted central controls over urbanization in order to stem population growth in cities.[42] An unpublished UNFPA study suggested that government policy is to prevent overcrowding in urban areas. United Nations representatives were told that population movement in the DPRK is strictly controlled through the household registration system and that the local Public Security Office issues certificates required for geographical movement. They were informed that a strictly enforced household registration system is the primary instrument for the spatial distribution of population in the DPRK. The government reportedly allocates jobs, housing, health, education, and other benefits so people are assigned to places where they are needed. Spontaneous or uncontrolled migration is claimed to be negligible. Though rural-to-urban migration is apparently restricted, there may be considerable urban-to-urban and rural-to-rural migration in North Korea.

Total Population Size, Growth, and Sex Ratio

Newly released data on the total population of North Korea by sex for selected years from year-end 1946 to year-end 1987 are given in Table 11. In 1953, at the end of the Korean War, the DPRK's total population sex ratio (males per 100 females) was reported to be 88.3, and in 1956 a sex ratio of 91.6 was reported. While these are extremely low sex ratios for a national population, they are consistent with figures for other countries that have suffered severe losses in wartime—for instance, the postwar Soviet Union. Between 1956 and 1970, North Korea's sex ratio was reported to have risen from 91.6 to 95.1—a pattern quite in keeping with postwar demographic recovery and influenced by the fact that slightly more boys than girls are born in any given year.[43] Between 1970 and 1975, however, North Korea's reported population sex ratio dropped radically to 86.9, lower than the level reported at the end of the Korean War. Between 1975 and 1987, North Korea's sex ratio was reported to have dropped still further; the most recent number given is 84.2 males per hundred females.

Table 11. North Korea, Reported Total Population by Sex, 1946–1987 (population in thousands)

Date, year-end	Total	Male	Male annual growth rate	Female	Female annual growth rate	Sex ratio
1946	9,257	4,629		4,628		100.0
			1.08		1.49	
1949	9,622	4,782		4,840		98.8
			−4.58		−1.77	
1953	8,491	3,982		4,509		88.3
			3.88		2.67	
1956	9,359	4,474		4,885		91.6
			3.86		3.27	
1960	10,789	5,222		5,567		93.8
			3.00		2.60	
1965	12,408	6,067		6,341		95.7
			3.22		3.34	
1970	14,619	7,127		7,492		95.1
			.84		2.65	
1975	15,986	7,433		8,553		86.9
			1.49		1.65	
1980	17,298	8,009		9,289		86.2
			1.14		1.54	
1982	17,774	8,194		9,580		85.5
			1.64		2.04	
1985	18,792	8,607		10,185		84.5
			1.19		1.61	
1986	19,060	8,710		10,350		84.2
			1.49		1.49	
1987	19,346	8,841		10,505		84.2

Notes: Annual growth rates are in percent. Sex ratio is males per hundred females. Population totals after 1970 apparently exclude the military.

Source: Nicholas Eberstadt received permission from officials of the Central Statistics Bureau to cite the statistics in this table, Pyongyang, May 25, 1990.

United Nations representatives were told that the population figures in Table 11 do not include the military population. A close look at these population sex ratios for successive years, however, indicates that the (mostly male) military population was probably dropped out of the figures after 1970, causing the sharp decline seen in the reported sex ratio of the population.[44] We hypothesize, therefore, that the total population figures

through 1970 included figures on the military but that for subsequent years the true total population size is approximated by the reported total plus the size of the military.

Table 12 presents our estimates of North Korea's population, *including* the military population, by sex for the three decades 1960 through 1990. The model has utilized as fully as possible the officially reported population statistics from North Korea. Population totals refer to midyear in contrast to the officially reported figures, which all refer to the end of the stated year. As discussed in the appendices, these estimates are not highly arbitrary, because the figures on population size, growth, and sex ratio have all been sharply constrained by the reported 1986 age structure and reported birth rates over time, as well as by the reported civilian population totals by sex and year.

As shown in Table 12, North Korea's population is estimated to have grown rapidly in the 1960s, at nearly 3 percent a year in the first half of the decade and peaking at 3.6 percent in 1970. As modeled from the reported statistics, population growth dropped sharply in the early 1970s to 1.7 percent a year in 1977. Since then, North Korea's population has grown just under 2 percent a year. The country's total population doubled from 10.57 million in 1960 to 21.41 million at midyear 1990. The sex ratio has risen gradually, so that the total number of males is slowly approaching the number of females.

The total population estimates in Table 12 are not very far from the population size of North Korea as estimated by the U.S. Census Bureau and the United Nations before the new data became available. Generally, outside guesses of North Korea's population size apparently erred on the low side until about 1980. Published estimates of the DPRK population at the beginning of the 1980s were consistent with the estimates given in Table 12. Since then, the available estimates for North Korea's total population have been higher than those given here.

In the early 1970s, for example, population estimates by both these organizations were at least half a million lower than in Table 12. By 1986, the UN estimate was almost a million higher and, by 1988, 1.2 million higher than estimated in this report. For 1988, the U.S. Census Bureau estimate for North Korea's total population was 1.3 million higher than that modeled in Table 12. In comparison to the statistics now reported, both organizations underestimated North Korea's high population growth rates of the 1960s but overestimated annual population growth rates since the

Table 12. North Korea, Estimated Total Population Size and Growth, 1960–1990 (population in thousands)

Year	Total population	Males	Females	Population sex ratio	Population growth (percent)
1960	10,568	5,094	5,475	93.0	2.7
1961	10,850	5,233	5,617	93.2	2.6
1962	11,140	5,377	5,763	93.3	2.7
1963	11,457	5,536	5,922	93.5	2.9
1964	11,803	5,709	6,094	93.7	3.0
1965	12,172	5,894	6,278	93.9	3.1
1966	12,565	6,092	6,473	94.1	3.2
1967	12,983	6,302	6,681	94.3	3.3
1968	13,424	6,525	6,899	94.6	3.4
1969	13,892	6,761	7,130	94.8	3.5
1970	14,388	7,012	7,376	95.1	3.6
1971	14,881	7,262	7,619	95.3	3.2
1972	15,338	7,493	7,846	95.5	2.9
1973	15,759	7,705	8,053	95.7	2.5
1974	16,140	7,898	8,242	95.8	2.2
1975	16,480	8,070	8,410	95.9	1.9
1976	16,788	8,225	8,563	96.1	1.8
1977	17,084	8,374	8,709	96.2	1.7
1978	17,379	8,524	8,855	96.3	1.7
1979	17,682	8,677	9,005	96.4	1.7
1980	17,999	8,838	9,161	96.5	1.8
1981	18,314	8,997	9,317	96.6	1.7
1982	18,623	9,154	9,469	96.7	1.7
1983	18,941	9,315	9,626	96.8	1.7
1984	19,267	9,480	9,787	96.9	1.7
1985	19,602	9,650	9,952	97.0	1.7
1986	19,944	9,823	10,121	97.1	1.7
1987	20,292	10,000	10,292	97.2	1.7
1988	20,650	10,181	10,468	97.3	1.8
1989	21,023	10,370	10,652	97.4	1.8
1990	21,412	10,568	10,844	97.5	1.9

Note: This table includes the military population. Population totals refer to midyear. Sex ratio is the number of males per hundred females in the total population.

Source: Model 1, computer population reconstruction produced at the Center for International Research, U.S. Bureau of the Census, derived from official DPRK data on population totals by sex, age structure, and vital rates. See Appendix A for assumptions and estimation procedures.

mid-1970s. Analysts did not fully appreciate the steepness of the fertility decline now reported to have occurred in North Korea in the early 1970s.[45]

Elections as an Indicator of Total Population Size

Before the release of North Korea's registered population data, Western researchers relied heavily on reported numbers of delegates elected to the government's Supreme People's Assembly (SPA) in their attempts to estimate the size of the DPRK population. In theory, there was to be a fixed relationship between the delegate count at the SPA and the country's overall population. Before 1962, each SPA delegate was supposed to represent a constituency of 50,000 persons; since 1962, constituencies have been fixed at 30,000 per delegate.[46] The DPRK's constitution specifies that elections are to be held every four years; in practice, however, this specification has never been precisely observed. Since the Korean War, the elapsed time between SPA elections has varied irregularly. It has been as long as five years, seven weeks (Third SPA to Fourth SPA) and as brief as three years, five and a half months (Eighth SPA to Ninth SPA).

Moreover, no two SPA elections have ever been held on the same date of the year. Establishing the intended date for the national population totals implied by SPA delegate counts, correspondingly, is problematic. The implied totals themselves, however, are easily computed, and these are presented in Table 13.

The population totals implied by the SPA elections can be compared with official population totals from the North Korean registration system (or with interpolated totals based on the official numbers) and with the estimates produced in our reconstruction of North Korean population trends. The population implied by SPA elections has always been greater than the total tabulated by the North Korean population registration system. For 1948, for example, SPA elections implied a population of 10.6 million for North Korea, yet the official figure reported for year-end 1949 was only 9.6 million—almost 10 percent lower. (Subsequent discrepancies, however, have been proportionately much smaller.) The consistent differential between population totals implied by SPA elections and those reported or interpolated from population registration data may suggest that SPA delegates have been selected to represent constituencies whose size may come close to, *but not actually exceed,* the indicated ratio of population to delegates.

Table 13. North Korean Population Totals Implied by Elections for Supreme People's Assembly (SPA), 1948–1990

Election date	Delegates elected	Indicated population per delegate	Implied population (millions)
Aug. 25, 1948*	212	50,000	10.60
Aug. 27, 1957	215	50,000	10.75
Oct. 8, 1962	383	30,000	11.49
Nov. 25, 1967	457	30,000	13.71
Dec. 12, 1972	541	30,000	16.23
Nov. 11, 1977	579	30,000	17.37
Feb. 28, 1982	615	30,000	18.45
Nov. 2, 1986	655	30,000	19.65
Apr. 22, 1990	687	30,000	20.61

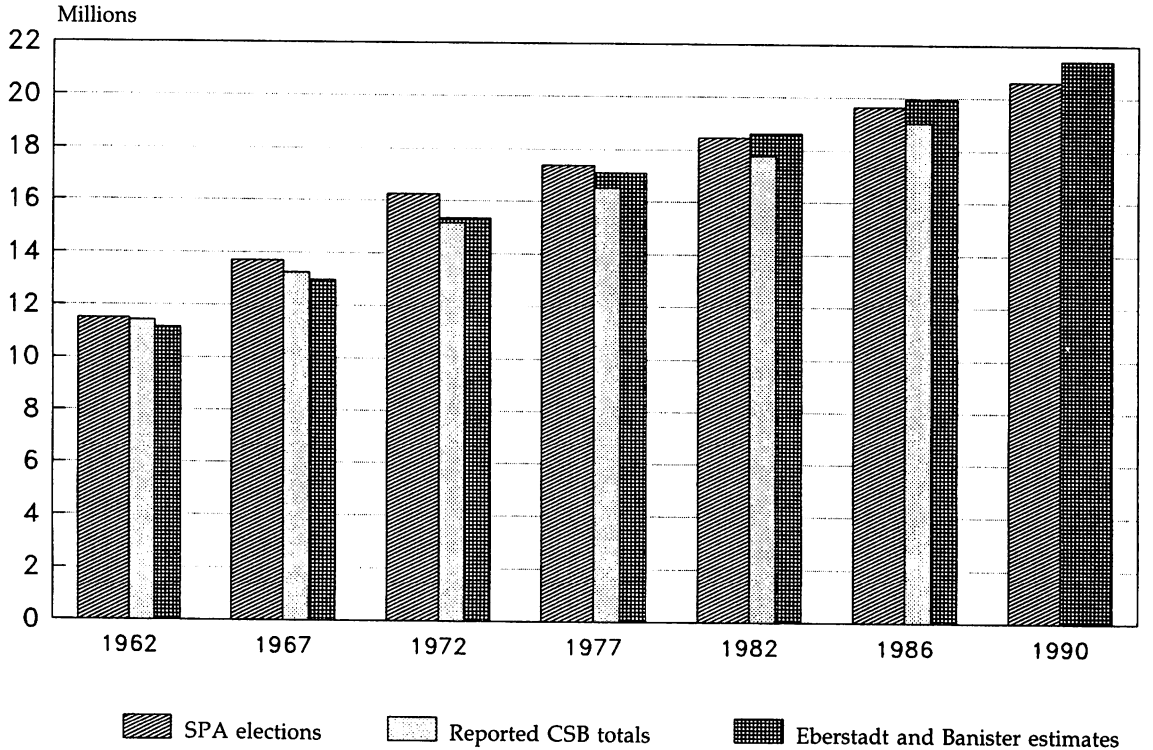
*First Supreme People's Assembly totaled 572 delegates, including 360 designated for the population of South Korea.

Sources: NUB, 1988, pp. 21–22; "Small Parties Represent Minority in North," *The Korea Herald* (Seoul), May 29, 1990, p. 2, Foreign Broadcast Information Service, *Daily Report*, No. FBIS-EAS-90-104, May 30, 1990, p. 36.

Figure 1 compares implied SPA population totals with official population figures and our estimates over the years 1962 to 1990. Note that the three sets of figures are not exactly comparable: our estimates are for midyear population, whereas the official registration numbers are year-end and the election dates are irregular.

For 1962, the three indicators for the North Korean population are in very close agreement. From 1972 onward, our estimates, in absolute terms, are closer to the implied SPA totals than are the figures from the registration system; from 1982 onward, however, our estimates exceed the implied SPA numbers. For 1990, our midyear estimate is about 800,000 higher than the population total implied by the April elections for the Ninth SPA. Between 1986 and 1990, the growth rate for SPA delegates averaged 1.4 percent per year; our estimate for the North Korean rate of natural increase for the late 1980s is 1.9 percent a year. Since the data upon which we based our estimates extended only to 1987, it is possible that the SPA totals reflect a subsequent but very sharp drop in recorded population growth rates. Alternatively, it may be that DPRK authorities

Figure 1. North Korean Population by Various Indicators: Selected Years, 1962–1990



NOTE: CSB totals are year-end, Eberstadt and Banister totals are midyear, and the dates for SPA elections are irregular. CSB totals are interpolated between reported years

SOURCES: Tables 11, 12, and 13.

have slightly slowed the increase in SPA delegates for some internal political reason—or that they have been losing track of a small portion of their country's total population.

Population and Party Membership

Whatever indicator one prefers for North Korea's current population, it is clear that members of the Korean Workers' Party account for a significant portion of the total. As noted earlier, one North Korean source published in 1987 claimed KWP membership to be "over 3 million."[47] This would imply, by our estimates, that over a fifth of all North Koreans old enough to vote (ages 17 or older) were Party members.

For an elite party (as Marxist-Leninist parties by definition construe themselves), such broadly based membership would seem rather uncharacteristic. By comparison with other contemporary Communist states, the ratio of Party members to total population looks quite high. If the claimed 1987 KWP membership figure is accurate, about 15 percent of North Korea's total population belonged to its ruling Party. In other Asian Communist states, the corresponding figures were 3 or 4 percent; in Cuba it was about 5 percent; and in the USSR it was under 7 percent (see Table 14). The only Communist government to report a higher ratio of Party members to total population was Romania in the final years of the Ceauçescu era.[48]

The high ratio of Party members to total population may or may not speak to prospects for stability in the North Korean political system. In recent years Communist power has eroded or collapsed under regimes where an unusually high fraction of the population enjoyed Party membership (e.g., Romania), but also where membership was relatively restricted (e.g., Mongolia and Poland). One may observe with much less speculation that the high ratio of Party members to population is a distinctive feature of North Korea's Communist system, separates that government from many other Communist regimes, and both reflects and affects the operations of the North Korean polity.

Age Structure

For the first time since partition in 1945, North Korea released the age structure of its population, which is shown in Table 15. Unlike ordinary age-sex structures, which group populations into five-year age cohorts, the North Korean figures classify the total civilian population for year-end

Table 14. Claimed or Estimated Party Membership as a Percentage of Total Population: North Korea and Selected Other Communist Countries, 1987

Country	Claimed or estimated 1987 Party membership (thousands)	Estimated midyear 1987 population (millions)	Party membership as percentage of total population
North Korea	over 3,000	20.29	over 14.8
China	46,012	1,064.15	4.3
Mongolia	88	2.01	4.4
Vietnam	1,900	63.59	3.0
Albania	147	3.09	4.8
Bulgaria	932	8.96	10.4
Czechoslovakia	1,705	15.58	10.9
GDR	2,324	16.61	14.0
Hungary	871	10.61	8.2
Poland	2,130	37.73	5.6
Romania	3,640	22.94	15.9
Yugoslavia	2,168	23.43	9.3
USSR	19,038	284.01	6.7
Cuba	524	10.26	5.1

Sources: For North Korea: Table 12 and Pang, 1987, p. 82; for all other countries: Richard F. Staar, ed., *Yearbook on International Communist Affairs 1988* (Stanford, Calif.: Hoover Institution Press, 1988), pp. xv–xxiii.

1986 into the following groups: under age 1, 1 through 3, 4–5, 6–15, the singulate year 16, 17–54, 55–59, 60–89, 90–99, and 100+.

These age groupings are apparently of use for North Korean authorities in planning and formulating policy; the 6–15 cohort, for example, provides the figure for children who are supposed to be enrolled in the state's universal primary and secondary education system.[49] Even without utilizing demographic techniques, a certain amount of information is evident from the reported age structure. The number of youth at age 16 in 1986, for example, is 40 percent greater than the number of children reported to

Table 15. North Korea, Reported Civilian Population by Age Group, Year-end 1986

Age	Total	Male	Female	Sex ratio
0 (infants)	387,300	198,423	188,877	105.1
1–3	1,204,785	613,739	591,046	103.8
4–5	923,078	470,713	452,365	104.1
6–15	4,400,204	2,235,540	2,164,664	103.3
16	544,355	264,536	279,819	94.5
17–54	9,817,072	4,286,768	5,530,304	77.5
55–59	574,469	222,639	351,830	63.3
60–89	1,197,352	415,227	782,125	53.1
90–99	11,436	2,874	8,562	33.6
100+	49	7	42	16.7
Total	19,060,100	8,710,466	10,349,634	84.2

Note: According to notes from United Nations experts, "Age group classification in the table is in accordance with the criterion of DPRK's CSB according to their need for analysis. Age 1–3 is for figuring out preschool enrollment, 6–15 for compulsory education and age 16 is the age of finishing compulsory education and becoming eligible to receive the citizenship card and to have a job." Sex ratio is males per hundred females in each age group.

Source: Nicholas Eberstadt received permission from officials of the Central Statistics Bureau to cite the statistics in this table, Pyongyang, May 25, 1990.

be under 1 year of age; even allowing for considerable undercounting or age misreporting of infants, it appears that more children were born in 1970 than in 1986, in spite of the greater numbers of women in the reproductive ages in the latter year. Such data indicate that fertility in the DPRK has dropped significantly over the past two decades.

The anomalous trend evident in reported population sex ratios over time is also visible in the 1986 DPRK reported age structure. For children ages 15 and under, sex ratios for all groupings are 103.3 or greater, as one would expect in a youthful population.[50] For youth at age 16, however, the sex ratio suddenly drops to 94.5 males per hundred females. It then falls even more dramatically, to 77.5, for the group ages 17–54. Thereafter it continues in an accelerated descent.

Many of the anomalies in the DPRK's reported sex ratio data can be explained by the decision to exclude the military. That the 1986 popula-

tion figures include civilians only could explain the strange sex ratios for the population at age 16, and for the group ages 17–54, but probably not for the older groups ages 55–59 and ages 60 and above. If the sex ratios of the older cohorts are really as low as reported, this would have to be explained by a combination of differential losses during the Korean War and the high differential male mortality characteristic of older age groups in East Asian populations.

Based on our numerous attempts to model North Korean population dynamics from the 1950s or 1960 to the present, we conclude that most aspects of the reported 1986 age structure are accurate. Even so, some errors can be detected; details are given in Appendix B. In general, age reporting appears to be good and the count seems relatively complete except for the missing military. The main anomalies are exaggeration of the ages of very young children and retention in the registers of too many women ages 55 and above, both of which can be corrected for by modeling North Korea's population change over time. The age structure reported in Table 15 is one of the key pieces of information for reconstructing and projecting North Korea's population, as discussed in Appendix A. In particular, the reported numbers of children at different ages constrain the fertility and mortality assumptions for the decade and a half prior to 1986.

Vital Statistics and Rates

Table 16 shows the officially reported birth rates, death rates, and natural population growth rates for North Korea for occasional years from 1944 through 1986. The absolute numbers of registered births and deaths for some years from 1980 through 1987 are given here:[51]

Year	Births	Deaths	Natural increase
1980	374,234	77,250	296,984
1982	386,641	75,916	310,725
1985	414,234	85,832	328,402
1986	433,407	94,630	338,777
1987	430,148	96,015	334,133

Using the numbers of births and deaths in 1986 in combination with official 1985 and 1986 year-end civilian population totals, it can be demonstrated that the official crude vital rates in Table 16 are births and

Table 16. North Korea, Reported Crude Vital Rates and Infant Mortality, 1944–1986

Year	Crude birth rate	Crude death rate	Natural increase rate	Infant mortality rate
1944	31.3	20.8	10.5	204.0
1949	41.2	18.7	22.5	
1953	25.1	18.1	7.0	
1955	40.5	20.9	19.6	56.4
1956	31.0	17.6	13.4	
1959	39.3	12.0	27.3	
1960	38.5	10.5	28.0	37.0
1961	36.7	11.5	25.2	
1962	41.1	10.8	30.3	
1963	42.7	12.8	29.9	
1965	43.5	9.8	33.7	35.3
1970	44.7	7.0	37.7	22.7
1975	25.9	4.7	21.2	18.1
1980	21.8	4.5	17.3	14.2
1982	21.9	4.3	17.6	
1985	22.2	4.6	17.6	10.5
1986	22.9	5.0	17.9	9.8

Notes: Infant mortality rates are infant deaths per thousand live births. Crude birth, death, and natural increase rates are per thousand population as of midyear. In recent years, official crude birth and death rates were calculated with the civilian, not the total, population in the denominator. But if the births and deaths are those of the total population, which is probably the case, the denominator should be the total population including the military. Such a recalculation would make the birth and death rates based on registered vital events slightly lower than reported here. Our estimates of North Korea's birth and death rates (Table A-1) are higher than these figures, which are based on vital registration.

Sources: CSB, 1983, p. 5; CSB, 1987, pp. 5, 7; CCN, 1963, p. 337; CCN, 1961, p. 321; CCN, 1964, p. 316.

deaths per thousand midyear *civilian* population. We believe that the absolute birth and death totals include births and deaths to the military population.[52] If this is the case, the denominator in the calculation of vital rates should be the total population including the military, which would make the birth and death rates based on registered vital events slightly lower than reported in Table 16 for recent years.

Appendix A includes two tables showing the results of our reconstruction of North Korean demographic trends, and Appendix B discusses the completeness of reporting of births, deaths, and infant deaths over time. We have concluded that birth reporting has been close to complete for three decades and death reporting has not. Therefore, we estimate that the natural population increase rates for most years were slightly lower than reported in Table 16. Figure 2 graphs our reconstructed birth and death rates from 1960 to 1990. The vertical distance between the lines in any year represents the rate of natural increase of the population.

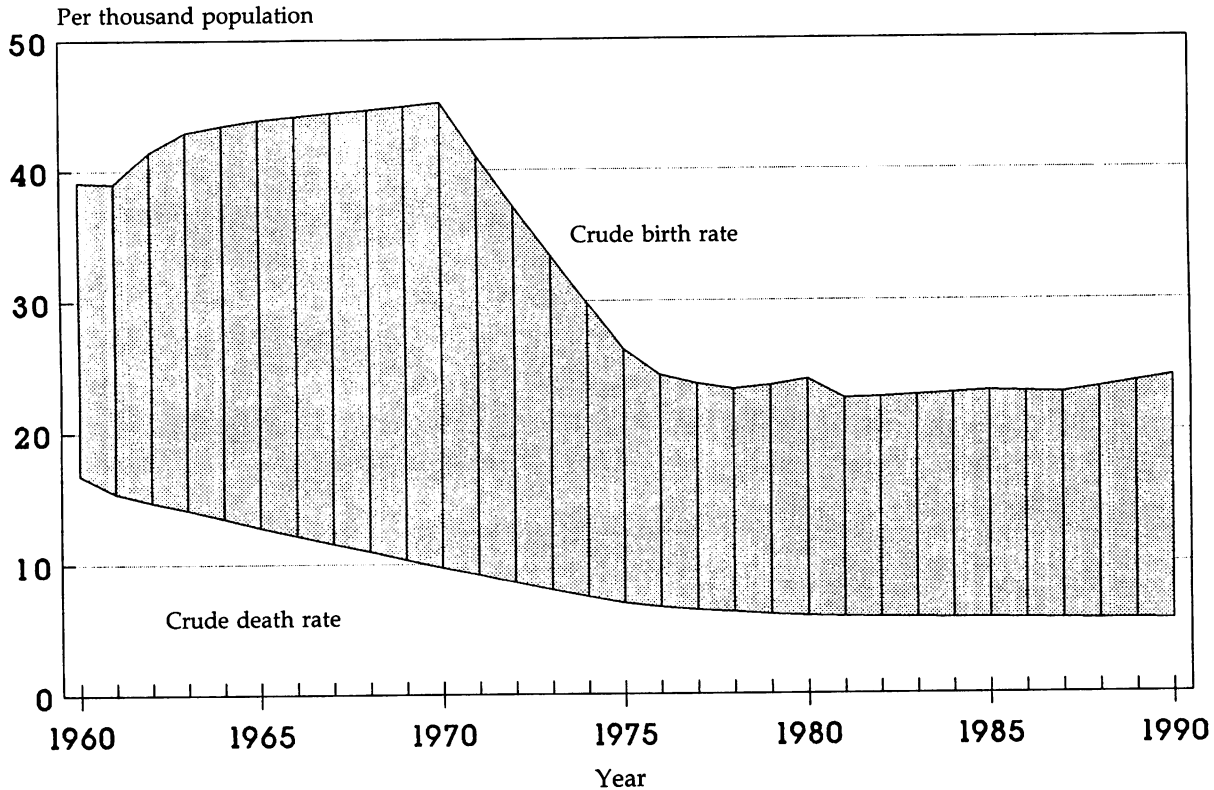
Figure 2 shows that North Korea's death rate was already much lower than its birth rate by 1960, and since then the crude death rate has declined to a low level. The birth rate, in contrast, was high and rising in the 1960s. After 1970, there was a steep drop in the birth rate till the mid-1970s and a more gradual decline in the late 1970s. Since then, the crude birth rate has stayed in the low twenties. It is evident from Figure 2 that the natural increase rate of North Korea's population peaked in 1970, declined by the late 1970s, and has essentially leveled out for more than a decade.

Mortality and Health

The DPRK has in recent years released a variety of data pertaining to the mortality and health of its population. These data include total deaths registered for a few specific years; time series figures for crude death rates and infant mortality rates; occasional data for what is described as "average life span"; mortality by reported cause of death for certain years; and a selection of statistics describing the structure and performance of the state medical and public health system.

