Summary Report

Data Sources and Methods Summary

Japanese Ministry of Health, Labour and Wellbeing

Overview of The Methodology

The age-specific suicide death count and suicide death rate data for the 1990 to 2019 period was compiled by the Suicide Countermeasures Promotion Office (SCPO) (also referred to as "Suicide Prevention Promotion Office" in some translations). It is based on the Vital Statistics (Definitive/Confirmed Values) collected by the Statistics and Information Department (SID) at the MHLW (Ministry of Health, Labour and Welfare, 2024).

Death rates by age are calculated as the ratio of the annual death count for a given age group (total and by sex) and the population of Japanese nationals in that age group as of October 1st, multiplied by a factor of 1,000 (Ministry of Health, Labour and Welfare, 2024, Furoku 3-2).

Cause-specific death rates are calculated as the ratio of annual deaths by a given cause and the population of Japanese nationals as of October 1st, multiplied by 100,000 (Ministry of Health, Labour and Welfare, 2024, Furoku 3-2).

Vital Statistics

<u>The Vital Statistics Survey</u>

The Vital Statistics data is collected via the Vital Statistics Survey (VSS), which aims to identify and record the vital events of Japan and provide a data source for policy making regarding health, labour, and welfare. The survey period runs from January 1st to December 31st of the survey year, during which period it collects data on the total number of births, deaths, marriages, divorces, and fetal deaths that occurred in Japan, concerning only Japanese nationals (Ministry of Health, Labour and Welfare, n.d.).

The VSS is comprised of the following five forms (Ministry of Health, Labour and Welfare, n.d.):

1. Live Birth Form: Items based on Notification of Live Birth
2. Death Form: Items based on Notification of Death
3. Fetal Death From: Items based on Notification of Fetal Death
4. Marriage From: Items based on Notification of Marriage
5. Divorce Form: Items based on Notification of Divorce

The Notification of Death includes questions about the cause of death, allowing the death form to collect cause of death data (Ministry of Health, Labour and Welfare, n.d.).

<u>Data collection process</u>

As a life event occurs, the person with the notification obligation submits the appropriate notification to their respective municipal head. Notification obligations and notification periods for each life event are detailed in Table 1. The municipal head then completes the relevant VSS form based on the notification and forwards the form to the appropriate public health centers. The heads of the public health centers collect all survey forms submitted by the municipal heads and send them to the prefecture's governor on a monthly basis. The prefectural governors review the contents of the survey forms and send them to the MHLW (Ministry of Health, Labour and Welfare, n.d.).

Data tabulation and release

The results of the survey are tabulated by the Director-General for Statistics and Information Policy at the MHLW. These are released as the Prompt Vital Statistics Report, Monthly Vital Statistics Report, and the Annual Vital Statistics Report (Ministry of Health, Labour and Welfare, n.d.). The data type and release times for these are detailed in Table 2.

Table 1 (Ministry of Health, Labour and Welfare, n.d.)

<table>
<tr><th>Category</th><th>Person with Notification Obligation</th><th>Notification</th><th>Notification Period[1])</th></tr>
<tr><td>Birth</td><td>1 Father or mother 2 Person living in the same household 3 Doctor, midwife or any other person present at the time of birth</td><td rowspan="3">Municipal head</td><td>14 days</td></tr>
<tr><td>Death</td><td>1 Relative living together 2 Any other person living together 3 House owner, land owner or manager of the house or land 4 Relative not living together, guardian, curator, assistant and voluntarily appointed guardian</td><td>7 days</td></tr>
<tr><td>Fetal death</td><td>1 Father or mother 2 Person living together 3 Doctor present at the time of stillbirth 4 Midwife present at the time of stillbirth 5 Any other person present at the time of birth</td><td>7 days</td></tr>
<tr><td>Marriage</td><td>Bride and groom</td><td rowspan="2">Municipal head of the registered domicile or location of the husband or wife</td><td>Not specified</td></tr>
<tr><td>Divorce</td><td>Wife and husband</td><td>Not specified for divorce by mutual agreement 10 days for divorces dependent on conciliation, adjustment, compromise, acknowledgement of claim and judicial divorce.</td></tr>
</table>

Table 2 (Ministry of Health, Labour and Welfare, n.d.)

Prompt Vital Statistics Report	Monthly Vital Statistics Report	Annual Vital Statistics Report
Data: Number of survey sheets submitted Tabulation Objects: Japanese and aliens living in Japan, and Japanese living abroad (both including events occurred earlier than the previous year) Release: Monthly (Two months after the survey month)	Data: Preliminary Tabulation Objects: Japanese living in Japan (excluding events occurred earlier than previous years) Release: Monthly (Five months after the survey month) : Annually (Annual total) (Early in June of the year after the survey year)	Data: Final (Corrected preliminary data) Tabulation Objects: Japanese living in Japan (Aliens living in Japan, Japanese living abroad, and events occurred earlier than the survey year are released separately) Release: Annually (September of the year after the survey year) Publications: Report (published in March of the second year after the survey year)

Cause-of-death coding

Japanese death statistics are published according to the primary underlying cause of death (UCD). The definition of UCD adopted by the Japanese vital statistics system follows the WHO recommendations (Human Mortality Database, 2024).

Japan introduced standard death certificates in 1900, which followed the First Revision of the International Classification of Disease (ICD). Japan has since implemented each ICD revision in a timely manner (Human Mortality Database, 2024). Most recently, the 10th ICD revision was implemented in 1995, at which point a bridge-coding study was conducted. However, a substantial revision of the 10th Revision was introduced in Japan in 2006 and has not been documented by bridge-coding (Human Mortality Database, 2024).

