EPH25

Impact of cancer deaths on years of life and productivity losses in Japan in 2019

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Background

- Over the past few decades, there has been a significant increase in the incidence of cancer in Japan, with 376,425 deaths in 2019(1). An estimated ¥40 billion is spent on cancer care annually in Japan(2).
- A rising number of new cancer patients increases the health-care expenditure for diagnostics and treatment. Few studies have evaluated the economic burden, with Saito et al., 2023 most recently evaluating direct and indirect costs of mortality and morbidity in Japan using data from 2015(3-5). A more recent estimate of the indirect costs associated with cancer death in Japan is needed.

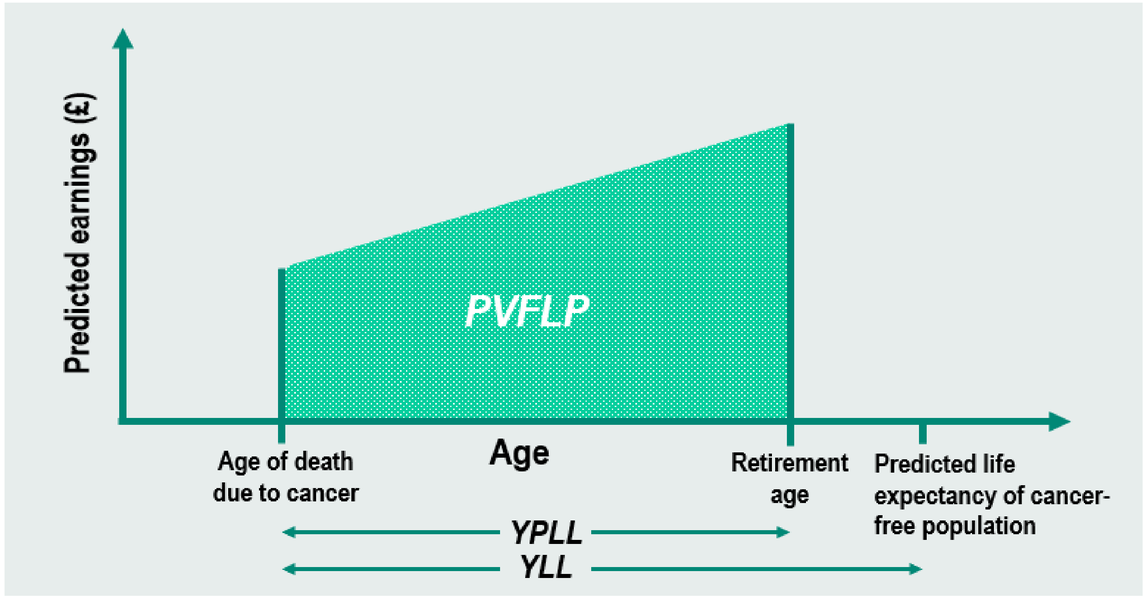
Objective

To estimate the burden of cancer-related deaths in Japan in terms of years of life lost (YLL) and indirect economic losses incurred due to productivity losses related to cancer deaths in Japan in 2019.

Methods

- The human capital approach was used to estimate YLL, years of productive life lost (YPLL) and present value of future lost productivity (PVFLP) due to cancer-related deaths in Japan in 2019.
- Age- and sex-specific cancer mortality data for 2019 were sourced from Cancer Statistics in Japan(6). YLL was calculated using the age at death compared to life expectancy (Figure 1)(7). YPLL was calculated using YLL, labor force participation and sex-specific retirement ages(8). A retirement age of 65 years was assumed for both men and women(9). PVFLP was calculated using YPLL and sex-specific average annual wages(10). A 3% annual discount rate was applied.
- The category 'all other cancers' included all cancer-related deaths which were not included as a separate cancer type in the model.

Figure 1. Diagram of model estimating indirect cost of cancer mortality



Abbreviations: PVFLP, present value of future lost productivity; YPLL, years of productive life lost; YLL, years of life lost.
*Figure adapted from Bencina et al. 2022(11)

Results

- In 2019, there were a total of 376,411 deaths which lead to 2,202,414 YLL and 454,683 YPLL (a 79% reduction compared to YLL) due to premature cancer mortality in Japan (Table 1).