Review and analysis of these figures reveal some shortcomings and inconsistencies and raise additional questions about the sources and derivation of some of these numbers. As shown in Appendices A and B, several different models of North Korean population trends indicate that mortality has been generally underreported, and infant mortality seriously underreported, in the DPRK during the period 1960–1987, although the degree of underreporting appears to have varied over time. Official data on crude birth rates and population growth indicate that the number of deaths each year had to be higher than reported. Similarly, reducing the number of children reportedly born in various years to the number reported as still alive in the age structure of year-end 1986 would require many more infant deaths than were in fact registered.

Figure 2. North Korea, Estimated Vital Rates, 1960–1990



SOURCE: Table A-1.

Table 17 shows the reported official figures for "average life span," which means expectation of life at birth.[53] There are some anomalies in these figures. For some years, the life expectancy reported for the whole population, "both sexes," is close to the figure reported for one of the sexes and quite different from the figure given for the other sex. This would suggest that one of the sexes is numerically very dominant in the total population. For example, the reported life expectancies for 1960 imply that females strongly predominated in the population count. In contrast, data for 1969 suggest that North Korea's population was overwhelmingly male. We hypothesize that there are errors in the calculation of the life expectancy for "both sexes" from data for males and females.

It is also noteworthy that the Central Statistics Bureau has calculated "average life span" for men and women for a number of years—1964, 1969, 1972, and 1976 among them—for which no other mortality data have yet been released. In fact, of the seven postwar years for which "average life span" estimates for men and women have to date been provided, only two (1960 and 1986) are years for which the CSB has reported crude death rates and infant mortality rates for the population. The reasoning behind the selection of the specific years for which "average life span" has been released, and for separating these figures from the other time series data on mortality, is not immediately apparent. But the very fact of the lack of synchronization between these "average life span" data and other mortality data thus far released suggests that demographic data may have been collected and computations may have been carried out by the CSB for more years than reported.[54]

In attempting to reconstruct postwar population trends in North Korea, we tested a number of mortality patterns and levels over time (see Appendix A). The mortality patterns and trends sought in our models were those required to replicate, as closely as possible, reported population growth through 1986 and the age structure reported for the DPRK at year-end 1986. Our estimates of life expectancy at birth, crude death rates, and infant mortality rates all derive from the mortality schedule that we found conforming best to these requirements.

Expectation of Life at Birth

Life expectancy at birth may be the single most comprehensive, and intuitively comprehensible, measure of mortality for an entire population. In Model 1, we estimate that overall life expectancy at birth in the DPRK in

Table 17. North Korea, Reported Life Expectancy, 1936–1986 (in years)

Year	Both sexes	Male	Female
1936–1940	38.4	37.3	39.5
1957	57.0	55.0	59.0
1960	58.3	56.0	59.0
1964	59.9	57.5	61.9
1965	61.0		
1969	63.8	62.0	68.0
1970	65.2		
1972	66.0	62.9	68.9
1976	73.0		
1982	74.0		
1986	74.3	70.9	77.3

Note: For some years, the figure for the expectation of life at birth for both sexes is not consistent with the figures for males and females (see text). Yet all the figures for the same year were reported in the same original table, so we reproduce them here without adjustment.

Sources: CSB, 1983, p. 15; 1987, p. 23.

1986 was 67.7 years—64.4 years for males and 70.7 years for females. By way of comparison, our Model 1 estimates would place overall life expectancy in 1986 in North Korea at roughly the same level as that which the World Bank imputed to Mexico (68 years). North Korea's overall life expectancy is also similar to the World Bank's figure of 67 years for countries it terms "upper middle income economies"—a grouping whose per-capita gross domestic product (GDP), by the World Bank's reckoning, ranged in 1986 from US$1,810 to $7,410.[55]

In 1960, based on Model 1, overall life expectancy at birth in the DPRK was about 49 years—46 years for men and 52 years for women.[56] Between 1960 and 1987, life expectancy apparently rose by about 19 years for both men and women. An increase of over one year in life expectancy at birth per calendar year would generally be considered a rapid reduction in overall mortality. Our modeling based on the official birth rates, population growth, and age structure suggests that life expectancy at birth rose especially rapidly in North Korea in the 1960s and 1970s: by about 10 years in the 1960s, and by around seven years in the 1970s. Our estimates suggest a pronounced slowdown in improvements in the 1980s:

between 1980 and 1986, for example, we estimate overall life expectancy to have increased by less than two years.

Estimated life expectancy in North Korea can be placed in perspective by comparison with available estimates for prepartition Korea and for contemporary South Korea (see Table 18). In the early 1940s, by Kwon's estimate, overall life expectancy at birth in Korea was 43.4 years. Two decades later, for the period 1960–1965, his estimate for overall life expectancy at birth in the Republic of Korea was 50.7 years—very close to our estimates for the DPRK at that time. For the late 1970s and the 1980s, estimates for North and South are again very similar. By about 1979, it appears that males in both Koreas had attained a life expectancy of around 62 years and females 68 or 69 years. As of 1985, we estimate North Korea's life expectancy at 64.1 years for males and 70.4 years for females, very similar to estimates for South Korea of 64.9 and 71.3 years, respectively.[57] (It may come as a surprise that so little in the way of reliable data on mortality should be available for South Korea, but the country's system for health statistics remains underdeveloped; much more reliable information, for example, can be found for such places as Taiwan or Peninsular Malaysia.)[58]

These results are somewhat surprising. It is striking that overall life expectancy trends should appear to be so similar in a population divided into two, prevented from contact and communication, and subjected for decades to distinctly different sorts of government policies. The similarity is all the more surprising for what it does *not* show. North Korea's Marxist-Leninist polity, for example, was characterized by a variety of policies and programs (e.g., land reform, mass literacy campaigns, expansion of public health facilities) that might have been expected to have an immediate impact on health conditions, especially for vulnerable elements of the prerevolutionary order. Moreover, it is widely thought that North Korea had achieved a higher level of economic development than South Korea by the early 1960s.[59] Despite these seeming advantages, life expectancy in North Korea in the early 1960s does not appear to have been appreciably higher than in South Korea.

Economic growth is generally thought to have been more rapid over the past quarter century in South Korea than in the North. Per-capita output in the South is believed to have surpassed that of the North in the 1970s and to have been significantly higher than in the North by the 1980s.[60] Ordinarily, one might have expected such performance to have

Table 18. Estimated Expectation of Life at Birth for North Korea, South Korea, and Prepartition Korea, 1940–1985

Year	North Korea			South Korea			South Korea NAS estimate
	Both sexes	Male	Female	Both sexes	Male	Female	Female
1940–1945 (prepartition)	43.4	42.0	44.8	43.4	42.0	44.8	NA
1955–1960	NA	NA	NA	49.6	46.9	52.5	58.9
1960	49.0	46.0	52.1	NA	NA	NA	NA
1960–1965	51.9	48.9	55.0	50.7	48.1	53.5	60.4
1970–1975	61.3	58.2	64.6	NA	NA	NA	67.2
1978–1979	65.2	62.1	68.4	NA	62.7	69.1	NA
1980	65.7	62.7	69.0	64.9	61.2	68.8	NA
1985	67.2	64.1	70.4	NA	64.9	71.3	NA

NA = Not available.

Notes: Estimates for prepartition Korea are for the country as a whole. For North Korea, the life expectancy estimates given for 1960–1965 are our 1963 estimates; for 1970–1975, our 1973 estimates; and for 1978–1979, our 1979 estimates.

Sources: Kwon, 1977, pp. 314–318; Table A-2; *Yearbook of Health and Social Statistics 1986*, p. 7; NAS, 1980, p. 8; KIPH, 1983, pp. 121–123.

translated into advantageous health conditions. The period between the early 1960s and the mid-1980s, however, does not seem to have conferred any special advantage in life expectancy improvement to the Republic of Korea. Despite the dramatically different political and social experiences of the North and South Korean populations, overall mortality levels today appear to be quite close, as seems to have been the case around 1960 (and perhaps before partition as well[61]).

North Korea seems to have achieved a life expectancy in the high sixties, yet at the same time there are persistent reports of economic difficulties, tight food supplies, and deprivation. For example, a 1988 study describes the "economic stagnation" of the DPRK since the mid-1970s, noting that problems of food supply have not been solved and that "a strict rationing system is still in effect."[62] A 1988 report critical of the human rights situation in North Korea paints an even more dismal picture. The authors report that the population is classified according to political criteria, with the result that half the population is seen as ideologically "wavering" or "uncertain." People in the so-called wavering class "subsist on a very restricted income and tight food rations.... Their education is poor, and their health needs are inadequately met." The "hostile" or "disloyal" class appears to comprise another 20 percent of the population, and they are reported to be harshly treated and assigned to dangerous or hard labor. According to this study, most people are undernourished, subsisting mostly on grain rations that have not increased since 1957, with few supplementary foods available. People outside Pyongyang are described as "listless, unenergetic, pale, and thin."[63]

How can we solve this apparent paradox? How can a population have fairly good mortality conditions when the quantity and quality of its food consumption appear to be so poor? To explain this anomaly, it is instructive to compare North Korea today with China before its economic reform period began in 1978. As of 1977, the PRC population had achieved a life expectancy of about 65 years, yet per-capita grain supplies had not improved since 1957, the diet had deteriorated so that people subsisted very heavily on grain, people were poorly nourished and many were malnourished, and simple primary health care was widely available but the quality of curative medical care was not high.[64] These two Asian Communist countries, China and North Korea, have demonstrated that an expectation of life at birth in the middle or high sixties is achievable under conditions of suppressed economic potential, bare subsistence food rations, and a

widely available primary health care system that emphasizes prevention and cure of common ailments.

Crude Death Rates

As discussed in Appendix A, death rate trends are derived as a residual from the reported birth rates and data on population size and growth. Based on Model 1, the DPRK's crude death rate declined from 17 deaths per thousand population in 1960 to 5.6 per thousand in 1987, or by two-thirds, because of significant improvement in mortality.

As detailed in Appendix B, our estimates suggest that North Korean authorities have consistently underregistered deaths. Underregistration notwithstanding, the DPRK's own officially reported crude death rate data suggest that significant mortality differentials separated urban and rural populations in the early 1960s. An article in a North Korean medical journal, for example, placed the "overall mortality rate" for 1961 at 10.0 per thousand in rural areas and 5.6 per thousand in urban areas.[65] Neither differential underreporting of deaths nor differences in rural and urban age structures would seem adequate to explain fully such a wide gap in reported death rates. By 1980, according to this same source, the "overall mortality rate" was 4.5 per thousand in rural areas and 3.5 in urban areas. Neither figure is likely to represent complete reporting of deaths. (Our reconstruction for the country as a whole for 1980 was 5.9 per thousand.) Nevertheless, these numbers suggest that the mortality transition in North Korea over the past three decades has not only improved overall survival chances but reduced previous differences in mortality between urban and rural areas.

Infant Mortality

We have utilized official statistics to model infant mortality trends for male and female babies from 1960 to 1990, as shown in Table A-2.[66] Our estimated levels of infant mortality and the relationships between male and female infant mortality over time are based on several assumptions. First, we assumed that the 1986 counts of boys and girls ages 0–5 and ages 6–15 are complete and accurate, since we could find no strong evidence of undercounts or overcounts for these groups. The reported birth rates in the years these cohorts were born, combined with our estimated levels of infant and child mortality, produce the numbers of children still living and counted from the registers in 1986.

Second, the level of mortality for the whole population in any year is derived from the difference between reported births and reported population growth, but deaths are allocated between infants and older age groups by the life table chosen. No life tables are available for North Korea, so a model life table must be used. After trying various model life tables, we chose the United Nations Far Eastern model for the reconstruction. Certain relationships between mortality at different ages and between male and female infant mortality are built into any set of life tables. We used small successive approximations to adjust male or female infant mortality assumptions only to the extent necessary to reproduce the reported 1986 childhood age groups by sex.

Finally, we assumed a constant sex ratio at birth of 105.0 males per hundred females, the lowest plausible estimate for an East Asian population. If we had assumed a higher sex ratio at birth, the disparity between the higher male and lower female infant mortality rates would have been wider than our estimates in Table A-2.

Based on these assumptions, and modeling plausible trends in infant mortality over time, we conclude that North Korea's infant mortality rate in 1960 was already below 100 deaths in the first year of life per thousand live births. Improvement thereafter in both overall mortality and infant mortality was rapid. By the mid-1970s, the infant mortality rate was below 50 per thousand, and our reconstruction indicates that it continued to drop. In the early 1980s, of each thousand infants born about 30 to 40 died under one year of age. Male infant mortality has been higher than female for at least the last three decades. By 1990, we estimate that North Korea had achieved an infant mortality rate of approximately 31 infant deaths per thousand live births, 35 for male infants and 28 for females. This is a low level for a developing country (roughly similar, for example, to rates reported for Sri Lanka and Yugoslavia in the mid-1980s) and suggests that North Korea's health system has emphasized maternal and child health. Because of the severe underreporting of infant deaths in North Korea, as discussed in Appendix B, the infant mortality rates from our reconstructions can be expected to reflect actual survival chances for North Korea's newborns more realistically than the country's officially reported figures.

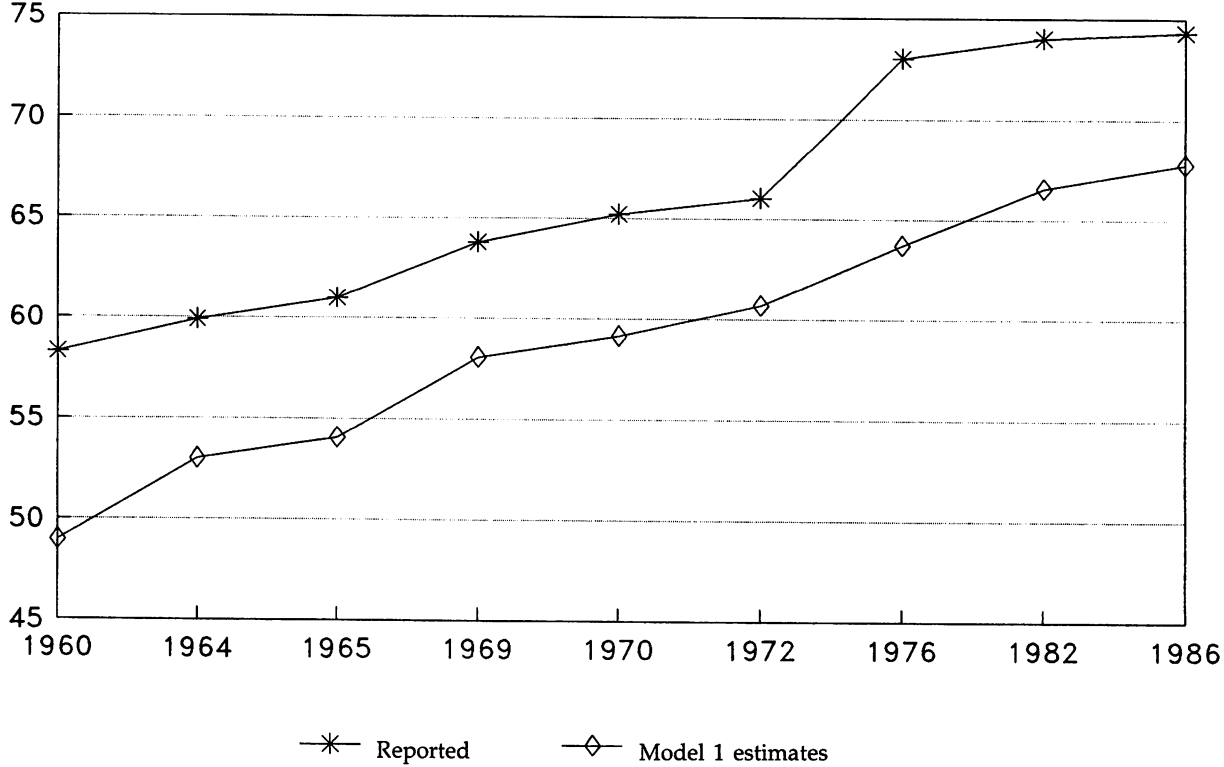
Reported vs. Estimated Mortality Trends

Although official North Korean data and our reconstruction of DPRK population trends both indicate substantial reductions in mortality for the country in the period since the Korean War, there are considerable discrepancies between our estimates and the figures North Korea has released. These differences are highlighted in Figures 3 and 4. Between 1960 and 1986, as shown in Figure 3, our estimates for expectation of life at birth in the DPRK are consistently lower than official claims for "average life span." The difference between our figures and the official North Korean numbers varies from about five years to over nine years, depending upon the year in question. (For the period before partition, in contrast, North Korea uses an "average life span" figure that is *lower* than Western estimates for Korea at that time.[67]) By the same token, our estimates for DPRK infant mortality during the years 1960–1986 range from twice to three and a half times the officially reported rates, as shown in Figure 4. (As with "average life span," North Korea's figure for the prepartition period suggests a more disadvantageous level of infant mortality than do Western estimates.[68])

North Korean official figures would suggest not only that lower mortality levels prevail today, but also that mortality improvement since the partition has been more substantial than has been indicated by our estimates. For North Korean authorities, the message conveyed by such official numbers is unlikely to raise objections. Yet the longstanding official underestimation of deaths and death rates does not necessarily mean that these data have been adjusted for political reasons.

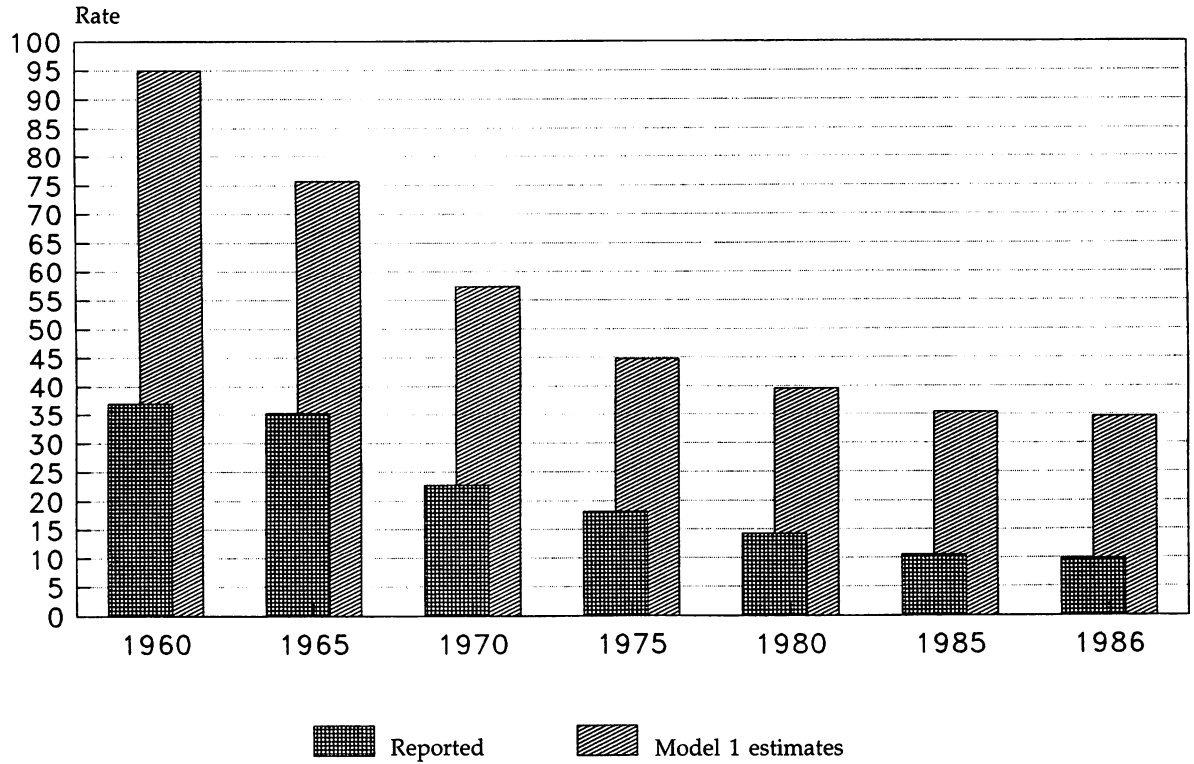
Mortality statistics have typically been problematic in low-income countries, including low-income Communist countries such as China, Vietnam, and Mongolia.[69] However "totalitarian" their rulers' intentions may have been, such states have never been able to keep a complete tally of the population changes in the societies under their control. North Korea's international reputation is as one of the most strictly regimented and tightly policed societies of the modern world.[70] It may be interesting to learn that a state with such a reputation has been unable to keep track of all the deaths in the society under its command for a period extending into decades.

Figure 3. North Korea, Life Expectancy as Reported and Model 1 Estimates, 1960–1986



SOURCES: Tables 17 and A-2.

Figure 4. North Korea, Infant Mortality as Reported and Model 1 Estimates, 1960–1986



SOURCE: Table B-1.

Causes of Death

North Korea has released data on mortality by reported cause of death for selected years between 1960 and 1986 (see Table 19). The categorization scheme for causes of death in this table seems to conform closely with the World Health Organization's International Classification of Diseases (ICD) system, although the ICD is not specifically mentioned and there is no indication as to which of the regularly updated ICD series DPRK authorities might have been using in any particular year.[71]

Between 1960 and 1986, North Korea not only reported a steep decline in crude death rates, but also a marked shift in the patterns of death by reported cause. In 1960, infectious and parasitic diseases and diseases of the respiratory system were recorded as accounting for 42.5 percent of the country's reported deaths; their share had declined to 13.3 percent by 1986. In contrast, the proportion of reported deaths ascribed to neoplasms (cancer) and diseases of the circulatory system rose sharply, from 14.7 percent in 1960 to 59.2 percent in 1986. (Despite the drop in reported crude death rates between 1960 and 1986, the number of deaths ascribed to cancers and cardiovascular disease per 10,000 population almost doubled during this period). North Korea's changing reported structure of mortality by cause would be consistent with a transition from a relatively high mortality regimen (in which diseases associated with poor hygiene, poor nutrition, and poverty take a disproportionate toll) to a relatively low mortality regimen (in which cancers, heart disease, and other chronic diseases predominate as causes of death).

Some other aspects of North Korea's cause-of-death data are of interest. For example, the share of deaths classified under "symptoms, signs and ill-defined conditions" was recorded as 13.7 percent in 1960, declining to 2.6 percent in 1986. However accurate the diagnoses may be, DPRK authorities were identifying a cause of death for over 97 percent of the deaths registered in their country by the late 1980s; perhaps even more surprising, they were identifying a cause of death for almost 90 percent of the cases reported in 1960—a time when mortality levels were higher and when medical capabilities may have been limited.[72]

The DPRK's cause-of-death data may be compared with contemporary figures from the Republic of Korea and with historical figures for Korea as a whole from the period of Japanese imperial rule (see Table 20). One must remember that the procedure for diagnosing deaths cannot be presumed to be uniform (much less uniformly accurate) in North and

Table 19. North Korea, Causes of Death, 1960–1986 (percent of all reported deaths)

Causes of death	1960	1965	1970	1975	1980	1985	1986
Circulatory system diseases	12.1	16.1	22.9	32.6	42.3	45.5	45.3
Neoplasms (cancer)	2.6	2.9	5.7	8.5	12.0	14.1	13.9
Digestive system diseases	14.4	17.2	20.6	15.5	10.6	10.6	10.4
Respiratory system diseases	14.2	13.5	14.9	13.4	10.3	9.0	9.4
Injury and poisoning	2.9	3.1	4.0	5.6	6.5	7.0	7.7
Infectious and parasitic diseases	28.3	29.1	10.9	7.5	5.2	4.0	3.9
Symptoms, signs and ill-defined conditions	13.7	8.0	10.7	9.5	5.7	2.6	2.6
Mental disorders	1.2	1.1	1.2	1.1	1.4	1.5	1.5
Nervous system and sense organs diseases	2.0	2.0	.7	.6	1.2	1.3	1.3
Genitourinary system diseases	2.1	2.0	1.4	2.1	1.3	1.2	1.1
Congenital anomalies	.4	.3	1.1	.6	.9	.9	.8
Endocrine, nutritional and metabolic disorders	4.7	2.8	2.1	.5	.7	.7	.6
Certain conditions originating in the perinatal period	.3	.5	2.7	1.1	.9	.6	.6
Blood and blood-forming organs diseases	.4	.5	.4	.8	.4	.5	.4
Complications of pregnancy, childbirth, and the puerperium	.4	.4	.5	.3	.3	.2	.2
Musculoskeletal system and connective tissues diseases	.2	.3	.1	.2	.2	.2	.2
Skin and subcutaneous tissue diseases	.1	.2	.1	.1	.1	.1	.1

Note: Breakdown based upon incomplete reporting of deaths. ICD classification apparently used, but the ICD systems varied over time. Actual classification procedures may vary. Causes of death listed by 1986 rank rather than ICD sequence.

Source: CSB, 1987, pp. 10–11.

Table 20. Breakdown of Reported Mortality by Cause of Death: Korea 1938–1942, South Korea 1985, North Korea 1986 (percent of all reported deaths)

Cause of death	Korea 1938–1942	South Korea 1985	North Korea 1986
Diseases of the circulatory system	1.0	31.8	45.3
Neoplasms (cancer)	0.8	15.1	13.9
Diseases of the digestive system	19.4	9.0	10.4
Diseases of the respiratory system	16.8	4.6	9.4
Injury and poisoning	2.1	11.6	7.7
Infectious and parasitic diseases	14.4	4.1	3.9
Symptoms, signs, and ill-defined conditions	21.2	3.0	2.6
Mental disorders	—	0.6	1.5
Diseases of the nervous system and sense organs	15.8	1.2	1.3
Diseases of the genitourinary system	3.4	0.9	1.1
Congenital anomalies	0.02	0.4	0.8
Endocrine, nutritional, and metabolic disorders	0.5	1.9	0.6
Certain conditions originating in the perinatal period	0.5	0.04	0.6
Diseases of the blood and blood-forming organs	0.2	0.1	0.4
Complications of pregnancy, childbirth, and puerperium	0.8	0.1	0.2
Diseases of musculoskeletal system and connective tissue	0.2	0.4	0.2
Disease of the skin and subcutaneous tissue	0.2	0.02	0.1
Senility, old age	2.8	15.0	—

Notes: Breakdown based upon incomplete reporting of deaths. ICD classification is used, but the ICD systems varied over time. Actual classification procedures may vary. Causes of death sequenced as in Table 19. The data for Korea 1938–1942 did not list deaths caused by "mental disorders." North Korean cause-of-death data do not report "senility" as a separate category.

Sources: Chai Bin Park, "Statistical Observations on Death-Rates and Causes of Death in Korea," *Bulletin of the World Health Organization 1955*, volume 13, p. 79; World Health Organization, *World Health Statistics Annual*, 1987, pp. 334–337; Table 19.

South Korea today, and that death registration was incomplete during the period of Japanese rule and remains incomplete in both North and South Korea today.[73]

In the years 1938–1942, 31.2 percent of deaths reported and diagnosed in Korea were ascribed to parasitic and infectious diseases and diseases of the respiratory system; the corresponding proportions were reported to be 8.7 percent in South Korea in 1985 and 13.3 percent in North Korea in 1986. Improved mortality and health conditions have meant great reductions in the proportion of deaths attributable to these causes in both North and South Korea, but respiratory disease still causes twice the proportion of the deaths in the North as in the South. Diseases of the digestive and nervous systems also cause a much lower proportion of deaths today in North and South Korea than for all of Korea from 1938 to 1942.

