Epidemiological and demographic contributions to future cancer burden in Hong Kong: abridged secondary publication

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KEY MESSAGES

- 1. Incidences of breast, endometrial, and thyroid cancers in women as well as incidences of colorectal and prostate cancers in men have increased in the last three decades and are expected to continue to increase.
- 2. Population growth and population ageing have contributed to the increase in cancer incidences and are expected to continue to do so.
- 3. Increases in resources and collaboration between disciplines and healthcare sectors are necessary

to enhance surveillance and monitoring of cancer disease trends.

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Introduction

In Hong Kong, the top five cancers for men are lung, prostate, colorectal, stomach, and liver cancers, and for women are breast, colorectal, lung, cervix uteri, and thyroid cancers. There is an increasing trend in incidences of breast, endometrial, and thyroid cancers in women and colorectal and prostate cancers in men.¹ Hong Kong is in a rapid transition to an ageing society. Cancer is predominately a disease of older people; >50% of patients were diagnosed with cancer after the age of 60 years in Hong Kong.² Cancer disease burden is expected to increase in the ageing population. This study aims to project the incidence of cancers in Hong Kong using the ageperiod-cohort model, identify significant changes in cancer disease trends over time, and quantify the effect of demographic changes on future cancer incidence.

Methods

Data of age-specific cancer incidences of top five cancers in men and in women in 2017 were retrieved, based on the International Classification of Diseases Tenth Revision codes of C33-34, C18-21, C61, C22, C16, C50, C54, and C73.

The age-period-cohort Poisson regression model was used to decompose the temporal trends of cancer incidences into three components of time, namely the effects of chronological age on incidence, birth cohort/generation, and calendar time period of incidence. An updated projection approach was used based on past observations and prior knowledge to predict age-specific incidences of selected cancers in men and in women in Hong Kong in short and

medium term.

To analyse the trends in incidences, joinpoint regression³ was used to break down the overall trend into several linear trends over the periods and to identify the breakpoints (ie, inflection points). The annual percentage changes (APCs) in each period were calculated, as were the overall average annual percentage changes (AAPCs).

The RiskDiff method was used to apportion the temporal variations in observed incidences of cancers into three components: population size, population structure, and cancer risk.⁴ Populations in an earlier period and in a later period were standardised to equal sizes and then age-specific incidence rates were applied in the earlier period to the population structure in the later period.⁴ The RiskDiff method enables decomposition of changes in the number of cases secondary to changes in population structure and cancer risk, leaving changes in population size as the remaining component.⁴

Results

Overall, the trends of age-standardised incidence rates from 1983 to 2017 were downwards in both men (AAPC= -1.08) and women (AAPC= -0.20). For individual cancers, the trends of age-standardised incidence rates for lung cancer in women and of liver, lung, and stomach cancers in men were downwards, whereas the trends for breast, endometrial, and thyroid cancers in women and for colorectal and prostate cancers in men were upwards (Fig 1).

In the age-period-cohort Poisson models, incidences for colorectal and prostate cancer in men and for breast, endometrial, and thyroid

cancers in women were projected to continue to increase, whereas incidences for liver, lung, and stomach cancers in men were projected to continue to decrease, and incidences for colorectal and lung cancers in women were projected to remain stationary. Age-standardised incidence rates for lung cancer decreased more markedly for men than for women (Fig 2).

Generally, incidence of cancers increased steadily as age increased until late middle age, with downward inflection at older old ages (85 years). Incidences of breast, colorectum, and lung cancers in women and of colorectum, lung, and prostate cancers in men increased more rapidly with age. The effects of birth cohort were strong on breast, endometrial, and thyroid cancers in women and prostate cancer in men. Period effects were also observed in these cancers.

The trends in the number of new cases of individual cancers have increased from 1983 to 2017, except for liver and stomach cancers in men, which plateaued. Changes attributed to population structure and population size were all positive and corresponded to population ageing and population growth. Changes attributed to cancer risk were negative for colorectal and lung cancers in women and lung, liver, stomach cancers in men, whereas changes attributed to cancer risk were positive for breast, endometrial, and thyroid in women and colorectal and prostate cancers in men (Fig 3).

Discussion

In the past three decades in Hong Kong, agestandardised incidence rates of all cancers have decreased, but the overall number of cases increased dramatically, primarily driven by ageing and cohort/generation effects, particularly for breast, endometrial, and thyroid cancers in women and prostate cancer in men, which were also attributed by period effects. Incidences of breast, endometrial, and thyroid cancers in women and prostate cancer in men were projected to continue to increase. Compared with 2013 to 2017, by 2028 to 2032, the increase in the number of cases was expected to be 83.0%, 119.0%, 85.0%, and 127.1% for breast, endometrial, thyroid cancers in women and prostate cancer in men, respectively. The increase in prostate cancer in men was expected to be mostly due to population ageing and increased cancer risk, whereas the increase in breast, endometrial, and thyroid cancers in women was expected to be mostly due to increased cancer risk, although population ageing and population growth also contributed considerably (Fig 3). Thus, cancer screening and healthier lifestyle promotion are recommended to mitigate cancer risk.

Birth cohort/generation and period effects were strong on breast, endometrial, and thyroid



FIG I. Annual age-standardised incidence rates of (a) all cancers combined, (b) top five cancers for women, and (c) top five cancers for men in Hong Kong from 1983 to 2017, as well as the average annual percentage change (AAPC) and annual percentage change (APC)

cancers in women and prostate cancer in men. Epidemiological transitions (receding of infectious diseases and emergence of degenerative conditions secondary to improvement in public health and sanitation) might be an explanation to changes in disease patterns or cancer risks of populations.⁵ More dominant period effects were observed for hormonally modulated cancers including breast, endometrial, and thyroid cancers in women and prostate cancer in men. We speculate that these changes in period effects may be accounted for by better cancer detection and diagnosis strategies in recent years.



FIG 2. Age-standardised incidence rates and overall average annual percentage change (AAPC) of the top five cancers in women and in men in Hong Kong from 1983 to 2017, as well as projected incidence rates in 2018-2022, 2023-2027, and 2028-2032 with 95% credible intervals



components), population size and structure (ie, demographic components) for women and men in Hong Kong from 1983 to 2017

Increases in numbers of cases were mostly attributable to population growth and population ageing in overall and individual cancers in both sexes (Fig 3). Cancer burden change was mostly associated with population ageing and population growth, whereas the variation in the temporal pattern of the cancer risk was likely to be associated with extended

cancer screening and epidemiological transition. We therefore recommend primary prevention and early cancer detection to combat the trend.

Conclusions

Population growth and ageing in Hong Kong

resulted in a marked increase in the number of cancer cases in the past decades, whereas the overall age-standardised incidence rates of cancers have decreased in the same period. The numbers of cancer cases are projected to continue to increase from 2018 to 2032. Thus, primary prevention by promoting healthier lifestyles and earlier cancer detection is recommended. The surge in overall numbers of cases is expected to stress out our healthcare system. More study is warranted for the cohort/generational effects on breast, endometrial, and thyroid cancers in women and prostate cancer in men. We recommend increase in resources and collaboration between disciplines and healthcare sectors to enhance surveillance and monitoring of cancer disease trends. We also need to adjust our cancer treatment care and surveillance in view of increasing demand from older people.

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Disclosure

The results of this research have been previously published in:

1. Wong IOL, Lam YT, Lam KF, Cowling BJ, Leung GM. Demographic and epidemiological contributions to recent trends in cancer incidence in Hong Kong. Cancers (Basel) 2021;13:5727.

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