Table 1. Number of deaths, years of life lost (YLL) and years of productive life lost (YPLL) due to cancer in Japan in 2019

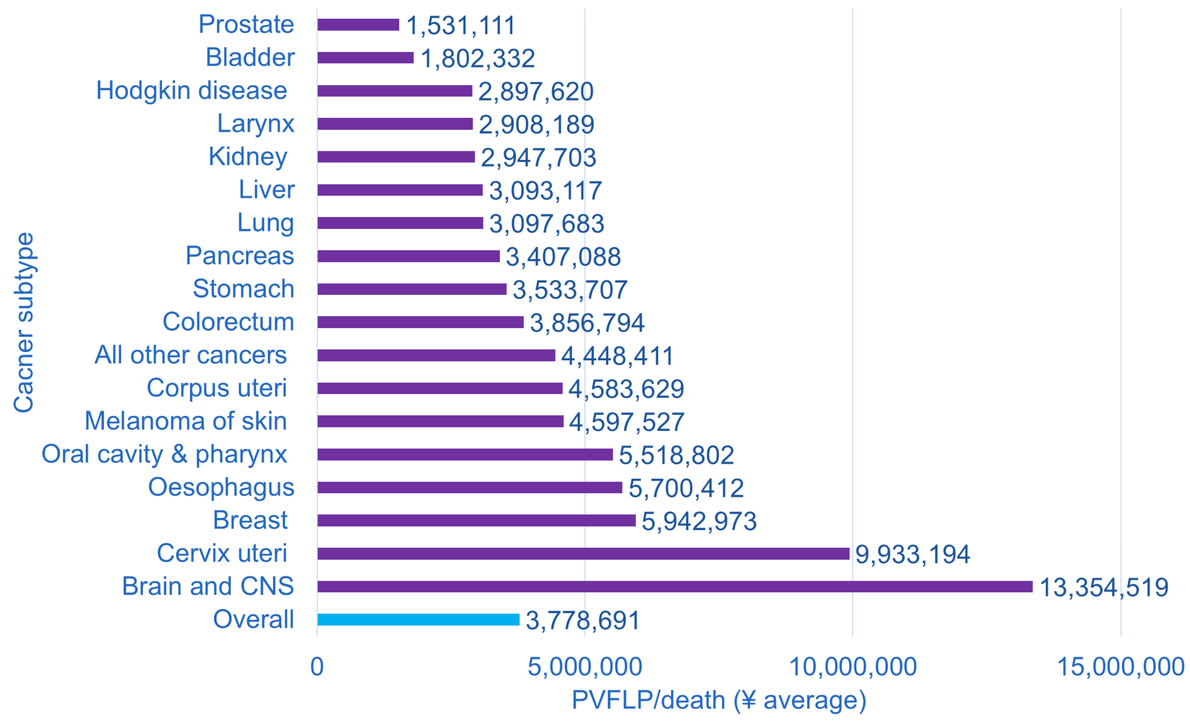
Cancer sub-type	Number of deaths			YLL	YPLL
	Male	Female	Total	Total	Total
Bladder	6,013	2,897	8,910	35,592	3,908
Brain and CNS	1,631	1,219	2,850	38,881	19,955
Breast	0	14,839	14,839	200,081	57,545
Cervix uteri	0	2,921	2,921	50,406	19,968
Colorectum	27,415	24,004	51,419	319,016	61,448
Corpus uteri	0	2,597	2,597	31,773	7,610
Hodgkin disease	7,192	5,670	12,862	69,152	11,960
Kidney	5,938	3,435	9,373	45,674	6,955
Larynx	806	57	863	2,764	393
Liver	16,749	8,514	25,263	120,722	17,505
Lung	53,336	22,055	75,391	343,148	49,128
Melanoma of skin	848	854	1,702	11,958	3,278
Oesophagus	9,570	2,048	11,618	58,444	12,270
Oral cavity & pharynx	5,503	2,260	7,763	45,964	11,340
Pancreas	18,124	18,232	36,356	220,728	35,510
Prostate	12,544	0	12,544	28,179	2,093
Stomach	28,042	14,888	42,930	221,780	41,055
All other cancers	32,902	23,308	56,210	358,152	92,765
Total	**226,615**	**149,796**	**376,411**	**2,202,414**	**454,683***