Notably, Japan has also added sub-categories to the existing ICD-10 list by introducing a 5th digit (Human Mortality Database, 2024).

Corrections

As noted in Table 2, the Monthly Vital Statistics Report (VSR) is comprised of preliminary data, while the annual VSR contains data that has been corrected.

Notably for suicide death rates, in situations where it is unclear if the death was a result of suicide, homicide, or an accident, the VSS records the cause of death as “unknown”. If it is later discovered that the death was a suicide, a correction can be issued and cause of death re-coded. However, this is only done in cases where the authority issuing the death certificate writes an amended report, declaring the correction to cause of death (Ministry of Health, Labour and Welfare, n.d., p10; Otsuka and Horita, 2013).

Human Mortality Database

Overview of The Methodology

The Human Cause-of-Death Data (HCD) series, produced by the Human Mortality Database (HMD) calculates cause- and age-specific death rates using the population exposures from the all-cause HMD series (Human Mortality Database, n.d.). Age- and cause-specific death rates are calculated per 1,000,000 in five year age groups (Human Mortality Database, 2024).

The HMD outlines their six-step process for computing mortality rates and life tables, of which steps 2 to 5 are especially relevant for the estimation of the cause- and age-specific death rates (Human Mortality Database, 2021, p.p.9-10):

1. Births: Annual counts of live births by sex are collected for the longest time period possible. As of March 2025, the data source for Japan's births between 1981 and 2021 is listed as the Human Mortality Database (Human Mortality Database, 2025).
2. Death counts: Data on death counts is collected or estimated from aggregates at the finest level of detail available, and classified by age, period and cohort where possible. Data for Japan's death counts by cause for the time period 1995 - 2021 is obtained from the World Health Organization mortality database (Human Mortality Database, 2025).
3. Population size: Below age 80, annual estimates of population size (as of January 1st of a given year) are either collected from another source or derived using intercensal survival methods. Over the age of 80, population estimates are calculated using the method of extinct cohorts for all cohorts that are extinct and by the survivor ratio method for non-extinct cohorts above age 90. For non-extinct cohorts aged 80-89, population estimates are either obtained from another source or derived using the method of intercensal survival. Population estimates for Japan for the period of 1981 - 2021 are derived by the Human Mortality Database (Human Mortality Database, 2025).
4. Exposure-to-risk: The annual population estimates are used to derive estimates of the population exposed to the risk of death during a given age-time interval.
5. Death rates: Death rates are calculated as the ratio of death counts for a given age-time interval and the estimate of exposure-to-risk in the same interval.
6. Death rates are used to compute probabilities of death. These probabilities are used to construct life tables.

Japan Cause of Death Data

<u>Source of data</u>

Since 1979, the Statistics and Information Department (SID) at Japan's Ministry of Health, Labour and Welfare (MHLW) has been responsible for processing and distributing the cause-of-death data. An electronic file of aggregated death counts by year, sex, age, and cause for the period from 1950 to 2013 was provided to the HMD by SID via the National Institute of Population and Social Security Research. Updated data for years 1995-2013 and new data for 2014-2021 was downloaded from the World Health Organization (WHO) Mortality Database (Human Mortality Database, 2024).

<u>Cause-of-death coding</u>

The cause-of-death lists published by HMD include only items that can serve as the underlying causes of death. The published data is classified according to the 2016 revision of ICD-10 and coded to the 4th digit of the ICD (Human Mortality Database, 2024).

<u>Raw data treatment</u>

Several corrections and adjustments were applied to the original data, of which the following are relevant to the time period and cause of death being examined:

- Deaths of persons of unspecified age were redistributed randomly across all age groups (Human Mortality Database, 2024).
- Deaths of ill-defined causes were redistributed proportionally among other causes of death for the whole period for each sex and each age group (Human Mortality Database, 2024).
- Non-UCD deaths were reassigned to target causes and re-coded.