Only 1.8 percent of Korea's diagnosed prepartition deaths were ascribed to cancers or heart diseases, as compared with 46.9 percent for South Korea in 1985 and 59.2 percent for North Korea in 1986. Senility or old age reportedly accounted for only 2.8 percent of Korean deaths in 1938–1942, compared to 15.0 percent in 1985 in South Korea. North Korea does not use this category in its published cause-of-death statistics. If this cause is included under circulatory diseases in North Korea, however, it would account for the reported difference in the proportions of deaths caused by diseases of the circulatory system in North and South Korea in the 1980s. Injury and poisoning accounts for a much higher share of diagnosed deaths in contemporary North and South Korea than in prepartition Korea.

These data, it should be emphasized once again, are distinctly limited in their completeness and accuracy. Within their limits, however, they seem to confirm the proposition that the mortality transition has proceeded quite far in both North and South Korea, and to suggest that differences in mortality levels between contemporary North and South Korea may not be great.

The Health Care System

The DPRK has released various data on the structure and performance of its state-run medical and public health services (see Table 21). These data include figures on health care personnel, numbers of hospital beds, utilization of medical services, and budgetary allocations to the country's health care sector.

As in other areas, puzzles and inconsistencies emerge in these numbers. According to the data provided to the UNFPA, for example, the DPRK had a total of over 285,000 health care personnel in 1986. The 1987 edition of *Health Statistics of the DPRK,* however, provides figures on the ratio of doctors and paramedics to total population in North Korea; if the civilian registered population is the base for these calculations, these numbers imply a total of fewer than 134,000—a discrepancy of over 150,000.[74] It may be that certain categories of workers are included in the overall health care sector figure but excluded from the tally of doctors and paramedics (e.g., pharmacists, pharmaceutical industry employees, sanitation and hygiene aides, Ministry of Public Health cadres, military medical personnel, etc.). Possibly the health care personnel total includes dependent adult family members of persons employed within that sector, since all adults seem to be classified according to the occupation of a working family member. These and other discrepancies, however, cannot be definitively resolved without additional information from the DPRK.

The DPRK health service system, like others modeled directly after that in the USSR, operates on the principles of state ownership and management of medical and public health facilities, with provision of care at no direct cost to the patient. In 1952, during the Korean War, the DPRK government decreed that "universal free medical care" would begin on January 1, 1953, "in all parts of the northern half of the Republic." North Korea's socialized medical system has evolved and expanded in the interim. It has also undergone a number of administrative overhauls; the year 1980, for example, saw the adoption of a new Public Health Law of the DPRK.[75]

As shown in Table 21, between 1955 and 1986 the number of medical units nationwide designated as "clinics" increased from 1,020 to 5,644, and the number of units designated as "hospitals" increased from 285 to 2,401. Of those units called "hospitals" in 1986, 338 (14 percent) were termed "tuberculosis hospitals"; 263 (11 percent) were described as "hepatitis hospitals"; and 189 (8 percent) were labeled "mental hospitals."[76] Although the distribution of the DPRK's medical facilities within the country's various administrative units is not known, by 1986 the total number of "hospitals" significantly exceeded the number of *dong* or urban blocks (2,401 vs. 1,520), and the number of clinics was greater than the number of *ri* or villages (5,644 vs. 4,107).

Table 21. Structure and Performance of Health Care Sectors in Korea, Selected Years, 1938–1987

Health care sector	1938	1955	1960	1965	1970	1975	1980	1985	1986	1987
Hospitals										
North Korea		285	449	755	1,655	2,341	2,558	2,454	2,401	2,355
South Korea	(149)	—	—	—	240	170	322	500	511	—
Clinics										
North Korea		1,020	4,364	5,092	5,577	4,928	5,358	5,728	5,644	—
South Korea	—	—	—	—	5,402	6,087	6,344	8,069	8,570	—
Doctors per 10,000 population										
North Korea		1.5	3.3	9.3	11.7	17.5	23.6	26.3	27.0	—
South Korea	(1.3)	—	—	4.8	5.6	5.6	6.7	8.1	8.6	9.2
Nurses or "paramedics" per 10,000 population										
North Korea		8.7	19.5	29.7	34.3	44.4	43.4	42.8	43.2	—
South Korea	(1.7)	—	—	3.1	5.6	16.2	26.6	40.3	41.4	44.2
Hospital beds per 10,000 population										
North Korea		19.1	35.2	58.0	104.1	118.0	130.1	135.3	135.9	—
South Korea	(1.2)	—	—	—	5.1	6.0	10.0	18.1	19.2	—
Annual hospital admissions as percent of population										
North Korea		—	7.0	9.9	10.7	10.4	11.0	9.6	9.3	—
South Korea	(1.7)	—	8.2	8.4	10.9	13.3	22.2	39.8	41.6	—

Outpatient treatment (annual average per capita contacts)										
North Korea		—	6.1	11.8	11.7	13.7	19.4	17.6	16.7	—
South Korea	—	—	0.1	0.2	0.2	0.3	0.6	1.1	0.9	—
Total health care personnel as percent of labor force										
North Korea		—	—	—	—	—	—	—	2.3	2.3
South Korea	—	—	—	0.4	0.5	0.8	1.1	1.5	1.5	1.6
Health expenditure in relation to national product										
North Korea		—	—	—	—	—	—	—	—	2.0
South Korea	—	—	—	—	—	2.4	2.8	2.7	2.6	—

Notes: Figures in parentheses refer to average for prepartition Korea as a whole. Outpatient ratio is for Korea ethnic population only. For North Korea, "population" refers to civilian population only after 1970. Training of medical personnel, classification of medical facilities, and quality of medical treatment may differ systematically. "Labor force" refers to economically active population for South Korea and to civilian population 16 and older for North Korea. "National product" refers to gross domestic product in South Korea and "gross national income" in North Korea. "Health expenditure" refers to "state estimated expenditure for public health" in North Korea and to combined government and private final consumption of health, medical care, and health expenses in South Korea; current prices are used for both North and South Korea.

Sources: Prepartition Korea: Andrew J. Grajdanzev, *Modern Korea* (Seoul: Royal Asiatic Society, 1975 (reprint of 1944 edition), p. 260. North Korea: CSB 1987, pp. 25, 30, 34, 39, 41, 48. South Korea: *Social Indicators in Korea 1987*, pp. 53, 108–109, 224–229; 1988 edition, pp. 214–215; and United Nations, *National Accounts Statistics: Main Aggregates and Detailed Tables 1986*, Part II, pp. 854, 859, 862. Nicholas Eberstadt received permission from officials of the Central Statistics Bureau to cite the statistics in this table, Pyongyang, May 25, 1990.

The DPRK has released data on the number of "doctors," "paramedics," and "hospital beds" for every 10,000 people in its population. "Doctors" appear to be defined so as to include dentists, "sanitary doctors," and practitioners of oriental medicine.[77] "Paramedics" appear to include "assistant doctors," "assistant chemists," midwives, "assistant radiodiagnosticians," prosthetists, and nurses.[78] We assume that "hospital beds" includes beds in clinics and other health-care facilities in addition to those in units designated as "hospitals." It should be remembered that the rates given refer to the *registered* population; with the exclusion of the country's growing military population after 1970, totals presented for subsequent years will somewhat overstate the actual ratio of medical personnel and beds to total population. Reported figures indicate that the ratio of "paramedics" to population rose rapidly between 1955 and 1975 but did not rise between 1975 and 1986. By contrast, the ratio of "doctors" to population rose steadily between 1955 and 1986, as did the ratio of "hospital beds" to population. By 1986, North Korea was reported to have one "hospital bed" for every 74 members of the civilian population.

The DPRK's health care system appears to be strongly geared toward extensive and preventive treatment. For 1986, the average per-capita number of outpatient treatments for the civilian population was reported to be 16.7—down from a reported high of 19.4 in 1980. (Overall, 42 percent of outpatient treatments were in polyclinics and clinics and about 58 percent were in various types of "hospitals."[79]) By contrast, the number of hospital admissions for inpatient care reportedly equaled 9.3 percent of the registered population in 1986—a lower ratio of inpatient cases to registered population than in 1965. (In 1986, only 3.6 percent of all inpatient cases were recorded as having been treated at *ri* people's hospitals";[80] this statistic may suggest that the overwhelming majority of inpatient admissions occurred in urban areas.)

According to figures released to the UNFPA, health care personnel would have accounted for 2.3 percent of the adult civilian DPRK population in both 1986 and 1987. The 1987 "state estimated expenditure for public health" was about 948 million won. This would amount to about 2 percent of the "gross national income" figure of 47,020.5 million reported for the country for the same year. It should be noted that no definition is provided for the DPRK's public health expenditures; it is not clear, for example, whether the figures cover such items as salary and personnel costs or capital budget expenditures. Pricing of inputs and services in the health

care sector, moreover, has not been explained, or even described. The DPRK's conception of "gross national income" presumably conforms with standard Marxist-Leninist national account taxonomy and therefore excludes the value of output created in the "nonproductive sphere" of service goods.

Table 21 also provides some comparisons between the DPRK's health care system and that of the Republic of Korea. One should bear in mind the differences in definition of services and outputs between the two countries. In South Korea, for example, the category "doctors" excludes dentists and practitioners of oriental medicine, "hospital beds" excludes a significant number of beds available in smaller health facilities, the ratio of health care personnel to labor force refers only to persons in the economically active population, and so on. Despite these qualifications, it is possible to draw a number of conclusions from the data. First, South Korea appears to have consistently reported a lower ratio of doctors and hospital beds to population than has North Korea. Second, South Korea's medical system (which is based almost entirely upon private payment of medical costs) appears to be geared much more toward curative and intensive treatment than the system in North Korea: the ratio of outpatient treatment to population is reported to be much lower in South Korea than in North Korea, for example, but since 1970 the ratio of inpatient admissions to population has been consistently higher in the South. Finally, both countries seem to allocate a rather low fraction of national income to medical and health care services. Despite their very different approaches to health care, however, mortality levels in North and South Korea—as noted earlier—are estimated to have been quite similar over the course of the postpartition period.

The substantial progress to date in improving health care and in stabilizing and reducing mortality has contributed to the rapid growth of population in North Korea in recent decades. The birth rate has remained well above the death rate, as shown in Figure 2. We turn now to an assessment of reported data on nuptiality and fertility in the DPRK.

The 1980s Marriage Boom

For the first time ever, North Korea has released data on marriage and divorce. Though divorce is reported to be legal, it is also reportedly discouraged.[81] According to the newly released figures in Table 22, the annual number of divorces is negligible in contemporary North Korean

Table 22. North Korea, Number of Cases of Marriage and Divorce, 1949–1987

Year	Marriages	Divorces
1949	46,368	4,763
1953	30,564	3,453
1956	107,098	4,124
1960	74,727	3,931
1965	107,493	3,021
1970	86,639	3,791
1975	84,819	3,714
1980	99,871	4,359
1982	138,673	4,182
1985	142,753	4,526
1986	177,443	4,650
1987	188,007	4,231

Note: The source table includes this note: "The numbers in the table refer to the cases of marriage and divorce, not to the people, i.e., for each case two persons were involved."
Source: Nicholas Eberstadt received permission from officials of the Central Statistics Bureau to cite the statistics in this table, Pyongyang, May 25, 1990.

society. (Divorce is also infrequent in South Korea; in 1980, for example, fewer than 21,000 divorces were reported for the country as a whole.[82])

Data in Table 22 show that there has been a great surge in the annual numbers of marriages since 1980. From 100,000 marriages registered in 1980 and typical of earlier years, the number increased rapidly to 139,000 in 1982, then slowly rose to 143,000 in 1985, and jumped to 177,000 in 1986 and 188,000 in 1987. On the basis of this trend, even if the number of births to each woman remained constant, we would expect a rising birth rate in the late 1980s and beyond as these newly married couples bear their first and second children.

The 88 percent increase in annual numbers of marriages between 1980 and 1987 was caused in part by a 31 percent increase in the number of women ages 20–34, from 2.2 million in 1980 to 2.9 million in 1987, according to our Model 1 reconstruction of DPRK demographic trends. The increase in cohort size, however, is insufficient in and of itself to explain the dramatic rise in marriages reported during the 1980s. In addition to this significant shift in age structure, mean age at marriage must also have

been dropping in the 1980s. That would help account for the bunching of marriages during the late 1980s.

These same phenomena were observed in the People's Republic of China in the 1980s. In China, the decline in the mean age at first marriage has been caused by a drop in the regulated minimum marriage ages for men and women, rural economic reforms that make earlier marriage more attractive, and reduced willingness to comply with unpopular official guidelines.[83]

We do not know if similar factors were at work in North Korea during the 1980s. A 1988 South Korean source reported that North Korea has a strict policy requiring late marriage, much like that in the urban areas of China in the 1970s:

> Men [in North Korea] are permitted to marry after they reach the age of 30 years and women after they reach the age of 28 years. In the case of men, the period of their military service is long and they are not allowed to marry while they are in service. In the case of women, they are utilized by the party for its purposes of securing the female labor force and infusing revolutionary zeal into them. The restriction is also connected with the policy of birth control.[84]

We hypothesize that any such restrictive late marriage policy has weakened in North Korea during the 1980s. It is possible that some of these extreme late marriage rules have been relaxed, so that people are permitted to marry at younger ages, or that resistance to the application of this policy has become more effective. The figures in Table 22 show two surges in the annual number of marriages that cannot be explained by increased numbers of women in the peak marriage ages; these were from 1980 to 1982 and from 1985 to 1987. Perhaps changes in marriage laws or other unreported forces caused these two sharp increases in the yearly marriage totals.

A third possible explanation for part of the increase in the reported annual numbers of marriages could be improvements in the statistical recording and reporting system for marriages. We have no information, however, suggesting that there has been any problem with the completeness of marriage registration or the compilation of marriage data in the past, nor have we seen any mention of official emphasis on the quality of marriage statistics in the 1980s. It seems unlikely that the North Korean statistical system could have underreported marriages by almost a third in the early 1980s. All citizens in the DPRK are required to carry identity cards issued

by their government. These cards contain information not only on residence and employment, but also on marriage and offspring.[85] There is no obvious reason to expect that marriage data were markedly less complete or more inaccurate than other data compiled through the population registration system.

Fertility

In North Korea, as in some other East and Southeast Asian populations, the sustained decline in mortality was followed, after a lag of several decades, by sharp fertility decline. Our conclusion is based on the officially reported birth rates, series of civilian population totals, and age structure of 1986. The DPRK birth rate remained quite high through 1970, as shown in Figure 2 and Table A-1, but then declined very rapidly in the first half of the 1970s. This was the same period when the birth rate of the People's Republic of China dropped almost by half. In China, the drop was the result of a vigorous, in some places mandatory, family-planning program that was activated because the leaders had decided China could not adequately feed a population growing at 2.5 or 3 percent a year.[86] We hypothesize that a similar decision was made in North Korea at roughly the same time, possibly influenced by PRC policies.

Since the late 1970s, North Korea's birth rate and natural population increase rate have essentially stabilized, fluctuating within a rather narrow range. This stabilization has happened in China, too. In both countries, the age structure is now unfavorable to a stationary population size. The population is still young, which causes the crude death rate to be low, but there is a bulge in the young adult ages caused by the large cohorts born before 1975, so it is difficult to reduce the birth rate further. The population of North Korea is now growing at about 1.9 percent a year.

Because the crude birth rate depends not only on the level of fertility but also on the population age structure, it is important to look at other measures of fertility to get a clearer picture of childbearing trends. The reported data on crude birth rates and total population size indicate that fertility rose during the 1960s decade and peaked at a total fertility rate[87] of about 6.9 births per woman in 1970 (Model 1).[88] By following the reported birth rates of the 1970s and 1980s, which do successfully produce the numbers of children reported in the 1986 age structure, we modeled a precipitous drop in the total fertility rate in the early 1970s to only 3.9 births per woman in 1975, with further fertility decline thereafter (Table A-2).

By 1987, the TFR was only about 2.5 births per woman, judging from the official data on the year-end 1986 age-sex structure, the growth in the civilian population totals, the absolute numbers of births and the birth rates reported for the 1980s, and the low mortality already attained. The DPRK has achieved a rather low fertility level for a low income country. (According to World Bank figures, the total fertility rate in 1986 for countries classified as "upper-middle income economies"—the group whose mortality level most closely approximates our estimates for the DPRK—was 3.5 births per woman.[89]) According to an informal UNFPA study, the DPRK government and the United Nations assumed that the North Korean total fertility rate was about 3.6 children per woman in 1985, much higher than our reconstructed estimate. High officials of the Ministry of Public Health said in 1989 that the country's total fertility rate of 3.6 children per woman was too high and that efforts should be exerted to reduce the TFR to 2.5 children by the end of the current plan period (1993). It appears that this goal has already been achieved.[90]

Although North Korean fertility levels are estimated to have dropped rapidly, and dramatically, since 1970, North Korean fertility is still estimated to be about one child per woman higher than in the South. Table 23 compares our Model 1 reconstruction of North Korean total fertility rates with those of South Korea. The fertility transition in South Korea started earlier than in the North and has been more gradual. North Korea's fertility decline was very steep and has now slowed. It should be noted that South Korea recorded a decline in its total fertility rate of over 70 percent between the early 1960s and 1988. In 1988, the TFR dropped to only 1.6 births per woman in South Korea whereas in North Korea the fertility level was still above replacement, at about 2.5 births per woman.

The foregoing estimates and discussion of fertility trends have been based on the crucial assumption that the DPRK has reported the actual data it has collected on population size and growth (Table 11), civilian population age-sex structure (Table 15), and birth rates and natural population increase rates (Table 16). But is it possible that these data are falsified and that the DPRK now has a much larger population and much faster population growth than reported? After all, North Korea is committed to a grim struggle with South Korea over domination of the whole of Korea, and yet South Korea has the advantage of a population apparently double the size of that in the North. If North Korea's population growth has actually remained as high as it was in 1970 during the succeeding two

Table 23. Total Fertility Rates, North and South Korea, 1966–1988 (children per woman)

Year	North Korea	South Korea
1966	6.5	5.4
1971	6.3	4.7
1974	4.5	3.6
1976	3.5	3.2
1982	2.8	2.7
1985	2.6	2.1
1988	2.5	1.6

Note: Fertility estimates for South Korea are from a series of national surveys on fertility and family planning.

Sources: For North Korea, Table A-2. For South Korea, H.S. Moon et al., "1985—Fertility and Family Health Survey," in *1985 KIPH Research Abstract* (Seoul: Korea Institute for Population and Health, 1985), p. 8; "Prevalence of Contraceptive Use and Fertility," *KIPH Bulletin*, no. 16, June 1989, p. 1.

decades and there was no fertility decline, then the DPRK has about 29 million people today instead of 21 million. The hidden people would all be children born in the 1970s and 1980s. Is North Korea readying a secret force of young people, soon to be young adults, for a surprise attack on the South?

Our assessment is that this scenario is extremely unlikely. To succeed in pulling off a disinformation campaign like this, the DPRK would need a skilled demographer with a sophisticated population projection model and an advanced computer, so that the demographer could create a hypothetical model like the models used in this report. Then this expert would have to extract from the model a 1986 age structure (in odd age groups often not derivable from population projection software) consistent with the fake fertility decline. But all the numbers would then have to be jumbled a bit so that they would not appear too consistent and therefore seem cooked. Finally, the demographer would have to go back and delete military men from the model starting after 1970, subtracting successively larger numbers of men each year. Yet a demographer this sophisticated would have counseled against taking out the male military, realizing that this allows other analysts to estimate the size of the DPRK military population.

It would have been necessary for all this crafty work to have been completed before early 1989, when these tables were released to the United Nations. Our assessment is that, at that time, the DPRK had neither the demographer, nor the computer, nor the demographic software sophisticated enough to plan and carry out such a scheme. Any attempt by an amateur would have produced major inconsistencies that would be detectable. Therefore, we conclude that the reported fertility decline happened and was recorded in the vital registration system of North Korea.

Population Policy

North Korea's rapid and pronounced fertility decline is not, in itself, unique. In the postwar period several other East Asian countries, including Japan and the People's Republic of China, have witnessed fertility declines of 50 percent or more in the course of a decade. What may today seem unusual about the North Korean experience, however, is the absence of a publicly articulated antinatalist government population policy. In the PRC and in many other developing countries, rapid, pronounced, and sustained declines in fertility have been accompanied by, or have coincided with, government efforts to achieve fertility reduction.[91]

North Korea does not lack the apparatus to exhort and instruct its population, yet the North Korean media have never extolled national population control—or, apparently, even mentioned any official program for family planning in the DPRK. According to a report by a visitor to North Korea, based on his conversations with government representatives in the DPRK: "There is no population policy toward family planning. The attitude of the authorities is that 'fewer children would be good for women's health and for the active participation of women in social activities, but the decision is absolutely dependent on women's will.'"[92]

Although North Korea's official presentations of its population policy in other settings have not been inconsistent with what the foregoing visitor was told, they have had a different emphasis. Between 1976 and 1986, for example, as part of its effort to monitor population trends and policies around the world, the UN Department of International Economic and Social Affairs has tabulated five questionnaires on governmental attitudes toward population policies; each of these included reported information on the attitude of the DPRK.

According to these monitoring reports, Pyongyang has consistently viewed the country's population growth rates as "unsatisfactory" because

they were seen as being "too low." Although no interventions to affect fertility rates were specifically described, the monitoring reports consistently classified North Korea's government as viewing "full intervention" to affect population growth rates as "appropriate." In its most recent compendium on governmental attitudes toward population policies, moreover, the UN Department of International Economic and Social Affairs flatly states that "the [DPRK] government directly intervenes to boost the rate of population growth."[93] On the basis of these descriptions, the DPRK's attitude toward population policy could easily be interpreted as pronatal. A variety of careful studies of the DPRK, in fact, have concluded that the DPRK's population policy has been, and continues to be, one of encouraging large family size.[94]

If DPRK government policy in the 1970s was pronatalist or neutral, then the steep decline in fertility happened in spite of the government's stand. This was a time when women in North Korea were strongly encouraged to join the economically active population and work outside the home. It is possible that women's sudden double burden of full-time jobs and continuing household responsibility without household conveniences caused couples to decide voluntarily to limit births sharply.

A very different picture of population policy in North Korea, however, has recently emerged through research in South Korea. According to a study by the Republic of Korea's National Unification Board,

> population decrease [during the Korean War] forced the North Korean government to implement forcefully social policies aimed at increasing the population.... North Korea experienced a population explosion in and after 1956.... In 1972 the North Korean government switched over to a policy of restraining new births. It propagated the idea that 'fecundity impairs the health of mothers and, furthermore, it not only increases child-rearing expenses but hinders women's social activities.'[95]

The study does not state the sources of its information on DPRK population policy; the National Unification Board, however, has access to official South Korean information on the DPRK, including information obtained from defector interviews.

In population policy, as in all other aspects of public affairs, North Korea's most authoritative expert is President Kim Il Sung. Although he has had little to say about demographic issues over the years, some comments from a speech in March 1980 are intriguing. "Apparently," he remarked, "the rate of population growth in our country is a little too

high. This is mainly because mortality is low compared to the high birth rate.... It would be preferable if the rate of population growth was to fall a little more in the future."[96] These words seem to imply a desire to see the country's birth rate reduced, although the method by which that objective is to be achieved is left unstated.

It is possible that the North Korean government has been secretly conducting a strongly antinatalist population program since the early 1970s. Such timing would coincide with the decline in birth rates reported between 1970 and 1975. A carefully and deliberately concealed population program, however, would raise many questions. What would be the motivation for concealment? Why would the government of the DPRK go to such lengths to hide a program of this sort? How would such a program be administered? In light of the role that government propaganda has played in other Communist countries' population programs, what means of instruction and persuasion would the North Korean government be using in this campaign if radio, television, and newspapers are silent on the issue?[97]

One possible parallel to consider might be the contradiction between word and deed that the PRC demonstrated in 1974 at the World Population Conference in Bucharest. In 1974, China's representatives railed against the superpowers for raising the false alarm of a population explosion and propagating these pessimistic views with "ulterior motives" of intervening in the population policies of poor countries and forcing family planning on the Third World.[98] From the 1950s through the early 1970s, Mao and other Chinese leaders repeated the orthodox Marxist line that rapid population growth was only a problem under feudalism or capitalism and not under socialism, where the growth in the means of production and the food supply would always outstrip population growth. Meanwhile, however, China was conducting a very forceful policy to restrict births because rapid population growth had in reality increased as fast as food production, leaving per-capita food supply stagnant for two decades.

If North Korean authorities in the early 1970s perceived rapid population growth to be constraining development or interfering in their fierce competition with the Republic of Korea, the DPRK government may have adopted strong fertility control policies at that time. Chinese leaders in the 1980s have stated frankly why they abandoned their previous population doctrine and now insist on tight control of fertility, but secrecy is still the

rule for policymaking in the DPRK—all the more for policies deemed to touch upon issues of national security. Therefore, in North Korea, it is conceivable that the network of cadres at the local level may be quietly implementing a vigorous family planning program while national leaders adhere more closely to the Marxist line in their pronouncements for international audiences.[99]

An unpublished UNFPA study indicates that officially the government of North Korea regards as targets for family planning all couples who already have two children and that there is no official policy limiting the number of children per family as in China. The government reportedly has a program of controlling pregnancies aimed at those women who have had two or more children in order to prevent rapid population growth. UNFPA sees DPRK educational and motivational work to encourage family planning as essentially passive and submerged under the Ministry of Public Health, which emphasizes health work and not family planning work. Although UN observers perceive that family planning in the DPRK is not yet considered a priority area, they were told that information on contraception is provided as part of general health information. The vast majority (reportedly, 70 percent) of couples practicing family planning in North Korea use intrauterine devices, according to informal UNFPA information.[100]

North Korea—1990 Population Profile

This demographic profile of North Korea in 1990 is derived from our Model 1, which is described in Appendix A. Detailed estimates of the 1990 age-sex structure, fertility, mortality, and population growth from Model 1 are given in Table C-1.

Because the data available for our reconstructions end with 1987, our 1990 profile is based upon careful reconstruction through 1987; for 1987 through 1990, however, it is a projection. Such a projection necessarily involves a bit of conjecture. The profile, however, will be fairly accurate unless truly radical changes in demographic trends took place between year-end 1987 and 1990.

According to our profile, as of midyear 1990 the DPRK had a total population of approximately 21.41 million people, of whom 10.57 million were male and 10.84 million female. The sex ratio of the total population was about 97.5 males per hundred females, but different age groups had very different ratios of males and females (see Table C-1). The sex ratio

declined from about 104 boys per hundred girls in infancy to 98 men per hundred women ages 45–49. Older cohorts were affected by the Korean War and so have a severe dearth of men.

