

ABOUT MORTALITY DATA FOR THE REPUBLIC OF KOREA (SOUTH KOREA)

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GENERAL

There are two government agencies responsible for producing population and vital statistics for the Republic of Korea (South Korea). Statistics Korea (KOSTAT; <http://kostat.go.kr> in Korean; <http://kostat.go.kr/portal/eng/> in English) is in charge of vital statistics, census, and population estimates. KOSTAT also operates the Korean Statistical Information Service (KOSIS; <http://kosis.kr> in Korean; <http://kosis.kr/eng/> in English), which is the national statistical database. The Ministry of Interior and Safety is responsible for the population register and produces estimates of the resident registration population.

Population estimates are available in three series: two for the total population (census population and population estimates based on the census counts) and a third series for the population of Korean nationality only (Resident Registration Population). Also, vital statistics for Korea pertain to persons of Korean nationality only.

The population census registration system in Korea dates back to ancient times. Nationwide censuses were taken during the Sam-Han Era (400 to 1 B.C.), the Goryeo Dynasty (A.D. 918-1392), and the Yi Dynasty (A.D. 1392-1910). Between 1910 and 1945, Korea was occupied by Japan. After the defeat of Japan in the Second World War and following the Korean War of 1950-1953, the country was divided along the 38th parallel into the Republic of Korea (South Korea) and the Democratic People's Republic of Korea (North Korea).

Sources of Data

Data on the Korean population originate from censuses conducted approximately every 5 years by KOSTAT (1925-2015). They are published in the *Report on the Population and Housing Census*. In addition, based on the census counts, KOSTAT produces annual population estimates for intercensal and postcensal periods since 1960 in the *Report on Population Projection*.

The data on the resident registration population are produced based on the Resident Registration System. These data are available from KOSIS (<http://kosis.kr> in Korean) for the period from 1992, when the Resident Registration System was computerized, to the present.

Counts of deaths and births are from the vital registration system. These data are available since 1970 from the *Annual Reports on the Vital Statistics*, also published by

KOSTAT. However, the HMD series starts in 2003 because of data quality issues for prior years (see below in the Data Quality Issues section).

TERRITORIAL COVERAGE

There were no changes in territorial coverage for the period covered by the HMD.

POPULATION COUNT DATA

Coverage and Completeness

There are three series of population count data for South Korea: population census (which are conducted on a *de jure* basis and include foreigners), official total population estimates (also *de jure*, including foreigners), and resident registration population (which covers only those of Korean nationality). For the purposes of estimating mortality rates, KOSTAT uses the mid-year resident registration population (i.e., registered residents of Korean nationality), which match the coverage of the death counts.

The first modern population housing census in South Korea was conducted in 1925. Since then, a census has been conducted approximately every five years interrupted only by the Second World War. The first postwar census was conducted in 1955, and thereafter censuses resumed on a quinquennial basis. Since 2015, a census has been carried out annually using a register-based method, which was a significant change from the traditional field-survey census every five years. Census enumeration serves as the basis for annual population estimates.

KOSTAT provides annual July 1st population estimates for the periods between quinquennial censuses from 1960 to 2015. The estimates based on field-survey censuses through 2010 were adjusted for the census undercount and for time movement from November 1st (when censuses were conducted) to July 1st. Since 2015, the population estimates are adjusted only for time movement from November 1st (when the register-based census takes place) to July 1st.

These census counts and population estimates are considered to be of good quality. The coverage of the 2005 census was evaluated to be 99.1% according to the post enumeration survey conducted one month after the census. Census coverage has improved over time from 1.25% coverage error in 1995 to 0.90% in 2005 (Lee, 2010).

Since 1993, KOSTAT also provides annual mid-year resident registration population counts based on the arithmetic mean of consecutive end-of-the-year resident registration population counts from Resident Registration System. Statistics Korea uses these population counts for computing vital rates to maintain consistency with the coverage of birth and death counts (which represent people of Korean nationality).