Overview of Data Trends

Trends in Suicide Mortality Data

Figure 1

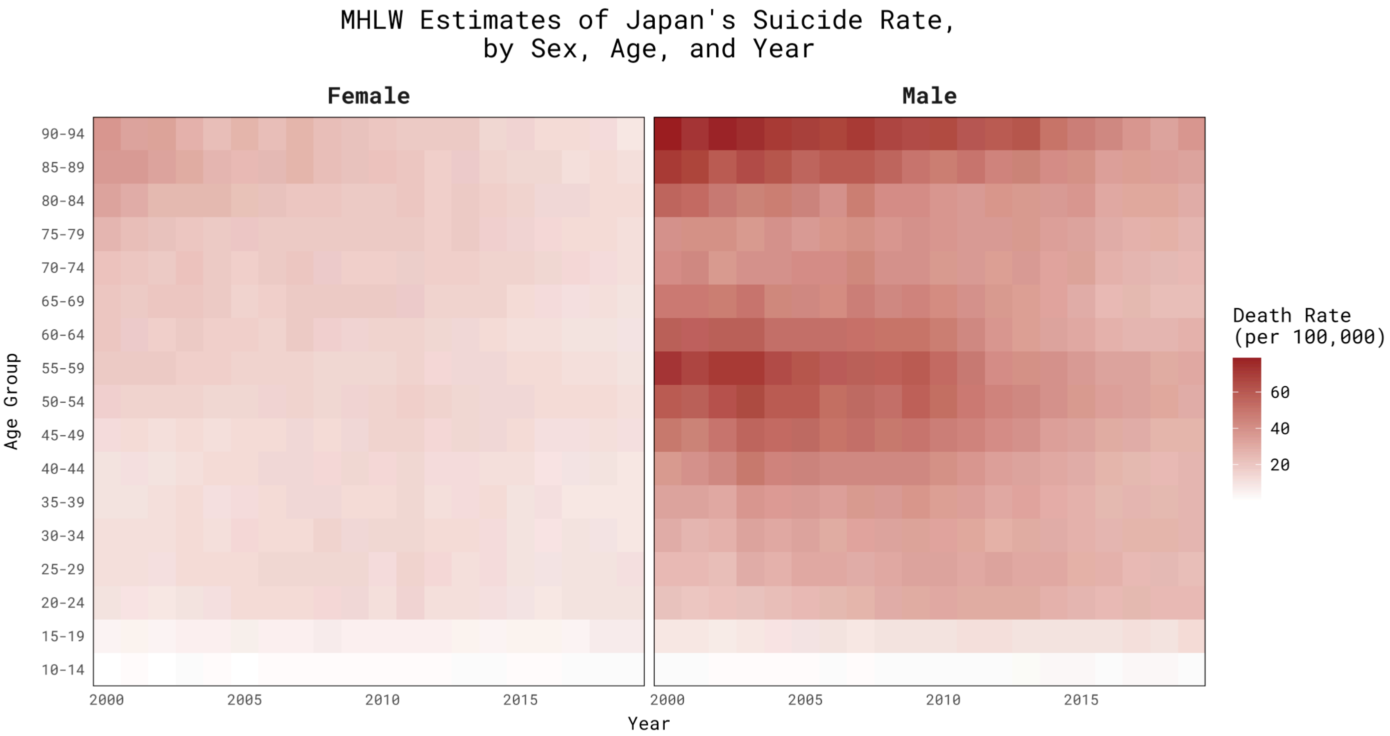


Figure 2

