Economic Impact of Cancer-Related Productivity Losses in High-Income and Middle-Income Asia-Pacific Markets: Trends from 2010 to 2022

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Background

- The Asia-Pacific (AP) region accounted for 49.3% of global new cancer cases and 58.3% of cancer deaths, with lung, colorectal, breast, stomach, and cervical cancers driving the highest mortality and morbidity[1]
- The population aged ≥65 years in Eastern and Southeast Asia is expected to double by 2050, contributing to an increase in new cancer cases from ~9.8 million (2022) to >17.4 million[2,3]
- The total economic cost of cancer in East Asia and the Pacific is estimated at INT$9.7 trillion (international dollars, INT$), with indirect costs from productivity losses due to premature mortality and disability representing a substantial share, especially in low- and middle-income countries[4-6]
- High-income geographies (HIGs) have benefited from screening and advanced therapies, improving survival, while many middle-income geographies (MIGs) face barriers to early diagnosis and treatment, resulting in poorer outcomes[7,8]
- Despite recognition of burden of cancer, comprehensive regional evidence on productivity losses, particularly from cancer-related morbidity, is limited; this study quantifies mortality- and morbidity-related productivity losses across 13 AP geographies from 2010 to 2022

Objectives

This study aimed to quantify and compare productivity losses due to both premature cancer mortality and cancer-related disability across high-income and middle-income Asia-Pacific geographies from 2010 to 2022, using standardized per-patient measures to assess temporal trends and regional disparities.

Methods

Model design and scope

- Longitudinal model using human capital approach was developed to quantify productivity losses (indirect costs from lost earnings due to cancer) in the AP
- Focused on 5 high-burden cancers (top 5 by 2022 mortality: lung, stomach, colorectal, breast, cervical; top 5 by morbidity also included prostate in addition to lung, colorectal, breast, and cervical)
- Analyzed 4 calendar years (2010, 2015, 2019, 2022) to capture trends
- Direct medical costs were excluded, emphasizing only productivity (indirect) losses from cancer-related premature death and disability

Population and geographies

- Thirteen AP geographies split by economic status as per World Bank 2022 gross national income (GNI) per capita[9]
- HIGs (≥$14,005 GNI per capita) were Australia, Hong Kong, Japan, New Zealand, Singapore, South Korea, Taiwan; MIGs ($1,145-$14,005 GNI per capita) were India, Indonesia, Malaysia, Philippines, Thailand, and Vietnam

Data sources

- Extracted cancer incidence, mortality and morbidity data from the Institute for Health Metrics and Evaluation (IHME) Global Burden of Disease database for each country by age, sex, and cancer type at each time point[10]
- Key inputs included number of cancer deaths, years of life lost (YLL) due to premature death, and years lived with disability (YLD)
- Economic and demographic parameters were country- and sex-specific where available: retirement ages, labor force participation rates, population by age, average wages, and unemployment rates, sourced from the World Bank, the International Labor Organization database of Labor Statistics (ILOSTAT)[11] (all costs standardized to 2024 USD)

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Measures of lost productivity

Measures to quantify lost productivity and its value due to cancer are in **Table 1**

Table 1. Productivity loss measures

Measures of lost productivity	Definition
YLL per death	Average life-years lost per cancer death (used to standardize YLL across countries)
Years of productive life lost (YPLL)	Estimated working-years lost due to premature death
Present value of future lost productivity (PVFLP)	Monetary value of YPLL, calculated by multiplying lost work years by age/sex-specific annual earnings and discounting to present value
YLD per incident case	Average years lived with disability per newly diagnosed cancer case, calculated as total YLD divided by number of incident cases
Productive YLD (PYLD)	The portion of YLD occurring during working ages: essentially lost work-years due to illness/disability
Value of YLD (VYLD)	Monetary cost of morbidity, obtained by multiplying PYLD by annual wages

