Famine in North Korea, 1995-1998: A Retrospective Study of North Korean Migrants in China.

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Background: A deteriorating economy, coupled with a series of natural disasters in 1995-1997 led to a severe food crisis in North Korea, officially known as the Democratic People's Republic of Korea (DPRK). Although the government sought and received large amounts of international food aid beginning in 1995 to alleviate a serious food crisis, restrictive government policies prohibited internationally supervised assessments of population mortality. Lacking direct means of measuring recent mortality in North Korea, it became necessary to explore alternatives to obtain demographic data.

Since 1994 or 1995, significant numbers of North Koreans had been moving across the Chinese border in search of food for themselves and their families. It was estimated that between 50,000 and 150,000 North Koreans were staying temporarily in China, principally in Yanbian Korean Autonomous Prefecture, which is home to nearly one million Korean-Chinese. The demographic survey of North Korean migrants in China sought to establish, using a framework of 19 "generalizations" about famine proposed by Dyson and Ó Gráda[1] that a famine had occurred in North Korea during the period 1995-1998.

Study Design: In 1999-2000, interviews were conducted with a total of 2,692 North Koreans who had crossed into China. Respondents provided information on births, deaths, and migration patterns in their household in North Korea between 1995 and 1998. These sites, all of which had participated in an earlier study, [2] were selected based on their willingness to participate for another year and on the presence of at least moderate levels of cross-border arrivals. All North Korean respondents gave verbal consent to be interviewed and were assured that the interview was voluntary and confidential. Only migrants who were 17 or older were interviewed and only one member of a family or household unit traveling together was interviewed. No incentives were given to respondents although interviewers received a monthly stipend. It is estimated that between 80-90% of all arrivals at the nine sites were interviewed during the twelve-month period with a non-response rate of under 5%.

Respondents were asked to list all household members who were alive as of January 1995, including age, sex, education level, occupation, and relationship to the respondent. Household members totaled 9,958 as of the beginning of 1995 in 2,692 households. From the beginning of 1995 to the end of 1998, all household births, deaths, and in-migrations and out-migrations of one month or more in duration were recorded. Data were entered and analyzed with SPSS 11.0 and Stata 8.0. The study was approved by institutional review boards at Johns Hopkins Bloomberg School of Public Health and in Yanbian.

Results: Building on Dyson and Ó Gráda's generalizations about famine mortality, the study generated nine hypotheses about mortality in North Korea, 1995 to 1998, of which three are presented here:

- ***Mortality in North Korea, 1995-1998, had increased relative to the 1993 baseline.***

More specifically, it was hypothesized that mortality was significantly in excess of the baseline crude death rate of 5.5/1000 in 1995. "Significantly in excess" was defined as at least a two-fold increase above baseline. Relative to the baseline crude death rate from the 1993 North Korean census (5.4 per 1,000), it would appear that, even by 1995, the crude death rate in the sample population was well above normal (16.2 per 1,000). Within the four-year recall period, using 1995 as the reference year, the risk of dying in 1997 essentially doubled for the entire population.

Table 1. Sample Population: Crude Death Rates, 1995-1998

Year	***Number of Deaths***	***Mid-Year Population in Households***	***Death Rate (per 1000)***
1995	161	9,946	16.2
1996	272	9,855	27.6
1997	303	9,616	31.5
1998	250	9,268	27.0
4-Year Total	***986***	***9,777 (end 1996)***	***25.2***

- ***Increased malnutrition was the principal cause of mortality and that mortality was also associated with increased infectious disease.***

For all deaths reported in the household from 1995 to 1998, respondents were asked to identify cause of death. Out of 986 total deaths, a cause of death was reported for 98.3 % (969 deaths). No attempt was made at verbal autopsy; respondents simply were asked to state the cause of death in their own words for each household member who died during the recall period, January 1995 to December 1998. A South Korea-trained physician reviewed the answers given and classified the cause of death into one of 17 major categories in the *International Classification of Diseases* (ICD-9). One additional classification, "Starvation/Malnutrition", was created to aggregate various answers given by respondents to the effect that the household member died from "starvation", "lack of food," "weakness from no food," and "malnutrition".

This added category, "Starvation/Malnutrition" ranked at the top of the causes of death, with 206 out of 986 deaths. A total of 205 deaths during the four-year period were classified under "Symptoms, Signs and Ill-Defined Conditions;" deaths were classified in

this category when respondents gave answers like "illness" (*pyong*) or listed only a symptom ("fever" for example) when asked for a cause of death.

The third-largest classification was "Infectious and Parasitic Diseases" with 147 deaths in this category from 1995-1998. The fourth most common category for cause of death was "Injury and Poisoning" with 110 deaths in this classification from 1995 to 1998. This is one of the more significant classifications for the study, first, because it is so large, second, because it probably involves the most precise classification of cause of death (no clinical training is needed, for example, to distinguish between a traffic accident and a mining accident), and, third, because it shows the greatest gender disparity of all the major classifications. Although male deaths outnumbered female deaths in most of the major categories (with one exception being "Starvation/Malnutrition" where the numbers were even at 103 deaths for both sexes) in the category of "Injury and Poisoning," the male mortality ratio was 7:3.