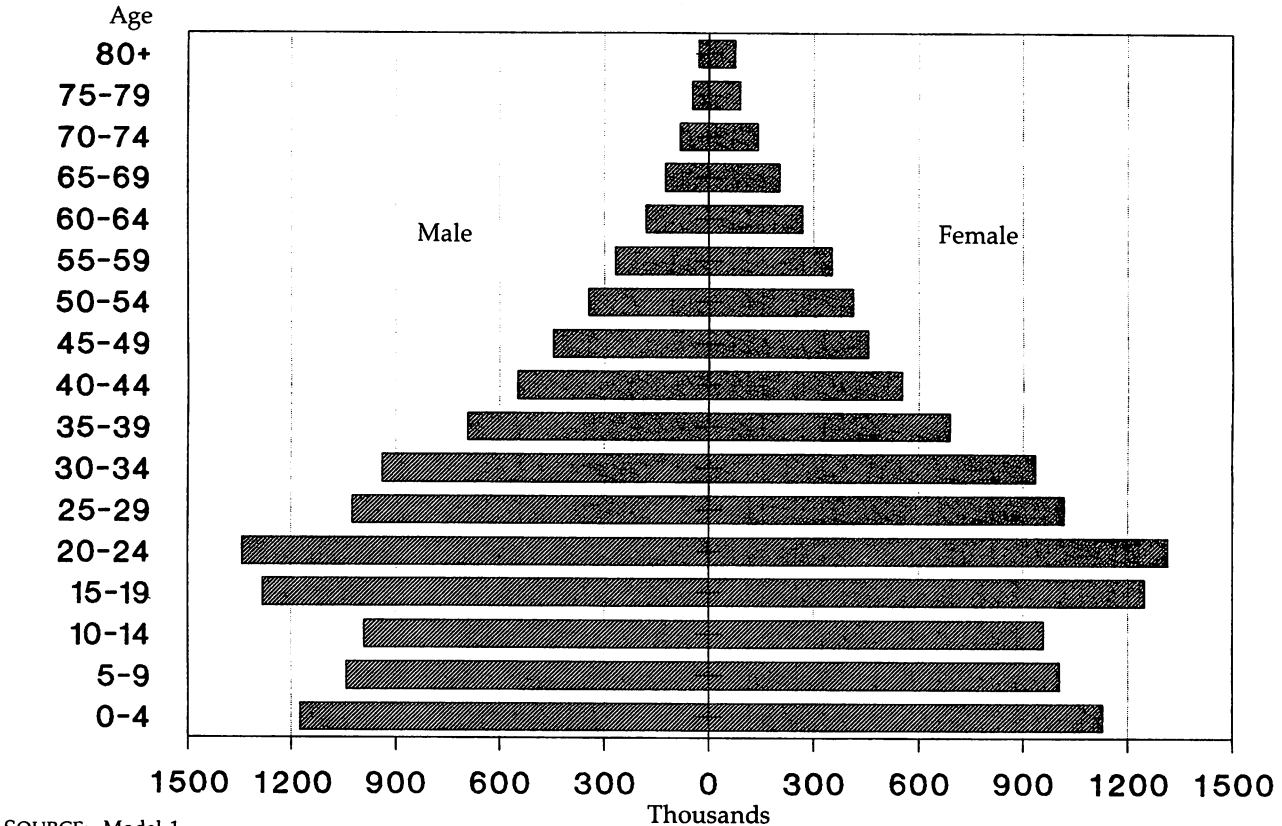
As of 1990, mortality conditions in North Korea were fairly advanced for a developing country. Expectation of life at birth was about 69.0 years, 65.6 years for males and 72.0 years for females. Infant mortality was quite low. The overall infant mortality rate was approximately 31 infant deaths per thousand live births, 35 for boys and 28 for girls. The crude death rate was about 5.6 deaths per thousand population in 1990.

As is typical of East Asian countries today, North Korea's fertility level is low. The total fertility rate is approximately 2.5 births per woman, and the crude birth rate is about 24 births per thousand population. The population is growing at 1.9 percent a year through natural increase alone.

Figure 5 shows North Korea's population structure as of midyear 1990. The most striking feature of this population pyramid is the bulge ages 20–24 and 15-19. These huge cohorts are in the young childbearing ages, currently tending to push up the birth rate, and in the ages of entry into the labor force, putting pressure on the systems of providing jobs for entry-level workers. But the younger cohorts are quite a bit smaller. The smaller numbers of children in school ages have already eased demands on the school system. As they age into the late teens and the twenties during the coming decade, employing them will become easier. Later on, as these smaller cohorts reach the peak childbearing ages, the birth rate will tend to drop, all else being equal.

We can predict with some confidence the imminent shifts and continuities in the age-sex structure of the North Korean population, because most people who will be alive in North Korea between now and the year 2000 or soon thereafter are already born and because mortality and fertility are already low. We project that fertility and mortality will continue to decline slowly, and this means that the total population is expected to continue growing. From 21.41 million people at midyear 1990, we project that the population will grow to 25.49 million in the year 2000 and 28.49 million in 2010. Assuming that fertility at that time declines to below replacement level (i.e., just over two births per woman), we project that the total population size will peak at almost 34 million by 2045 and begin slowly declining. The following discussions of North Korea's educational enrollments, and of its population in the labor force and military ages, utilize our Model 1 reconstruction of recent demographic trends and population projection into the next century.

Figure 5. North Korea
1990 Population Structure



SOURCE: Model 1.

Educational Attainment

For the first time in more than two decades, the DPRK has provided breakdowns on the enrollment and educational attainment of its population (see Tables 24 and 25). In the DPRK, the educational system currently calls for one year of preschool (age 5), four years of primary school (ages 6–9), and six years of secondary education (ages 10–15), with graduation at age 16. Education for children ages 5 to 16 is compulsory: "The country enforces universal free eleven-year compulsory education for all the school-aged children."[101] North Korea's educational system also includes specialized colleges (with a course lasting two to three years), and colleges and universities (where the stay is said to be four to six years).[102]

Based on official data reported in Table 15, the total size of North Korea's 6–15 cohort at year-end 1986 was 4.400 million. Averaging the 1986 and 1987 school enrollment data in Table 24 to approximate enrollment at the end of 1986, there were reportedly 4.228 million children enrolled in primary and secondary schools in North Korea. This would imply a gross enrollment ratio of 96 percent.[103] By way of comparison, the gross enrollment ratio in South Korea in 1985 for children 6–17 years of age (ages corresponding to primary, middle, and high school) was placed at 95 percent.[104]

In 1987, over half a million persons (521,000) were reported to be enrolled in institutions of higher education in the DPRK. (By way of comparison, in South Korea, with a total population roughly twice as large, 1.340 million students were reported to be enrolled in postsecondary education in 1987.)[105] Among graduates of specialized colleges in the North, the sex ratio in 1988 was 149 men per hundred women; for universities, it was 246. The overall sex ratio for graduates of higher education in the DPRK was 184 men per hundred women (see Table 25).

Table 26 places the DPRK's reported attainment in higher education in international perspective, though there are obvious problems of comparability. Although a smaller fraction of the DPRK's adult population has received postsecondary educational training than in such places as Japan, the United States, or the former German Democratic Republic, its nominal attainment ratio compares favorably with that of such places as South Korea, the People's Republic of China, Hong Kong, and the Soviet Union. In all these instances, however, it should be emphasized that the course of study and quality of training vary by country; thus, such figures should not be treated as fully comparable.

Table 24. North Korea, School Enrollment, 1986–1987 (in thousands)

School level	Ages	1986	1987
Primary school (4 years)	6–9	1,466	1,492
Middle school (6 years)	10–15	2,842	2,655
Specialized college (2–3 years)		215	220
College and university (4–6 years)		279	301
Total		4,802	4,668

Note: Compulsory education in the DPRK reportedly includes one year of kindergarten education, four years of primary school, and six years of middle school education. Kindergarten education starts at age five, primary school starts at age six, and graduation from middle school is at age 16.

Source: Nicholas Eberstadt received permission from officials of the Central Statistics Bureau to cite the statistics in this table, Pyongyang, May 25, 1990.

Table 25. North Korea, College and University Graduates, 1988 (in thousands)

	Total	Male	Female
Graduates of universities and specialized colleges	1,353	876	477
University graduates	592	421	171
Specialized college graduates	761	455	306

Source: Nicholas Eberstadt received permission from officials of the Central Statistics Bureau to cite the statistics in this table, Pyongyang, May 25, 1990.

There is significance to the release of a figure for graduates of higher education for the year 1988, when other figures for education pertained to 1986 and 1987. At 1.353 million, the pool of graduates of higher education had finally surpassed the DPRK's longstanding target of "an army of 1.3 million intellectuals." It would seem likely that the figure was released for 1988 rather than for 1986 or 1987 as with the educational data in Tables 24 and 25 because 1988 was the first year in which this target had been achieved and exceeded. In 1989, during a speech on the national budget, North Korea's Minister of Finance apparently referred to this

Table 26. Reported Educational Attainment for North Korea and Selected Other Countries, Recent Years

	Graduates and attendees of postsecondary schools as percent of adult population	Sex ratio of graduates and attendees
North Korea 1987/1988 (16 and above)	13.7	184
South Korea 1980 (15 and above)	9.2	283
Japan 1980 (15 and above)	18.5	161
PRC 1982 (15 and above)	.9	297
Hong Kong 1981 (15 and above)	6.6	175
USA 1987 (16 and above)	36.0	105
GDR 1981 (15 and above)	14.9	107
USSR 1979 (16 and above)	9.4	101

Notes: Figures in column 2 are not directly comparable; length and quality of "postsecondary education" training varies by country, and within country over time. For North Korea, we have added those enrolled in specialized colleges, colleges, and universities in 1987 to the 1988 total of graduates of colleges and universities and divided the total number of graduates and attendees by our estimated total DPRK population at ages 16 and above, including the military, at year-end 1987. For North Korea and Japan, the sex ratio is for graduates only. For Japan, we assumed that two-fifths of enrolled students at ages 15–19 are enrolled in postsecondary education. Data for the United States include all persons at ages 25 and above who have completed one or more years of college, plus all those persons of any age who are currently enrolled in college or university. This may mean there is some double-counting of persons who are age 25 or older and who are still enrolled in higher education.

Sources: North Korea, Tables 24 and 25; Japan: derived from Government of Japan Statistics Bureau, *Japan Statistical Yearbook 1989* (Tokyo: Management and Coordination Agency, 1989), p. 44; United States: derived from U.S. Bureau of the Census, *Statistical Abstract of the United States 1989* (Washington: Government Printing Office, 1989), pp. 13, 127, and 131; Soviet Union: *Itogi Vsesoyuznoy perepisi naseleniya 1979 goda.* Tom 3. *Uroven' obrazovaniya naseleniya SSSR, soyuznykh i avtonomnykh respublik, krayev i oblastey.* Chast' I. (Results of the 1979 All-Union Census of Population. Volume III: Educational Attainment of the Population of the USSR, Union and Autonomous Republics, Krays and Oblasts. Part I), (Moscow: Goskomstat informatsionno-izdatel'skiy tsentr. 1989), p. 16. All other: derived from *UNESCO Statistical Yearbook 1989* (Paris: UNESCO, 1989), pp. 1–39 to 1–56.

figure when he mentioned that "a large army of 1.35 million intellectuals with firm faith in the *chuch'e* idea and with rich knowledge of many fields has grown up."[106]

On the basis of our reconstruction, it is possible to estimate gross educational enrollment for certain years in the 1960s and 1970s. In 1977, for example, Kim Il Sung told a visiting Japanese delegation that "the number... of pupils and students attending schools at all levels from primary to university [is] 5,100,000."[107] In 1976, as in the late 1980s, the DPRK's educational system called for one year of kindergarten and ten years of universal primary and secondary education. Based on Model 1, the cohort ages 6–15 totaled 4.940 million at year-end 1976. If the total postsecondary educational enrollment for that year had been, for example, 300,000, the gross enrollment ratio for primary and secondary schools would have been 97.2 percent; if it had been 400,000, the gross enrollment ratio would have been 95.1 percent. Such ratios would be close to those we have estimated for the DPRK in the late 1980s.

The most detailed public figures on educational enrollment in North Korea during the 1970s were included in some comments by President Kim Il Sung in a chat with a French communist youth group in 1975, in which he placed the total student and pupil population at 4.6 million and stated that "the number of students attending universities, colleges and higher technical schools alone is 240,000."[108] If these totals were taken to refer to year-end 1974, they would imply a gross enrollment ratio of 96.5 percent for children 6 to 15 years of age. By way of comparison, gross enrollment ratios in South Korea in 1975 are calculated to have been 93.2 percent for children aged 6–14 and 80.8 percent for the 6–17 cohort.[109]

In the early 1960s, the North Korean educational system called for seven years of universal schooling (for children ages 7–13 inclusive). *North Korea Central Yearbook*s have provided breakdowns on total enrollment for such years as 1960–1961 and 1964–1965. For 1960–1961, total enrollment at primary and secondary schools was placed at 2.036 million.[110] By our reconstruction, the cohort ages 7 to 13 totaled 2.019 million at year-end 1960, implying a gross enrollment ratio of 100.8 percent. (Gross enrollment ratios can exceed 100 percent because attendees can include pupils older or younger than the recommended school ages.) If primary and secondary enrollment for 1960–1961 were compared instead against the 6 to 15 cohort, the gross enrollment ratio would have been 71.4 percent.

For 1964–1965, the DPRK has reported a total of 1.817 million students enrolled in primary and secondary schooling.[111] By our reconstruction, this would equal only 79.1 percent of the 1964 year-end cohort of

children ages 7 to 13, and only about 56.7 percent of those ages 6 to 15. Such a sharp drop in enrollment ratios would certainly seem anomalous, especially under a government that was directing a forced-pace modernization. This is an anomaly upon which other observers have remarked. In a report on North Korea published in 1968, for example, the West German Federal Statistical Office noted this apparent drop in enrollment and accompanied it with an explanatory note stating "decline due to drop in births during and after the Korean War."[112] Based on our reconstruction, this drop in enrollment would *not* seem to be explained by a decline in births during the 1950s.

Labor Force

For the first time in more than a quarter of a century, the DPRK has released figures on the total civilian population ages 16 and above by occupational sector and by sex (see Table 27). These figures include not only those adults who are in the labor force, that is, who are employed or looking for work. In addition, students enrolled in higher education are included. Moreover, no retirement age is indicated; men and women in their seventies, eighties, nineties, and even the country's centenarians are all counted as workers, farmers, or officials. In the DPRK, these occupational data are collected in the form of a table in which even the population that is not employable or not working is assigned the occupation of the head of the household to which such persons belong. Therefore, all adults are included.

The DPRK breaks its civilian adult population into four occupational categories. "Workers" are defined as "people doing physical labor in state-owned enterprises." "Officials" apparently refers to persons doing nonphysical labor in "government agencies or other institutions." "Farmers" are defined as "those doing physical labor in cooperative agricultural units." A fourth category is "workers doing physical labor in cooperative industrial units"; this refers to the DPRK's officially sanctioned activities perhaps approximating something like private enterprise.[113] Although the DPRK is a Marxist-Leninist government, its classification scheme for occupation does not include a category for workers in the "nonproductive sphere" (education, health care, etc.) as is customary in Soviet-style taxonomies; it is possible that such workers are included among "officials."

The limited extent to which "socialist transformation" has been effected is indicated by the small size of the civilian population classified

Table 27. North Korea, Population Ages 16 and Over by Occupation, 1986 and 1987 (in thousands)

	1986			1987		
	Total	Male	Female	Total	Male	Female
State worker	6,830	2,990	3,840	7,135	3,134	4,001
Official	2,060	855	1,205	2,103	879	1,224
Farmer	3,141	1,305	1,836	3,167	1,312	1,855
Coop worker	110	41	69	112	42	70
Total	12,141	5,191	6,950	12,517	5,367	7,150

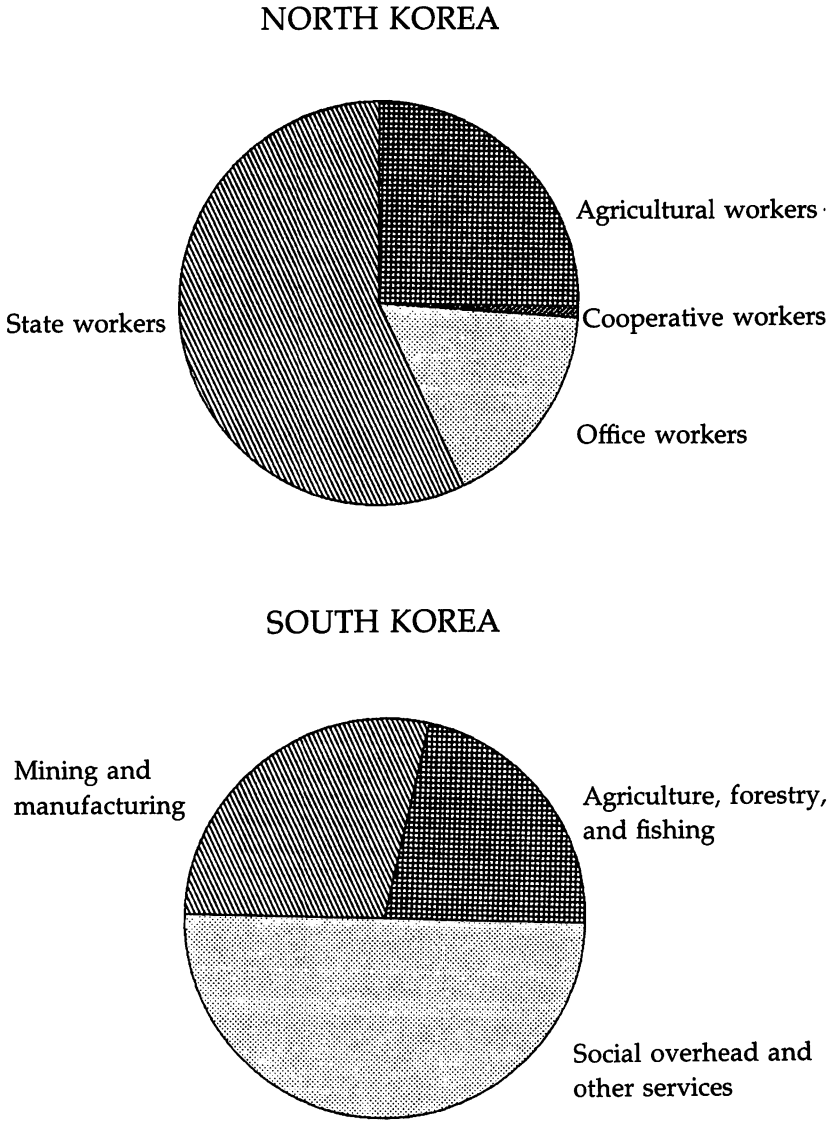
Notes: "State worker" refers to people doing physical labor in state-owned industrial enterprises. "Official" refers to the officials in government agencies or other institutions. "Farmer" refers to those doing physical labor in cooperative agricultural units. "Coop worker" refers to those doing physical labor in cooperative industrial units. All civilians ages 16 and above are included in one of the above occupational categories, even if they are elderly, retired, disabled, etc. The military are excluded.

Source: Nicholas Eberstadt received permission from officials of the Central Statistics Bureau to cite the statistics in this table, Pyongyang, May 25, 1990.

in "cooperative" industrial units rather than state-owned ones; in 1986 and 1987, it was measured at only 0.9 percent of civilian adults. Economic transformation, for its part, is indicated by the share of the agricultural population among all civilian adults. In 1986 and 1987, "farmers" accounted for 25.9 and 25.3 percent of civilians ages 16 and above. Industrial workers in state-owned units, by the DPRK's estimate, accounted for 56.3 percent of the population of adult civilians in 1986, and 57.1 percent in 1987. "Officials" accounted for 17.0 percent in 1986 and 16.8 percent in 1987.

North Korea's reported 1987 sectoral distribution of its civilian adult population is compared with that of South Korea's economically active population in Figure 6. Both the conceptual schema and the actual procedures in occupational classifications and measurement differ significantly between the two countries, so the categories in Figure 6 are not fully comparable.[114] Even so, the chart suggests similarities and contrasts in employment structure between North and South. Though defined and measured differently, the fractions of North Korean adult civilians and of the South Korean labor force reported to be engaged in the agricultural sector

Figure 6. Reported Occupations by Sector: North and South Korea, 1987 (percent)



SOURCES: Table 28; and *Social Indicators in Korea, 1988,* pp. 92, 105, 110.

in 1987 were quite similar. Whereas state-owned industries are reported to be the principal employer in North Korea, mining and manufacturing account for only somewhat more than a quarter of total employment in the South. South Korea's predominant employment sector today is its tertiary sector, which is comprised of private and government services.

The occupational distribution in the DPRK in the late 1980s can be compared with the early 1960s (Table 28).[115] By 1960, according to official figures, the majority of the labor force was already employed outside the agricultural sector. As recently as 1963, however, a greater fraction of the workforce was reported to be in agriculture than in state-owned industries. The intervening decades have apparently witnessed a progressive sectoral shift out of agriculture and into state industry. Between 1963 and 1987, the share of adults reported to be in state industry rose by 17 points; correspondingly, the share designated as working in agricultural cooperatives declined by 17.5 points. The net shift between agriculture and industry is the dominant tendency transforming the reported sectoral structure of the adult population over this period; by comparison, changes in the proportion classified as office workers and cooperative handicraftsmen were small.

North Korea Central Yearbooks from the early 1960s present not only figures on the fractional distribution of employment by sector, but also absolute figures for "workers employed in all fields of the national economy."[116] This terminology is phrased to exclude "agricultural cooperative workers" and "cooperative handicraftsmen," whose proportions in the total workforce are reported. On the basis of these figures, the total active workforce in the DPRK "at the end of 1963"[117] is implied to be 3.485 million. By our reconstruction of the DPRK's year-end 1963 population, this would amount to 54.6 percent of the cohort ages 15 years and older and 57.9 percent of all men and women between the ages of 15 and 64, inclusive. (By way of comparison, the labor force participation rate for the population 14 years and older reported for South Korea for 1967 was 55.4 percent).[118] The *North Korea Central Yearbook* also reports that women accounted for 36.2 percent of the country's total employees at the end of 1963, which would imply a working population of 2.223 million men and 1.262 million women at the time. By our reconstruction, this would be consistent with a labor force participation rate for men of 74.9 percent (with the denominator being all men 15 years of age and older) or 78.5 percent (15–64 years of age only) and for women of 36.9 percent (15 and

Table 28. Reported Classification of North Korean Population by Occupation, 1960–1987 (percent)

Classification	1960	1963	1986	1987
Laborers (state worker)	38.3	40.1	56.3	57.0
Office worker	13.7	15.1	17.0	16.8
Farmer	44.4	42.8	25.9	25.3
Cooperative worker	3.3	1.9	0.9	0.9

Note: The 1964 source referred to "Composition of Inhabitants by Occupation (%)." The military population was apparently included in the 1960s, but the 1986 and 1987 classification is for civilians only.

Sources: Figures for 1960 and 1963 from *North Korean Central Yearbook 1964*, Joint Publications Research Service, no. 35,218, April 27, 1966, pp. 197–198; 1986 and 1987 figures derived from Table 27.

older) or 39.6 percent (15–64 only). (In South Korea, the labor force participation rate for those 14 years of age and older in 1967 was reported to be 76.0 for men and 36.8 for women.[119])

To judge by these computations, it appears that North Korean authorities adjusted their method for tabulating civilian occupational status at some point during the long "statistical blackout" between the first and the third Seven-Year Plans. Whereas the DPRK currently classifies into occupational categories virtually 100 percent of the entire civilian population ages 16 and older, it seems as if the earlier procedure referred only to those persons in the adult population who were actually economically active. The timing of, and motivation for, this apparent change in occupational classification procedures are unknown; it may be worth noting, however, that North Korean policy since the 1970s has explicitly called for an increasing mobilization of the population for the "construction of an independent national economy" and that directives in the 1970s repeatedly emphasized the importance of increasing female participation in the "people's economy."[120] Today the DPRK may still collect data on the actual labor force or the economically active population in addition to the figures in Table 27. For instance, a 1987 publication from Pyongyang reported:

> In our country where the social source of exploitation has been eliminated and personal interests fully accord with social interests, there are no loafers and all people faithfully work to the best of their ability. Labour in our

> country is an honourable duty which is based on high conscious zeal and creativity and is for the country and people and for personal welfare. Today 8,950,000 able-bodied citizens all have a job and are engaged in creative labor.... In our country the minimum age for starting work is 16 years. The employment of children under working age is prohibited.[121]

Assuming that this figure of 8.95 million refers to employed civilians at about year-end 1986, since the figure was published in 1987, this would mean that the employed population constituted approximately 74 percent of civilians ages 16 and above. This employment participation rate for the whole civilian adult population is almost as high as the male employment participation rate was in the 1960s. This figure suggests that the proportion of women employed outside the home in North Korea today is unusually high compared to that in most other countries. The PRC next door is one of the few countries of the world that mobilizes a similar proportion of its population for employment. China's 1987 census reported that 77 percent of the population ages 15 and above was employed; regular annual reported statistics gave a lower estimate of 68 percent for year-end 1986 and 69 percent for the end of 1987.[122]

North Korea's emphasis on employing a very large proportion of the adult population may come from a perception that there is a shortage of labor in the DPRK. Foreign studies of North Korea have repeatedly brought up this point. A 1976 study reported that, because of Korean War losses and massive emigration the lack of manpower had been a major hindrance to economic development in the North, a chronic labor shortage persisted, and labor was a very scarce resource.[123] A 1983 source argued that North Korea is "a relatively labor-scarce country" and that the problem had become "increasingly more acute in recent years."[124] These analysts quote DPRK sources on the need for a greater labor force for socialist construction.[125]

Based on our Model 1 reconstruction and projection, Table 29 traces the relevant labor force age groups in the total population, not just the civilian population, for selected years from 1986 through the year 2050. We estimate that in 1986 there were 585,000 people age 16, the age at which people enter the labor force. This number declined rapidly to 470,000 in 1990 and will decline further to 387,000 in 1995. After that, the population age 16 will increase again. The cause of this decrease was the drop in the birth rate after 1970, which produced smaller and smaller birth cohorts until the early 1980s.

Table 29. North Korea, Estimated and Projected Population in Labor Force Ages, 1986–2050 (in thousands)

Age group	1986	1990	1995	2000	2005	2010	2030	2050
16	585	470	387	415	469	526	421	384
16–29	6,273	6,804	6,706	6,054	5,747	6,351	6,027	5,872
30–64	5,995	7,086	8,474	10,327	11,928	12,821	15,608	15,277
16–64	12,268	13,890	15,180	16,381	17,675	19,172	21,635	21,149
15–19	2,766	2,532	1,944	2,036	2,279	2,589	2,088	1,952
20–24	2,184	2,658	2,521	1,936	2,029	2,271	2,086	2,103
25–29	1,906	2,042	2,643	2,507	1,926	2,019	2,278	2,196
30–34	1,479	1,875	2,027	2,625	2,492	1,915	2,549	2,159
35–39	1,161	1,381	1,857	2,009	2,604	2,472	2,543	2,057
40–44	954	1,101	1,361	1,833	1,985	2,574	2,216	2,045
45–49	808	901	1,076	1,333	1,798	1,950	1,950	2,212
50–54	682	758	869	1,041	1,293	1,747	1,815	2,438
55–59	518	620	716	825	992	1,237	2,272	2,374
60–64	393	450	568	661	765	926	2,263	1,993

Source: Model 1 reconstructed and projected at the Center for International Research, U.S. Bureau of the Census.

The size of the teenage group 15–19 has dropped more slowly, from 2.77 million in 1986 to 2.53 million in 1990. The decline will continue to 194 million in 1995, then the total will rise again. The young adult group 20–24 will also decline about 27 percent from 2.66 million in 1990 to 1.94 million in 2000.