Analysis and comparisons

- Results were aggregated for HIGs vs MIGs to compare measures of lost productivity
- Key metrics (YLL, YLD, present value of future lost productivity [PVFLP], value of YLD [VYLD]) were reported for each time point, and standardized indicators (YLL per death and YLD per incident case) were used to allow fair comparisons
- Temporal trends in key metrics were examined using linear regression of the yearly data (2010-2022) for YLL per death and YLD per incident case in each income group
- A deterministic sensitivity analysis (±10% variation in inputs such as mortality, YLL, retirement age, etc) was performed to test the robustness of present value of future lost productivity (PVFLP) and value of YLD (VYLD) estimates

Results

Mortality (year 2010, 2015, 2019, 2022)

- HIGs saw a modest rise in deaths (+13.8%), whereas MIGs experienced a surge (+47.7%)
- YLL remained essentially flat in HIGs (+1.2%) but jumped by 42.3% in MIGs
- Average YLL per death declined slightly in both groups (eg, from 23 to 20 years in HIGs, and 33 to 31 years in MIGs), indicating small survival gains

Productivity loss: premature mortality

- In HIGs, YPLL due to early cancer death decreased by 17.4%, and the corresponding PVFLP fell from $12.3 billion in 2010 to $10.1 billion in 2022 (−17.8%)
- Whereas MIGs saw rising losses: YPLL increased 23.7%, and PVFLP climbed from $2.6 billion to $3.2 billion (+22.7%)
- This reflects a growing economic toll from cancer deaths in lower-income settings, even as higher-income areas have started to mitigate mortality-related losses

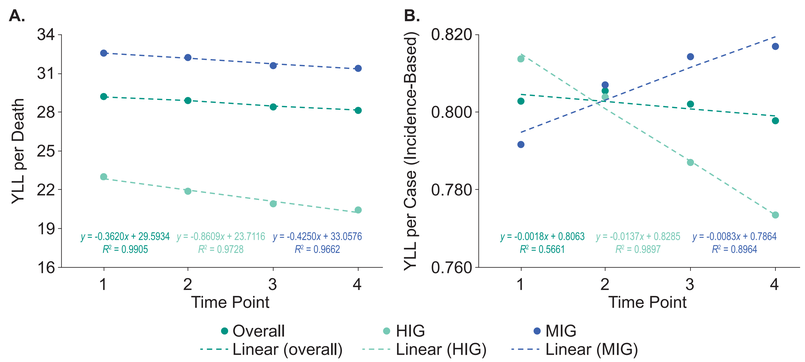
Productivity loss: morbidity

- The burden of cancer-related disability; YLD increased moderately in HIGs (+18.7% from 2010, 2015, 2019, 2022) but surged in MIGs (+71.9%)
- MIGs added roughly 4 times more YLD than HIGs over the period, underscoring a far greater rise in the number of people living with cancer-related health loss in MIGs
- While the absolute economic impact of cancer-related disability remained higher in HIGs, the associated productivity losses were relatively stable over time, with the annual VYLD staying ~$3 billion (from $2.99 billion in 2010 to $2.92 billion in 2022). In contrast, MIGs, experienced a marked increase in morbidity related productivity losses, with VYLD increasing by 51.3% - from $238.1 million in 2010 to $360.3 million in 2022 - indicating a worsening burden on the working-age population

Temporal trends per patient

- Regression analyses showed improved mortality outcomes over time. YLL per death decreased in both HIGs and MIGs, reflecting fewer life-years lost on average per fatal case, as shown in **Figure 1A**
- YLD per incident case declined in HIGs but increased in MIGs, reflecting rising average morbidity-related productivity loss per incident case in middle-income settings (**Figure 1B**)
- Productivity burden is increasingly driven by morbidity in MIGs, while absolute mortality-related losses remain higher in HIGs

Figure 1. YLL per death (A) and YLD per incident case (B) over time by HIGs and MIGs in AP



Conclusions

- Cancer causes substantial productivity losses from both premature mortality and morbidity across the AP, imposing a significant economic and humanistic burden on patients, payers, and health systems
- These findings highlight the need for policymakers to prioritize investment in cancer care, particularly in awareness, prevention, early detection, and equitable access to advanced treatments when allocating limited resources

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