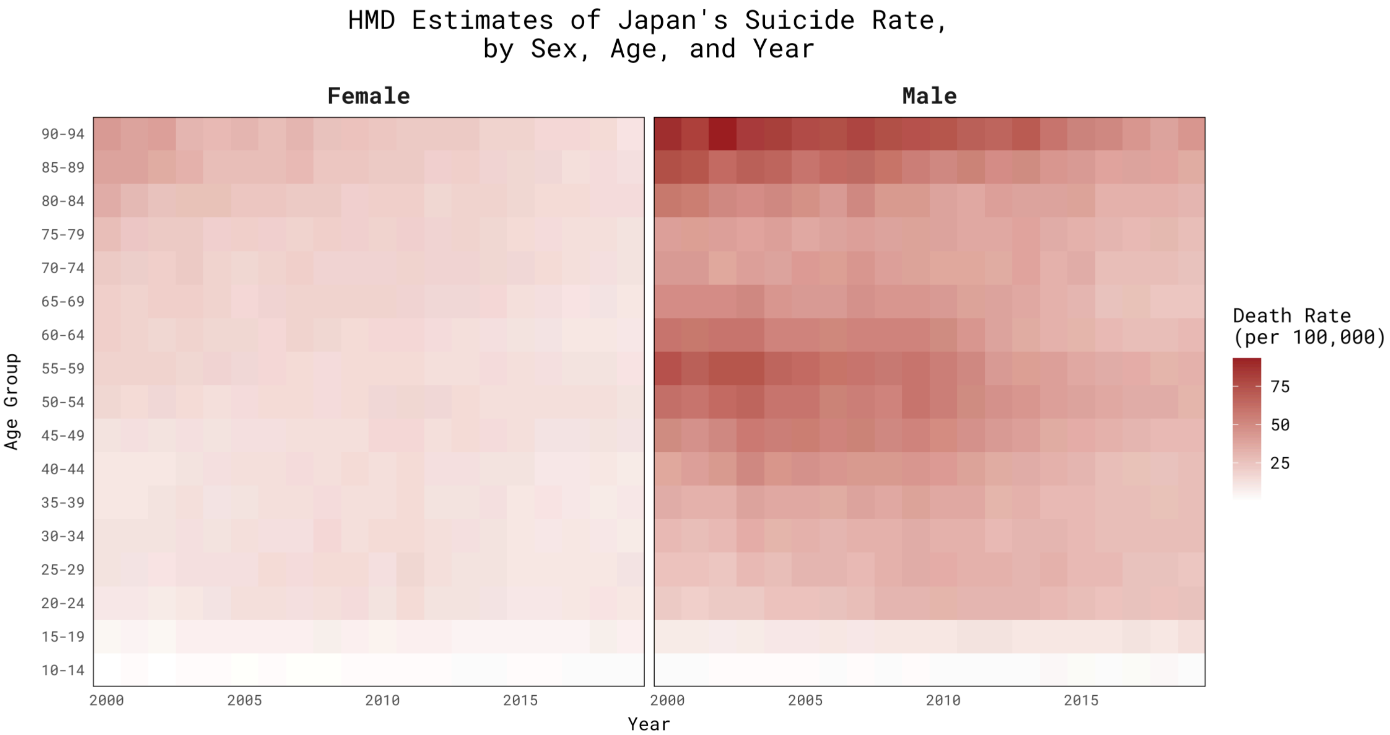


Figure 3

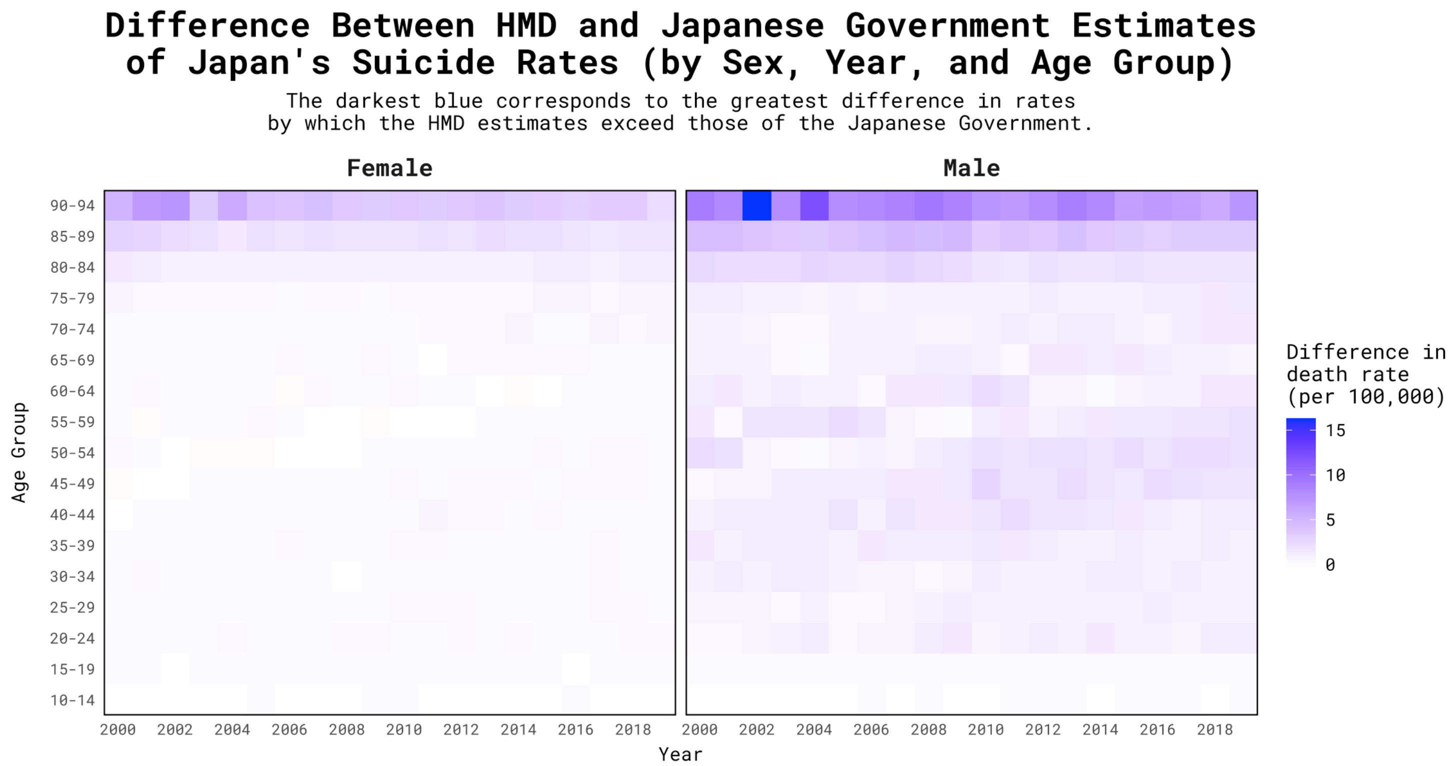
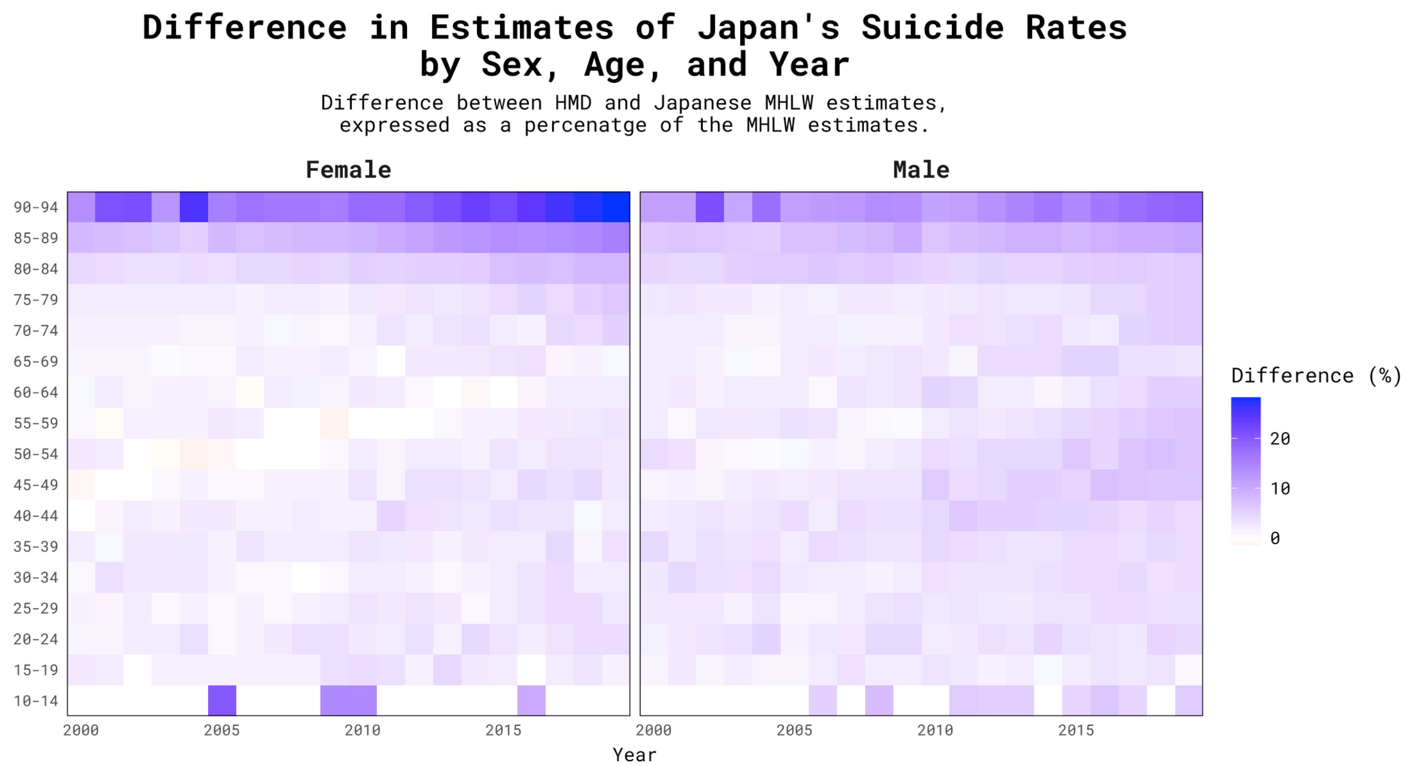