Though there are big shifts in the sizes of individual cohorts of young adults, such as at age 16, a sudden shortage of workers at one age could be compensated by using workers from nearby age groups that have not declined in size. In the coming five years 1990 to 1995, for example, the population 15–19 will decline by about 588,000 and the group 20–24 by 137,000, but the population ages 25–29 will grow by an estimated 601,000. These compensatory effects leave the young adult labor force 16–29 not much changed. In the subsequent quinquennium 1995 to 2000, however, the 16–29 group will decline in size from 6.71 million to 6.05 million.

Because North Korean fertility has not yet dropped below replacement level, our projections do not show any absolute declines in the population of working age in the foreseeable future. The population in the labor force ages 16–64 will keep increasing in size from 13.89 million in 1990 to 15.18 million in 1995 and 16.38 million in 2000. It will, however, be an aging labor force. Of those in the 16–64 range, the proportion ages 30–64 will increase from 51 percent in 1990 to 56 percent in 1995, 63 percent in 2000, and 67 percent in 2005.

"Missing Males": The Military Population

One of the most striking, and peculiar, characteristics of the DPRK's recently released demographic data concerns what might be described as the "missing male problem." On the basis of those data recently divulged by North Korean statistical authorities, a trained demographer would have to conclude that an enormous, and rapidly increasing, portion of the country's male population, for whatever reasons, was being excluded from the national registration counts from the mid-1970s onward.

Such omissions are strongly suggested by the radical and implausible drop in reported sex ratios after 1970 and by the anomalous sex ratios reported for the adult population of North Korea in the data for 1986. By far the simplest and most internally consistent explanation for North Korea's sex ratio anomalies would be the proposition that a sizeable and growing proportion of the male population was purposely excluded from

official counts from the 1970s onward.

Our estimates concerning North Korea's "missing male" population are indirectly derived from our reconstruction of overall population. As shown in Table 30, our preferred reconstruction (Model 1) placed the total North Korean male population as of year-end 1986 at 9.912 million. The DPRK reported that its civilian male population was 8.710 million that year. The difference amounts to 1.202 million. For men 17–54 years of age, Model 1 placed the total at 5.456 million; by contrast, the DPRK reported a civilian male total of 4.287 million, 1.17 million fewer. The civilian figure for young men 16 years of age appeared to undercount the whole male cohort at that age by about 31,000. The total discrepancy for men ages 16 through 54, then, amounted to 1.201 million. As discussed in Appendix D, the estimates in Table 30 of males not included in the civilian male totals are at the lowest end of the reasonable range of estimates for the number of "missing" men.

Male population totals reported from the North Korean registration system can be compared with our population reconstructions for other years as well (see Table 30). In 1975, the total male discrepancy indicated by Model 1 amounted to approximately 714,000. In 1980, the discrepancy totaled about 909,000. In 1982, it came to 1.040 million. In 1985, there were about 1.130 million men in North Korea omitted from the civilian population figure and in 1987, 1.249 million.

Who are the men who are missing from the civilian population registers? Our estimates for 1986 suggest that they are drawn almost completely from age groups traditionally considered able-bodied: only negligible numbers are estimated to have been children or pensioners. North Korean authorities told UNFPA researchers that their registration system excluded military personnel. We are inclined to treat North Korea's "missing male" totals as an estimate of the number of men under arms in any given year and base subsequent international comparisons on this presumption.

A number of objections may be lodged against this procedure. Three of the most obvious and important ones should be dealt with directly.

First, the military might not be the only group excluded from North Korea's permanent civilian registration system. North Korea's prison population, for example, is another politically sensitive group the government might wish to hide from its official figures. (Indeed, officials from the Central Statistics Bureau told Eberstadt that prisoners were omitted from the registration numbers.) Although prisoners are thought to comprise a

Table 30. North Korea, Males Not Reported, 1975–1987 (in thousands)

Date, year-end	Reconstructed (Model 1)	Reported	Total males missing	Missing in ages 16–54
1975	8,147	7,433	714	NA
1980	8,918	8,009	909	NA
1982	9,234	8,194	1,040	NA
1985	9,737	8,607	1,130	NA
1986	9,912	8,710	1,202	1,201
1987	10,090	8,841	1,249	NA

NA = Not available.

Notes: The reported totals are the civilian male population of North Korea. The missing males constitute our estimate of the size of the male military population of the DPRK.

Sources: Model 1, reconstructed by the Center for International Research, U.S. Bureau of the Census. Official data from Tables 11 and 15.

considerably smaller fraction of the contemporary North Korean population than was the case in, say, Stalin's Soviet Union, the totals most commonly quoted run in the range of 100,000 to 150,000.[126] Counting prisoners in with soldiers would correspondingly exaggerate our estimates of the size of the military.

We cannot conclusively dismiss the possibility that prisoners might be part of the missing male population, although we are skeptical about its likelihood. For one thing, the age-sex composition of North Korea's "disappearing persons" does not strongly suggest the inclusion of imprisoned detainees. A variety of studies, including some by international human rights organizations, suggest that detention or internment is meted not only on suspects convicted of political crimes themselves, but commonly upon their relatives as well: wives, parents, in-laws, or children.[127] Our estimates for 1986, however, detect virtually no omission of male children or persons 55 or older.

A second objection concerns women in the armed forces. By using the "missing male" population as a proxy for North Korea's armed forces, we are implicitly positing an all-male military. Yet the DPRK's publications display women in uniform, and some visitors to North Korea have remarked upon the number of women that they have seen on the streets

of Pyongyang dressed in what looked like military garb. If our presumption is in error, however, our estimates of troop strength would tend to be too low. If the KPA were, for example, 5 or 10 percent female, actual force totals could be correspondingly higher than our estimates indicate.

We do not believe that the female proportion of the DPRK armed forces is that large. Except for a few minor discrepancies, the reported female population by age in 1986 is consistent with reported birth rates and population growth in previous decades. There appears to be no systematic understatement of women in the civilian female age structure except at age 16, and there the difference appears to be in the range of only 3,000–8,000. We hypothesize that most women in uniform in North Korea are not active duty military personnel, but rather reserve or militia members, and thus were included in the civilian population figures we were able to analyze. Appendix D discusses further the possible numbers of women in the military.

A third objection involves a technical consideration. Since our estimate of the total size of the KPA comes by way of a residual—projected total male population minus registered civilian male population—we hypothesized that it would be extremely sensitive to even relatively slight changes in our reconstructions. To our surprise, this did not turn out to be so. There is enough information over time on births, deaths, and total population, and on the civilian age structure for year-end 1986, to constrain strongly the possible variability in the models. The rather narrow range of plausible estimates for the DPRK armed forces that can be derived from the official statistics analyzed in this report is discussed in Appendix D.

One should not doubt that our approach would raise objections on the part of those most familiar with North Korea's statistics: the authorities responsible for compiling them at the CSB. Fortunately, we do not have to imagine what those objections would be. In May 1990, during a visit to Pyongyang, Nicholas Eberstadt had a chance to discuss a draft version of this study with officials from the CSB and other DPRK population specialists. Three days after Eberstadt presented copies of the draft to DPRK authorities, they convened a meeting in which population issues were discussed in detail. The North Korean discussants were not confrontational; to the contrary, their comments were professional and technical in nature. Their reactions, however, strongly implied that our study had overestimated both the level and the tempo of military buildup in the DPRK. One

official gave the following explanation. We quote relevant portions of his whole statement so that readers may draw their own conclusions:

> Your estimates of our military population show increases that are too great... Up to 1970, the population registers included everyone within the boundaries of the nation, as well as everyone in diplomatic offices and our citizens abroad in the USSR. From 1975, those mobilized for construction of the state and people overseas were omitted. Prisoners and the long-term hospitalized population are also omitted from the statistics. Those omitted are for the most part young people, men, but also a few women. During the 1970s, many volunteered for socialist construction. They were omitted from the registers because they were removed from their place of registration and assigned to mobile units. Because our registration system is stationary, it was impossible to count them. As you know, we have been doing tremendous construction lately. In Pyongyang, you have seen the Kim Il Sung Stadium, the Grand People's Study House, the hospitals, zoo, ice rink, May 1 Sports Complex, and the districts undergoing renovation; outside of Pyongyang there has been the 300,000 Chongbo [hectare] land reclamation effort, the Nampo Barrage project, northern rail construction, the building of all sorts of bridges and gates, the construction of our Vinalon plants, and more. These projects took enormous mobilization of young manpower. If we had taken time to count all these people, we could have had complete statistics, but it is impossible at this time. I do not know the percent of women excluded from the registration system, but basically there are very few. Overseas, only a few wives, internally, 8–10 percent women. Many hundreds of thousands of people have been mobilized. The work on the Kwangbok Street project in Pyongyang took 250,000 people alone. If our level of machine use were higher, we would not have to mobilize so many people.[128]

We have carefully reviewed his critique, and we concur in part with some of its statements and implications. It is plausible, for example, that the Central Statistics Bureau originally released to the UNFPA only those population figures they had at hand, and excluded those that would have required extra work to gather, or those that would have required special permission to release. Yet other aspects of this statement seem to contradict each other or to be inconsistent with the picture we have reconstructed of the North Korean population.

For example, it was officially asserted that the people assigned to highly mobile work units were dropped from the permanent population registers in the early 1970s because they were too difficult to count. But this

would not fit with the statement (tendered simultaneously) that the population in prisons and under long-term hospital care is omitted from the statistics. In other population registration systems around the world, when someone is put in prison for a long time or hospitalized for long-term care, he might be dropped from his *household* register but then would be added to the register of the prison or medical institution. In China's population registration system, for instance, institutionalized populations in prisons, hospitals, or dormitories are counted in their "collective household," not deleted entirely from the registers. Besides, residents of prisons and hospitals are not highly mobile; they should be easy to count.

By our estimates, over 1.2 million men and hardly any women were missing from the reported 1986 population figures by age and sex. Yet any nonmilitary categories of people reportedly missing from the registers would be expected to include many women as well as men. It is apparently true that vast numbers of civilian workers and students are mobilized for days or months of "voluntary labor" each year in the DPRK.[129] A significant proportion of these are surely women, yet they are not missing from the reported population statistics.

Even if civilian workers on construction projects, prisoners, or hospitalized persons were temporarily deleted from the neighborhood household registers, this does not explain why the total number of these workers and inmates would not be reported as part of the population of the DPRK. The government presumably knows how many people it is supporting on construction crews at any one time as well as how many people are imprisoned or institutionalized. If the government can gather end-of-year statistics on the age-sex structure and occupational structure of registered households, the same information can be gathered from highly organized or regimented construction teams, prisons, and hospitals. Although the DPRK government might perceive national security reasons for excluding its military population from the population figures given to the outside world, it is hard to imagine a corresponding motive for hiding the members of mobile construction crews.

As it happens, official North Korean pronouncements identify personnel from both the KPA and the internal security forces to be engaged in precisely the activities ascribed above to "mobile units."[130] Indeed, according to one report, "more than half of a soldier's time is consumed by construction projects and other economic activities."[131] In addition, North Korea's armed forces must be sustained by an infrastructure of munitions

and other war-related industries, at least some of whose workers might not be counted in the nation's civilian employment totals.

Should they then be classified as active duty military forces or not? We suggest the following criteria: People who work in jobs normally considered civilian, receive no military training except that associated with a village or town militia, and are not available for rapid alert status or deployment in times of tension or crisis should not be classified as active duty military personnel. They are in reality civilians. Those who work in jobs normally seen as civilian, engage in occasional military training like an American reservist, but require a period of intensive training to be ready for military action should be classified as members of the reserves but not active duty military personnel. Finally, those people in North Korea who work in industrial, agricultural, construction, transport, or other jobs usually called civilian yet receive frequent, regular military training, have uniforms and wear them much of the time, have a position in the military hierarchy, and are immediately on call for full-time military duty when the government perceives a need should be seen as active duty military personnel.

Unfortunately, because of the secretive posture of the DPRK government, we do not yet have enough information to break down the missing men into the categories of active duty military personnel, reservists, and civilians. Our provisional approach, until the DPRK releases data that might clarify some of the ambiguities upon which we have touched, is to assume that the missing men purposely deleted from the newly released population statistics are essentially all active duty military personnel. If our estimates can be taken as a relatively close proxy for actual North Korean military manpower, they would suggest a continuous buildup of forces since 1975, albeit at a varying tempo for different periods. Our estimates reinforce scholarly reports of a continuing "extraordinary military buildup" in North Korea throughout the 1970s and 1980s.[132]

If the discrepancy between our projected male population total and the officially reported civilian male population reflects the actual size of North Korea's active duty military forces, the DPRK would have had more men under arms in the late 1980s than all but a handful of countries in the world. In 1987, for instance, no more than five countries—the USSR, the PRC, the United States, India, and Vietnam—were judged by the International Institute for Strategic Studies (IISS) of London to have armed forces of 1.25 million persons or more (see Table 31). (By some of our estimates

Table 31. World's Largest Military Forces, Totals and Percent of Population, 1987 (in thousands)

Country	Active duty armed forces	Total population	Percent military
USSR	5,227	282,550	1.8
PRC	3,220	1,078,765	0.3
United States	2,158	243,321	0.9
India	1,262	779,983	0.2
Vietnam	1,260	61,532	2.0
DPRK	1,249	20,471	6.1

Notes: The total population estimate is for year-end 1987 for the DPRK; for all other countries the population estimate is for midyear 1987.

Sources: For USSR, PRC, United States, India, and Vietnam: *Military Balance 1987–1988*, pp. 212–214. For DPRK: Model 1, Tables 30 and A-1.

in Appendix D, in fact, the DPRK's military forces in 1986 and 1987 might actually have ranked at the fourth largest in the world!) The DPRK's total population, of course, is far smaller than that of any of those countries; the smallest of the five, Vietnam, had a population three times as large as North Korea's. This implies that an extraordinarily large portion of the North Korean population is currently in active military duty.

By our estimates and hypotheses, military men constituted 21 percent of North Korea's male population in the ages 16–54 as of 1986. The armed forces comprised 12 percent of the country's male population and accounted for 6 percent of the total population. According to the IISS, no other country in the world had such a high ratio of armed forces to population in 1986. As shown in Table 32, the nearest runner-up was Iraq (5.5 percent), then in the midst of a full-fledged war with Iran. North Korea's estimated ratio of military forces to population for the 1980s would be suggestive of a condition approaching total war mobilization; the estimated 6.1 percent of the DPRK population under arms in 1987, for example, compares with 6.5 percent for the United States in 1943, in the middle of World War II.[133]

As shown in Table 33, contemporaneous published estimates of the size of the armed forces of the DPRK for the years 1975–1987 were far smaller than our most conservative estimate derived from the newly available official statistics. The two most authoritative sources gave a figure of

Table 32. Military Mobilization, Estimated 1986 Percent of Population in Armed Forces, North Korea and "Top Ten" Other Countries By Source of Estimate

Source			
Country	Ranked by IISS	Country	Ranked by ACDA
North Korea	6.0*	North Korea	6.0*
Iraq	5.5	Iraq	4.9
Syria	3.5	Israel	4.3
Israel	3.4	Syria	3.7
United Arab Emirates	3.1	Jordan	3.2
Jordan	2.6	Qatar	3.0
Nicaragua	2.2	Cuba	2.9
Singapore	2.1	United Arab Emirates	2.6
Taiwan	2.1	Nicaragua	2.3
Greece	2.0	Oman	2.2
Qatar	2.0	Singapore	2.2

Notes: Estimate for North Korea refers to year-end 1986. Estimates for other countries refer to midyear 1986. IISS estimates refer to active duty military manpower, and ACDA estimates refer to armed forces.

*This estimate and ranking are based on our estimates of North Korea's military manpower in Table 30; they are not estimates given by IISS and ACDA.

Sources: Derived from Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers 1988* (Washington: ACDA, 1987), Table 1, pp. 27–28; International Institute for Strategic Studies, *Military Balance 1986–1987*, pp. 15–127, Tables 30 and A-1.

only 838,000 members of the armed forces for 1987, just two-thirds the number we estimate in our Model 1.[134] As shown in Appendix D, some plausible estimates for the North Korean military are even higher than Model 1.

More recently, estimates for the size of the North Korean armed forces have been revised sharply upward. In July 1989, in hearings before the House Committee on Foreign Affairs, a U.S. deputy assistant secretary of defense presented the figure of 1.04 million for "total active armed forces" in North Korea.[135] Later that same year, an official at the National Security Council publicly placed DPRK troop strength at "about 1 million men."[136] The latest issue of the IISS's *The Military Balance* (for 1990–91)

Table 33. Estimates of North Korean Armed Forces by Source, 1975–1987 (armed forces in thousands)

Year	IISS and ACDA	Eberstadt and Banister Model 1
1975	467	714
1980	700	909
1982	782	1,040
1985	784	1,130
1986	838	1,202
1987	838	1,249

Notes: IISS estimates refer to active duty military manpower. ACDA estimates refer to armed forces. Our Model 1 series includes only males ages 16 and above who are categorized as noncivilians by the North Korean government. This is the lowest series of estimates for the North Korean military that can reasonably be derived from the official DPRK data analyzed in this report, as discussed in Appendix D.

Sources: International Institute for Strategic Studies, *Military Balance*: 1982–1983 edition, p. 125; 1987–1988 edition, p. 213; Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers* (Washington: ACDA), 1988 edition, p. 49; Table 30.

puts the figure even higher. According to its current estimates, total active armed forces in North Korea number 1.111 million; in addition, security troops under the Ministry of Public Security are said to number 200,000, and 540,000 personnel are said to be in the military reserves.[137] It is not clear to which years these various estimates are meant to refer. Our own estimates differ substantially from one year to the next but extend no further forward than 1987. One may note, however, that the IISS's newest figures for North Korean armed strength (including total active armed forces and security troops) come very close to our own estimates of North Korea's missing male population as of 1987 (see Appendix D).

Information on the length of service and customary ages of induction into the KPA is fragmentary and inconsistent. According to the U.S. government's 1981 area handbook on North Korea, for example,

> Young men selected for military duty are at least eighteen years of age (some reports put the lowest age of recruits at seventeen) and serve until they are twenty-seven or twenty-eight. The official obligatory service period for the army and navy is five years and for the air force between three and four years. Actual duty depends on the age at which one enters

> the military and on extended service resulting from manpower shortages.... Some women also join the KPA, usually as volunteers.[138]

A recent study on human rights in the DPRK, however, comments that "some academic sources in the United States contend that military duty is compulsory from the ages of 18 to 28. Other sources in the United Kingdom believe the compulsory service ends at age 26 or earlier."[139] A Japanese source states that "the draft age [in North Korea] was lowered from 18 to 17 in 1974 and then to 16 in 1976 in order to increase troop strength."[140] An official South Korean study published by the government's National Unification Board places the age group for KPA "regulars" at 17–24 years and reports the tour of duty to last 5–10 years.[141] The International Institute for Strategic Studies in London states that the "tour of service" in the North Korean Army is 5–8 years.[142] A recent unofficial South Korean study states that the "legally mandated service periods for enlisted army draftees is 42 months but is 48 months for those drafted into the Navy or Air Force... however... most young North Koreans enter the military at 17, when they graduate from high school. Some postpone entering the military until 23, the maximum legal draft age. Draftees who serve in the infantry or artillery are discharged at age 26 irrespective of their age when they entered the service.... Draftees who serve in special units like light industry infantry are not discharged until age 30."[143]

In view of these conflicting indications, we cannot make a definitive and categorical assumption about the actual ages and length of service of KPA recruits. Our reconstructions, for example, suggest that some young men are "missing" from the 16-year-old age group reported for 1986; these "missing men" account for about 10 percent of males age 16. For lack of any obviously superior alternative, we use the working hypothesis that the vast majority of those in the active duty armed forces are in the ages 16 through 28. Although some within the KPA may be older than 28 (including perhaps the bulk of the officer corps), the ages 16 to 28, in all likelihood, will provide a cohort in which the overwhelming majority of active duty forces are to be found. By our projections, the KPA would appear to draw off a very substantial portion of that cohort. If, for the sake of simplicity, we assume that North Korea's existing military system requires 1.2 million men between the ages of 16 and 28, it would have absorbed about 40 percent of that cohort as of year-end 1986. If the DPRK's newly released figures on graduates of higher educational institutions were

to reflect current sex ratios among those enrolled in colleges and universities, furthermore, an additional 320,000 young men—or 11 percent of the cohort by our reconstruction—would have been in school as of year-end 1986. This would leave a maximum of 1.5 million, or about 50 percent of the male cohort ages 16–28, for the civilian labor force.

Between 1990 and the turn of the century, the absolute size of the DPRK's cohort ages 16 to 28 is projected to decline. Based on Model 1, the male cohort 16 to 28 will decline from 3.26 million in 1990 to 2.78 million in 2000, or by about 15 percent over the course of the decade. If the assumption of a 1.2 million men KPA force drawn from this age group is held constant and projected into the future, it would absorb 37 percent in 1990, rising to 43 percent in 2000. Note that the projections for 1990–2000 are not driven by conjecture: the young men in question for this decade, after all, have not only already been born, but were included in the age structure data that were released for year-end 1986.

Compared with some demographic shifts in other countries, this one does not look particularly dramatic. Nevertheless, the impending decline in the absolute size of the cohort of 16–28 years of age implies that sharper constraints and harder choices may lie in store for the DPRK's leadership. Growth of the civilian labor force may be desired as a means of increasing economic output. Expanding the postsecondary school population would seem necessary for upgrading the technical skills, and potential productivity, of the civilian labor force. Between 1975 and 1987, the DPRK leadership also deemed it important not only to field a very large military force but also to increase its size continually. From the standpoint of available manpower, these objectives are mutually exclusive. The tensions between them should become more evident as available young male manpower becomes scarcer in the coming decade.

Conclusions

In this report, we have sought to utilize as fully as possible the official population data released by the North Korean government to provide information about that little known country. For each topic addressed here, the former vacuum of knowledge has now been partially filled, and much firmer quantitative and qualitative information is now available. For the first time we have enough data of reasonable quality to reconstruct the last several decades of population trends in North Korea with some confidence. This reconstruction provides a fairly reliable basis for characteriz-

ing the North Korean population today and projecting it into the future.

Available statistics on the population of North Korea are still comparatively sparse. Even so, we were able to draw the following information from the recently released tables. The total population of North Korea was about 21.4 million in 1990, 1–2 million fewer people than previously estimated by other sources for that year. Females still outnumbered males, but the gap is narrowing over time. Mortality conditions appear to be relatively good for a developing country. Expectation of life at birth may have reached about 69 years and appears to be considerably greater for females than males. Even after adjustment for severe underreporting of infant deaths, North Korea's infant mortality rate is low in comparison to many other developing countries.

Fertility dropped steeply in the early 1970s and has declined very gradually since then. The latest year for which fertility data were released was 1987. The registered births for that year imply a crude birth rate of 21.2 births per thousand population and a total fertility rate of about 2.4 births per woman. We estimate that some births were unregistered in the early 1980s, so that the 1987 birth rate was actually around 22.9 and the total fertility rate 2.5. Therefore, fertility was low but had not yet reached replacement level by 1987.

The current age structure is characterized by a bulge in the young labor force and young childbearing ages. This phenomenon is tending to raise the birth rate and population growth rate and to create enormous demand for entry-level jobs in the economy. These pressures will ease by the turn of the century, as smaller cohorts who are now under 15 years old enter their late teens and twenties.

In the coming decades, North Korea's labor force will begin to age. No overall decline in the population of working ages is expected over the next few decades, even though the cohort of younger workers can be expected to shrink in absolute size between 1990 and 2000.

About 60 percent of the North Korean civilian population lives in areas defined as urban. Only one-quarter of the adult civilian population is still in agriculture, whereas over one-half works in industry. The service sector employs a much smaller proportion of the workforce than in South Korea's economy, which suggests that there might be some unmet need for services in the North Korean economy.

North Korean data suggest that education is nearly universal among children ages 6–15. The government emphasizes the expansion of enroll-

ments in higher education. Many more men than women have graduated from postsecondary specialized schools and universities.

Population figures released by the DPRK government included the military population through 1970, then excluded military personnel from 1975 on. This quirk in the statistics allowed us to recreate the population structure and mortality and fertility conditions of 1970, then project the population forward while retaining the military in the projection. Since 1970, the difference between our reconstruction of the population and the officially reported civilian population is a reasonably robust estimate of the number of men under arms in North Korea. Our three alternative scenarios that assumed different base populations and different levels of fertility and mortality resulted in similar estimates for the military male total and the military men ages 16–54. Our work confirms what was previously suspected: namely, that North Korea's population is highly militarized. In fact, our estimates suggest that in the late 1980s a larger proportion of population was in the military in the DPRK than in any other country in the world.

What are the prospects that the DPRK government will show greater openness with population statistics in the future? To date, North Korean authorities have given no indication that they plan to follow up this first release of data with further revelations, although authorities reportedly are considering publication of results from the upcoming national census. In the next several years, we can hope that they will accept the idea that not all demographic or economic statistics need to be kept secret for reasons of national security. One may hope that North Korea will follow the precedent set by the PRC and Vietnam. These Asian Communist countries released a volume of data from their first censuses conducted with United Nations advice, assistance, and funds. The planned 1992 census of the DPRK will provide the opportunity for North Korea to do the same.

APPENDIX A

Modeling North Korean Population Dynamics

The tables of population statistics released by the Central Statistics Bureau of North Korea provide enough useful information to permit a sophisticated reconstruction of the country's population changes from the 1950s or 1960s through 1987, the last year for which data are provided. We used the microcomputer version of the U.S. Census Bureau's Rural-Urban Projection Program (RUP) to model the total population rather than its urban and rural components. For our reconstruction we relied heavily on the reported crude birth rates by year and absolute numbers of births in the 1980s, reported population totals by sex through 1970, reported female population totals since 1970 and, most useful, the reported year-end 1986 age-sex structure of the civilian population. The level of mortality for each year was essentially a residual: the difference between births and population growth was set equal to the number of deaths.

The biggest problem with reconstructing North Korea's population dynamics is that no base population structure has been reported for any year before 1986. We tried using all-Korean or South Korean population structures for various years estimated by Kwon (1977), reported census age-sex structures for South Korea, Coale-Demeny model populations, and Far Eastern model populations from the United Nations. We attempted to begin the projections in 1935, 1940, 1956, and 1960. Our attempts to begin the reconstruction before World War II, partition, or the Korean War of the early 1950s were unsuccessful. Too little is known about the changing patterns and fluctuating levels of mortality, fertility, and net international migration during and between those crises.

We created three different population reconstructions and projections for this report to try out a variety of base populations, base years, fertility assumptions, and mortality assumptions. Each model matched most of the official data rather well, but there are internal inconsistencies in the report-

ed statistics, so we allowed the three models to deviate from the reported data in slightly different ways. Then we used the three models to test how sensitive our conclusions were to each reconstruction we had chosen.

Model 1, the population reconstruction used most in this report, began in 1960 with a modified South Korean 1960 census age-sex structure. Because Korea was not a divided country before the 1940s, we assumed that the historic Korean patterns of fertility and mortality, plus the effects of crises like World War II and the Korean War, would be reflected in the age-sex structures of the populations of both the North and the South. First we adjusted the South Korean male and female age structures for apparent undercounting of young children, then we smoothed age reporting at middle age and older to get rid of age heaping.