For HMD, we use the end-of-the year resident registration population counts. These estimates result from direct tabulations from population register after excluding persons of unknown residence and Korean Nationals residing abroad, which were included in separate categories in the register since 2010 and 2015, respectively.

Differences between the census counts and the resident registration population may result from differences in coverage, undercounting in the census, and Koreans who reside in a foreign country but do not report residing abroad (i.e., they appear in the resident registration population but are not counted by the census). The numerators and denominators for Korean mortality rates are consistent because deaths of persons who reside abroad but do not report residing abroad are supposed to be reported in the death counts.

DEATH COUNT DATA

Registration of deaths is legally required in the Republic of Korea. Deaths are supposed to be reported to the local administrative office within one month after the death.

Coverage and Completeness

The death counts represent registered residents of Korean nationality. If a legal resident of Korean nationality dies while outside the country, it is supposed to be registered in their system.

Although annual life tables for South Korea exist for since 1970, death registration is not considered complete until 2000. The overall completeness of death registration did not reach 98% until 1990 (Kim and Kim, 200), and the completeness of infant deaths only reached acceptable levels by 2000 (Lee, 2016). Park (1998) noted that only 32% of infant deaths were reported to the registration authorities for 1995. Prior to 2000, KOSTAT adjusted the life table infant mortality rate using the relationship between death rates at age 0 and at ages 1 to 4; after supplementing with cremation data, the coverage of infant deaths has increased by up to 70% of registered infant deaths for the period of 1997-1998 (Park, 2001). Lee (2016) noted that KOSTAT has collected extra information on infant deaths from crematories since 1999, and as a result, the completeness and accuracy of infant mortality statistics has dramatically improved. This was the main reason we chose to start the HMD mortality series after 2002. If necessary adjustments were made to infant deaths, reasonable mortality estimates could be obtained for years 1990 and later.

There is also a problem of delayed registration (i.e., deaths were not registered within the same year in which they occurred), but it has steadily improved over the last three decades. In 1995, delayed registration accounted for about 2% of all deaths (Park, 1998), but by 2015 the percentage had declined to 0.2% (Kim and Kim, 2017). Korean Vital Statistics are updated to incorporate delayed registrations once every 10 years (Kim and Kim, 2017).

BIRTH COUNT DATA

Like deaths, birth registration is legally required in the Republic of Korea. Births are supposed to be reported to the local administrative office within one month after the birth.

Coverage and Completeness

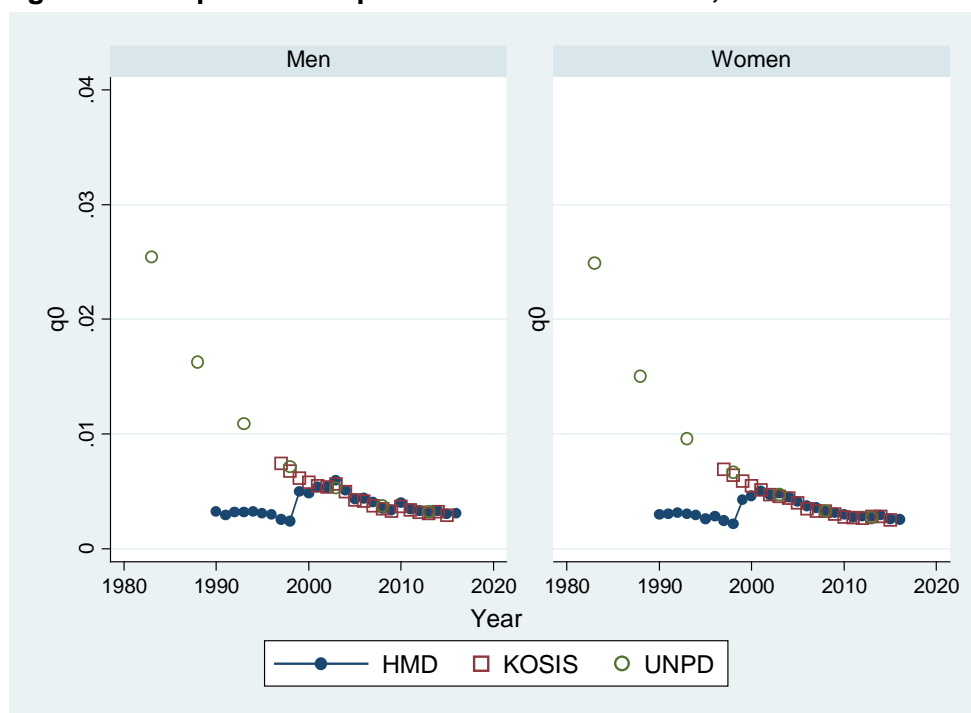
Delayed registration of births (i.e., births reported after the year in which they occurred) has improved over recent decades. In 2015, delayed registration accounted for 0.3% of all births (Kim and Kim, 2017). As with deaths, delayed registrations (for births) are incorporated into Korean Vital Statistics once every 10 years (Kim and Kim, 2017).