*YPLL total does not match the sum of the cancers due to rounding within the model

Results (continued)

- In 2019, there were a total of 376,411 deaths which lead to 2,202,414 YLL and 454,683 YPLL (a 79% reduction compared to YLL) due to premature cancer mortality in Japan (Table 1).
- Lung cancer, colorectal cancer and stomach cancer had the highest number of deaths with 75,391 (20% of total deaths), 51,419 (14%) and 42,930 (11%) deaths, respectively
- Lung cancer, colorectal cancer and stomach cancer also had the highest number of associated YLL in 2019 (lung cancer: 343,148, 16% of total YLL; colorectal cancer: 319,016, 14%; stomach cancer: 221,780, 10%). Colorectal cancer (61,448; 14% of total YPLL), breast cancer (57,545; 13%) and lung cancer (49,128; 11%) had the highest number of YPLL.
- Total PVFLP in 2019 was estimated at ¥1,422,340,991,418 (Table 2). The average cost of lost productivity per premature cancer death was ¥3,778,691 across all cancer types (Figure 1).

Figure 2. PVFLP/death per cancer subtype in Japan in 2019



Abbreviations: CNS; central nervous system; PVFLP, present value of future lost productivity.

Table 2. Present value of future lost productivity (PVFLP) due to cancer in Japan in 2019

Cancer sub-type	PVFLP; ¥		
	Male	Female	Total
Bladder	14,073,866,356	1,984,908,763	16,058,775,119
Brain and CNS	27,171,525,602	10,888,854,789	38,060,380,391
Breast	0	88,187,769,922	88,187,769,922
Cervix uteri	0	29,014,859,568	29,014,859,568
Colorectum	153,717,433,142	44,595,063,130	198,312,496,272
Corpus uteri	0	11,903,685,509	11,903,685,509
Hodgkin disease	29,524,680,583	7,744,501,951	37,269,182,534
Kidney	23,676,027,632	3,952,790,099	27,628,817,731
Larynx	2,467,231,278	42,536,218	2,509,767,496
Liver	68,922,076,961	9,219,326,740	78,141,403,701
Lung	210,581,173,449	22,956,234,385	233,537,407,834
Melanoma of skin	5,444,268,422	2,380,722,155	7,824,990,576
Oesophagus	62,749,200,237	3,478,182,303	66,227,382,540
Oral cavity & pharynx	37,783,339,702	5,059,122,139	42,842,461,841
Pancreas	95,709,013,724	28,159,079,504	123,868,093,228
Prostate	19,206,254,012	0	19,206,254,012
Stomach	129,989,165,406	21,712,888,470	151,702,053,876
All other cancers	195,122,544,606	54,922,664,663	250,045,209,270
Total	**1,076,137,801,111**	**346,203,190,307**	**1,422,340,991,418**

Limitations

- Direct costs to the healthcare system due to cancer treatment or surgery are not included. Indirect costs such as productivity loss due to cancer morbidity or caregiver costs are not included. Although there is more recent data for cancer deaths available, this data was not considered in the analyses to avoid any COVID-19-related mortality influence on the estimates.

Conclusion

- There is a high burden due to cancer deaths in Japan, reflected by the high number of YLL, YPLL and PVFLP with lung cancer, colorectal cancer and stomach cancer having the largest impact. The highest PVFLP/death was estimated for brain and CNS cancers, with cervical and breast cancer having the 2nd and 3rd highest respectively.
- There is a need to increase efforts in cancer care, including prevention, early detection and optimal treatment, to reduce number of cancer-related deaths and improve productivity in Japan.

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