For females, we then simply applied the adjusted 1960 South Korean age structure to the reported 1960 female population total for North Korea, which we had backdated a half year from year-end 1960 to midyear 1960. The estimation of the male age-sex structure was much more difficult. The problem is that adult male losses from the Korean War period, the result of death or emigration, were greater in North Korea than in South Korea. The total population sex ratio for South Korea in 1960 was 101 males per hundred females, whereas North Korea that year reported only 94 males per hundred females. We assumed that the deficit of males was in those cohorts who had been teenagers or older (that is, old enough to fight) during the Korean War and therefore were at about ages 20 and above in 1960.

To estimate the male age structure under age 20, we made use of the UN Far Eastern model stable population described later for Model 2. The sex ratio for each childhood age group in the model stable population was applied to our estimated female North Korean population to derive estimates of the number of boys. The residual number of North Korean males was allocated to the age groups ages 20 and above according to the pattern in our adjusted male 1960 census population of South Korea. As our modeling progressed, we made very slight adjustments in the male base population so that the year-end 1986 population ages 55–59 and at 60 and above would come close to the reported figures in Table 15.

For mortality estimation, we tried various model life tables because no age-specific mortality data are available. We found that UN Far Eastern model life tables worked well until the late 1970s, when there was no longer a sufficient differential between male and female infant mortality in

the life tables to reproduce faithfully North Korea's reported childhood age-sex structure of 1986. So we retained the Far Eastern pattern of mortality except that we slightly modified the infant mortality estimates.

Fertility levels were estimated from the reported crude birth rates and 1986 population structure at ages 16 and below. No age-specific fertility rates have been reported for North Korea, so we assumed that South Korean patterns for similar levels of fertility were applicable. We used South Korean age-specific fertility rates estimated by Kwon for 1960–1965 and by Coale, Cho, and Goldman for 1970 and 1975, using these patterns for North Korea during 1960–1974, 1975–1979, and 1980 and beyond, respectively.[144]

In general, North Korea has been enough of a closed population since the mid-1950s that it is reasonable to assume zero net international migration, which we have done for most years. But in the late 1950s and the very beginning of the 1960s, a large number of Koreans were repatriated from Japan to North Korea. Since we were unable to get statistics on the age-sex structure of these migrants, we simply assumed that half of the return migrants were male and the other half were female and that the age structure of immigrants conformed to that of the base population by sex.

Once we had reconstructed demographic trends from 1960 to 1987, thus recreating as closely as possible the reported year-end 1986 population structure, we continued the projection into the future to 2050. Assumptions for the future are arbitrary. We held the total fertility rate steady through 1990 because we lack further information about 1987–1990 fertility trends, then we assumed that the total fertility rate will decline from 2.5 births per woman in 1990 to 2.0 in the year 2010 and 1.7 in 2050. We assumed gradual improvement in mortality from an expectation of life at birth of 65.6 years for males and 72.0 years for females in 1990 to 76 years for males and 83 years for females in 2050. The following pages are output tables generated by Model 1 that summarize North Korea's population dynamics.

Table A-1
North Korea: Population and Vital Rates, 1960–2050

			Calendar Year Data						
							Net international		
Year	Midyear population	Expon. growth rate (%)	Births	CBR	Deaths	CDR	Migrants	Rate	Growth rate (%)
1960	10568165.		413631.	39.14	177318.	16.78	49000.	4.64	2.700
		2.634							
1961	10850221.		423107.	39.00	167308.	15.42	23000.	2.12	2.570
		2.636							
1962	11140074.		461985.	41.47	164080.	14.73	3000.	.27	2.701
		2.808							
1963	11457292.		492422.	42.98	161891.	14.13	3000.	.26	2.911
		2.969							
1964	11802545.		512953.	43.46	158978.	13.47	3000.	.25	3.025
		3.082							
1965	12171985.		534438.	43.91	155532.	12.78	3000.	.25	3.138
		3.182							
1966	12565486.		555044.	44.17	152947.	12.17	3000.	.24	3.224
		3.268							
1967	12982958.		576891.	44.43	150043.	11.56	3000.	.23	3.311
		3.344							
1968	13424476.		600039.	44.70	146851.	10.94	0.	.00	3.376
		3.421							
1969	13891669.		624581.	44.96	143384.	10.32	0.	.00	3.464
		3.509							
1970	14387821.		650744.	45.23	139638.	9.71	0.	.00	3.552
		3.370							
1971	14880990.		611717.	41.11	136484.	9.17	0.	.00	3.194
		3.028							
1972	15338408.		570900.	37.22	131299.	8.56	0.	.00	2.866
		2.704							
1973	15758824.		527033.	33.44	125801.	7.98	0.	.00	2.546
		2.390							
1974	16139977.		481169.	29.81	120096.	7.44	0.	.00	2.237
		2.084							
1975	16479865.		432989.	26.27	114285.	6.93	0.	.00	1.934
		1.851							
1976	16787716.		408213.	24.32	111216.	6.62	0.	.00	1.769
		1.748							
1977	17083749.		404264.	23.66	109194.	6.39	0.	.00	1.727
		1.716							
1978	17379365.		403967.	23.24	107803.	6.20	0.	.00	1.704
		1.726							
1979	17682020.		415967.	23.52	106822.	6.04	0.	.00	1.748
		1.778							

(continued)

(Table A-1 continued)

			Calendar Year Data						
							Net international		
Year	Midyear population	Expon. growth rate (%)	Births	CBR	Deaths	CDR	Migrants	Rate	Growth rate (%)
1980	17999265.	1.736	431535.	23.98	106189.	5.90	0.	.00	1.808
1981	18314415.	1.673	411931.	22.49	106976.	5.84	0.	.00	1.665
1982	18623324.	1.689	420545.	22.58	107681.	5.78	0.	.00	1.680
1983	18940581.	1.708	430621.	22.74	108972.	5.75	0.	.00	1.698
1984	19266833.	1.725	441184.	22.90	110327.	5.73	0.	.00	1.717
1985	19601990.	1.731	451153.	23.02	111695.	5.70	0.	.00	1.732
1986	19944189.	1.728	457941.	22.96	113002.	5.67	0.	.00	1.730
1987	20291804.	1.748	464562.	22.89	114271.	5.63	0.	.00	1.726
1988	20649584.	1.790	480976.	23.29	115707.	5.60	0.	.00	1.769
1989	21022586.	1.834	498049.	23.69	117314.	5.58	0.	.00	1.811
1990	21411618.	1.865	516276.	24.11	118947.	5.56	0.	.00	1.856
1991	21814655.	1.874	529782.	24.29	121037.	5.55	0.	.00	1.874
1992	22227302.	1.865	539592.	24.28	123044.	5.54	0.	.00	1.874
1993	22645810.	1.841	545439.	24.09	124972.	5.52	0.	.00	1.857
1994	23066571.	1.804	547870.	23.75	126814.	5.50	0.	.00	1.825
1995	23486548.	1.762	547478.	23.31	128580.	5.47	0.	.00	1.784
1996	23904122.	1.712	546536.	22.86	130286.	5.45	0.	.00	1.741
1997	24317002.	1.649	541493.	22.27	131985.	5.43	0.	.00	1.684
1998	24721312.	1.575	532765.	21.55	133655.	5.41	0.	.00	1.614
1999	25113682.	1.493	520944.	20.74	135314.	5.39	0.	.00	1.536
2000	25491317.	1.407	506611.	19.87	136973.	5.37	0.	.00	1.450

(continued)

(Table A-1 continued)

			Calendar Year Data						
							Net international		
Year	Midyear population	Expon. growth rate (%)	Births	CBR	Deaths	CDR	Migrants	Rate	Growth rate (%)
2001	25852547.		492284.	19.04	139461.	5.39	0.	.00	1.365
		1.323							
2002	26196917.		477983.	18.25	142066.	5.42	0.	.00	1.282
		1.244							
2003	26524849.		464756.	17.52	144809.	5.46	0.	.00	1.206
		1.172							
2004	26837516.		453077.	16.88	147690.	5.50	0.	.00	1.138
		1.108							
2005	27136532.		443338.	16.34	150692.	5.55	0.	.00	1.078
		1.054							
2006	27424151.		436329.	15.91	153738.	5.61	0.	.00	1.030
		1.009							
2007	27702241.		430531.	15.54	156942.	5.67	0.	.00	.988
		.969							
2008	27971942.		426129.	15.23	160314.	5.73	0.	.00	.950
		.934							
2009	28234490.		423121.	14.99	163841.	5.80	0.	.00	.918
		.904							
2010	28491025.		421275.	14.79	167486.	5.88	0.	.00	.891
		.883							
2011	28743585.		422449.	14.70	171120.	5.95	0.	.00	.874
		.869							
2012	28994318.		425052.	14.66	174916.	6.03	0.	.00	.863
		.858							
2013	29244076.		428228.	14.64	178847.	6.12	0.	.00	.853
		.848							
2014	29493237.		431792.	14.64	182852.	6.20	0.	.00	.844
		.840							
2015	29742015.		435476.	14.64	186860.	6.28	0.	.00	.836
		.831							
2016	29990199.		439598.	14.66	191846.	6.40	0.	.00	.826
		.822							
2017	30237591.		443968.	14.68	196936.	6.51	0.	.00	.817
		.811							
2018	30483878.		447700.	14.69	202157.	6.63	0.	.00	.805
		.798							
2019	30728059.		450291.	14.65	207473.	6.75	0.	.00	.790
		.780							
2020	30968793.		451463.	14.58	212814.	6.87	0.	.00	.771
		.761							
2021	31205339.		452360.	14.50	217918.	6.98	0.	.00	.751
		.740							

(continued)

(Table A-1 continued)

			Calendar Year Data						
							Net international		
Year	Midyear population	Expon. growth rate (%)	Births	CBR	Deaths	CDR	Migrants	Rate	Growth rate (%)
2022	31437060.	.715	452137.	14.38	223136.	7.10	0.	.00	.728
2023	31662569.	.685	450552.	14.23	228535.	7.22	0.	.00	.701
2024	31880315.	.652	447564.	14.04	234088.	7.34	0.	.00	.670
2025	32088812.	.616	443240.	13.81	239722.	7.47	0.	.00	.634
2026	32287178.	.579	438305.	13.58	245092.	7.59	0.	.00	.598
2027	32474731.	.540	432550.	13.32	250656.	7.72	0.	.00	.560
2028	32650508.	.499	426148.	13.05	256489.	7.86	0.	.00	.520
2029	32813740.	.457	419330.	12.78	262524.	8.00	0.	.00	.478
2030	32963992.	.414	412346.	12.51	268649.	8.15	0.	.00	.436
2031	33100733.	.371	405464.	12.25	275678.	8.33	0.	.00	.392
2032	33223638.	.328	398926.	12.01	282902.	8.52	0.	.00	.349
2033	33332855.	.287	392872.	11.79	290463.	8.71	0.	.00	.307
2034	33428597.	.247	387391.	11.59	298316.	8.92	0.	.00	.266
2035	33511242.	.211	382548.	11.42	306332.	9.14	0.	.00	.227
2036	33581861.	.178	378796.	11.28	313776.	9.34	0.	.00	.194
2037	33641531.	.146	375749.	11.17	321430.	9.55	0.	.00	.161
2038	33690708.	.116	373413.	11.08	329379.	9.78	0.	.00	.131
2039	33729891.	.089	371728.	11.02	337396.	10.00	0.	.00	.102
2040	33759848.	.066	370607.	10.98	345023.	10.22	0.	.00	.076
2041	33782302.	.048	369918.	10.95	350594.	10.38	0.	.00	.057
2042	33798583.	.030	369538.	10.93	356300.	10.54	0.	.00	.039

(continued)

(Table A-1 continued)

			Calendar Year Data						
							Net international		
Year	Midyear population	Expon. growth rate (%)	Births	CBR	Deaths	CDR	Migrants	Rate	Growth rate (%)
2043	33808680.	.011	369366.	10.93	362410.	10.72	0.	.00	.021
2044	33812471.	-.008	369279.	10.92	368654.	10.90	0.	.00	.002
2045	33809902.	-.026	369154.	10.92	374915.	11.09	0.	.00	-.017
2046	33801250.	-.042	369286.	10.93	380829.	11.27	0.	.00	-.034
2047	33786954.	-.059	369138.	10.93	386187.	11.43	0.	.00	-.050
2048	33767149.	-.075	368627.	10.92	391187.	11.58	0.	.00	-.067
2049	33741762.	-.092	367700.	10.90	395913.	11.73	0.	.00	-.084
2050	33710608.		366334.	10.87	400429.	11.88	0.	.00	-.101

Table A-2
North Korea: Estimates of Mortality and Fertility, 1960–2050

	Expectation of Life at Birth			Infant Mortality Rate (per 1,000)			
Year	Both sexes	Male	Female	Both sexes	Male	Female	TFR
1960	48.97	45.99	52.08	95.0	106.6	82.7	5.3995
1961	49.93	46.92	53.03	91.1	102.2	79.5	5.3995
1962	50.91	47.89	54.00	87.3	97.7	76.4	5.8005
1963	51.92	48.89	55.00	83.5	93.2	73.3	6.0805
1964	52.97	49.92	56.03	79.6	88.6	70.1	6.2205
1965	54.04	50.98	57.09	75.7	84.1	67.0	6.3590
1966	55.00	51.92	58.05	72.1	80.0	63.7	6.4755
1967	55.99	52.89	59.04	68.4	76.0	60.5	6.5900
1968	57.01	53.89	60.06	64.7	71.9	57.2	6.7050
1969	58.06	54.92	61.11	61.0	67.8	53.9	6.8200
1970	59.14	55.98	62.19	57.3	63.7	50.6	6.9350
1971	59.91	56.71	62.97	54.8	61.1	48.2	6.3375
1972	60.70	57.47	63.77	52.3	58.6	45.7	5.7405
1973	61.50	58.24	64.59	49.8	56.0	43.2	5.1300

(continued)

(Table A-2 continued)

Year	Expectation of Life at Birth			Infant Mortality Rate (per 1,000)			TFR
	Both sexes	Male	Female	Both sexes	Male	Female	
1974	62.32	59.04	65.43	47.2	53.4	40.7	4.5200
1975	63.17	59.85	66.29	44.7	50.9	38.3	3.9095
1976	63.71	60.39	66.80	43.7	49.4	37.6	3.5000
1977	64.25	60.94	67.33	42.6	48.0	37.0	3.3000
1978	64.81	61.51	67.86	41.6	46.6	36.4	3.1300
1979	65.38	62.08	68.41	40.5	45.1	35.7	3.0700
1980	65.96	62.66	68.97	39.5	43.7	35.1	3.0390
1981	66.25	62.95	69.25	38.7	42.8	34.4	2.8000
1982	66.54	63.24	69.54	37.9	41.9	33.6	2.7500
1983	66.83	63.53	69.83	37.1	41.0	32.9	2.7000
1984	67.13	63.82	70.13	36.2	40.1	32.2	2.6500
1985	67.43	64.12	70.42	35.4	39.2	31.5	2.6000
1986	67.74	64.42	70.72	34.6	38.3	30.7	2.5500
1987	68.04	64.72	71.03	33.8	37.4	30.0	2.5000
1988	68.35	65.02	71.33	33.0	36.5	29.3	2.5000
1989	68.66	65.33	71.64	32.2	35.6	28.5	2.5000
1990	68.98	65.64	71.96	31.3	34.7	27.8	2.5000
1991	69.24	65.90	72.22	30.4	33.7	26.9	2.4680
1992	69.50	66.16	72.48	29.5	32.8	26.1	2.4360
1993	69.76	66.42	72.75	28.6	31.8	25.3	2.4040
1994	70.03	66.69	73.02	27.7	30.8	24.4	2.3725
1995	70.30	66.96	73.29	26.8	29.8	23.6	2.3395
1996	70.57	67.23	73.57	25.9	28.9	22.7	2.3140
1997	70.85	67.50	73.85	25.0	27.9	21.9	2.2880
1998	71.13	67.78	74.13	24.1	26.9	21.1	2.2620
1999	71.41	68.07	74.42	23.1	25.9	20.2	2.2360
2000	71.69	68.36	74.71	22.2	24.9	19.4	2.2100
2001	71.89	68.56	74.92	21.7	24.4	18.9	2.1880
2002	72.09	68.76	75.12	21.2	23.8	18.4	2.1660
2003	72.28	68.96	75.33	20.6	23.2	17.9	2.1440
2004	72.49	69.17	75.54	20.1	22.6	17.4	2.1220
2005	72.69	69.38	75.75	19.6	22.0	17.0	2.0995
2006	72.90	69.59	75.97	19.0	21.4	16.5	2.0820
2007	73.10	69.81	76.19	18.5	20.9	16.0	2.0645
2008	73.32	70.02	76.41	17.9	20.3	15.5	2.0460
2009	73.53	70.24	76.63	17.4	19.7	15.0	2.0275
2010	73.75	70.46	76.86	16.9	19.1	14.5	2.0100
2011	73.96	70.69	77.08	16.3	18.5	14.1	1.9985
2012	74.19	70.91	77.32	15.8	17.9	13.6	1.9865
2013	74.41	71.14	77.55	15.3	17.3	13.1	1.9740

(continued)

(Table A-2 continued)

Year	Expectation of Life at Birth			Infant Mortality Rate (per 1,000)			TFR
	Both sexes	Male	Female	Both sexes	Male	Female	
2014	74.64	71.38	77.79	14.7	16.7	12.6	1.9625
2015	74.87	71.61	78.03	14.2	16.2	12.1	1.9510
2016	75.02	71.76	78.18	13.9	15.8	11.9	1.9380
2017	75.16	71.91	78.33	13.6	15.5	11.6	1.9255
2018	75.31	72.06	78.49	13.4	15.2	11.4	1.9140
2019	75.45	72.21	78.64	13.1	14.9	11.1	1.9025
2020	75.60	72.37	78.80	12.8	14.6	10.9	1.8900
2021	75.76	72.52	78.96	12.5	14.3	10.7	1.8820
2022	75.91	72.68	79.12	12.2	14.0	10.4	1.8740
2023	76.06	72.84	79.28	12.0	13.7	10.2	1.8655
2024	76.22	73.00	79.45	11.7	13.4	9.9	1.8580
2025	76.38	73.16	79.61	11.4	13.0	9.7	1.8500
2026	76.54	73.32	79.78	11.1	12.7	9.5	1.8440
2027	76.71	73.49	79.95	10.9	12.4	9.2	1.8380
2028	76.87	73.65	80.12	10.6	12.1	9.0	1.8325
2029	77.04	73.82	80.30	10.3	11.8	8.7	1.8265
2030	77.21	73.99	80.47	10.0	11.5	8.5	1.8200
2031	77.31	74.09	80.58	9.9	11.3	8.4	1.8140
2032	77.40	74.19	80.68	9.8	11.2	8.3	1.8080
2033	77.50	74.28	80.78	9.6	11.0	8.1	1.8020
2034	77.60	74.38	80.89	9.5	10.9	8.0	1.7960
2035	77.70	74.49	80.99	9.4	10.7	7.9	1.7900
2036	77.80	74.59	81.10	9.2	10.6	7.8	1.7855
2037	77.90	74.69	81.21	9.1	10.4	7.7	1.7815
2038	78.01	74.79	81.31	9.0	10.3	7.6	1.7780
2039	78.11	74.90	81.42	8.8	10.1	7.5	1.7740
2040	78.21	75.00	81.53	8.7	10.0	7.4	1.7695
2041	78.32	75.11	81.64	8.6	9.8	7.2	1.7660
2042	78.43	75.21	81.75	8.4	9.7	7.1	1.7625
2043	78.54	75.32	81.87	8.3	9.5	7.0	1.7580
2044	78.65	75.42	81.98	8.2	9.3	6.9	1.7545
2045	78.76	75.53	82.10	8.0	9.2	6.8	1.7505
2046	78.87	75.64	82.21	7.9	9.0	6.7	1.7480
2047	78.98	75.75	82.33	7.8	8.9	6.6	1.7460
2048	79.09	75.86	82.45	7.6	8.7	6.5	1.7445
2049	79.20	75.97	82.57	7.5	8.6	6.3	1.7425
2050	79.32	76.08	82.69	7.3	8.4	6.2	1.7405

The major difference between Model 1 and Model 2 is the assumed base population structure for 1960. Model 2 began with a UN model stable population of the Far Eastern model with expectation of life at birth of 47 years for males and 51 years for females and with a total fertility rate of 5.5 births per woman.[145] The age-specific fertility pattern used to derive the base population was that of South Korea for 1955–1960.

We were surprised that a model stable base population beginning in 1960 successfully produced most aspects of the reported 1986 population age structure after modeling the intervening decades of population change. (A stable population is a population closed to migration whose levels and patterns of fertility and mortality have stayed constant for a long time.) Of course, this does not exactly describe the North Korean experience, but for modeling purposes it seems to be close enough. Our initial working assumption had been that North Korea by the late 1950s had something resembling a quasi-stable population, meaning one that had experienced constant fertility and a recent drop in mortality. Kwon estimated that life expectancy in all Korea rose slowly from 38 years in 1925–1930 to 43 years in 1940–1945. In the North, we would expect further mortality improvement for the late 1940s, elevated or catastrophic mortality levels during the Korean War of 1950–1953, and mortality reductions thereafter. Our attempts to create a quasi-stable population structure using these assumptions, however, did not succeed. Perhaps the stable population assumption is imperfect but adequate because much mortality improvement happened in the first quarter of the century, and any subsequent secular trend of declining mortality was punctuated by temporary reversals during the wars and upheavals of the midcentury decades. That answer, unfortunately, does not seem satisfactory; we simply note that this facet of our modeling worked tolerably well.

One major adjustment had to be made to the 1960 Far Eastern stable population. Such a stable population has a sex ratio of 100.25 males per hundred females, that is, slightly more males than females. But the official population totals for North Korea soon after the Korean War show a striking dearth of males. It was necessary to delete from the stable age structure 14 percent of the adult men to simulate the severe loss of military-aged men in the Korean War. We presume that most of these missing males had died, though some may have fled the country.

Model 3 differs from Models 1 and 2 in that it began in 1956 rather than 1960 and assumed higher fertility and lower mortality in the early

1960s than the other two models. This alternative reconstruction utilized a Coale-Demeny North model stable population with life expectancy of 51.5 years for males and 55.0 years for females, and a total fertility rate of 5.0 births per woman. Enough adult males were deducted from the base stable population to replicate the reported total population sex ratio for 1956.

APPENDIX B

Data Accuracy and Completeness

Because the age structure data were not reported in single years of age, it is difficult to assess the accuracy of age reporting and the degree of "heaping," if any, on preferred years of age. It is likely that the people of North Korea know their ages rather well, like the people of other East Asian cultures (South Korea, China, Japan). There is fragmentary information suggesting that age reporting is not too bad. For example, the population reported to be age 16 at year-end 1986 were born in calendar year 1970, if they all correctly reported their age. There is indeed fairly close correspondence between the reported 1970 birth rate and the reported population age 16 at year-end 1986, considering the numbers of children likely to have died in the interim and males who might have joined the military at age 16.

One minor age reporting problem is apparent. It seems that some North Koreans continue to use the traditional method of counting age for young children, at least before school age. Using the traditional system, a child is age "1" at birth and turns age "2" on the first lunar new year's day, even if the child is only a few days old.[148] This jumbles the age reporting for the youngest children in the 1986 age structure, but the exaggeration of age seems to be sorted out and corrected by the time children reach age 6. Although the 1986 count of children ages 6 through 15 is consistent with reported birth rates for the 1970s, too many children are reported to be ages 4 and 5, whereas too few are recorded in infancy and at ages 1 through 3.

Apparent errors are seen when comparing the number of children reported to be at a certain age with recorded births in that cohort's year of birth. For example, those ages 4 and 5 at year-end 1986 were born in 1981 and 1982. Assuming that half were born in 1982, only 386,641 births were registered that year, yet 461,539 surviving children were called

age 4 at year-end 1986. In contrast, although North Korea reported that there were 433,407 registered births in calendar year 1986, at year-end 1986 only 387,300 babies under age one were reported. Some of this discrepancy is accounted for by infant deaths, but much is unexplained. Though the reported 1986 age structure includes too few children at ages birth through 3, the reported total number of children in ages from birth through 5 does not appear to be too low. The count is higher than expected from the reported births and birth rates in the period 1981 through 1986, when the cohorts ages 0–5 were born. We conclude that the major error is not undercounting of young children in the population registers but rather the traditional exaggeration of the ages of young children, resulting in heaping on ages 4 and 5.

How complete is the total count of the North Korean population from the permanent population registration system? Of course, since the reported data are for civilians only, the true population size and the true number of men are higher than the reported civilian figures. For males younger or older than broadly defined military ages (that is, for males from birth through age 15 and at ages 55 and above), the reported numbers are reasonable, and we were able to recreate the reported cohorts of 1986 quite well. As far as we can tell, the male civilian count looks accurate.

The 1986 female count under age 16 is reasonable and consistent with the demographic trends we have modeled after 1970, especially in Models 1 and 2. Those age 16 in 1986 were born in 1970. For all three models we have assumed that the birth rate in 1970 was as high as or higher than reported. Model 1 projects 8,000 more young women at age 16 in 1986 than reported, Model 2 results in 3,000 more, and Model 3 produces 5,000 more. These small discrepancies could easily be caused by young women joining the military. At ages 17–54, Models 1 and 3 closely matched the reported numbers of women, whereas Model 2 recreated 34,000 more women than reported, but these could also be in the military. Therefore, from birth through age 54 the count of females is reasonable, meaning that the numbers in each broad age group are consistent with a possible base population structure and with reported trends in fertility, mortality, population size, and population growth.

There do, however, appear to be too many women recorded in the population registers at ages 55–59 and at ages 60 and above. We tested a whole range of plausible and barely plausible base population structures, mortality levels, and mortality patterns prior to 1986, and we were unable

to recreate anywhere near as many older women as reported. Because the count of women under age 55 appears to be essentially accurate and because there are about 150,000–200,000 too many older women recorded in the registration system, there has been a net overcount of women in the population registers. Our reconstructions of North Korean demographic trends all suggest that the overcount of women emerged between 1970 and 1975, escalated during 1982–1985, and has continued since then. We hypothesize that there must be some reason why it is advantageous to retain the names of deceased women in the registers, perhaps connected with the food rationing system. Yet men do not appear to be overcounted at older ages.[149] Why women but not men? One possibility is that a higher proportion of men than women is economically active. If almost all men are connected to a work unit and are on some sort of pension after retirement, then the work unit might keep track of them and report their deaths. But those women who have not been economically active in middle or old age might not be receiving pension benefits, and their deaths might go unrecorded.

During the period from 1960 through 1987, the registration of births has been rather complete. In our reconstructions, we assumed crude birth rates slightly or negligibly higher than the reported birth rates. This assumption was very successful in recreating the young portion of the 1986 age structure and reasonably successful in following the reported increases in the size of the population. In the early 1980s, the difference between the numbers of births we have modeled and the reported numbers of births implies that about 8 percent of the actual births were not registered. It is necessary to assume more births than reported in order to produce the registered population of children ages 0–5 in 1986.

Death reporting in North Korea is not nearly as complete as birth reporting. Year-by-year completeness of death reporting appears to have vacillated wildly, possibly because periodically there has been an attempt to update the permanent population registers, and some earlier deaths got recorded in the clean-up year. For example, the reported crude death rate in 1963 was much higher than in prior or subsequent years. The proportion of deaths registered ranged from about 65 percent to 95 percent in different years of the 1960s and 1970s. Over one-fourth of all deaths were unregistered in the early 1980s, but the completeness of death reporting improved in 1986 and 1987 to about 85 percent of deaths.