Figure 4



Figures 1 and 2 illustrate death rates due to suicide by age group, year, and sex, as estimated but the MHLW and HMD. Although the HMD estimates are consistently higher than those of MHLW, both Figures show similar age, sex, and temporal patterns. Death rates are significantly higher for men than women, across all age groups. The highest suicide death rates are seen among men aged 50-59 and 85-94. Men aged 45-49, 60-64, and 80-84 are also highly affected. Within these age groups, death rates fall between 2000 and 2019. Among women, the highest death rates are seen at ages 85-94 between 2000 and 2002. Suicide death rates among women decline over time, with a notable drop among all age groups between 2011 and 2012.

Figure 3 shows that the greatest discrepancies between HMD and MHLW estimates of suicide death rates are seen among the 80-94 age groups, with highest differences among men. In these age groups, the discrepancies in estimates appear to positively correlate with the death rates illustrated in Figures 1 and 2, with highest discrepancies seen among men. However, this is not the case in the 45-65 age groups. While men in these age groups display high suicide death rates, there is no corresponding high discrepancies in estimates. Instead, a diagonal “stripe” of no/low discrepancies can be observed, beginning with men aged 45-49 in 2000 and stretching to men aged 65-69 in 2019.

Figure 4 illustrates differences between HMD and MHLW estimates as a percentage of the MHLW estimate, presenting a clearer view of where these discrepancies are highest, when accounting for variations in death rates between age-sex-year groups. The greatest discrepancies in estimates appear to be in the 85-89 and 90-94 female age groups. Figure 4 appears to also show a temporal pattern, with discrepancies increasing for both male and female 85-89 and 90-94 age groups between 2009 and 2019. Similarly to Figure 3, the diagonal “stripe” emerges again on both male and female panels, starting at ages 40-44 and 45-49 in 2000 and extending to 60-64 and 65-69 in 2019. This low discrepancy zone is more pronounced on the female panel, showing greater areas of no difference or negative difference (MHLW estimating higher). This is perhaps suggestive of a particular cohort that was subject to a change in the methodology for population estimation, either by MHLW or HMD, which could have affected the calculations of death rates and thus allowed for the conversion of estimates. Further investigation is required.