Table 2. Sample Population: Cause of Death by the International Classification of Diseases (ICD-9)

Cause of Death	***Male***	***Female***	***Total***
Infectious and Parasitic Diseases	84	63	147
Neoplasms	32	29	61
Endocrine, Nutritional and Metabolic Diseases	4	2	6
Diseases of the Blood and Blood-Forming Organs	6	5	11
Mental Disorders	7	6	13
Diseases of the Nervous System and Sense Organs	1	2	3
Diseases of the Circulatory System	61	47	108
Diseases of the Respiratory System	21	14	35
Diseases of the Digestive System	33	25	58
Diseases of the Genitourinary System	0	0	0
Complications of Pregnancy, Childbirth, & the Puerperium	0	1	1
Diseases of the Skin and Subcutaneous Tissue	0	0	0
Diseases of the Musculoskeletal System/Connective Tissue	0	0	0
Congenital Anomalies	2	1	3
Certain Conditions Originating in the Perinatal Period	1	1	2
Symptoms, Signs and Ill-Defined Conditions	114	91	205
Injury and Poisoning	78	32	110
Starvation/Malnutrition	103	103	206
Missing	9	8	17
Total	***556***	***430***	***986***

- ***The mortality rates of males increased by more than the mortality rates of females.***

Comparing increases in male and female mortality rates can be done by measuring either proportional or absolute increases from baseline to crisis. In both proportional and absolute terms, the female crude death rate increased less than the male crude death rate.

Proportional to 1993 figures, female crude mortality in 1995-1998 rose by a factor of 4.3 while male crude mortality increased by a factor of 4.6. In absolute terms, the difference—or what has been referred to as the female mortality advantage during famines—is even greater: male crude death rates increased by 23.0 per 1,000 per year during the four-year interval, while female crude death rates increased by 16.4 per 1,000 per year. [3]

Table 3. Age-Specific Death Rates, 1993 Census and Sample Population, 1995-98, with Proportional and Absolute Increases for Males and Females

Age Interval	*Male ASDR (93)*	*Female ASDR (93)*	*Male ASDRs (Sample)*	*Female ASDRs (Sample)*	*Proportional Increase Males*	*Proportional Increase Females*	*Absolute Increase Males*	*Absolute Increase Females*
0-4	5.6	5.1	23.5	37.3	4.2	7.3	17.9	32.2
5-9	0.7	0.5	24.2	11.9	34.6	23.7	23.5	11.4
10-14	0.4	0.2	12.5	8.3	31.3	41.4	12.1	8.1
15-19	0.6	0.4	4.8	1.9	7.9	4.8	4.2	1.5
20-24	0.8	0.6	3.7	4.4	4.6	7.4	2.9	3.8
25-29	1.1	0.7	8.7	4.4	7.9	6.2	7.6	3.7
30-34	1.3	0.7	24.9	11.9	19.2	17.0	23.6	11.2
35-39	1.5	0.7	34.9	18.4	23.3	26.2	33.4	17.7
40-44	2.7	1.1	32.9	24.7	12.2	22.4	30.2	23.6
45-49	4.0	1.6	49.6	25.6	12.4	16.0	45.6	24.0
50-54	6.8	2.6	66.7	32.8	9.8	12.6	59.9	30.2
55-59	14.4	4.8	82.3	42.0	5.7	8.7	67.9	37.2
60-64	31.0	10.1	134.2	73.9	4.3	7.3	103.2	63.8
65+	76.6	43.7	191.6	128.2	2.5	2.9	115.0	84.5
Total	***6.4***	***4.9***	***29.4***	***21.3***	***4.6***	***4.3***	***23.0***	***16.4***

Note: **Proportional** increases are measured by dividing sample ASDRs by baseline (1993) ASDRs
Absolute increases are measured by subtracting baseline (1993) ASDRs from sample ASDRs.

[1] Tim Dyson and Cormac Ó Gráda, *Famine Demography: Perspectives from the Past and Present* (Oxford and New York: Oxford University Press, 2002), 10-12.

[2] W. Courtland Robinson, Myung Ken Lee, Kenneth Hill, Gilbert Burnham, "Mortality in North Korean Households," *Lancet* 354, no. 9175 (July 24 1999), 291-295.

[3] Kate MacIntyre, "Famine and the Female Mortality Advantage," ed, Tim Dyson and Cormac Ó Gráda, *Famine Demography: Perspectives from the Past and Present* (Oxford: Oxford University Press, 2002), 240. MacIntyre defines "female mortality advantage" as "high (m/f) sex ratio of mortality, where the age-specific rates for women are lower than those of men." Others have suggested that the female mortality advantage is not measured as a simple sex ratio of mortality but as either a proportional increase (famine rate/baseline rate) or absolute increase (difference between famine rate and baseline rate) in age-specific mortality (disaggregated by sex) during famine.