Table B-1. North Korea, Estimated Completeness of Infant Mortality Reporting, 1960–1986

Year	Infant mortality rate		Approximate percent missed
	Reconstructed	Reported	
1960	95.0	37.0	61
1965	75.7	35.3	53
1970	57.3	22.7	60
1975	44.7	18.1	60
1980	39.5	14.2	64
1985	35.4	10.5	73*
1986	34.6	9.8	73*

*For 1985 and 1986, the official figures for total births and for infant mortality rates have been reported. Therefore we were able to calculate absolute numbers of infant deaths registered, to compare with the absolute numbers of infant deaths from Model 1.

Note: Infant mortality rates are per thousand live births.

Sources: Official data from CSB, 1987, p. 7. Model 1 by Center for International Research, U.S. Bureau of the Census.

As is common in developing countries, the reporting of infant mortality in North Korea is very poor, in spite of that country's comprehensive and highly regimented administrative system. By our estimates, well over half the infant deaths were unrecorded from 1960 to 1986, as shown in Table B-1. In the mid-1980s, according to our estimates, over 70 percent of infant deaths were not registered.

Current Central Statistics Bureau regulations require the reporting of a death within 10 days and a birth within 15 days. Such regulations may contribute to the underreporting of infant mortality. When a low level of infant mortality has been achieved, as is true of North Korea, most infant deaths occur in the neonatal period (within 28 days of birth), and most neonatal deaths occur in the first week or two of life. If babies who die within 10 or 15 days of birth need not be registered, a considerable fraction of the country's infant deaths could go unreported.

APPENDIX C

North Korea 1990 Population Profile

Table C-1. North Korea, 1990 Population Profile

Age group	Estimated midyear population			Sex ratio
	Both sexes	Male	Female	
Total	21,411,618	10,567,950	10,843,668	97.5
0	493,552	252,079	241,473	104.4
1–4	1,808,316	922,501	885,815	104.1
5–9	2,046,355	1,042,714	1,003,641	103.9
10–14	1,949,407	991,168	958,239	103.4
15–19	2,531,943	1,283,591	1,248,352	102.8
20–24	2,658,012	1,342,791	1,315,221	102.1
25–29	2,041,534	1,024,064	1,017,470	100.6
30–34	1,875,169	939,853	935,316	100.5
35–39	1,380,927	691,191	689,736	100.2
40–44	1,100,728	548,727	552,001	99.4
45–49	900,998	446,532	454,466	98.3
50–54	757,991	345,978	412,013	84.0
55–59	620,179	269,532	350,647	76.9
60–64	450,494	181,397	269,097	67.4
65–69	329,689	125,824	203,865	61.7
70–74	223,830	82,942	140,888	58.9
75–79	137,636	47,668	89,968	53.0
80+	104,858	29,398	75,460	39.0

(continued)

(Table C-1 continued)

Age group	Estimated midyear population			Sex ratio
	Both sexes	Male	Female	
0–3	1,865,960	952,299	913,661	104.2
4–5	862,949	439,987	422,962	104.0
0–5	2,728,909	1,392,286	1,336,623	104.2
6–15	3,996,276	2,033,125	1,963,151	103.6
16	469,646	238,215	231,431	102.9
16–29	6,803,934	3,433,497	3,370,437	101.9
16–64	13,890,420	6,856,707	7,033,713	97.5
17–26	5,191,462	2,623,183	2,568,279	102.1
17–54	12,350,101	6,167,563	6,182,538	99.8
15–49	12,489,311	6,276,749	6,212,562	101.0
60+	1,246,507	467,229	779,278	60.0

Total fertility rate:	2.5	Crude death rate:	5.6
Total births:	516,276	Rate of natural increase:	18.6
Crude birth rate:	24.1	Net international migration rate:	0
Total deaths:	118,947	Population growth rate:	1.9

	Both sexes	Male	Female
Expectation of life at birth	69.0	65.6	72.0
Infant deaths:	15,894	9,019	6,875
Infant mortality rate:	31.3	34.7	27.8

Source: Reconstructed at the Center for International Research, U.S. Bureau of the Census, based on official DPRK statistics.

APPENDIX D

Range of Estimates of DPRK Armed Forces

The estimates used in this study for the total number of men in the North Korean armed forces are derived directly by comparing the time series of male population totals from our Model 1 reconstruction of North Korean population growth with the reported male civilian population totals since 1970. The estimates presented in Table 30 are the most conservative—that is, the lowest estimates of the size of the North Korean military that can reasonably be derived from the official DPRK population data analyzed in this report.

For those readers who need to know how wide a range of estimates can be justified from these statistics, we present here some alternative estimates. The following sets of estimates all assume that armed forces personnel were completely included in official population totals through 1970 and completely excluded thereafter. This is the most reasonable assumption, given the implausibly low population growth rate for males given in Table 11 for 1970–1975 and the sudden sharp drop in the reported population sex ratio from 1970 to 1975.

Our three models of North Korea's population change use three different base population structures, two different sets of model life tables, and two different starting years. In all three models we have tried to match as closely as possible the official data on birth rates, male population totals through 1970, female population totals through 1987, and the age-sex structure reported for year-end 1986. But since there is not full internal consistency in these official figures, the three models vary marginally from the official statistics in different ways. One result is that the missing male population, calculated as the difference between the reconstructed year-end male total for certain years and the official civilian male total for the same years, varies somewhat from model to model. Table D-1 shows these estimates.

Table D-1. North Korea, Alternate Estimates of Males Not Reported, 1975–1987

Date, year-end	Total males missing (in thousands)		
	Model 1	Model 2	Model 3
1975	714	727	746
1980	909	959	980
1982	1,040	1,099	1,111
1985	1,130	1,181	1,185
1986	1,202	1,250	1,264
1987	1,249	1,298	1,323

Notes: The missing males in each model constitute an estimate of the size of the male military population of the DPRK. They are calculated as shown in Table 30, by subtracting the reported civilian male population from the estimated total male population at year-end.

Sources: These three models were reconstructed by the Center for International Research, U.S. Bureau of the Census. The reported civilian male population figures are in Table 11.

Though Models 2 and 3 result in higher estimates of the North Korean male military population than our preferred Model 1, the implied trend is the same. All three models suggest that North Korea's military population was already over 700,000 strong by the end of 1975 and increased by 5–6 percent a year in the late 1970s to over 900,000 by year-end 1980. In 1981 and 1982, the male military total apparently grew by 6 or 7 percent a year to over 1 million by the end of 1982. This estimation technique suggests that, for the next three years, the annual growth rate may have slowed to 2–3 percent a year. In 1986, the male military population grew 6 percent to exceed 1.2 million, based on these estimates, and increased further in 1987.

A different approach to estimating the North Korean male military total is as follows. Assume that the total population sex ratio as reported for 1970 was correct and that every subsequent figure officially reported for the female population size was also correct. Use the models to estimate what the sex ratio of the total population should be in each of these years, in relation to the revealed 1970 sex ratio, and estimate the range of the missing male population that way. Table D-2 shows the results of this method.

Table D-2. North Korea, Estimation of Missing Males using Sex Ratios, 1975–1987 (population in thousands)

Date Year-end	Reported female population	Estimated population sex ratio	Estimated male population	Reported male population	Missing males
1970	7,492	95.13	7,127	7,127	0
1975	8,553	95.70–95.94	8,185–8,206	7,433	752–773
1980	9,289	96.15–96.46	8,931–8,960	8,009	922–951
1982	9,580	96.31–96.66	9,226–9,260	8,194	1,032–1,066
1985	10,185	96.53–96.95	9,832–9,874	8,607	1,225–1,267
1986	10,350	96.59–97.05	9,997–10,045	8,710	1,287–1,335
1987	10,505	96.66–97.15	10,154–10,206	8,841	1,313–1,365

Notes: This table assumes that the reported total male and female populations for year-end 1970 were correct, and therefore that the 1970 sex ratio was correct. Trends in the total population sex ratio are taken from Models 1, 2, and 3 to determine what the sex ratio should be in later years in relation to the 1970 reported sex ratio. Sex ratios are males per hundred females.

Sources: Official population totals by sex from Table 11. Estimated population sex ratios for 1975–1987 derived from Models 1, 2, and 3, reconstructed at the Center for International Research, U.S. Bureau of the Census.

The estimates in Table D-2 also show continual growth in the size of the North Korean male military population. This method, however, suggests a growth rate of 4 percent a year in the late 1970s, rising to almost 6 percent annually from 1981 through 1985, continuing to grow rapidly at 5 percent in 1986, with the growth rate dropping off sharply to 2 percent in 1987. By then, this method suggests that the male military total already exceeded 1.3 million. The reason that this method produces higher recent figures for the men in the military is that the reported female totals are assumed correct. In all our models, however, we have detected what appears to be an overcount of 150,000 to 200,000 women at ages 55 and above in the population registers. If the reported female population totals are slightly too high, the use of a reasonable total population sex ratio to derive the male total would produce a slight overestimate of males as well.

Therefore, the use of two different estimation techniques on the three models of North Korean population change since 1970 produce a range of estimates for year-end 1987 of 1.25 million to 1.37 million *men* in the DPRK military. What about women? All three of our models indicate that there may be a small number of women at age 16 in the North Korean military. The high reported 1970 birth rate produced a huge cohort of children who were age 16 at year-end 1986. As shown in Table 15, there were reported to be 279,819 girls at age 16 as of that date, but our models indicate that there were between 283,000 and 288,000 female 16-year-olds at the end of 1986. Perhaps the additional 3,000 to 8,000 women age 16 were in the military.

We cannot estimate with any certainty the number of women in the DPRK military ages 17–54. Model 2 produces 34,000 more women in this broad age group than were reported in the year-end 1986 civilian age structure, but Models 1 and 3 replicated the reported number of women ages 17–54 almost exactly. If there are women in the North Korean armed forces, and anecdotal reports suggest that there are, the available statistics do not allow precise estimation of their number. One reason that our estimates of the North Korean military population in Table 30 are conservative is that only the men are included in those estimates.

In conclusion, the statistics analyzed in this report show that the DPRK armed forces were already large in 1975 and have grown rapidly since then. We conclude from the available official data that by year-end 1987 there were at least 1.25 million men plus an unknown number of women in the North Korean military. The plausible range of estimates for men in

the armed forces is 1.25 to 1.37 million men as of year-end 1987. We detect only a few thousand women in the military with the data at hand.

Notes

1. For background on Korea's prepartition history, see Ki-Baik Lee, trans. Edward W. Wagner with Edward J. Shultz, *A New History of Korea* (Cambridge, Mass.: Harvard University Press, 1984).

2. For a detailed description of the similarities between the DPRK's initial 1948 constitution and formal political structure and those of the contemporary Soviet Union, see Chin-wee Chung, "The Evolution of a Constitutional Structure in North Korea," in Scalapino and Kim, 1983, pp. 19–42.

3. For general background on the DPRK, see Robert A. Scalapino and Chong Sik Lee, *Communism in Korea*, Part II (Berkeley, Calif.: University of California Press, 1972), and Vreeland et al., 1976.

4. For more details, see Chung, 1974.

5. Chang, 1984.

6. Chung, 1974, p. 169.

7. Liu, 1989.

8. According to population researchers in Pyongyang, North Korea's population registration system has been in effect since the foundation of the state in 1948; the system, it was stated, has collected data on an annual basis since its inception. (Nicholas Eberstadt, personal communication, Pyongyang, May 22, 1990.)

According to South Korea's National Unification Board, however, intensive surveys of the population have been conducted more intermittently:

> When the so-called "democratic reform" begun in 1946 was completed in 1958, North Korea carried out a series of surveys on the social origins of people.... Typical examples follow: The project from 1958 to 1960, with intensive guidance provided by party headquarters, the project of registering all residents from April 1964 to 1969, the project of classifying residents into 51 (or 33) strata on the basis of results from the registration

> in February 1971, the project of cross-checking citizenship identification cards in January 1980, the project of classifying persons who crossed into North Korea and those who returned from abroad in April of that year. (NUB, 1988, pp. 163–165)

It should be noted that these two contrasting descriptions of the population registration system are not necessarily inconsistent. A regular and routine registration process, for example, could have been supplemented by additional and more detailed examinations, as special political directives may have required.

9. The won is the nonconvertible currency of the DPRK. This officially released note added that GNI = GNP − C = V + M, but did not define or elaborate on the calculation of any of these variables. It appears that this figure of 47 billion won represents North Korea's net material product, which does not include the service sector. In the equation, "GNP" apparently should be GSP, gross social product. C stands for costs of material inputs. Subtracting C from GSP gets rid of the double-counting caused when the products of one enterprise or farm become inputs for another. V stands for labor costs and M for surplus product. The concepts of C, V, and M are the Marxist breakdown of national production. For an official discussion of the DPRK's national accounts framework, see Hwang Byung-yok, "National Income of a Socialist State," *Nodong Sinmun*, July 10, 1966, translated in Joint Publications Research Service (JPRS), *Translations on North Korea*, no. 10 (September 13, 1966): 31–36.

10. North Korea's most authoritative commentator, President Kim Il Sung, has personally criticized the quality of the DPRK's official statistics—including demographic statistics—on various occasions in the past. In 1974, for example, he made the following comments about the "lack of a detailed estimate of the labor situation" for the country:

> The State Planning Commission only collects information on the birth rate and the natural growth of labor.... in other words, it made no calculations on exploring manpower reserves and making effective use of the existing manpower.... Their estimates of manpower have been wrong, not only in making the long-term plan but also in making short-term plans.... If you work in such a careless way, you cannot manage the socialist economy as you should. (Kim, *Works*, vol. 29, 1987, pp. 260–261)

11. The DPRK's 1972 constitution sets 17 as the minimum age for voting (*Human Rights in the DPRK*, 1988, p. 170). Presumably other rights and obligations of full citizenship begin at age 17 as well. According to a

1987 DPRK publication, moreover, "elderly people [men on reaching 60 and women 55] receive old-age pensions" (Pang, 1987, p. 155). This means that part of the workforce begins retiring after age 54. The single large cohort in CSB statistics for persons 17 to 54 years of age, therefore, may actually provide information considered necessary by DPRK authorities in their framing of social and economic policies.

12. Carmelo Meso-Lago, "The Availability and Reliability of Statistics in Socialist Cuba," Part 2, *Latin American Research Review,* no. 2 (1969); cited in Eberstadt, 1988, p. 206.

13. *New York Times,* May 31, 1989. The budget divulged, however, may *still* understate the U.S.S.R's true level of military spending. According to one Soviet official, for example, the revised official claim of a military budget of 77 billion rubles is an underestimate:

> We, members of the Supreme Soviet of the U.S.S.R, still have no clue as to how the military budget is distributed among the ministries, or what our major military programmes are, or how they conform to the principles of defence sufficiency. Our parliamentary committee has been the only one to disagree with the 1990 draft budget submitted by the government. After our analysis of the draft we doubted the correctness of the figures mentioned in it. Military expenditure of 70-odd billion is mentioned. According to our experts, the figure is likely to approximate 200 billion rubles. (Yuri Ryzhov, "The Security We Do Not Need," *New Times* [Moscow], no. 10, 1990, p. 27)

14. Kim Il Sung, *New Year's Address, January 1, 1980* (Pyongyang: Foreign Languages Publishing House, 1980), p. 5.

15. North Korea's "national income" estimates, moreover, most likely refer to net material product rather than gross domestic product. A recent comment by Han Si Hae, Deputy Chairman for Unification of the DPRK, underscored this possibility; responding to questions from an American reporter, he noted that "G.N.P. is calculated differently in the East than in the West" (*New York Times,* June 2, 1991).

16. For an older and a more recent account of the suppressed Soviet census of 1937, see W. von Poletika, "Annullierte volkszählung 1937 und Bevölkerungsstand in der Sowjetunion" [The Canceled Census of 1937 and the Population Situation in the Soviet Union], *Allgemeines Statistiches Archiv* [General Statistical Archives], vol. 28 (1939): 322–356; and M. Tol'ts, "Skol'ko zhe nas togda bylo?" [How Many Were We in Those Years?], *Ogonek* [Little Flame], no. 51, 1987, pp. 10–11.

17. For details see Banister, 1987, p. 19.

18. Christopher Davis and Murray Feshbach, *Rising Infant Mortality in the U.S.S.R. in the 1970's* (Washington, D.C.: U.S. Bureau of the Census, 1980), Foreign Demographic Analysis Division, series P-95, no. 74, p. 5; and Nicholas Eberstadt, "Health and Mortality in Eastern Europe, 1965–1985," in U.S. Congress Joint Economic Committee, *Pressures for Reform in the East European Economies,* vol. 1 (Washington, D.C.: U.S. Government Printing Office, 1989), pp. 99–100.

19. Chang, 1984, pp. 89–97.

20. It may be significant, moreover, that many of the data in these tables are similar to figures cited by North Korea's most authoritative voice, President Kim Il Sung, on many separate occasions in the 1960s and 1970s (Kim, *Works,* vols. 24–34). At the very least, the consistency of the figures in question indicates that some North Korean demographic data were not altered or adjusted before their release to the UNFPA. More broadly, these consistencies would seem to support the inference that the UNFPA obtained some of the same data used by the highest political authorities—irrespective of the actual quality of the statistics themselves.

21. *Nord-Korea, 1971,* p. 10.

22. Pang, 1987, pp. 4–5.

23. See Vreeland et al., 1976, pp. 46–50.

24. Kim Yong-kyu, 1990, p. 3.

25. *Korea Statistical Yearbook,* 1987, p. 39.

26. China, State Statistical Bureau, *Fenjin de sishi nian, 1949–1989* [Forty Years of Vigorous Progress, 1949–1989] (Beijing: Zhongguo tongji chubanshe, 1989), p. 350.

27. *Korea Statistical Yearbook,* 1989, p. 41.

28. *Korea Statistical Yearbook,* 1986, p. 41. South Korean data on household population size include the military, whereas North Korean data do not.

29. Pang, 1987, p. 82.

30. Researchers at the Korean Population Research Center stated that the general definition of an urban block or workers' district (*dong*) is a jurisdiction in which an industrial enterprise employs 3,000 persons or more. Further discussion, however, suggested that in practice there was considerable flexibility, and variation, in the actual designation of urban blocks, both across the country and over time. (Nicholas Eberstadt, personal communication, Pyongyang, May 22, 1990.) Perhaps because of the ad hoc

nature of the designation process, certain puzzling inconsistencies are evident in the DPRK's statistics on urbanization. In the early 1970s, for example, North Korean policy emphasized the rapid incorporation of women into the state labor force; today women reportedly comprise 45 percent of the industrial labor force. (Nicholas Eberstadt, personal communication, Pyongyang, May 25, 1990.) As women swelled the factory employment rolls, many localities might suddenly have qualified for urban status under this definition. Other things being equal, one would expect this policy to have increased significantly the proportion of the population defined in North Korea as urban. Yet the 1970s are precisely when the tempo of urbanization in North Korea reportedly slowed (see Table 6).

31. Data derived from satellite photography may prove capable of providing additional perspective on North Korea's patterns of urbanization. Landsat imagery from the 1970s (1973–75), for example, identified the "built-up" areas of Kaesong as comprising roughly 6 square kilometers (vs. the 1,255 square kilometers officially designated for Kaesong municipality in 1987) and showed Pyongyang's "built-up" area to be 44.6 square kilometers (vs. 2,000 square kilometers designated for the whole municipality in 1987). By way of comparison, contemporary Landsat imagery identified Seoul's "built-up" area at 195.6 square kilometers and Pusan's at 31.1 square kilometers; official South Korean data for 1987 place the areas of those two municipalities at 605 square kilometers and 435 square kilometers, respectively. (Kyun Hyung Han, "Estimation of Major City Population in Korea Using Landsat Imagery," Ph.D. dissertation, University of Utah, 1985, pp. 4, 55, 70, 86; *Korea Statistical Yearbook*, 1987, p. 19.)

32. *Korea Statistical Yearbook*, 1988, p. 40. According to the 1985 census of South Korea, Seoul had 9.64 million residents and Pusan had a population of 3.51 million.

33. Kim Yong-kyu, 1990, p. 5.

34. Ibid., pp. 1, 3.

35. A researcher at the Korean Population Research Institute told Eberstadt that there had been much discussion of this issue, and for the time being it had been decided to call the whole population in Pyongyang Municipality "urban." Yet looking at the vista from the top of the Chuch'e Tower in Pyongyang, Eberstadt saw large agricultural areas, which he was told were inside the boundaries of Pyongyang Municipality. (Nicholas Eberstadt, personal communication, Pyongyang, May 22, 1990.) At the moment, the official urban statistics evidently exaggerate the size of the ac-

tual urbanized population of Pyongyang. In the absence of hard data for earlier periods, it is impossible to determine how longstanding this tendency has been or how pronounced it may have been in earlier periods. One may note, however, that President Kim Il Sung remarked in 1974 that Pyongyang city's area included over 30,000 hectares—300 square kilometers—of rice paddy fields. (Kim, *Works,* vol. 29, 1987, p. 200.)

36. Nampo was reportedly elevated to a directly administered city in 1980, so it is unclear why Nampo's city population was not included in Table 7 until 1986. All information in this paragraph is from Kim Yong-kyu, 1990.

37. Data derived from Republic of China, Executive Yuan, *Statistical Yearbook of the Republic of China 1988* (Taipei: Directorate-General of Budget, Accounting and Statistics, 1988), pp. 14–17.

38. *Demographic Yearbook,* 1986, pp. 244, 283.

39. The single exception to this generalization involves immigration of pro-DPRK Korean residents from Japan. Between 1959 and 1984, a total of 93,366 Koreans reportedly were repatriated from Japan to the DPRK. (NUB, 1988, p. 156.) The overwhelming majority of these immigrants returned to North Korea during the years 1959 through 1962.

40. A conversation with researchers from the Korean Population Research Center and officials from the Central Statistics Bureau provided perspective on these data. According to this conversation, migration figures pertain only to individuals who shift their permanent residence from one fixed civilian jurisdiction (in this case, a *ri* or *dong*) to another. Only the individuals actually migrating are tabulated; should family or household members continue to reside in the migrant's place of origin, they would in theory not be included in migration statistics. The DPRK's migration statistics also appear to exclude all military movements and relocation to new jurisdictions after military service is completed. (Nicholas Eberstadt, personal communication, Pyongyang, May 25, 1990.)

41. Derived from *Korea Statistical Yearbook,* 1989, pp. 62–63.

42. NUB, 1988, p. 136.

43. We have modeled in the rising sex ratio from 1956 to 1970. This looks entirely plausible, but the sharp rise from 88.3 in 1953 to 91.6 in 1956 is probably spurious and may be the result of a relative undercount of males in 1953.

44. Conversations in Pyongyang reinforced this impression. According to officials from the Central Statistics Bureau, for example, the registration

system was amended in the early 1970s to exclude persons in "mobile units." "Mobile units," it was stated, are still excluded from the registered population count. (Nicholas Eberstadt, personal communication, Pyongyang, May 25, 1990.) These units, it was stated, are overwhelmingly male—and, we believe, probably overwhelmingly military in nature as well.

45. *Demographic Yearbook,* 1972, p. 123; 1976, p. 121; 1981, p. 169; 1986, p. 153; *World Population,* 1983, p. 242; 1987, p. 41; *Population and Vital Statistics Report,* 1989, series A, vol. 41, no. 4, p. 10.

46. NUB, 1988, pp. 21–22.

47. Pang, 1987, p. 82.

48. North Korea's high ratio of Party members to national population is not a new phenomenon. As early as 1948, "according to one source, [the Korean Workers' Party] had already 1,000,000 members.... On the basis of a population of ten million, claimed by North Korea, this would mean that the rather high percentage of over 11 percent of the total population were members of the Party." (Philip Rudolph, *North Korea's Political and Economic Structure* [New York: Institute of Pacific Relations, 1959], p. 31.) From its inception, the Korean Workers' Party was intended to be a particular kind of Marxist-Leninist Party. As one student of North Korean affairs has noted, "In 1946, when Kim Ilsong merged his new party with the heterogenous elements of the [Shin mindang, or New Democratic Party], he had argued the need for 'a mass party that can consolidate the greatest number of people' and for getting rid of class boundaries in order to 'consolidate the entire forces... of the working masses' including workers, peasants and intellectuals. In short, the North Korean Workers' Party formed at that time supposedly represented a broader spectrum of society than the communist parties elsewhere." (Chong-Sik Lee, "Korea," in Witold S. Sworakowski, *World Communism: A Handbook 1918–1965* [Stanford, Calif.: Hoover Institution Press, 1973], p. 261.)

49. Further indications of the uses for this classification scheme come from a 1987 North Korean publication. It states, for example, that a "two-year nursery school, a pre-school educational establishment, brings up and educates four-five year old children at state and public expense" and that "in our country the minimum age for starting work is 16 years." (Pang, 1987, pp. 78, 162.) As already mentioned, there may also be a policy use for the highly unorthodox grouping of persons between the ages of 17 and 54 into a single cohort.

50. In East Asian populations, the sex ratio at birth is in the range 105–107 males per hundred females, but boys generally have higher mortality than girls, so the sex ratio declines from one age to the next.

51. Nicholas Eberstadt received permission from officials of the Central Statistics Bureau to cite the statistics in this table, Pyongyang, May 25, 1990.

52. It is not clear whether deaths to the military population are included in the reported absolute number of registered deaths. According to an official of the Central Statistics Bureau, there is a separate medical statistics reporting system that reports deaths for the local civilian registered population only. (Nicholas Eberstadt, personal communication, Pyongyang, May 25, 1990.)

53. As W. Ward Kingkade of the U.S. Bureau of the Census has pointed out to us, "average life span" in DPRK publications sounds like a verbatim translation of the traditional Russian language expression for life expectancy (*srednyaya prodolzhitel'nost'zhizni*). In Soviet literature, this misleading heading appeared over the life table column for life expectancy (and was generally employed everywhere else) despite the easy availability of more accurate alternatives. In 1988, the U.S.S.R. State Statistical Bureau (Goskomstat) modified the term to denote expectation of life.

54. An official of the Central Statistics Bureau told Eberstadt that figures on expectation of life at birth are calculated from the medical statistics system, not from the permanent population registration system. He said that each doctor is responsible for the medical needs of about 100 households and is supposed to report information on health conditions and deaths in the locality. Each year these figures are cumulated upward in the statistical hierarchy of the Central Statistics Bureau. (Nicholas Eberstadt, personal communication, Pyongyang, May 25, 1990.)

55. World Bank, 1988, p. 223.

56. In view of the DPRK's reportedly effective reconstruction and development efforts in the mid- and late 1950s, this may seem to be a somewhat low level for overall life expectancy. It would compare, for example, with an estimated life expectancy at birth of about 50 years for the PRC in 1957, before the temporary rise in China's mortality associated with the "Great Leap Forward." (Banister, 1987, p. 116). The PRC, it is commonly believed, was less economically developed in the late 1950s than the DPRK. Yet, on the basis of available DPRK data, it would be difficult to ascribe a much higher level of life expectancy to the 1960

North Korean population. A higher level of life expectancy, for example, would require a concomitantly lower initial level of fertility for our base population in order to replicate the reported population growth trends of the 1960s. Yet our 1960 fertility estimate—a total fertility rate of 5.4—is already quite low, by comparison either with contemporary South Korea or with prepartition Korea. (Kwon, 1977, p. 347.) In Model 3, we did posit better life expectancy for North Korea by 1960—55 years for both sexes combined—but this resulted in more deviations from the reported 1960–1987 demographic data than were necessary.