Trends in Neoplasm Mortality Data

Figure 5

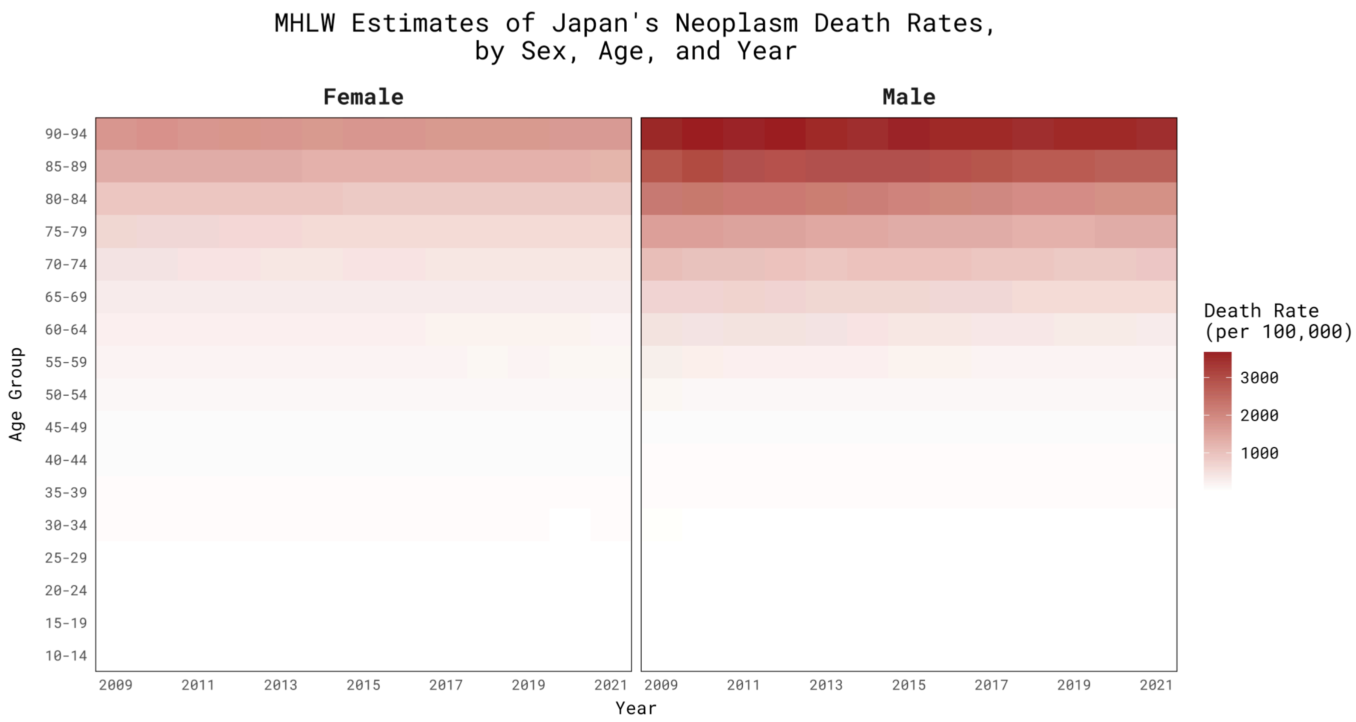


Figure 6

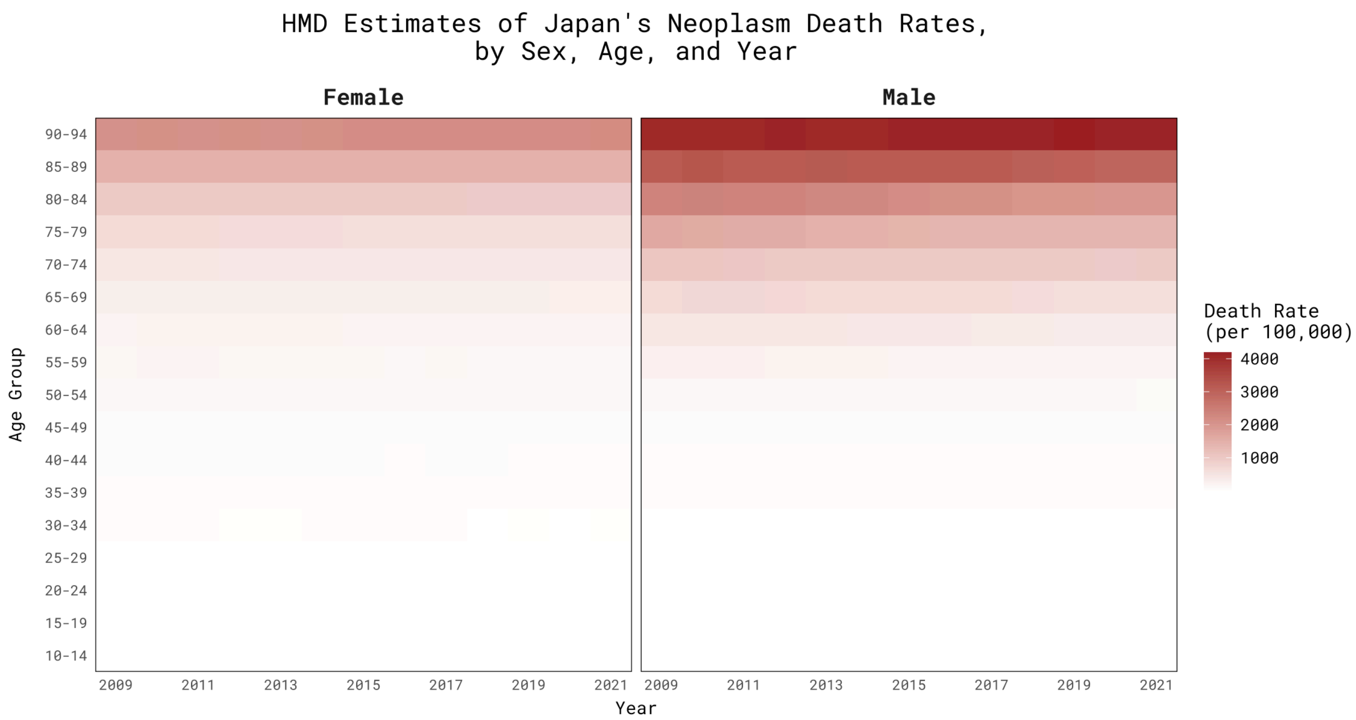


Figure 7

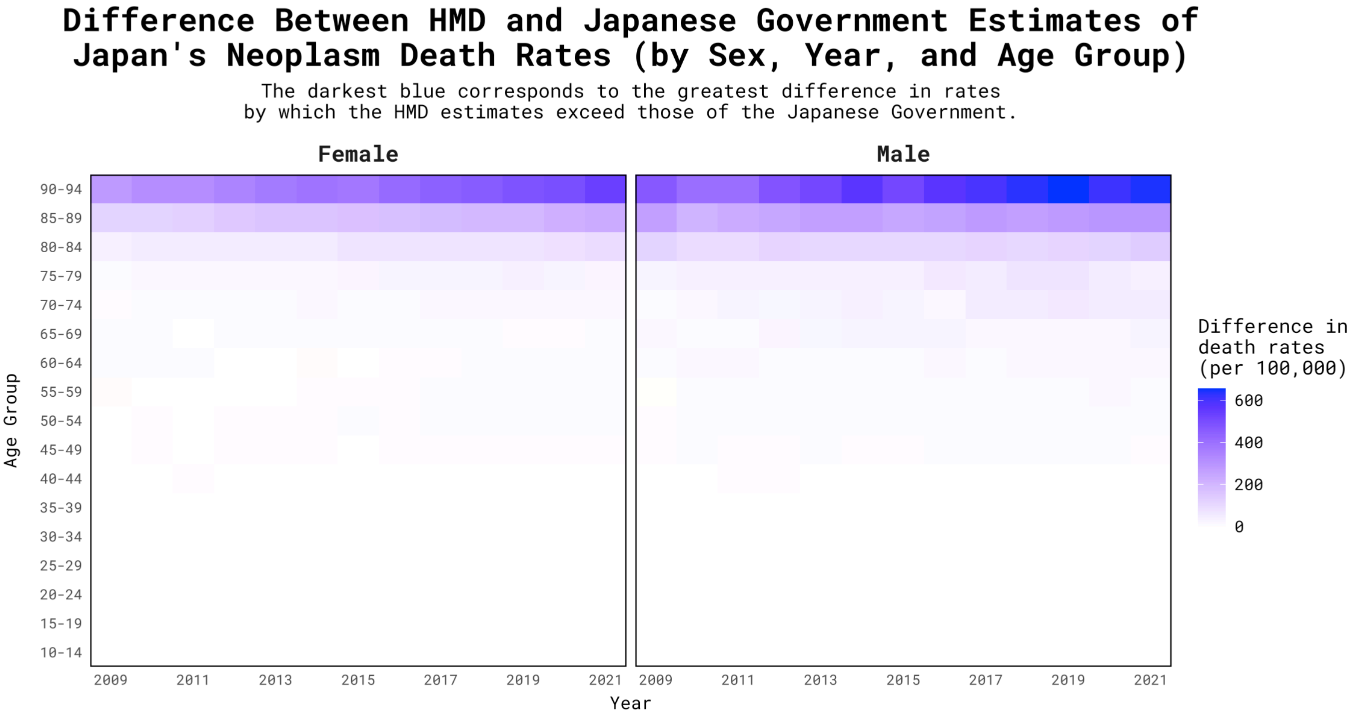
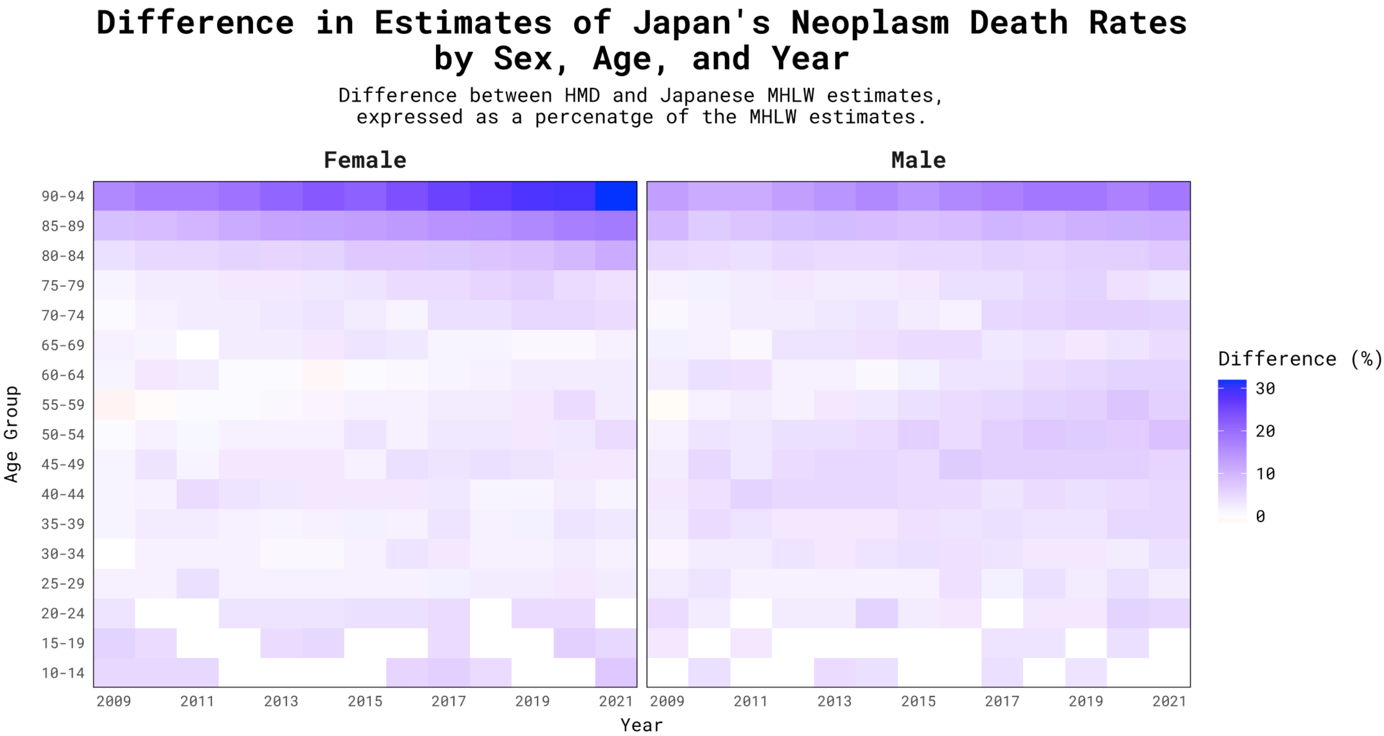


Figure 8



Figures 5 and 6 illustrate death rates due to neoplasms by age group, sex, and year, as estimated by the MHLW and HMD respectively. Both estimates display an age pattern as mortality rates increase with age, with the greatest mortality rates among each sex being in the 90-94 age groups. Age groups below 45 do not have significant death rates. According to both HMD and MHLW, men face higher death rates than women in each age group, with the male 90-94 age group displaying the highest death rates. There is also a temporal pattern — across all age groups above 50 there appears to be a decrease in death rates between 2009 and 2021, for both men and women.