DATA QUALITY ISSUES

Our initial data quality analysis confirmed suspiciously low infant mortality prior to 2000. Although the pattern looked much more reasonable in 2000-2002, there was still some evidence of rising infant mortality during that period (see Figure 1), which suggested a data quality problem (e.g., completeness of death coverage improving over time). Figure 2 focuses on the relationship between infant and early childhood mortality. Compared with other HMD countries with a similar level of child mortality (${}_5q_0$), the ratio of infant to under-five mortality in South Korea was suspiciously low for 1990-98 (Figure 2). Between 1998 and 1999, this ratio jumped from 51% to 70% for males and from 53% to 69% for females (which resulted from a suspicious doubling of the infant mortality rate between 1998 and 1999). There was another notable increase in the ratio of ${}_1q_0$ to ${}_5q_0$ from 72% in 2002 to 78% in 2003 for males (74% to 77%, respectively, for females). The ratio of infant to under-five mortality continued to increase over time, albeit more slowly; by 2016, it had reached 79% and 81%, respectively. Though increased concentration of child mortality towards the early days of life is not implausible in a context of rapid survival progress, a ratio below 70% when early child mortality has reached low levels (${}_1q_0 < 0.01$) appears to be decidedly on the low side. Given these findings together with the evidence of rising infant mortality during 2000-2002 (Figure 1), we began the HMD series for South Korea in 2003.