57. The National Academy of Sciences made estimates of life expectancy for females in South Korea that were considerably higher for the late 1950s and early 1960s than the other available estimates. But by the early 1970s estimates from the NAS and other sources had converged (see Table 18).

58. As one specialist on Korean social statistics has noted, although "[South] Korea is regarded as having better data gathering systems than most comparable countries... the existing reality of the health data and information system in [South] Korea is much more serious than a casual observer can imagine." (Choo Hakchung, "National Health Data and Information System," in Chong Kee Park, ed., *Human Resources and Social Development in Korea* [Seoul: Korea Development Institute, 1980], p. 170.)

59. See, for example, CIA, 1978, p. ii, where it is estimated that per-capita GNP as of 1965 was over 50 percent higher in North Korea than in South Korea.

60. See, for example, NUB, 1988, pp. 92–95; and CIA, 1978, pp. i, iii, 2–10.

61. Kwon, 1977, pp. 64–66.

62. Komaki, 1988, pp. 45–63.

63. *Human Rights in the DPRK*, 1988, pp. 34–38, 189–199.

64. Banister, 1987, pp. 70–77, 114–119, 354–355.

65. Chang, 1984, pp. 94–95.

66. The infant mortality rate is the number of deaths in the first year of life per thousand babies born alive.

67. According to North Korean sources, the "average life span" (presumably for the North only) for the period 1936–1940 was 38.4 years (see Table 17). For Korea as a whole, however, Kwon estimates life expectancy at birth for the years 1935–1940 to have been 41.0 years. (Kwon, 1977, p. 313.)

68. For the year 1944, for example, North Korea reports an infant mortality rate of 204 (see Table 16). By Kwon's estimates, infant mortality for Korea as a whole during the period 1940–1945 was in the range of 151–168. (Kwon, 1977, pp. 306, 314.)

69. Mortality data for Mongolia may have been far from complete as late as the 1970s—after more than half a century of Communist rule and central economic planning. (Eberstadt, 1988, pp. 234–239.)

70. One student of politics in the DPRK has described the country as being "as close to totalitarian as a humanly operated society could come." (Robert A. Scalapino, *The Politics of Development: Perspectives on Twentieth Century Asia* [Cambridge, Mass.: Harvard University Press, 1989], p. 39.)

71. DPRK authorities also released a second set of cause-of-death data pertaining to "major diseases causing death" (CSB, 1987, pp. 16–17); this taxonomy includes specific entries for such items as bronchitis and asthma, chronic hepatitis and cirrhosis of the liver, pneumonia, and pulmonary tuberculosis. The broad categories outlined in this table would be unfamiliar to many students of mortality statistics; the schema, however, seems to be generally consistent with a classification system in use in the Republic of Korea, whereby the ICD categories are reclassified to an abridged tabulation of 124 causes of death "for Korea." See, for example, SWT, 1985, pp. 211–215. This alternative set of tables on cause of death, though not standard outside Korea, may facilitate comparisons of North and South Korean health and mortality data for DPRK authorities.

72. Problems with diagnosis are suggested by inconsistencies in cause-of-death data reported in the 1983 and the 1987 editions of *The Health Statistics of the Democratic People's Republic of Korea.* The 1983 edition, for example, reported that parasitic and infectious diseases accounted for 18.8 percent of all deaths in 1970 and only 1.3 percent in 1980; in the 1987 edition, the respective figures given were 10.9 percent in 1970 and 5.2 percent in 1980. Discrepancies may also be found in figures for respiratory diseases and digestive diseases. The 1983 edition had listed a category termed "Others" accounting for 18.9 percent of all deaths for 1980; these were allocated to other categories in the later edition.

73. Derived from Kwon, 1977, pp. 66, 72.

74. The Central Statistics Bureau released the following figures on health care facilities and personnel to the UNFPA:

Year	*no. of hospitals*	*no. of beds*	*no. of personnel*
1980	2,558	223,339	281,500
1982	2,510	229,513	278,610
1985	2,454	252,459	272,623
1986	2,401	257,205	285,267
1987	2,355	261,354	284,955

75. See Vreeland et al., 1976; and DPRK, Ministry of Public Health, *Health Service in the Democratic People's Republic of Korea* (Pyongyang: Public Health Administration Institute, 1983). Some aspects of the DPRK's public health system are described inconsistently in the North Korean media. Although the system is said to exact no direct charge from the patient, for example, a 1989 report on the treatment of cardiac patients stated that "all the patients who have been saved... at the hospital *did not pay a penny until they recovered their health*" (emphasis added). See "Chuche System Brings Dead People Back To Life," Pyongyang KCNA in English, March 27, 1989, in Foreign Broadcast Information Service (FBIS), *Daily Report*, no. FBIS-EAS-89-057, March 27, 1989, p. 29.

76. CSB, 1987, pp. 28–29.

77. Ibid., p. 38.

78. Ibid., p. 40.

79. Ibid., pp. 44–45.

80. Ibid., p. 51.

81. Vreeland et al., 1976, pp. 86–87. Official divorce policy reportedly tightened in 1956, in the wake of the Korean War. For more details, see Chin Kim, "Law of Marriage and Divorce in North Korea," *Osteuropa Recht*, vol. 20, no. 1 (March 1974), esp. pp. 59–61.

82. *Social Indicators in Korea 1985*, p. 272.

83. Banister, 1987, pp. 152–165.

84. NUB, 1988, p. 148. Anecdotes and impressions from a recent visit to North Korea contrast to a degree with the quoted assessment. In response to his questions, Nicholas Eberstadt was told that the "typical" marriage age for men was 27–28 and for women 23–25, with younger ages tending to characterize rural areas. Eberstadt also noticed a number of men in uniform promenading the streets of Pyongyang in the company of women and children whom he took to be their families; not all of these personnel looked like older men or officers. (Nicholas Eberstadt, trip notes, observations in Pyongyang, May 28, 1990.) The contrasts between the National Unification Board assessment and Eberstadt's experiences

could be interpreted in many ways. One possibility is that in the late 1980s there may have been a relaxation of stricter policies toward marriage age previously in force. A surge of marriages at younger ages could result from such a relaxation.

85. Nicholas Eberstadt had the chance to examine such identity cards on his visit to North Korea in May 1990. (Nicholas Eberstadt, trip notes from May 28, 1990.)

86. Banister, 1987, pp. 147–152, 165–170.

87. The total fertility rate is the average number of children who would be born alive to a woman during her lifetime if she were to live through all her childbearing years and conform to all the age-specific fertility rates of a given year.

88. Our estimates may be compared with contemporary comments by Kim Il Sung, North Korea's most authoritative official voice. In October 1971, Kim stated: "At present a fairly large number of families of factory and office workers have five or six children each." (Kim, *Works*, vol. 26, 1956, p. 307.) Whether Kim was referring to actual numbers of children residing in households or to the more complex calculation of total fertility rates for such households is not clear.

89. World Bank, 1988, p. 277.

90. For 1987, North Korea's Central Statistics Bureau reported that there were 430,148 births and 5,745,832 women ages 15–49, which means a "general fertility rate" (GFR) of 75 births per thousand women at ages 15–49. Our estimates of this measure of North Korean fertility are slightly higher. Model 1 produced 464,562 births in 1987, as well as 5,801,679 women ages 15–49, for a GFR of 80 births per thousand women at ages 15–49. Using the more common measure of the GFR based on women ages 15–44, Model 1 results in a GFR of 87 births per thousand women at ages 15–44.

91. In Japan, postwar population policy has been neither coercive nor explicitly antinatal; it has, however, been shaped by antinatal pressures and concerns. For a review of its evolution, see Minoru Miromatsu and Toshio Kuroda, "Japan," in Bernard Berelson, ed., *Population Policy in Developed Countries* (New York: Population Council, 1974).

92. Liu, 1989.

93. United Nations Department of International Economic and Social Affairs, *World Population Policies*, vol. 1 (New York: United Nations, 1987), pp. 166–167; idem, *World Population Trends, Population and*

Development Interrelations, and Population Policies, vol. 2, p. 160; idem, *World Population Trends and Policies, 1981 Monitoring Report,* vol. 2, p. 97; idem, *World Population Trends and Policies, 1979 Monitoring Report,* vol. 2, p. 76; idem, *World Population Trends and Policies, 1977 Monitoring Report,* vol. 2, p. 124.

94. See, for example, Vreeland et al., 1976, pp. 61–62; and *Human Rights in the DPRK,* 1988, p. 129.

95. NUB, 1988, pp. 155–156.

96. Kim, *Works,* vol. 35, 1989, pp. 75–76.

97. Conversations with researchers at the Korean Population Research Institute touched upon the question of whether the DPRK had been engaged in an unannounced antinatal population campaign. The researchers insisted that this was not the case. They ascribed high fertility levels in the 1950s and 1960s to low levels of maternal education. As the general educational attainment of women of reproductive age increased, they argued, it was natural to expect fertility to decline. Several policies of a generally *pronatal* variety—including shorter working hours at full pay for mothers with three or more children—were described as being currently in force. The researchers stated that they believed that rapid fertility decline in the early 1970s may have been affected by two specific policies: (1) a decision to encourage female participation in the state workforce and (2) a concomitant decision to make contraceptives widely available, "not to suppress births but to liberate women." The scholars also stated that before contraceptives had been available, women had chosen to limit births and had resorted often to abortions, which was hard on their health. (Nicholas Eberstadt, personal communication, Pyongyang, May 25, 1990.)

These statements, it should be noted, contrast directly with information provided to Nicholas Eberstadt in 1984 by a high official within the pro-DPRK General Association of Korean Residents in Japan. In conversations touching upon social and economic policy in the DPRK, this official stated he was authorized to tell Eberstadt that the DPRK was indeed implementing an antinatal policy, with a "norm" of two children per family and encouragement of a one-child "ideal." (Nicholas Eberstadt, personal communication with Choe Kwan Ik, Tokyo, September 28, 1984.)

98. Discussed in Banister, 1987, pp. 165–166.

99. If there is such a contradiction between words and actions, this would raise an additional question: Does the government of the DPRK treat population policy as an issue of national security, and if so, why?

100. In conversations with researchers at the Korean Population Research Institute, Eberstadt was told that abortion also plays a role in the DPRK's contraceptive policies. According to these discussions, "high-risk" pregnancies are monitored with care. At six months, such mothers are given ultrasonic examinations. Based upon the results of these examinations, the fetus may subsequently be aborted if it appears to be deformed. North Korea's low officially reported rate of infant mortality, it was stated, in part reflects the decision to abort such defective fetuses. (Nicholas Eberstadt, personal communication, Pyongyang, May 25, 1990.)

101. "Many Popular Welfare Measures in Force in North," Pyongyang KCNA in English, March 21, 1990, FBIS, *Daily Report,* no. FBIS-EAS-90-056, March 22, 1990, p. 21.

102. For a schematic representation, see Pang, 1987, p. 161. According to this source, however, "there are now 4,923,000 pupils and students in our country." (Ibid., p. 162.) This figure is not the same as the numbers released for 1986 or 1987 in Table 24; it may include students not mentioned in that table (e.g., doctoral or postgraduate students) or might refer to some earlier reference year.

103. In Pyongyang, however, officials from the Central Statistics Bureau stated that the educational statistics upon which these computations were based were in actuality incomplete. According to their discussions with Nicholas Eberstadt, various forms of specialized education were omitted from the tally, including schools for blind or disadvantaged children, schools for orphans, schools for sports training, and schools attached to provincial universities. When all these additional students were taken into account, it was stated, the enrollment ratio would be 100 percent. (Nicholas Eberstadt, personal communication, Pyongyang, May 25, 1990.)

104. *Social Indicators in Korea,* 1987, p. 161.

105. *Social Indicators in Korea,* 1988, p. 165.

106. Yun Ki-chong, "Summarizing the Execution of the State Budget for 1989," Pyongyang Domestic Service, April 7, 1989, translated in FBIS, *Daily Report,* no. FBIS-EAS-89-067, April 7, 1989, p. 12. In May 1990, this official referred to "a large army of 1,460,000 intellectuals in Korea." "Minister Yun Speaks about the Budget," Pyongyang KCNA in English, May 25, 1990, in FBIS, *Daily Report,* no. FBIS-EAS-90-102, May 25, 1990, p. 28.

107. Kim Il Sung, *Talk with Executive Managing Editor of Japanese "Yomiuri Shimbun" and His Party, April 23, 1977* (Tokyo: Central Standing

Committee of the General Association of Korean Residents in Japan, May 1977), p. 4.

In the same interview, Kim also stated that "the number of babies and children growing up in nurseries and kindergartens is 3,500,000" (p. 4). The assertion is puzzling. According to *The Health Statistics of the DPRK* (CSB, 1987, p. 57), the total number of "charges" in North Korean kindergartens in 1975 was 1.630 million. Moreover, based on Model 1, the total number of children in the DPRK ages 0–5 (i.e., of kindergarten and pre-kindergarten age) would have been 2.987 million at year-end 1975 and 2.813 million at year-end 1976. By our estimates, the total number of DPRK children at ages 0–6 at year–end *1975* would have been 3.556 million. By year-end 1975, however, the extension of the educational system to its current eleven-year attendance requirement was reportedly completed, and children six years of age should have been included as first graders, not kindergarten enrollees. Kim Il Sung's statements, then, may reflect a double counting of children six years of age, and impute a 100 percent enrollment ratio in state nurseries to newborns, infants, and babies.

108. Kim, *Works*, vol. 30, 1987, p. 305.

109. Derived from *Social Indicators in Korea*, 1989, pp. 162–163.

110. Joint Publications Research Service (JPRS), *Compilation of Statistics on the Development of the People's Economy of the Korean Democratic People's Republic, 1946–1960*, JPRS No. 18,763, April 17, 1963.

111. *North Korea Central Yearbook 1965*, translated in Joint Publications Research Service, JPRS No. 35,146, April 22, 1966, p. 261.

112. *Nord-Korea*, 1968, p. 10.

113. Private enterprises as such, however, are formally prohibited in the 1972 constitution. Private enterprise for personal consumption, on the other hand, is constitutionally permitted. (Chin-wee Chung, "The Evolution of a Constitutional Structure in North Korea," in Scalapino and Kim, 1983, p. 25.) Recent accounts by ethnic Korean visitors to the DPRK suggest that the country has an active "underground" economy; such private enterprise, however, would be in large measure illegal under existing North Korean laws and is probably not reflected in official statistics. For one recent description of the DPRK's underground economy, see "Chinese-Korean Peddler Describes DPRK Travel," *Wolgan Choson*, December 1990, translated in FBIS, *Daily Report*, no. FBIS-EAS-91-056, March 22, 1991, pp. 22–33.

114. Moreover, South Korea's data on employment are rather more problematic than might generally be supposed. For a discussion of the limitations and inconsistencies in South Korean labor force series, see David L. Lindauer, "Labor Market Behavior in the Republic of Korea: An Analysis of Wages and their Impact on the Economy," *World Bank Staff Working Papers*, no. 641 (July 1984): 71–76.

115. Virtually no information has been published on labor force distribution in North Korea in the 1970s. In 1976, President Kim Il Sung stated: "Our country has some 1,000,000 farming households." (Kim, *Works*, vol. 31, 1987, p. 25.) The figure mentioned may have referred to the 1975 year-end registration system count. A very rough extrapolation from the data presented in Table 5 of our study would suggest that North Korea may have registered around 3 million households in 1975. Very roughly speaking, this comment would be consonant with a labor force in which about a third of all workers were classified as agricultural.

116. CCN, 1962, p. 294; CCN, 1964, p. 110; CCN, 1965, p. 168.

117. CCN, 1964, p. 110.

118. *Social Indicators in Korea 1985*, p. 115.

119. Ibid.

120. In 1970, at the KWP Fifth Party Congress, the slogan "liberation of women from the kitchen" was officially embraced. The 1972 constitution includes the commitment that "the state frees women from the heavy burden of household chores and provides every favorable condition to facilitate their participation in public life." In 1976, according to a speech by the chairwoman of the North Korean Women's League, "now our women constitute 48 percent of the workforce in North Korea." (Changsoo Lee, "Social Policy and Development in North Korea," in Scalapino and Kim, 1983, p. 124.)

121. Pang, 1987, pp. 77–78.

122. China, State Statistical Bureau, Department of Population Statistics, *Zhongguo 1987-nian 1% renkou chouyang diaocha ziliao; quanguo fence* [Tabulations from China's 1987 1% Sample Survey, National Volume] (Beijing: Zhongguo tongji chubanshe, 1988), p. 224; and *China, Statistical Yearbook 1988* (Beijing: State Statistical Bureau, 1988), p. 123.

123. Vreeland et al., 1976, pp. x, xi, 53.

124. Joseph S. Chung, "Economic Planning in North Korea," in Scalapino and Kim, 1983, p. 178.

125. The theme of manpower scarcity has been personally expounded by Kim Il Sung since at least the early 1970s. See, for example, Kim, *Works*, vol. 29, 1987, pp. 260–261.

126. In 1982, South Korea's National Unification Board named eight camps for "ideological culprits" in North Korea and put their total population at over 105,000. (*A Comparative Study of South and North Korea* [Seoul: National Unification Board, 1982], pp. 19–20.) The timing of the announcement, which was made just before North Korea began its official celebrations for Kim Il Sung's seventieth birthday, made some observers suspicious. In subsequent years, however, a wide range of publications have come to accept this information as reliable, including reports by independent human rights groups. (*Human Rights in the DPRK*, pp. 101–104.) According to one South Korean publication, "Recently...it has been learned that the former eight camps have been expanded to 12 and the number of prisoners has increased from 105,000 to 152,000." *Pukhan*, September 1990, translated as "Antigovernment Forces in North Korea," in FBIS, *Daily Report*, no. FBIS-EAS-90-229, November 28 , 1990, p. 29.

127. "Reports also suggest that a political prisoner's family may also be interned in these camps....when interned with the alleged offender, the family's property is confiscated and its resident identification cards are revoked." *Human Rights in the DPRK*, p. 106.

128. Representative of the DPRK Central Statistics Bureau, to Nicholas Eberstadt, Pyongyang, May 24, 1990.

129. *Human Rights in the DPRK*, 1988, pp. 181–188.

130. As early as 1975, comments by President Kim Il Sung indicated that soldiers were being utilized in mine crews. (Kim, *Works*, vol. 30, 1987, p. 157.) In 1980, he prescribed the activities of some military units in the following fashion:

> Approximately 2,000 of the soldiers now working at the Musan mine should be sent quickly to the Tongnim mine to develop it so that they can settle in before winter. If this mine still needs additional manpower even after receiving men from the Musan mine, it can be sent further reinforcements. (Kim, *Works*, vol. 35, 1989, p. 157)

More recently, North Korean press and radio reports have announced that units of the KPA and the security forces are involved in construction works in Pyongyang. See, for example, "Soldiers Join in 'Tongil Street' Construction," translated in FBIS, *Daily Report*, no. FBIS-EAS-90-179, September 14, 1990, pp. 21–22; and "Pyongyang's Chinese Residents Help

Build Tramway," in FBIS, *Daily Report,* no. FBIS-EAS-91-056, March 22, 1991.

131. *Human Rights in the DPRK,* 1988, p. 184.

132. Levin, 1986, pp. 390–391; and Takesada, 1988, pp. 64–79.

133. U.S. Bureau of the Census, *Statistical Abstract of the United States 1984* (Washington, D.C.: U.S. Government Printing Office, 1983), p. 352.

134. The discrepancy between our estimates of the DPRK military population and those of IISS and ACDA (Table 33) may be caused by confusion regarding who are active duty military personnel and who are reserves in North Korea. For example, for 1987, IISS estimated that there were 838,000 active duty military plus 540,000 reserves, for a total of 1,378,000 armed forces personnel. *Military Balance 1987–1988,* p. 213.

135. Prepared statement by Carl W. Ford, Jr., in *Developments in United States-Republic of Korea Relations,* U.S. House of Representatives, Committee on Foreign Affairs, Subcommittee on Asian and Pacific Affairs (Washington, D.C.: U.S. Government Printing Office, 1990), p. 28.

136. Douglas Paal, in Kenneth J. Conboy, ed., *The U.S.–Republic of Korea Relationship: Reaffirming the Commitment for the 1990s* (Washington, D.C.: The Heritage Foundation, 1990), p. 4.

137. *The Military Balance 1990–1991,* pp. 166–167. By the IISS definitions, "the 'Active' total comprises all servicemen and women on full-time duty (including conscripts and long-term assignments from the Reserves).... the term 'Reserve' is used to describe formations and units not fully manned or operational in peacetime but which can be mobilized by recalling reservists in emergency." (Ibid., pp. 5–6.)

138. Gregory F. T. Winn, "National Security," in Fredrica M. Bunge, ed., *North Korea* (Washington, D.C.: U.S. Government Printing Office, 1981), p. 234.

139. *Human Rights in the DPRK,* 1988, p. 184.

140. Takesada, 1988, p. 67.

141. NUB, 1988, p. 282.

142. *Military Balance 1988–1989,* p. 167.

143. "*Wolgan Choson* Views DPRK Military," FBIS, Supplement, no. FBIS-EAS-91-073-S, p. 5.

144. Kwon, 1977, p. 348; NAS, p. 3.

145. United Nations, 1982, pp. 166, 189.

146. Kwon, 1977, p. 348.

147. Kwon, 1977, pp. 311–314.

148. Discussed in Kwon, 1977, pp. 7–10.

149. Given the small numbers of men reported at older ages, it is possible that they are accurately counted or are undercounted.

Works Frequently Cited

Banister, Judith. *China's Changing Population.* Stanford, Calif.: Stanford University Press, 1987.

CCN [*Choson Chungang Nyongam* (North Korea Central Yearbook)]. Trans. Joint Publications Research Service (JPRS). Various issues.

Coale, Ansley J., and Paul Demeny. *Regional Model Life Tables and Stable Populations.* Princeton, N.J.: Princeton University Press, 1966.

CSB [Democratic People's Republic of Korea, Central Statistics Bureau]. *The Health Statistics of the Democratic People's Republic of Korea.* Pyongyang: CSB, 1983, 1987).

Chang Il-won. "A Study on the Fall of the Mortality Rate and the Process of Reducing Distinctions in that Rate Between Urban and Rural Areas Under the Socialist System of Our Nation." *Chuch'e Uihak,* no. 2 (1984): 2–6. Trans. as "Mortality Rate Analyzed." Joint Publications Research Service, *Korean Affairs Report.* JPRS-KAR-85-061 (September 5, 1985). Pp. 89–97.

Chung, Joseph Sang Hoon. *The North Korean Economy: Structure and Development.* Stanford, Calif.: Hoover Institution Press, 1974.

CIA [U.S. Central Intelligence Agency]. *Korea: The Economic Race Between the North and the South.* Washington, D.C.: National Foreign Assessment Center, 1978. No. ER 78-10008.

Demographic Yearbook. New York: UN Department of International Economic and Social Affairs, Statistical Office. Annual.

Eberstadt, Nicholas. *The Poverty of Communism.* New Brunswick, N.J.: Transaction Books, 1988.

Human Rights in the Democratic People's Republic of Korea. Washington, D.C.: Asia Watch and Minnesota Lawyers International Human Rights Committee, 1988.

Kim Il Sung. *Works.* Vols. 1–35. Pyongyang: Foreign Languages Publishing House, 1980–1989.

Kim Yong-kyu. "The New North Korea Gazetteer." *Seoul Wolgan Choson,* no. 3 (March 1990): 448–457. Translated as "North Korean Administrative Boundary Changes Detailed." Mimeo.

KIPH [Korea Institute of Population and Health]. Kong Se-kwon, Im Chong-kwon, and Kim Mi-kyom. *Hunguk ui Samangnyok kwa Samang Wonin* [Korean Mortality and Causes of Death]. Seoul: Korea Institute of Population and Health, 1983.

Komaki, Teruo. "Current Status and Prospects of the North Korean Economy." In Masao Okonogi, ed., *North Korea at the Crossroads.* Tokyo: Japan Institute of International Affairs, 1988. Pp. 45–63.

Korea Statistical Yearbook. Seoul: Republic of Korea, Economic Planning Board, National Bureau of Statistics. Annual.

Kwon Tai Hwan. *Demography of Korea: Population Change and Its Components 1925–66.* Seoul: Seoul National University Press, 1977.

Levin, Norman D. "North Korea's Strategic Relations." In Robert A. Scalapino and Hongkoo Lee, eds., *North Korea in a Regional and Global Context.* Berkeley, Calif.: University of California, Institute of East Asian Studies. Korea Research Monograph, no. 11. Pp. 387–405.

Liu Yunde. "A Brief Introduction to the Statistical System and the Agencies Related to Contraceptive Practice in DPRK." Unpublished notes, 1989.

Military Balance. London: International Institute for Strategic Studies. Various issues.

NAS [National Academy of Sciences]. Coale, Ansley J., Lee-Jay Cho, and Noreen Goldman. *Estimation of Recent Trends in Fertility and Mortality in the Republic of Korea.* Washington, D.C.: National Academy of Sciences, 1980. NAS Committee on Population and Demography, Report No. 1.

Nord-Korea. Federal Republic of Germany, Statistiches Bundesamt. *Allgemeine Statistik des Auslandes: Nord-Korea.* Wiesbaden: Federal Statistical Office. Various issues.

NUB [Republic of Korea, National Unification Board]. *Comparative Study of North and South Korea, 1988.* Seoul: National Unification Board, 1988.

Pang Hwan Ju. *Korean Review.* Pyongyang: Foreign Languages Publishing House, 1987.

Population and Vital Statistics Report. New York: United Nations Department of International Economic and Social Affairs, Statistical Office. Quarterly.

Scalapino, Robert A., and Jun-yop Kim, eds. *North Korea Today: Strategic and Domestic Issues.* Berkeley, Calif.: University of California, Institute of East Asian Studies, 1983. Korea Research Monograph, no. 8.

Scalapino, Robert A., and Hongkoo Lee, eds. *North Korea in a Regional and Global Context.* Berkeley, Calif.: University of California, Institute of East Asian Studies, 1986. Korea Research Monograph, no. 11.

Social Indicators in Korea. Seoul: Republic of Korea, Economic Planning Board, National Bureau of Statistics. Various issues.

SWT. Republic of Korea, National Bureau of Statistics. *Samang Wonin Tonggye* [Cause of Death Statistics], *1984.* Seoul: Economic Planning Board, 1985.

Takesada, Hideshi. "Military Trends in North Korea." In Masao Okonogi, ed. *North Korea at the Crossroads.* Tokyo: Japan Institute of International Affairs, 1988. Pp. 64–87.

United Nations Department of International Economic and Social Affairs. *Model Life Tables for Developing Countries.* New York: United Nations, 1982. Population Studies, no. 77.

Vreeland, Nena, et al. *Area Handbook for North Korea.* Washington, D.C.: U.S. Government Printing Office, 1976.

World Bank. *World Development Report 1988.* New York: Oxford University Press, 1988.

World Population. U.S. Bureau of the Census, Center for International Research. Washington, D.C.: U.S. Government Printing Office. Annual.

Yearbook of Health and Social Statistics 1986. Seoul: Republic of Korea, Ministry of Health and Social Affairs, 1986.

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