Figure 7 shows that the HMD estimates consistently exceed those of the MHLW. The highest difference in rates is in the 85-89 and 90-94 age groups, with men having the highest discrepancies. This corresponds to the age-sex groups with the highest neoplasm death rates, as seen in Figures 5 and 6. There is, perhaps, also a temporal pattern as differences in rates for these age groups increase between 2009 and 2021, for both men and women, with some fluctuations year to year. Unlike Figure 3, Figure 7 does not feature a prominent low discrepancy zone. This could be attributed to negligibly low neoplasm mortality rates below age 55. However, it does appear to show the upper edge of the cohort responsible for the low discrepancy zone seen in Figures 3 and 4. While the difference in male death rates for ages 70-94 do not appear to decrease with time, discrepancies for males aged 65-69 fall between 2016 and 2017 and stay low between 2017 and 2021; for males aged 60-64 discrepancies fall between 2011 and 2012 and stay low from 2012 to 2021. Figure 3 similarly shows a drop in difference in death rates for males 65-69 from 2017 onwards and likewise a drop for males 60-64 from 2012 onwards.

As seen in Figure 8, the percent differences in neoplasm mortality estimates are highest for women in the 85-89 and 90-94 age groups, with the differences increasing over time. Figure 8 once again shows the low discrepancy zone. As in Figure 4, this zone is more pronounced for women. It appears to start at ages 50-54 and 55-59 in 2009 for both sexes. This is consistent with the pattern seen in Figures 3 and 4, where the low discrepancy zone starts nearly a decade earlier, in 2000, among cohorts ten years younger — 40-44 and 45-49.

The Female panels of Figures 4 and 8 offer most evidence in support of this being a cohort-specific pattern in differences in estimates between the HMD and MHLW. Figures 4 and 8 both show a negative difference in mortality estimates of suicide and neoplasm mortality rates respectively for women aged 55-59 in 2009. This is followed by a period of no/low difference from 2010 to 2012, an increase in differences in 2013, a further increase in 2014, and sustained positive percent difference in estimates for both suicide and neoplasm mortality data. Discrepancies in estimates for women aged 60-64 also follow similar patterns. In both Figures 4 and 8 this age group experiences a period of no/low discrepancies between 2012 and 2015, with a negative discrepancy in both neoplasm and suicide estimates in 2014. This is then followed by an increase and a sustained positive difference from 2016 in both Figures. Women aged 66-69 also display a period of no/low discrepancies in estimates from 2017 to 2019 for both causes of death.

Conclusions

The comparison of suicide and neoplasm mortality data yields several conclusions about the overall patterns in data discrepancies between the two data sources. Across both suicide and neoplasm data, HMD estimates consistently exceed those of the MHLW, with greatest discrepancies at older age, suggesting a systematic methodological difference between the HMD and MHLW. Discrepancies in estimates emerge in the same patterns across both causes of death, showing that the divergence is likely not cause-specific and therefore unlikely to be caused by differences in cause-of-death classification or ICD coding. Instead, potential methodological differences may be found in estimates of population denominators, age classification, or modelling assumptions about cohort survival and age-specific mortality interpolation. Notably the HMD uses annual population estimates as of January 1st while MHW estimates population as of October 1st, which could be a factor here. For populations aged 80 and above, the HMD applies extinct cohort and survivor ratio methods for population estimation. Further research is necessary to determine how this diverges from MHLW methodology in order to provide insight into the increased discrepancies in estimates observed at older ages.

For both causes, discrepancies between HMD and MHLW estimates increase over time, especially after 2009. This suggests that recent methodological changes are not implemented symmetrically by both sources, causing a growing divergence in estimates. A closer investigation of the timings of methodological changes implemented by the HMD and MHLW from 2009 onwards could offer some clarity on this temporal pattern.

There is a cohort-specific pattern visible in absolute and percent differences in data sets for both causes of death. This zone of low or negative discrepancies implies that a specific methodological change in either the HMD or MHLW affected cohorts born in the 1950s—1960s. As this pattern is seen for both neoplasms and suicides, it is unlikely to be resultant from changes in cause-of-death coding and therefore appears to stem from denominator inconsistencies. Notably, this cohort-specific “stripe” also appears on the female panels of both Figures 1 and 2 as a faint zone of low death rates. This suggests the use of proportionally higher population estimates for this cohort as compared to other cohorts by both HMD and MHLW. It might be useful to investigate the source data for population estimates for this cohort to reveal if there had been a change or error in how births were recorded during this time period. The greater context may also be significant here, as the data artefact pertains specifically to the cohort born in the period following World War 2, during which time Japan underwent widespread political, economic, and social reforms. It is not implausible that these could have had an impact on the administrative structures responsible for the collection and processing of data on births, which needs to be researched further.

Although absolute death rates are lower among women for both causes of death, percent discrepancies in estimates are more pronounced for women. The cohort-specific pattern is also more pronounces in the female data. This suggests that female mortality data is subject to greater denominator inconsistencies between the two sources. It is possible that sex-specific assumptions about cohort survival are applied by either HMD or MHLW, which needs to be investigated further.

These observations provide a clear indication of the necessary direction of future research. Both HMD and MHLW methodologies for population estimation need to be investigated in greater detail, with a focus on MHLW methodology for ages 80 and above, methodological changes implemented from 2009 onwards by either database, birth data sources and processing methodologies for for the 1950s-1960s birth cohorts, and the presence of sex-specific assumptions about cohort survival in either MHLW or HMD.

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