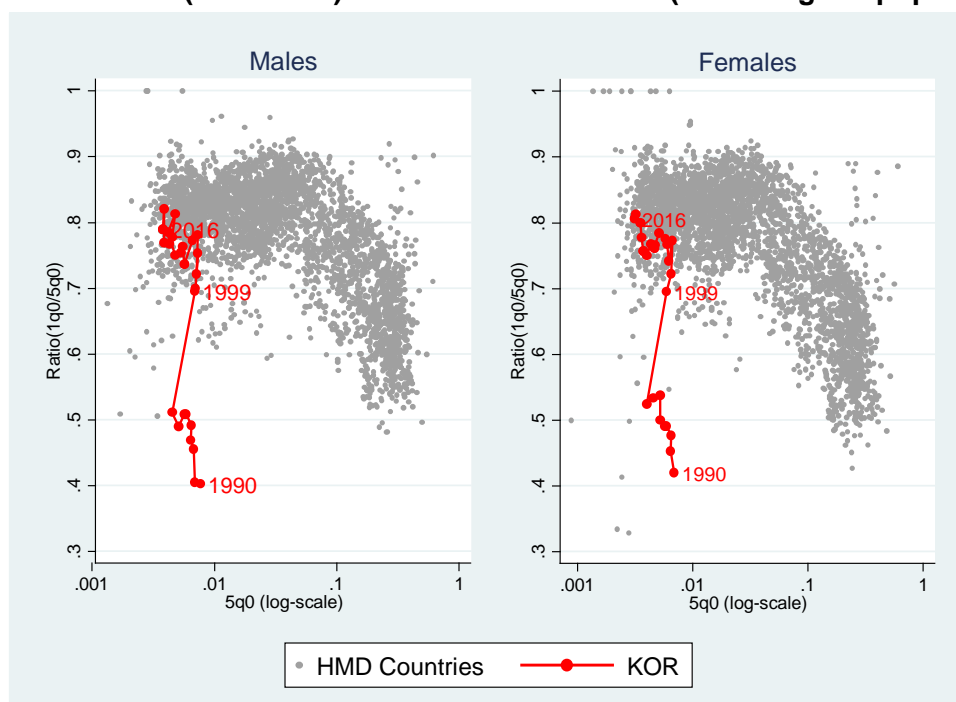
A comparison of sex- and age-specific death rates in South Korea relative to Japan suggests that mortality rates in 2003 were generally higher in Korea than in Japan, especially at young (<18) and older (>60) ages. Among men, Korean rates at ages 30-59 were also much higher than in Japan, although rates were more similar at ages 18-24. In women, Korean rates were similar to or slightly higher than Japan throughout the age range 18-59. It is possible that there is some underestimation of out-migration (of Korean nationals) that may be biasing Korean death rates downwards, particularly at young ages (18-30) and among men among whom migration rates tend to be highest. However, given that net migration is low in Korea, any such bias is likely to be small. By 2016, death rates in Korea were similar to those in Japan except for among men aged 39-55 (higher in Korea) and among both sexes at ages 73-93 (again, higher in Korea).

Figure 1. Comparison of q_0 with external estimates, 1990-2016



Sources: KOSIS estimates (Statistics Korea, 2017); UNPD estimates (UNPD, 2017).
 Note: United Nations Population Division (UNPD) estimates are for 5-year periods (1980-85,...2010-15) and have been plotted at approximately the mid-point of each period (1983, 1988,...2013).

Figure 2. Ratio of infant (${}_1q_0$) to under-five (${}_5q_0$) mortality plotted by ${}_5q_0$, separately by sex, South Korea (1990-2016) versus HMD countries (excluding subpopulations)



REVISION HISTORY

Changes with the November 2019 revision:

Deaths: We used a revised set of death counts for 2003-2016 and added death counts for 2017-18.

Births: We added annual birth counts for 2017-18 and monthly birth counts for 1981-1999 and 2017-18.

Population estimates: We added population estimates for 2017-18.

ACKNOWLEDGEMENTS

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APPENDIX 1: DESCRIPTION OF DATA USED FOR LEXIS DATABASE

DEATHS

Period	Type of Data	Age groups	Comments	RefCode(s) [†]
2003-2018	Annual death counts by sex and single year of age to 100+	0,1,...100+, UNK	‡	10

† The reference code is used in the raw data files (Input Database) to link data with sources.

‡ Death counts represent persons of Korean nationality who are registered residents of the Republic of Korea; if s/he died while outside the country, his/her death is supposed to be reported and included in these statistics.

POPULATION

Period	Type of Data	Age groups	Comments	RefCode(s) [†]
2002-2017	Population estimates as of December 31st [‡] by sex	0,1,...100+		20
2018	Population estimates as of December 31st [‡] by sex	0,1,...100+		21

† For more information, see the references file for the raw data.

‡ Represents registered residents who are of Korean nationality (same as for vital statistics).

BIRTHS BY SEX

Period	Type of Data	Comments	RefCode(s)
1975-1980	Live birth counts by sex and calendar year		1
1981-2018	Live birth counts by sex and calendar year		2

BIRTHS BY MONTH

Period	Type of Data	Comments	RefCode(s)
1981-2018	Live birth counts by month and calendar year		3